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Ready Reference

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How to use the MICROPAEDIA

The 12 volumes of the MICROPAEDIA contain tens of thousands of shorter articles on specific persons, places, things, and ideas, arranged in alphabetical order. The MICROPAEDIA can be used as an information resource on its own; and it can function as support for the longer articles in the MACROPAEDIA (to which it refers whenever appropriate). The MICROPAEDIA in turn is supported by references in the INDEX and by the lists of suggested readings in the PROPAEDIA. Finally, the MICROPAEDIA is the portion of the *Encyclopædia Britannica* best suited for the reader who wishes to browse among the countless subjects in all fields of human learning and history in all times and places.

Alphabetization

Entry titles are alphabetized according to the English alphabet, A to Z. All diacritical marks (such as in ö, ł, or ñ) and foreign letters without parallels in English (such as ayin [ʿ] and hamza [ʾ]) are ignored in the alphabetization. Apostrophes likewise are ignored. Titles beginning with numbers, such as **1812, War of**, are alphabetized as if the numbers were written out (**Eighteen-twelve, War of**).

Alphabetization proceeds according to the "word-by-word" principle. Thus, **Mount Vernon** precedes **mountain**; any **John** entry precedes **John Henry**, which in turn precedes **Johne's disease**. Any character or string of characters preceding a space, hyphen, or dash is treated as a word and alphabetized accordingly. Thus, **De Broglie** precedes **debenture**, and **jack-o'-lantern** precedes **jackal**. Titles with identical spellings are arranged in the following order: (1) persons, (2) places, (3) things.

For many rulers and titled nobility, chronological order, as well as alphabetical order, governs placement. Rulers of the same given name (*e.g.*, William) may be grouped together, separate from other entries, and indicated by the symbol •. They may be subgrouped alphabetically by country and, within each country, arranged chronologically (**William I, William II**, etc.). Nobility or peers of the same titled name (*e.g.*, **Essex, EARLS OF**) are similarly grouped together, separate from other entries; they are indicated by the symbol • and arranged chronologically.

Places with identical names are arranged in the alphabetical order of the countries where they are located. Identical place-names in the same country are alphabetized according to the alphabetical order of the state, province, or other political subdivision where they are found.

Entry arrangement

The titles of entries are arranged according to the forms commonly found in indexes and dictionaries, with some special conventions.

Entry titles for certain physical features, institutions, structures, events, and concepts are ordinarily inverted to place the substantive word first. Thus, the Bay of Bengal is entered as **Bengal, Bay of**; the Bank of England as **England, Bank of**; the Tower of London as **London, Tower of**; the Siege of Vienna as **Vienna, Siege of**; and the balance of power as **power, balance of**. If the name of a physical feature, institution, structure, event, or concept has two or more descriptors, it is entered under the descriptor appearing first. Thus, the Episcopal Church in Scotland is entered as **Episcopal Church in Scotland** (not **Scotland, Episcopal Church in**); the Leaning Tower of Pisa as **Leaning Tower of Pisa**; and the kinetic theory of gases as **kinetic theory of gases**.

The entries for most Western persons are arranged so that one can read a name in correct order by beginning after the first comma, proceeding to the end of the boldface type, returning to the beginning word or words, and proceeding forward to the first comma. Thus, the entry **March, Patrick Dunbar, 2nd Earl of**, is read "Patrick Dunbar, 2nd Earl of March"; the entry **Orléans, Louis, duc d'**, is read "Louis, duc d'Orléans." Names of Far Eastern origin are given in Oriental order, with the surname preceding the personal name (*e.g.*, **Tōjō Hideki, Deng Xiaoping, Nguyen Cao Ky**).

Cross-references

Some cross-reference entries appear in the MICROPAEDIA for the purpose of leading a reader from names that are familiar to alternate names that may not be. Cross-references also appear frequently within or at the ends of standard entries, where they are identified by *see, see also, see under, q.v.* (*quod vide,* "which see"), or *qq.v.* (*quae vide,* "which see," plural).

Certain entries serve both as relatively brief essays on general subjects and as cross-references to the same subjects treated at greater length and in greater depth in the MACROPAEDIA. Such an entry (*e.g.*, **igneous rock**) begins with a definition of the subject and then provides the following cross-reference: "A brief treatment of igneous rocks follows. For full treatment, *see* MACROPAEDIA: Minerals and Rocks.

Entries on certain broad subjects (*e.g.*, **music**) direct the reader to several relevant articles in the MACROPAEDIA and also to the PROPAEDIA for listings of related articles in the MICROPAEDIA.

Abbreviations

Abbreviations used in the MICROPAEDIA are given in a list that appears at the end of every MICROPAEDIA volume.

Territorial boundaries

In articles and maps indicating disputed geopolitical boundaries and territories, the attribution of sovereignty or administrative subordination to any specific area does not imply recognition of the status claimed by an administering power.

Freon (trademark), any of a group of aliphatic organic compounds containing the elements carbon and fluorine and, in many cases, other halogens (especially chlorine) and hydrogen. The name Freon is a trademark registered by the E.I. du Pont de Nemours & Company.

The Freons are colourless, odourless, nonflammable, noncorrosive gases or liquids of low toxicity introduced as refrigerants in the 1930s; they have also proved useful as propellants for aerosols and in numerous technical applications. Their low boiling points, low surface tension, and low viscosity make them especially useful refrigerants. The presence of fluorine atoms in Freon molecules makes them extremely stable, inert compounds that are entirely harmless to humans. The Freons neither present a fire hazard nor give off a detectable odour in their circulation through refrigerating and air-conditioning systems. The most important members of the group have been dichlorodifluoromethane (Freon 12), trichlorofluoromethane (Freon 11), chlorodifluoromethane (Freon 22), dichlorotetrafluoroethane (Freon 114), and trichlorotrifluoroethane (Freon 113). In the mid-1970s it was suggested that halogenated organic propellants were, by chemical reaction, destroying the ozone present in the stratosphere. Depletion of the ozone could create a threat to animal life on the Earth because ozone absorbs ultraviolet radiation that can induce skin cancer.

frequency, in physics, number of waves that pass a fixed point in unit time; also the number of cycles or vibrations undergone during one unit of time by a body in periodic motion. A body in periodic motion (*q.v.*) is said to have undergone one cycle or one vibration after passing through a series of events or positions and returning to its original state. *See also* angular velocity; simple harmonic motion.

If the period, or time interval, required to complete one cycle or vibration is ½ second, the frequency is 2 per second; if the period is 1/100 of an hour, the frequency is 100 per hour. In general, the frequency is the reciprocal of the period, or time interval—*i.e.*, frequency = 1/period = 1/(time interval). The frequency with which the Moon revolves about the Earth is slightly more than 12 cycles per year; the frequency of the A string of a violin is 440 vibrations or cycles per second.

The symbols most often used for frequency are *f* and the Greek letters nu (*ν*) and omega (*ω*). Nu is used more often when specifying electromagnetic waves, such as light, X-rays, and gamma rays; omega is mostly used by electrical engineers in referring to alternating current. Usually frequency is expressed in the hertz unit, named in honour of the 19th-century German physicist Heinrich Rudolf Hertz, one hertz being equal to one cycle per second, abbreviated Hz; one kilohertz (kHz) is 1,000 Hz, and one megahertz (mHz) is 1,000,000 Hz.

In spectroscopy another unit of frequency, the wave number (*q.v.*), is sometimes used.

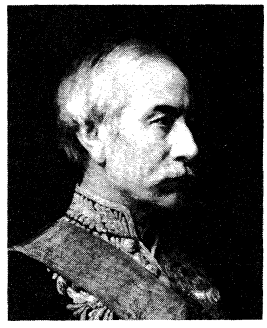
frequency meter, device for measuring the repetitions per unit of time (customarily, a second) of a complete electromagnetic waveform. Various types of frequency meters are used. Many are instruments of the deflection type, ordinarily used for measuring low frequencies but capable of being used for frequencies as high as 900 Hz. These operate by balancing two opposing forces. Changes in the frequency to be measured cause a change in this balance that can be measured by the deflection of a pointer on a scale. Deflection-type meters are of two types, electrically resonant circuits and ratiometers.

An example of a simple electrically resonant circuit is a moving-coil meter. In one version, this device possesses two coils tuned to different frequencies and connected at right angles to one another in such a way that the whole element, with attached pointer, can move. Frequencies in the middle of the meter's range cause the currents in the two coils to be approximately equal and the pointer to indicate the midpoint of a scale. Changes in frequency cause an imbalance in the currents in the two coils, causing them and, in turn, the pointer to move.

Another type of frequency meter, not of the deflection type, is the resonant-reed type, ordinarily used in ranges from 10 to 1,000 Hz, although special designs can operate at lower or higher frequencies. These work by means of specially tuned steel reeds that vibrate under the effect of electric current; only those reeds that are in resonance vibrate visibly, however.

frequency modulation (FM), variation of the frequency of a carrier wave in accordance with the characteristics of a signal. *See* modulation.

Frere, Sir (Henry) Bartle (Edward), 1ST BARONET (b. March 29, 1815, Brecknockshire, Wales—d. May 29, 1884, Wimbledon, Surrey, Eng.), British colonial administrator



Sir Bartle Frere, detail of an oil painting by Sir George Reid, 1881; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

in India and finally in South Africa, where his administration as high commissioner became highly controversial.

After graduation from college at Haileybury in 1834, Frere began his long career in the Indian civil service. He became chief commissioner of Sind in 1850, and during his nine years in that post he did much to foster the economic development of the region. During the great Indian Mutiny of 1857 the Sind remained relatively quiet, enabling Frere to send troop reinforcements to the neighbouring Punjab. These successes led to knighthood and a place on the viceroy's council at Calcutta (1859–62) for Frere.

After serving as governor of Bombay for five years, he returned to England as a member of the India Council (1867–77), in which posts he concerned himself with the development of India's agriculture and communications and with educational improvements. He was created a baronet in 1876.

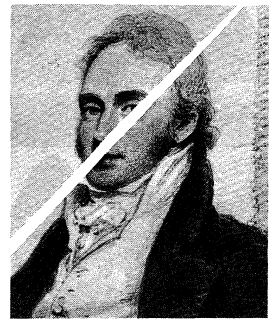
Lord Carnarvon, the British colonial secretary, sent Frere to the Cape Colony as governor and high commissioner in 1877 in order to carry out the planned confederation of British South Africa and the Boer republics. When he landed at Cape Town, Frere found that events were conspiring against his mission. There were Zulu uprisings, the colonists were unsympathetic to federation, and the Transvaal Boers were growing rebellious after the annexation of the Transvaal by the British shortly before his arrival. Accustomed to ruling Asians, Frere's policies were precipitate. He regarded the spear-wielding Zulu tribes as a standing menace whose elimination would enhance the prospects for federation. Thus, he provoked a war with them by an ultimatum in December 1878. The initial disaster to British arms at Isandhlwana was his undoing. After sharp political debates, in and out of Parliament, Frere was officially censured and eventually recalled in July 1880.

Frere, John (b. Aug. 10, 1740, Roydon Hall, near Diss, Norfolk, Eng.—d. July 12, 1807, East Dereham, Norfolk), British antiquary and a founder of prehistoric archaeology.

Frere was a country squire, and, from 1771, he was also an active member of the Royal Society of Antiquaries. In 1790 he discovered Stone Age flint implements among some fossilized bones of extinct animals at Hoxne, near Diss. Anticipating later archaeological methods, Frere carefully noted and described the strata uncovered. Though fettered by the then-popular belief that the Earth had been created in 4004 BC, in reporting his findings (1797) Frere nevertheless suggested that the remains may have dated from a time considerably earlier than 4004. His report was politely received but had to wait some 60 years to be appreciated.

Frere, John Hookham, pseudonym WILLIAM AND ROBERT WHISTLECRAFT (b. May 21, 1769, London—d. Jan. 7, 1846, Valletta, Malta), British diplomat and man of letters.

Frere was educated at Eton, where he met the future statesman George Canning (with whom he collaborated on *The Anti-Jacobin*), and at Cambridge University. He entered the Foreign Office, in 1799 becoming undersecretary of state for foreign affairs and in 1800 going to Portugal as envoy extraordinary. His diplomatic career ended disastrously in 1808, when he was blamed for endangering the British Army by advising its commander, Sir John Moore, against retreat from the French



John Hookham Frere, detail of a pencil drawing by Henry Edridge; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

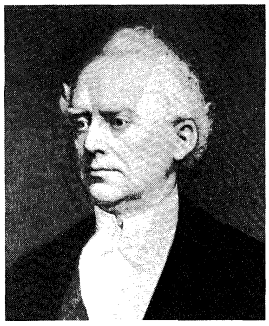
to La Coruña, Spain. Recalled, he spent the rest of his life in retirement, after 1820, in Malta.

Frere is remembered for witty parodies in *The Anti-Jacobin* (1797–98), a weekly that opposed revolution in England and abroad; for his brilliance as a translator; and for his experiments with metre. He reintroduced into English verse the Italian ottava rima, an eight-line stanza with a skillfully interwoven rhyme scheme, which he used effectively in his mock-heroic Arthurian epic *The Monks and the Giants* (1817–18). He also showed mastery of metre in his translations of four plays by Aristophanes, greatest of the Greek comic dramatists.

Frère-Orban, Hubert Joseph Walther (b. April 22, 1812, Liège, French Empire—d. Jan. 1, 1896, Brussels), Belgian statesman and Liberal Party reformer who was twice prime minister (1868–70 and 1878–84).

A strong advocate of free trade, Frère-Orban played a prominent part in the Liberal movement while practicing law in Liège. He was sent in 1847 to the Chamber of Representatives as a member from that city. From 1847 to 1894 he served as the leading Liberal member of the lower house in addition to holding many ministerial posts. As minister of finance (1848–52), he founded the Banque

Nationale, abolished the newspaper tax, reduced the postage, and modified the customs duties as a preliminary to a decided free-trade policy.



Frère-Orban, detail of an oil painting by Louis Gallait, 1880; in the Banque Nationale, Brussels

© A.C.L., Brussels

To facilitate negotiations for a new commercial treaty, he conceded to France a law of copyright, which proved highly unpopular in Belgium. He resigned and the rest of the Cabinet soon followed him. Finance minister again in 1857, he embodied his free-trade principles in commercial treaties with Great Britain and France and abolished the *octroi* duties (local import taxes) and tolls on national roads. Becoming prime minister in 1868, he defeated a French attempt to gain control of the Luxembourg railways (1869). In his second term, he provoked the bitter opposition of Belgium's Catholic party by establishing secular primary education (1879) and by breaking off diplomatic relations with the Vatican (1880). Although Frère-Orban grudgingly conceded an extension of the franchise (1883), the hostility of the Radicals and the discontent caused by a financial crisis resulted in the overthrow of his government in the elections of 1884. He continued to lead the Liberal opposition until 1894.

Frerichs, Friedrich Theodor von (b. March 24, 1819, Aurich, Hanover—d. March 14, 1885, Berlin), German founder of experimental pathology whose emphasis on the teaching of physiology and medical biochemistry helped give clinical medicine a scientific foundation.

Frerichs, c. 1880

Archiv fur Kunst und Geschichte, Berlin

Frerichs worked at the University of Breslau (1851–59) and then directed the Charité Hospital at the University of Berlin (1859–85). A leading exponent of clinical medicine supported by exacting laboratory analyses and experiments, he decisively influenced the development of his students, one of whom was Paul Ehrlich, a co-recipient of the 1908 Nobel Prize for Physiology or Medicine for work in immunity. Frerichs' investigations into the general biochemistry of diseased organisms led to improvements in the diagnosis and treatment of diabetes and liver diseases.

Fréron, Louis(-Marie-Stanislas) (b. Aug. 17, 1754, Paris—d. July 15, 1802, Santo Domingo, Hispaniola), journalist of the French Revolution and leader of the *jeunesse dorée* ("gilded youth") who terrorized Jacobins (radical democrats) during the Thermidorian reaction that followed the collapse of the Jacobin regime of 1793–94.

His father, Élie-Catherine Fréron, was the editor of *L'Année Littéraire* ("The Literary Year"), which combatted the ideas of Voltaire and other Philosophes. Louis took over the management of the journal upon his father's death in 1776, and, soon after the outbreak of the Revolution in 1789, he founded the newspaper *L'Orateur du Peuple* ("The Spokesman of the People"), which violently attacked the new system of constitutional monarchy.

Louis Fréron

By courtesy of the Bibliotheque Nationale, Paris

After King Louis XVI's abortive flight from Paris in June 1791, Fréron called for the King's execution. Threatened with arrest, Fréron went into hiding until the monarchy was overthrown on Aug. 10, 1792. He sat with the Montagnards (deputies from the Jacobin Club) in the revolutionary National Convention, which convened in September 1792, and in March 1793 he was sent to suppress counterrevolutionary activity at Marseille and Toulon. In both cities, Fréron ordered mass executions of hundreds of captured insurgents. As a result, Robespierre, chief spokesman for the Jacobin regime, had Fréron recalled in March 1794. Fearing that Robespierre intended to order his execution, Fréron became one of the most active participants in the conspiracy that brought about Robespierre's downfall on 9 Thermidor (July 27, 1794). In the ensuing Thermidorian reaction, Fréron vigorously denounced the Jacobins in *L'Orateur du Peuple* and organized the gangs of fashionably dressed jeunesse dorée who assaulted Jacobin workmen in the streets. He led the raid on the Parisian Jacobin Club that gave the government an excuse to order the club closed in November 1794. In November 1801, two years after Napoleon Bonaparte came to power, Fréron was appointed subprefect of Santo Domingo.

Consult the INDEX *first*

fresco painting, method of painting on freshly applied, wet lime-plaster walls with colours made by grinding artists' dry-powder pigments in pure water. The colours dry and set with the plaster to become a permanent part of the wall.

Buon', or "true," fresco is the most durable technique, others such as fresco secco being somewhat more superficial. Fresco painting is

Early Renaissance Italian artists painting a fresco and grinding pigments, detail of a print attributed to Maso Finiguerra, mid-15th century; in the British Museum

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

ideal for making murals because it lends itself to a monumental style, is durable, and has a mat surface.

Frescobaldi FAMILY, family of Florence, medieval bankers prominent in Florentine business and politics, who financed the wars of Edward I and II of England.

Important in Florentine public affairs from the 12th century, the Frescobaldi belonged to the wealthy "magnate" class, occupying a street in Florence that still bears their name. In the 1290s the family split into Whites and Blacks, representing Florentine factions that became allied with the Ghibelline (imperial) and Guelf parties. By the early 14th century, only the White (Ghibelline) Frescobaldi remained. The family's conservatism virtually excluded it from government office from 1285 to 1433.

Opening a branch in England in the 1270s, in two decades the Frescobaldi firm rose to the position of royal bankers, formerly occupied by the Riccardi company of Lucca, which had been driven into bankruptcy by loans for Edward I's wars in Wales and France. Between 1302 and 1310, the Frescobaldi loaned £150,000 to Edward I and II. In return they were given virtual control of the revenues of England, including the mint and the customs, and were granted lands, honours, and privileges. In 1310 Edward II's barons, jealous of the Italians' power, drew up ordinances forbidding the assignment of customs to foreigners and calling for the arrest of foreign merchants and seizure of their goods. Before the ordinances could be implemented, the Frescobaldi fled to the Continent, taking refuge at Avignon and then at Florence.

Active participants in the unsuccessful revolt of Florentine magnates in 1343, the Frescobaldi were excluded from the democratic government when it was reinstated.

The family included several literary figures, among them the poet Dino Frescobaldi (died *c.* 1316) and Leonardo Frescobaldi, who visited Egypt and the Holy Land in 1384 and left an account of value to historians of the social and economic life of the countries he visited.

Frescobaldi, Girolamo (b. September 1583, Ferrara, Papal States—d. March 1, 1643, Rome), Italian organist and one of the

first great masters of organ composition. He strongly influenced the German Baroque school through the work of his pupils, J.J. Froberger and Franz Tunder. Frescobaldi began his public career as organist at the church of Sta. Maria in Trastevere in Rome, in 1607. He travelled to the Netherlands the same year and published his first work, a book of madrigals, in Antwerp. In 1608 he became organist at St. Peter's in Rome, and, except for the period when he was court organist at Florence (1628–34), he remained at St. Peter's until his death.

Frescobaldi's fame rests on his instrumental works. Among these, keyboard compositions predominate, but the canzone for unspecified instruments with basso continuo are of outstanding historical significance in the development of the trio sonata. They are of a transitional type that led to the fully developed trio sonata, which was the principal chamber music medium until it was displaced by the string quartet.

In 1608 Frescobaldi published 12 fantasias in open score that are notable for their variety and for contrapuntal mastery of the highest order. The textures are idiomatic in a way rarely found in earlier examples of the form. In 1624 he published, again in open score, a collection of 10 ricercari, 5 canzoni, and 11 capriccios. The composer's preface contains valuable information about performance: "Should the player find it tedious to play a piece right through he may choose such sections as he pleases, provided only that he ends in the main key. . . . The opening passages should be played slowly so that what follows may appear more animated. The player should broaden the tempo at cadences. . . ."

Much of Frescobaldi's keyboard music was intended for the harpsichord, as is made clear in the title of his *Toccate d'intavolature di cimbalo e organo* (1637). The volume includes also partitas on various melodies and pieces on ground basses. These show Frescobaldi's free inventiveness in genuine keyboard textures and figuration. The preface of another collection, first published in 1627, again gives information of great value to the interpretation of Baroque instrumental music: "Play the opening of a toccata slowly and arpeggiando. . . . If one hand has a trill, while the other plays a passage, do not play note against note, but play the trill rapidly and the other expressively." Such directions indicate the extent to which keyboard style had moved

Girolamo Frescobaldi, engraving by Christian Sas, *c.* 1619

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

away from its origin in transcriptions of vocal or instrumental compositions. Frescobaldi's remaining publication, the *Fiori musicali* of 1635, consists of organ music intended for liturgical use.

Frescobaldi's style is characterized by a dramatic inventiveness and a bold use of chromaticism, but these qualities were carefully subordinated to a logical, effective construction within the piece. He was one of the first to develop the modern principle of monothematic writing, which replaced the rapid presentation of a number of themes typical of the early ricercar and canzone.

Fresenius, Carl Remigius (b. Dec. 28, 1818, Frankfurt am Main—d. June 11, 1897, Wiesbaden, Prussia), German analytical chemist whose textbooks on qualitative analysis (1841) and quantitative analysis (1846) became standard works. They passed through many editions and were widely translated.

Apprenticed to an apothecary (1836), he became an assistant to Justus von Liebig at the University of Giessen (1841) and a privatdocent (1843). From 1845 he was active

Fresenius, engraving after a photograph

Bavaria-Verlag

in scientific and technological education and research at Wiesbaden. Many of his papers appeared in the *Zeitschrift für Analytische Chemie* ("Journal of Analytical Chemistry"), which he founded (1862) and edited until his death.

Freshfield, Douglas William (b. April 27, 1845, London—d. Feb. 9, 1934, Forest Row, Sussex, Eng.), British mountaineer, explorer, geographer, and author who advocated the recognition of geography as an independent discipline in English universities (from 1884).

On an expedition to the central Caucasus Mountains (1868), Freshfield made the first ascent of Mt. Elbrus (18,510 feet), the highest peak in Europe (including the present Soviet Union west of the Ural Mountains). Later, he failed in attempts to climb the Himalayan mountain Kāngchenjunga (1899; 28,208 feet) and the Ruwenzori Range in Central Africa (1905). Freshfield was secretary (1881–94) and president (1914–17) of the Royal Geographical Society and chairman of the Society of Authors (1908–09). Among his books are *Italian Alps* (1875), *The Exploration of the Caucasus* (1896), *Round Kangchenjunga* (1903), and two editions of *Murray's Guide to Switzerland.*

Freshwater, parish, South Wight district, county of Isle of Wight, England. It lies close to Alum Bay, notable for its many-coloured sandstone cliffs and for the Needles, a group of chalk sea stacks.

Farringford House at Freshwater was the home of Alfred, Lord Tennyson, who is commemorated by a tablet in All Saints' Church and by a large cross on High Down. Pop. (1971) 4,170.

freshwater duck: *see* dabbling duck.

freshwater jellyfish, any medusa, or free-swimming form, of the genus *Craspedacusta,* class Hydrozoa (phylum Cnidaria). *Craspedacusta* is not a true jellyfish; true jellyfish are exclusively marine in habit.

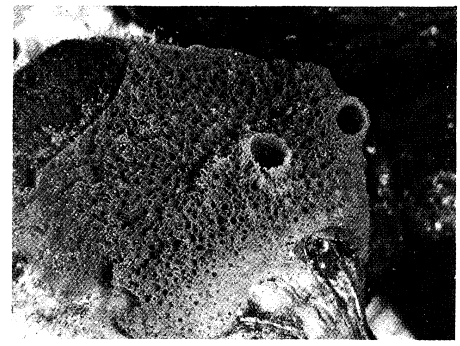
Craspedacusta sowerbyi, which is widespread in freshwaters of the Northern Hemisphere, grows to about 2 centimetres (0.8 inch) in diameter. Several hundred short tentacles extend, fringelike, from the margins of the animal's bell-shaped body.

The medusoid form alternates in generations with a polypoid form (cylindrical, stalklike, and permanently attached to a surface). The polyp, about 2 millimetres (0.08 inch) high, produces a medusoid form by budding; *i.e.,* an extension of the main body breaks away. The medusa is either male or female, rather than bisexual, and produces eggs or sperm. These unite to form a planula, a free-swimming larva, that settles onto a surface and develops into a polyp. The *Craspedacusta* polyp is notable for its lack of tentacles.

freshwater snail, any of the approximately 5,000 snail species that live in lakes, ponds, and streams. Most are members of the subclass Pulmonata; some are members of the subclass Prosobranchia; both subclasses belong to the class Gastropoda. The southeastern United States has the greatest number of species; another notable location is Lake Tanganyika, in Africa.

Freshwater snails are distributed via birds' feet, wind-blown leaves, and floods. Several species are hosts of flatworms causing disease in warm-blooded animals; *e.g.,* schistosomiasis. Large forms used to keep aquariums clean include the amphibious snail *Ampullarius gigas.*

freshwater sponge, any of about 20 species of the genus *Spongilla* (class Demospongiae, siliceous sponges), a common, widely occurring group. *Spongilla* species are found in clean lake waters and slow streams.



Freshwater sponge (*Spongilla*)

Larry West—The National Audubon Society Collection/Photo Researchers

Freshwater sponges are delicate in structure, growing as encrusting or branching masses. They usually appear greenish because of the algae that live on them. Freshwater sponges may attain a volume of more than 2,500 cubic centimetres (150 cubic inches). The larva of the spongillafly lives as a parasite on freshwater sponges.

Fresnay, Pierre, original name PIERRE-JULES-LOUIS LAUDENBACH (b. April 4, 1897, Paris—d. Jan. 9, 1975, Paris), versatile French actor who abandoned a career with the Comédie-Française for the challenge of the cinema. Groomed for the stage by his uncle, the actor Claude Garry, Fresnay made his first stage appearance in 1912 before entering the Paris Conservatory.

Admitted to the Comédie-Française as a pensionnaire (contract player) in 1915, he played 80 roles there, making a particular impression in the plays of Alfred de Musset, and became a sociétaire (life member) four years before he resigned in 1927. During the next 10 years he worked in England and the United States as well as in France. He was outstanding in the title roles in *Cyrano de Bergerac* (1928) and *Don Juan* (London, 1934). In London and New York City Fresnay made his English-language debut in Noël Coward's *Conversation Piece* (1934) opposite his wife, the actress Yvonne Printemps. Subsequently, the

couple became managers of the Théâtre de la Michodière in Paris (1937).

Although he made several silent films, his reputation as a cinema actor was established with his portrayal of Marius in the screen adaptations of Marcel Pagnol's trilogy: *Marius* (1931), *Fanny* (1932), and *César* (1936). His appearance as the young French officer opposite Erich von Stroheim in Jean Renoir's *La Grande Illusion* (1937; *Grand Illusion*) was a high point in his film career, although his principal honours came for later works: the Venice Biennial Prize (1947) for *Monsieur Vincent* and awards for *Dieu à besoin des hommes* (1950; *God Needs Men*).

Fresnel, Augustin-Jean (b. May 10, 1788, Broglie, Fr.—d. July 14, 1827, Ville-d'Avray), French physicist who pioneered in optics and did much to establish the wave theory of light advanced by Thomas Young.

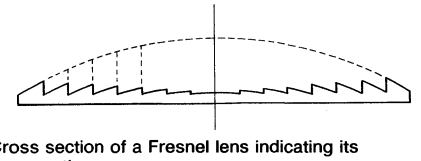
Fresnel, detail of an engraving by Ambroise Tardieu after a contemporary portrait, 1825

H. Roger-Viollet

Fresnel served as an engineer in various departments of France but lost his post temporarily during the period following Napoleon's return from Elba (1814). About that time he seems to have begun his researches in optics. He studied the aberration of light, created various devices for producing interference fringes, and, by applying mathematical analysis to his work, removed a number of objections to the wave theory.

With François Arago he studied the laws of the interference of polarized light. He obtained circularly polarized light and developed the use of compound lenses instead of mirrors for lighthouses. Although his work in optics received scant public recognition during his lifetime, Fresnel maintained that not even acclaim from distinguished colleagues could compare with the pleasure of discovering a theoretical truth or confirming a calculation experimentally.

Fresnel lens, succession of concentric rings, each consisting of an element of a simple lens, assembled in proper relationship on a flat surface to provide a short focal length (*see* illustration). The Fresnel lens is used particularly in lighthouses and searchlights to concentrate the light into a relatively narrow beam. It would be almost impossible to make a large lighthouse lens of the usual solid glass-disk type because the thickness and weight would be prohibitive; the lighter Fresnel lens is constructed of elements that are separately ground and polished from suitable glass blanks and assembled to make up the complete lens.



Cross section of a Fresnel lens indicating its construction

A one-piece molded-glass Fresnel lens is convenient for spotlights, floodlights, railroad and traffic signals, and decorative lights in buildings. Cylindrical Fresnel lenses are used in shipboard lanterns to increase visibility.

A wide variety of thin Fresnel lenses are molded in plastic, the width of the rings being only a few thousandths of an inch, for use as field lenses with ground-glass screens in cameras and small projectors to increase the brightness of the outer parts of the screen.

Georges-Louis Leclerc de Buffon (1748) originated the idea of dividing a lens surface into concentric rings in order to reduce the weight significantly. In 1820 this idea was adopted by Augustin-Jean Fresnel in the construction of lighthouse lenses.

Fresnillo, in full FRESNILLO DE GONZÁLEZ ECHEVERRÍA, city, central Zacatecas state, north central Mexico. It lies on an interior plateau more than 7,000 ft (2,100 m) above sea level and northwest of Zacatecas city, the state capital. It was founded in 1554 and has been an important silver-mining centre since 1569. Limited quantities of gold, copper, lead, and zinc are also produced. Irrigation has increased grain and vegetable production in the area; the livestock industry dates from the colonial period. The city is accessible by highway and air and is near a major rail line. Pop. (1980) 132,365.

Fresno, city, seat (1874) of Fresno County, central California, U.S., in the San Joaquin Valley. Settled in 1872 as a station on the Central (later Southern) Pacific Railroad, it became an agricultural community after the introduction of irrigation in the 1880s. It processes and markets cotton, grain, fruits, wines, sugar beets, and dairy products and is the site of the huge Sun Maid Raisin processing plant. Fresno (Spanish: "Ash Tree") is headquarters of the Sierra National Forest and is a gateway to resort areas of the Sierra Nevadas. It is the home of California State University, Fresno (1911), and Fresno City College (1910). Inc. 1885. Pop. (1980) city, 218,202; metropolitan area (SMSA), 515,013.

fret, also called KEY PATTERN, in decorative art and architecture, any one of several types of running or repeated ornament, consisting of lengths of straight lines or narrow bands,

Mosaic fret in S. Apollinare Nuovo, Ravenna, 6th century

Alinari—Art Resource/EB Inc.

usually connected and at right angles to each other in T, L, or square-cornered G shapes, so arranged that the spaces between the lines or bands are approximately equal to the width of the bands. Occasionally the system is arranged so that the lines intersect or interlace, as in the common swastika fret. Because the fret is one of the simplest and most natural of decorative forms, it is one of the most widely spread, found from early times in most art forms and on all continents. Thus, it was a favourite decoration, during and after the 4th dynasty, for the ceilings of tombs in Egypt, where in later examples it was combined with rosettes, scarabs, and the lotus into patterns of great richness.

In America the design has been found in early Peruvian textiles, on extant sculpture and architecture of the Mayan and Aztec cultures in Meso-America, and as a universal pottery decoration among American Indians. Highly developed by both the Chinese and the Japanese for textiles as well as for architectural ornament, the fret occurs not only as a band but also as a complicated allover pattern, sometimes with acute and obtuse angles instead of the more usual right angles. Its most important development, however, came at the hands of the Greeks (hence the common name Greek fret or Greek key), who used it for pottery and for painted decoration of architectural members, such as the abaci of capitals, where it was later carved.

Like so many Greek motifs, the fret was widely used by the Romans, particularly in Syria (*e.g.,* the propylaea at Damascus and the great temple at Baalbek), and it occurs in Byzantine and Romanesque work.

Fretwork, either painted or carved, is the most often used of any small-scale repeated ornament in which geometrical forms occur.

Freud, Anna (b. Dec. 3, 1895, Vienna—d. Oct. 9, 1982, London), Austrian-born British founder of child psychoanalysis and one of its foremost practitioners. She also made fundamental contributions to understanding how the ego, or consciousness, functions in averting painful ideas, impulses, and feelings.

Anna Freud, *c.* 1970

Archiv fur Kunst und Geschichte, West Berlin

The youngest daughter of Sigmund Freud, Anna was devoted to her father and enjoyed an intimate association with developing psychoanalytic theory and practice. As a young woman she taught elementary school, and her daily observation of children drew her to child psychology. While serving as chairman of the Vienna Psycho-Analytic Society (1925–28), she published a paper (1927) outlining her approach to child psychoanalysis.

Publication of Anna Freud's *Das Ich und die Abwehrmechanismen* (1936; *The Ego and Mechanisms of Defense,* 1937) gave a strong, new impetus to ego psychology. The principal human defense mechanism, she indicated, is repression, an unconscious process that develops as the young child learns that some impulses, if acted upon, could prove dangerous to himself. Other mechanisms she described include the projection of one's own feeling into another; directing aggressive impulses against the self (suicide being the extreme example); identification with an overpowering aggressor; and the divorce of ideas from feelings. The work also was a pioneer effort in the development of adolescent psychology.

In 1938 Anna Freud and her father, whom she had cared for during a number of years of his terminal illness, escaped from Nazi-dominated Austria and settled in London, where she worked at a Hampstead nursery until 1945. During World War II she and a U.S. associate, Dorothy Burlingham, recounted their work in *Young Children in Wartime* (1942), *Infants Without Families* (1943), and *War and Children* (1943).

Anna Freud founded the Hampstead Child

Therapy Course and Clinic, London, in 1947 and served as its director from 1952 to 1982. She viewed play as the child's adaptation to reality but not necessarily as revealing unconscious conflicts. She worked closely with parents and believed that analysis should have an educational influence on the child. A summation of her thought is to be found in her *Normality and Pathology in Childhood* (1968).

Freud, Sigmund (b. May 6, 1856, Freiberg, Moravia, Austrian Empire [now Příbor, Czech.]—d. Sept. 23, 1939, London), Austrian neurologist, founder of psychoanalysis. Freudian theory had a great effect on psychology, psychiatry, and other fields.

A brief account of the life and works of Sigmund Freud follows; for a full biography, *see* MACROPAEDIA: Freud.

Freud entered the University of Vienna in 1873 as a medical student and the General Hospital of Vienna in 1882. In 1885 he went to Paris to study with the neurologist Jean-Martin Charcot, which proved a turning point in his career. Charcot's work with patients classified as hysterics introduced Freud to the possibility that mental disorders might be caused by purely psychological factors rather than by organic brain disease.

Upon his return to Vienna he entered into a fruitful partnership with the physician Josef Breuer. They collaborated on *Studien über Hysterie* (1895; *Studies in Hysteria*), which contains a presentation of Freud's pioneering psychoanalytic method of free association. It was this method that allowed Freud to arrive at numerous new insights; he developed theories concerning the deeper layers of the mind, the unconscious; he arrived at an understanding of neuroses; and in 1899 he published *Die Traumdeutung* (*The Interpretation of Dreams*), in which he analyzed the highly complex symbolic processes underlying dream formation. In 1905 appeared his controversial study *Drei Abhandlungen zur Sexualtheorie* (*Three Essays on the Theory of Sexuality*), in which he presented his discoveries concerning infantile sexuality and in which he delineated the complicated stages of psychosexual development, including the formation of the Oedipus complex.

Freud also applied his psychoanalytic insights to mythological, anthropological, cultural, and religious phenomena. Among his most noted works in this vein are *Totem und Tabu* (1913; *Totem and Taboo*) and *Das Unbehagen in der Kultur* (1930; *Civilization and Its Discontents*).

Freudenstadt, city, Baden-Württemberg *Land* (state), southwestern Germany, in the Schwarzwald (Black Forest). Founded in 1599 as a refuge for Protestants from Salzburg, Freudenstadt ("Town of Joy") was severely damaged by fire during World War II. The central city, including the Renaissance arcades in the marketplace and the Evangelical church (1601–08), was rebuilt in its original form. The town is a winter sports centre and one of the most frequented resorts in the Black Forest. Its spa has been reconstructed with modern facilities. Pop. (1989 est.) 21,355.

Freudenthal, Axel Olof (b. Dec. 12, 1836, Sjundeå, Fin.—d. June 2, 1911), philologist, Swedish nationalist, and the leading ideologist for the nationalist movement of Finland's Swedish minority in the 19th century.

An adherent of the Pan-Scandinavian movement while still a student in the 1850s, Freudenthal was strongly influenced by one of the leaders of the movement, August Sohlman, a Swedish journalist who had written a racist defense of Finland's dominant Swedish minority against the claims of the Finnish nationalist movement.

Basing his position largely on Sohlman's views, Freudenthal, after becoming professor of Swedish language and literature at the University of Helsinki (1878–1904), developed the notion that nationality is primarily determined by language and that, by forsaking Swedish for Finnish, the educated classes would therefore be destroying the Swedish nation in Finland. He further maintained that because Finland had advanced culturally under Swedish influence, the annihilation of the Swedish cultural element would mean general decline. The Svecoman (Swedish nationalist) movement that arose in the 1860s based itself on Freudenthal's ideology.

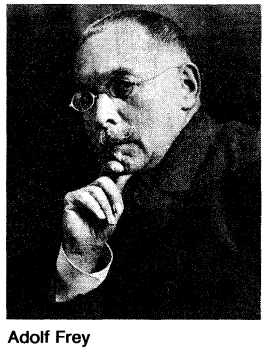
Freudian criticism, literary criticism that uses the psychoanalytic theory of Sigmund Freud to interpret a work in terms of the known psychological conflicts of its author or, conversely, to construct the author's psychic life from unconscious revelations in his work.

Freudian critics depart from the traditional scope of criticism in reconstructing an author's psychic life on the basis of his writings. Edmund Wilson's *Wound and the Bow* (1941) explored this realm, and Van Wyck Brooks used this approach to biography in works such as *The Ordeal of Mark Twain* (1920). Professional analysts have applied their techniques to literature, notably Ernest Jones in *Hamlet and Oedipus* (1910 and 1949), which traces the famous problem of Hamlet's irresolution back to Shakespeare's own Oedipal guilt.

Freundsberg, Georg von: *see* Frundsberg, Georg von.

Frey, Adolf (b. Feb. 18, 1855, Külligen, near Aarau, Switz.—d. Feb. 12, 1920, Zürich), Swiss novelist, poet, and literary historian whose most lasting achievements are his biographies of Swiss writers and his Swiss-German dialect poetry.

As a biographer Frey showed a predilection for rich character studies in the manner of the 19th-century Realists. Because he knew many writers and painters personally when he was a professor of German literature at Zürich (1898–1920), his portraits of them contain important personal material. Among these biographies are *Erinnerungen an G. Keller* (1892), *C.F. Meyer* (1899), *A. Böcklin* (1903), and *Der Tiermaler R. Koller* (1906). With his poetry, notably *Duss und underm Rafe* (1891), rooted in the style of the folk song, he helped inaugurate creative and stylistic developments in Swiss poetry. His historical novels, such as *Die Jungfer von Wattenwil* (1912), and his plays are considered to be of less importance.



Adolf Frey

By courtesy of the Bibliotheque Nationale Suisse, Bern

Frey, Roger (b. June 11, 1913, Nouméa, New Caledonia), French Gaullist politician, considered a brilliant administrator with a flair for reform.

Frey was reared in New Caledonia. When World War II broke out, he rallied to Charles de Gaulle in 1940 and served in the Italian, French, and German campaigns. In 1945–46 he served on a government mission to the Far East.

He was a key member (1947–52) of the Rassemblement du Peuple Français (RPF), which was the fledgling Gaullist party. Frey was a critical component of the movement in the Fourth Republic to restore de Gaulle to power. He managed, with consummate skill, to merge different and sometimes contentious pro-de Gaulle groups and fuse them into the Union pour la Nouvelle République (UNR). After serving as secretary-general of the UNR (1958–59) when de Gaulle came to power, Frey served in nearly every Cabinet under de Gaulle and his successor, Georges Pompidou. He was minister of information (1959), minister of the interior (1961–67), and minister of state (1967–72). Elected deputy successively from 1962 on, Frey left his seat in the National Assembly in 1974 to serve as president of the Constitutional Council (until 1983).

Frey-Wyssling, Albert F(riedrich) (b. Nov. 8, 1900, Küssnacht, Switz.), Swiss botanist and pioneer of submicroscopic morphology who helped to initiate the study later known as molecular biology.

He was educated at the Federal Institute of Technology, Zürich, at the University of Jena, and at the Sorbonne. From 1928 to 1932 he was a plant physiologist at Medan, Sumatra. He became a lecturer at the Federal Institute of Technology (1932), served as a professor in the department of botany and plant physiology (1938–70), and was also rector of the institution (1957–61).

In 1938 he began his studies in submicroscopic morphology, using polarizing microscopy and other optical techniques to obtain indirect evidence concerning submicroscopic structures. He held that the studies of the histologists (those who deal with structures discernible through the microscope) and of the physiological chemists, who study submicroscopic structures, would eventually be unified on the level of macromolecular chemistry. This subject, later known as molecular biology, became a practical reality with the application of the electron microscope in biological research (1940). Frey-Wyssling found that the basic concepts he evolved from his indirect methods were corroborated by the direct imaging of submicroscopic structures with the electron microscope. He wrote several books based on his submicroscopic studies.

Freyberg (of Wellington and of Munstead), Bernard Cyril Freyberg, 1st Baron, also called (from 1942) SIR BERNARD CYRIL FREYBERG (b. March 21, 1889, Richmond, Surrey, Eng.—d. July 4, 1963, Windsor, Berkshire), commander in chief of the New Zealand forces in World War II and governor-general of New Zealand from 1946 to 1952.

In 1891 Freyberg immigrated with his parents to New Zealand and was educated at Wellington College. He soldiered in the territorial army in New Zealand in 1911–12, and early in World War I he took part in the retreat from Antwerp and in the operations in Gallipoli. Later in France he fought in many of the fiercest battles and was awarded the Victoria Cross in December 1917. He was promoted to brigadier general at 27, then the youngest of that rank in the British Army. He commanded the 29th Division in 1917–18. Freyberg was nine times wounded, and his bravery became legendary.

Between the wars he held senior staff appointments and a command in England. In World War II, as major general, he commanded the New Zealand Expeditionary Force (1939–45) and commanded the Allied forces during the battle for control of Crete in 1941. Later in the war he fought in North Africa and in Italy under Montgomery and Alexander. In 1942 he received a knighthood. Freyberg in 1946 became governor-general of New Zealand, an appointment he held for six years. In 1951 he was created a baron.

Freycinet, Charles-Louis de Saulces de (b. Nov. 14, 1828, Foix, Fr.—d. May 15, 1923, Paris), French political figure who served in 12 different governments, including four terms as premier; he was primarily responsible for important military reforms instituted in the last decade of the 19th century.

Freycinet graduated from the École Polytechnique and entered government service as a mining engineer, eventually rising to the position of inspector general of mines in 1883. Upon the establishment of the French Republic in September 1870, during the Franco-German War, he offered his services to Léon Gambetta, who appointed him prefect of Tarnet-Garonne and, in October, chief of the military Cabinet of the provisional government of national defense at Tours. It was largely Freycinet's powers of organization that

Charles de Freycinet, photograph by Nadar (Gaspard-Felix Tournachon)
Archives Photographiques, Paris

enabled Gambetta to muster forces with which to oppose the advancing German armies. Freycinet's account of his experience, *La Guerre en Province pendant le siège de Paris, 1870–1871* ("The War in the Provinces During the Siege of Paris, 1870–71"), was published in 1871.

Freycinet was elected to the Senate in 1876. Joining Jules Dufaure's government as minister of public works the next year, he directed a policy—often called the Freycinet Plan—whereby the government purchased railroads and built extensive new railways and waterways. In December 1879 he became premier for the first of four terms, but the issue of state support for religious organizations soon brought about the fall of his Cabinet.

Freycinet headed a new government and simultaneously served as foreign minister in January–August 1882; this time it fell because of his decision to occupy the Isthmus of Suez. He was in and out of governments for the next 17 years; in 1887 he lost the presidential election to Sadi Carnot. In April 1888 he became the first civilian war minister since 1848. For the next five years, in five successive governments, including one of his own (1890–92), he directed an impressive reform of the Army, which included the introduction of three-year terms of service, the establishment of a general staff, and the creation of a supreme war council. In January 1893 he was forced to resign as war minister because of a financial scandal over the proposed construction of a Panama canal. He returned to the War Ministry briefly in 1899 and then served as minister without portfolio in 1915–16.

Freycinet became a member of the Académie Française in 1890. In addition to many technical and scientific works, he wrote his memoirs, *Souvenirs, 1848–1878* (1912).

Freycinet, Louis-Claude de Saulces de (b. Aug. 7, 1779, Montélimar, Fr.—d. Aug. 18, 1842, near Loriol, Fr.), French naval officer and cartographer who explored portions of Australia and islands in the Pacific Ocean.

In 1800 he joined Captain Nicolas Baudin on a voyage of exploration to southern and southwestern coastal Australia and Tasmania. After his return to Paris in 1804, he completed an account of this expedition, *Voyage de découvertes aux terres australes* (1807; "Voyage of Discovery to Southern Lands"), for which he also drew maps.

In 1817 he took command of *l'Uranie* to conduct magnetic and oceanographic researches in the Pacific. His wife, Rose, disguised as a sailor, was smuggled aboard and accompanied the voyage, which she described in a journal published in 1827. After a stop at Rio de Janeiro, *l'Uranie* rounded the Cape of Good Hope and visited Timor, north of Australia, and the Mariana and Hawaiian islands. Freycinet named Rose Island in the Samoa group for his wife.

On the return voyage from Sydney to France, via Cape Horn, *l'Uranie* was wrecked in the Falkland Islands, but the scientific data and specimens aboard were saved. Freycinet purchased an American whaler, renamed *la Physicienne,* and in it returned to France. Observations from the expedition were published in *Voyage autour du monde . . . sur les corvettes de S.M. "l'Uranie" et "la Physicienne,"* 13 vol. and four atlases (1824–44; "Voyage Around the World . . . in H.M. Corvettes *l'Uranie* and *la Physicienne*").

Freycinet Peninsula, peninsula extending south into the Tasman Sea from east-central Tasmania, Australia. Measuring about 14 miles (23 km) by 4 miles (6.5 km), with an area of 25 square miles (65 square km), it rises to a high point at Mount Freycinet (2,011 feet [613 m]), one of the peaks along a high central granite ridge known as the Hazards. The peninsula is joined to the mainland by twin sandspits. Off its southern tip lie the Schouten Passage and Island and, to the west, Oyster Bay. The promontory was surveyed in 1802 by the French captain Nicolas Baudin and was named after his lieutenant, Louis-Claude de Saulces de Freycinet. In 1916 part of the peninsula was made a national park, which is entered via the resort town of Coles Bay, 70 miles (115 km) northeast of Hobart.

Freyja (Old Norse: "Lady"), most renowned of the Norse goddesses, who was the sister and female counterpart of Freyr and was in charge of love, fertility, battle, and death. Her father was Njörd, the sea god. Pigs were sacred to her, and she rode a boar with golden bristles. A chariot drawn by cats was another of her vehicles. It was Freyja's privilege to choose one-half of the heroes slain in battle for her great hall in the Fólkvangar (the god Odin took the other half to Valhalla). She possessed a famous necklace called *Brísinga men,* which the trickster god Loki stole and Heimdall, the gods' watchman, recovered. Greedy and lascivious, Freyja was also credited with the evil act of teaching witchcraft to the Aesir (a tribe of gods). Like the Egyptian goddess Isis and the Greek Aphrodite, Freyja traveled through the world seeking a lost husband and weeping tears of gold. She was also known by four nicknames—Mardöll, Hörn, Gefn, and Syr.

Freyr, also spelled FREY, also called YNGVI, in Norse mythology, the ruler of peace and fertility, rain, and sunshine and the son of the sea god Njörd. Although originally one of the Vanir tribe, he was included with the Aesir. Gerd, daughter of the giant Gymir, was his wife. Worshiped especially in Sweden, he was also well-known in Norway and Iceland. His sister and female counterpart, Freyja, was goddess of love, fertility, battle, and death. The boar was sacred to both. Freyr and Freyja figure in many lays and stories of medieval Iceland.

Freyre, Gilberto de Mello, Freyre also spelled FREIRE (b. March 15, 1900, Recife, Braz.—d. July 18, 1987, Recife), sociologist, considered the 20th-century pioneer in the sociology of the Brazilian northeast.

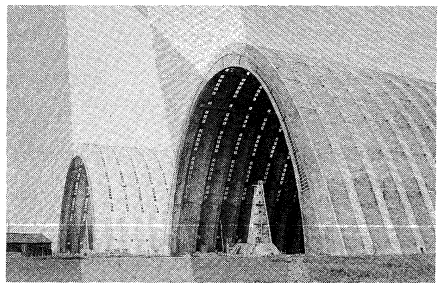
Freyre received a B.A. from Baylor University, Waco, Tex., and his M.A. from Columbia University in 1923. In 1926 he organized the first northeastern regionalist congress in Recife and published the "Regionalist Manifesto." He was joined in this endeavour by the northeast writers Jorge de Lima, José Américo de Almeida, José Lins do Rego, and Luís Jardim, among others.

Most of Freyre's numerous sociological essays are concerned with the socioeconomic development of the northeastern region of Brazil and the attempt to relate this pattern constructively to the Portuguese-speaking African nations. Freyre's basic premise is that, by reason of its wide Afro-European cultural experience prior to the discovery of Brazil, the Portuguese nationality was uniquely endowed to work out in the New World a successful multicultural and multiracial society that could be imitated to advantage elsewhere.

Among Freyre's numerous published works in Portuguese and English, the best-known is *Casa-grande e senzala* (1933; "The Big House and the Slave Quarters"; Eng. trans. *The Masters and the Slaves*), an account of the relationship between Brazil's Portuguese colonizers and their African slaves. His other works include *Sobrados e mucambos* (1936; "The Rich and the Servants"; Eng. trans. *The Mansions and the Shanties*), *Brazil: An Interpretation* (1945), *Nordeste* (1937; "The Northeast"), and *Ordem e progresso* (1959; "Order and Progress"). *Sobrados e mucambos* traces the processes of urbanization and the decline of the rural patriarchal society in Brazil.

Freyre organized several university departments of sociology in Brazil and was the prime mover in the first Congress of Afro-Brazilian Studies in 1934. In 1949 he represented Brazil in the UN General Assembly.

Freyssinet, (Marie-) Eugène (-Léon) (b. July 13, 1879, Objat, Fr.—d. June 8, 1962, St. Martin-Vésubie), French civil engineer who successfully developed pre-stressed concrete—*i.e.,* concrete beams or girders in which steel wire is embedded under tension, greatly strengthening the concrete member.



Hangars at Orly Airport, near Paris, designed by Freyssinet, 1916–24
By courtesy of the Musee de l'Air, Paris

Appointed bridge and highway engineer at Moulins in 1905, Freyssinet designed and built many reinforced-concrete bridges, including one with a 300-foot (91-metre) span. From the end of World War I until 1928 he worked for a contracting firm, and in 1930 he completed the Plougastel Bridge across the Elorn River at Brest. With three 612-foot (187-metre) spans, this was the largest reinforced-concrete bridge constructed up to that time.

After 1928 Freyssinet devoted himself to the development of pre-stressed concrete and also to the manufacture of high-strength concrete. His most significant discovery was that only a high-strength steel at a high stress would achieve a permanent pre-stress in concrete. At first little recognized, Freyssinet's methods were successfully applied at the Gare Maritime (harbour station) at Le Havre, Fr., in 1933 and gradually became universally adopted. After

his invention in 1938 of a practical tool for applying tension to steel, the use of pre-stressed concrete became worldwide.

Freytag, Gustav (b. July 13, 1816, Kreuzburg, Silesia, Prussia—d. April 30, 1895, Wiesbaden, Ger.), German writer of realistic novels celebrating the merits of the middle classes.

After studying philology at Breslau and Berlin, Freytag became Privatdozent in German literature at the University of Breslau (1839), but he resigned after eight years to devote himself to writing. He was much excited by the revolutions of 1848 and became, with Julian Schmidt, joint editor of the Leipzig weekly *Die Grenzboten,* which he made into the leading organ of the middle-class liberals. He abhorred both the democratic radicalism of the *Jungdeutschen* ("Young Germany") and the escapism of the Romantics. From 1867 to 1870 he represented the national liberal party in the North German *Reichstag,* and he served at the headquarters of the 3rd Army in the Franco-German War until the battle of Sedan (1870).

His literary work was influenced by his early reading of English novelists, especially Sir Walter Scott and Charles Dickens, and of French plays. His name was made with the comedy *Die Journalisten* (1854; *The Journalists*), still regarded as one of the most successful German comedies, and he acquired an international reputation with his widely translated novel *Soll und Haben* (1855; *Debit and Credit,* 1857). It celebrates the solid bourgeois qualities of the German merchants, and the close relationships between people's characters and the work they do is well brought out. The success of the novel was such that its author was recognized as the leading German writer of his day. He attempted to realize a similar intention with *Die verlorene Handschrift* (1864; *The Lost Manuscript,* 1865), which depicts Leipzig university life in the same realistic manner, but the plot is much weaker and the effect less successful. His most ambitious literary work was the novel-cycle *Die Ahnen,* 6 vol. (1873–81) which unfolded the story of a German family from the 4th century AD up to Freytag's own time. His *Bilder aus der deutschen Vergangenheit,* 5 vol. (1859–67; partial Eng. trans. *Pictures of German Life,* 1862–63) were originally contributed to *Die Grenzboten* and give a vivid and popular account of the history of the Germans, in which Freytag stresses the idea of folk character as determinative in history. His collected works, *Gesammelte Werke,* 22 vol. (1886–88) were reissued, edited by E. Elster (12 vol.) in 1926.

Fria, town and administrative capital of Fria region, western Guinea, West Africa, near the Amaria Dam on the Konkouré River. The Fria Company's bauxite-reducing factory at nearby Kimbo was one of Africa's first alumina-processing plants and is Guinea's largest industrial enterprise. Bauxite deposits were discovered in 1954, and alumina was first exported in 1960 via rail to Conakry, 55 mi (88 km [91 mi by rail]) south. The site of the largest technical training school in the country, Fria also has a hospital, a stadium, a mosque, and a Roman Catholic mission (1959). The town is also the chief trade centre for a region inhabited mainly by the Susu (Soussou) people. Pop. (1977 prelim.) region, 45,000.

friar (from Latin *frater* through French *frère,* "brother"), one belonging to a Roman Catholic religious order of mendicants. Formerly, friar was the title given to individual members of these orders, as Friar Laurence (in *Romeo and Juliet*), but this is no longer common. The 10 mendicant orders are the Dominicans, Franciscans, Augustinians (Augustian Hermits), Carmelites, Trinitarians, Mercedarians, Servites, Minims, Hospitallers of St. John of God, and the Teutonic Order (the Austrian branch).

Friar Lands Question, problem confronting the U.S. government after the takeover of the Philippines from Spain in 1898, concerning the disposition of large landed estates owned by Spanish monastic orders on the islands.

For more than 300 years the Roman Catholic Church had been intimately involved with Spanish colonial government in the Philippines. During that time three religious orders—Dominicans, Augustinians, and Recollects—had acquired about one-tenth of all the improved land in the islands. The discontent of the Filipino peasants with this situation had been a contributing factor in the Philippine Revolution of 1896–98.

In the Treaty of Paris (1898), which settled the Spanish–American War, the U.S. government agreed to protect the friars' property rights, but it was clearly dangerous to allow them to return to their lands. An agreement was eventually reached under which the U.S. purchased 410,000 acres (about 170,000 hectares) for a sum of $7,000,000. The land was then resold to tenant farmers on an installment basis. This solution was not entirely satisfactory; numerous disputes arose over the accuracy of surveys and terms of repayment. Continued monastic possession of certain parcels of land has been a source of contention ever since, as has the issue of land reform in general.

Fribourg (French), German FREIBURG, canton, western Switzerland, bounded by Lake Neuchâtel and the cantons of Vaud on the west and south and Bern on the east, with enclaves within Vaud. Occupying an area of 644 sq mi (1,669 sq km), it lies in an elevated plain (Swiss Plateau) and rises from flat land in the west through a hilly region up to the PreAlps in the south and east. The highest summits are to the south in La Gruyère district and include the Vanil Noir (7,836 ft [2,389 m]). The canton is bisected by the Saane River (La Sarine), which flows from south to north (to join the Aare), and by its tributaries. On the west, La Broye flows northeast into Lakes Morat (Murtensee) and Neuchâtel, and, in the southwest, La Veveyse flows south to Lake Geneva (Lac Léman).

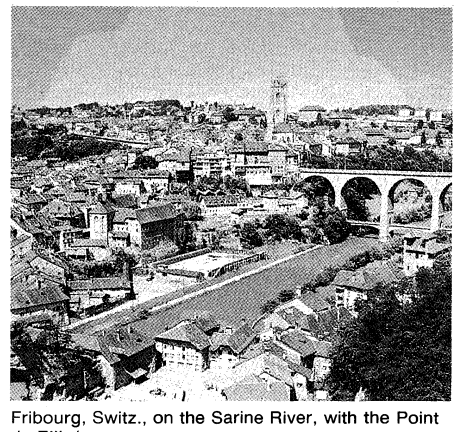
Traces of prehistoric settlements have been found on the shores of Lakes Neuchâtel and Morat. The canton, made up of districts acquired by its capital, the city of Fribourg (*q.v.*), reached its present extent with the inclusion of Morat (now Murten) in 1803. It joined the Sonderbund (separatist league of Catholic cantons) in 1846 but surrendered to the federal army in 1847. Predominantly Roman Catholic, it has numerous monasteries and convents.

The canton is predominantly agricultural. Cattle breeding and dairying (including the processing of milk and cheese, notably in La Gruyère district) are important. Market gardening, cereals, tobacco, and fruit prosper in the fertile north and on hillsides in the centre of the canton. Light industries are largely concentrated in Fribourg city, Düdingen, and Murten and the timber industry in La Gruyère. Power plants in La Sarine district generate electricity for home use and for export. Tourism is most developed in the mountain and lake regions and in Fribourg. The canton is served by the main railway line from Lausanne to Bern, with several branch lines.

Situated on the Swiss linguistic frontier, Fribourg's population is two-thirds French speaking (west) and one-third German speaking (east). Pop. (1983 est.) 187,608.

Fribourg (French), German FREIBURG, capital of Fribourg canton, Switzerland, on a loop in La Sarine (Saane) River, southwest of Bern. Founded in 1157 by Berthold IV, duke of Zähringen, to control a ford across the river, it passed to the sons of Rudolf of Habsburg in 1277. The Habsburgs abandoned it in 1452; it then accepted the suzerainty of the dukes of Savoy. Fribourg assisted the Swiss in defeating Charles the Bold of Burgundy at Grandson and Morat (now Murten) in 1476 and was admitted to full membership in the Swiss Confederation in 1481. Occupied by the French in 1798, Fribourg became part of the Helvetic Republic and then one of the cantons of the Swiss Confederation as reconstituted by Napoleon's Act of Mediation in 1803.

The oldest part of the city (the Bourg) is high above the river bank; the Neuveville, Auge, and Planche (Matte) quarters form the lower part (Basseville). West of the Bourg and still higher are the modern Places and Pérolles quarters. The old quarters retain much of their medieval appearance, characterized by Gothic-fronted houses and the remains of towers and gateways with 13th- to 17th-century ramparts, which originally surrounded the city. Medieval buildings include St. Nicholas Cathedral (13th–15th century) with a famous organ built by Aloys Mooser; the Franciscan church (Église des Cordeliers [1281; altered 1748]) with a 15th-century reredos; the former Augustinian Church of St. Maurice (1255) with a baroque reredos; and numerous chapels and



Fribourg, Switz., on the Sarine River, with the Point de Zähringen
Josef Muench

former convents and monasteries. The town hall dates from 1506–22 with a tower of 1642. Modern architecture includes the university buildings (1941) and the Church of Christ the King (1954). The Sarine River is spanned by several bridges, notably the seven-arched Pont de Zähringen. The seat of the bishopric of Lausanne–Geneva–Fribourg and of a Roman Catholic state university (founded 1889), Fribourg is the centre of Swiss Catholicism. It possesses numerous works of art, mainly preserved in its churches and in the Musée d'Art et d'Histoire.

Situated on the main railway from Lausanne to Bern and a junction of lines to Murten and Payerne, the city is also a centre for bus and postal road services. There are breweries, a foundry, and factories for chocolate, cardboard boxes, machinery, electrical equipment, wood products, clothing, and chemicals. The population is primarily French speaking. Pop. (1983 est.) 37,100.

fricative, in phonetics, a consonant sound, such as English *f* or *v,* produced by bringing the mouth into position to block the passage of the airstream, but not making complete closure, so that air moving through the mouth generates audible friction.

Fricatives (also sometimes called "spirants") can be produced with the same positions of the vocal organs as stops; bilabial, labiodental, dental, alveolar, palatal, velar, and uvular consonants. In addition to the *f* and *v* sounds,

examples of fricatives in English are *s* as in "sitter," *z* as in "zebra," and the two *th* sounds as in "think" and "this."

Frick, Henry Clay (b. Dec. 19, 1849, West Overton, Pa., U.S.—d. Dec. 2, 1919, New York City), U.S. industrialist, art collector, and philanthropist who helped build the world's largest coke and steel operations.

Frick began building and operating coke ovens in 1870, and the following year he organized Frick and Company. Taking advantage of the difficult times following the financial panic of 1873, he acquired extensive coal deposits and supplied Pittsburgh with the coke required for its steel and iron industry.

In 1889 Frick was made chairman of Carnegie Brothers and Company to reorganize their steel business. He initiated far-reaching improvements and bought out Carnegie's chief competitor, the Duquesne Steel Works. He was responsible for building Carnegie into the largest manufacturer of steel and coke in the world. As a result of his leading role in the dispute during the Homestead (Pa.) steel strike of 1892, he was shot and stabbed by Alexander Berkman, an anarchist, but survived.

Frick played a major role in the formation of the United States Steel Corporation in 1901 and later became a director. He also served as a director of a number of railroads.

Upon his death Frick bequeathed $15,000,000 and his Fifth Avenue mansion to New York City to establish the Frick Collection, a trove of paintings, bronzes, and enamels he had collected over a 40-year period. It is generally considered one of the great privately owned museums of the world. His other gifts include a 150-acre (61-hectare) park and a $2,000,000 endowment to the city of Pittsburgh, as well as liberal contributions to Princeton University.

Frick, Wilhelm (b. March 12, 1877, Alsenz, Ger.—d. Oct. 16, 1946, Nürnberg), longtime parliamentary leader of the German National Socialist Party and Adolf Hitler's minister of the interior, who played a major role in drafting and carrying out the Nazis' anti-Semitic measures.

An official in the police administration at Munich, Frick was convicted of high treason for participating in Hitler's Munich (Beer Hall) Putsch of November 1923 but managed to avoid imprisonment. Elected to the Reichstag (parliament) in May 1924, he began to lead the Nazis in that body in 1928.

During 1930–31, as minister of the interior in the state government of Thuringia, Frick was the first Nazi to hold any ministerial-level post in Germany. Thereafter he became the recognized party expert in German domestic politics. As Hitler's national minister of the interior (1933–43), he played a significant role in devising and obtaining passage of legislation providing for government by decree (March 1933) and in drafting subsequent measures against the Jews, especially the notorious Nürnberg laws of September 1935.

With the growth of the SS (Schutzstaffel) as the state's principal internal-security force, however, Frick's importance in the government declined, and in 1943 he was replaced at the interior ministry by SS chief Heinrich Himmler. Thereafter Frick served as Reich protector for Bohemia and Moravia until the end of World War II. Arraigned before the Allied war-crimes tribunal at Nürnberg (1946), he was convicted and subsequently executed for his "crimes against humanity."

Frick Collection, gallery of paintings, sculpture, and decorative arts in New York City. The art, spanning the history of Western art from the Middle Ages to the late 19th century, was amassed by the industrialist Henry Clay Frick (1849–1919) under the guidance of the art dealer Joseph Duveen and the English art critic Roger Fry.

The collection, as well as an art reference library, is housed in Frick's Manhattan townhouse. It includes decorative arts, drawings, furniture, paintings, prints, and sculpture.

friction, force that resists the sliding or rolling of one solid object over another. Frictional forces, such as the traction needed to walk without slipping, may be beneficial; but they also present a great measure of opposition to motion. About 20 percent of the engine power of automobiles is consumed in overcoming frictional forces in the moving parts.

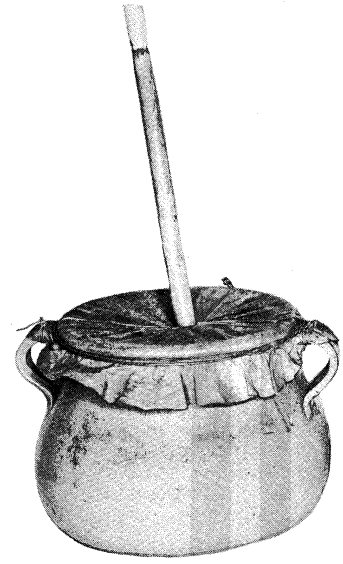
The major cause of friction between metals appears to be the forces of attraction, known as adhesion, between the contact regions of the surfaces, which are always microscopically irregular. Friction arises from shearing these "welded" junctions and from the action of the irregularities of the harder surface plowing across the softer surface.

Two simple experimental facts characterize the friction of sliding solids. First, the amount of friction is nearly independent of the area of contact. If a brick is pulled along a table, the frictional force is the same whether the brick is lying flat or standing on end. Second, friction is proportional to the load or weight that presses the surfaces together. If a pile of three bricks is pulled along a table, the friction is three times greater than if one brick is pulled. Thus, the ratio of friction F to load L is constant. This constant ratio is called the coefficient of friction and is usually symbolized by the Greek letter mu (μ). Mathematically, $\mu = F/L$. Because both friction and load are measured in units of force (such as pounds or newtons), the coefficient of friction is dimensionless. The value of the coefficient of friction for a case of one or more bricks sliding on a clean wooden table is about 0.5, which implies that a force equal to half the weight of the bricks is required just to overcome friction in keeping the bricks moving along at a constant speed. The frictional force itself is directed oppositely to the motion of the object. Because the friction thus far described arises between surfaces in relative motion, it is called kinetic friction.

Static friction, in contrast, acts between surfaces at rest with respect to each other. The value of static friction varies between zero and the smallest force needed to start motion. This smallest force required to start motion, or to overcome static friction, is always greater than the force required to continue the motion, or to overcome kinetic friction.

Rolling friction occurs when a wheel, ball, or cylinder rolls freely over a surface, as in ball and roller bearings. The main source of friction in rolling appears to be dissipation of energy involved in deformation of the objects. If a hard ball is rolling on a level surface, the ball is somewhat flattened and the level surface somewhat indented in the regions in contact. The elastic deformation or compression produced at the leading section of the area in contact is a hindrance to motion that is not fully compensated as the substances spring back to normal shape at the trailing section. The internal losses in the two substances are similar to those that keep a ball from bouncing back to the level from which it is dropped. Coefficients of sliding friction are generally 100 to 1,000 times greater than coefficients of rolling friction for corresponding materials. This advantage was realized historically with the transition from sledge to wheel.

friction drum, musical instrument made of a membrane stretched across the mouth of a vessel and set in vibration by rubbing with wet or resined fingers a stick or string passed through the membrane or tied upright from underneath; in some types the membrane is rubbed with another piece of skin. Closer in



Flemish *rommelpot* friction drum; in the Musée Instrumental du Conservatoire Royal, Brussels

By courtesy of the Musee Instrumental, Brussels; photograph © A.C.L., Brussels

sound production to primitive friction, or rubbing, boards, it probably evolved separately from the beaten drum, which is associated with different rites in nonliterate societies.

The friction drum—found in Africa, Europe, Asia, and the Americas—is primarily a ritual instrument. In Europe this ritual association survives in places where the instrument has not become a toy—*e.g.,* in Italian religious processions and Romanian New Year's festivities. Other European friction drums include the Flemish *rommelpot* and the Spanish *zambomba.*

Friday, sixth day of the week (*q.v.*).

Fridolin OF SÄCKINGEN, SAINT (b. Ireland—d. 6th or 7th century AD, Säckingen, Ger.; feast day March 6), Irish-born missionary who is said to have established churches among the Franks and Alamanni and who, in modern times, has been revered in southern Germany, Switzerland, and Austria.

Accounts of his life (generally unreliable and deriving principally from the 10th-century monk Balther of Säckingen) describe him as a man of noble birth who became an itinerant preacher in Ireland, travelling from town to town, and then crossed over to France. He lived for a while at a monastery at Poitiers and then travelled to the Rhine, building churches along the way. At Säckingen he purportedly founded a church and monastery, with a nunnery nearby.

Fried, Alfred Hermann (b. Nov. 11, 1864, Vienna—d. May 5, 1921, Vienna), Austrian pacifist, publicist, co-founder of the German peace movement, and co-winner (with Tobias Asser) of the Nobel Prize for Peace in 1911.

In 1891 Fried, in Berlin, founded the paci-

Fried

By courtesy of the Bild-Archiv, Osterreichische Nationalbibliothek, Vienna

fist periodical *Die Waffen nieder!* ("Lay Down Your Arms!"), from 1899 called *Friedenswarte* ("The Peacekeeper"). In 1892, encouraged by the pacifist author Bertha von Suttner, he founded the Deutsche Friedensgesellschaft (German Peace Society), which became the focus for the German pacifist movement before World War I. Fried advocated "fundamental pacifism" and believed that "international anarchy" should be met by both legislative measures and spiritual regeneration.

With the outbreak of World War I he immigrated to Switzerland in protest against German policy. As editor of *Blätter für internationale Verständigung und zwischenstaatliche Organisation* ("Papers for International Understanding and Inter-State Organization"), he worked for an immediate peace. Fried protested against the Treaty of Versailles but warned the Germans against attempting to revise it by force. His works include *Handbuch der Friedensbewegung,* 2 vol. (1911–13; "Handbook of the Peace Movement"), and *Mein Kriegtagebuch,* 4 vol. (1918–20; "My War Diary").

Friedan, Betty (Naomi), *née* GOLDSTEIN (b. Feb. 4, 1921, Peoria, Ill., U.S.), American feminist best known for her book *The Feminine Mystique* (1963), which explored the causes of the frustrations of modern women in traditional roles.

Friedan was awarded a B.A. in psychology (1942) from Smith College, Northampton, Mass., and did graduate work at the University of California at Berkeley. She worked for a time in New York City but married in 1947 (divorced 1969), moved to the suburbs, and reared three children. Friedan's unhappiness with her role as housewife and mother coupled with the discovery that her dissatisfaction was shared by other women, prompted her to write *The Feminine Mystique.* One result of this work was her further involvement in the women's movement.

In 1966 Friedan cofounded and became the first president of the National Organization for Women (NOW), and in 1973 she helped found the First Women's Bank. Her second book, *It Changed My Life* (1976), is an account of her campaigns of the 1960s and early '70s as recorded in speeches, essays, and interviews. *The Second Stage,* an assessment of the status of the women's movement, was published in 1981.

Friedel, Charles (b. March 12, 1832, Strasbourg, Fr.—d. April 20, 1899, Montauban), French organic chemist and mineralogist who, with the American chemist James Mason Crafts, discovered in 1877 the chemical process known as the Friedel-Crafts reaction.

In 1854 Friedel entered C.A. Wurtz's laboratory and in 1856 was appointed conservator of the mineralogical collections at the Superior National School of Mines. In 1871 he began to lecture at the École Normale and in 1876 became professor of mineralogy at the Sorbonne, but on the death of Wurtz in 1884 he exchanged that position for the chair of organic chemistry.

He collaborated in efforts to form diamonds artificially, studied the pyroelectric properties of crystals, determined crystallographic constants, and did research on ketone and aldehyde compounds. Friedel was the chief founder of *Revue Générale de Chimie* in 1899.

Friedel, Georges (b. July 19, 1865, Mulhouse, Fr.—d. Dec. 11, 1933, Strasbourg), French crystallographer who formulated basic laws concerning the external morphology and internal structure of crystals.

Friedel studied at the École Polytechnique and the Superior National School of Mines, where his father, the chemist Charles Friedel, was curator of the mineralogical collections. After graduation he worked as a mining engineer and then turned to teaching and research, first at the School of Mines of Saint-Étienne and later at the University of Strasbourg.

Friedel's observations established the general validity of the hypothesis, put forward by Auguste Bravais, that the different faces of crystals were external expressions of a periodic, internal arrangement of atoms, or lattice structure. His own law of rational symmetric intercepts (1905) and law of mean indices (1908) are generalizations of the regularities observed in the external symmetry of crystals. After conclusive proof of the lattice structure was achieved in 1912 by the X-ray diffraction experiments of Max von Laue, Friedel showed that, because the X-ray diffraction pattern is always symmetric, it is impossible (except under special circumstances) to determine whether the crystal actually has a centre of symmetry and that only 11 different types of crystal symmetry can be distinguished. This result is known as Friedel's law, and the 11 possible types of symmetry are known as Friedel classes (or Laue symmetry groups).

Friedjung, Heinrich (b. Jan. 18, 1851, Roschtin, Moravia, Austrian Empire [now Roštín, Czech.]—d. July 14, 1920, Vienna, Austria), Austrian historian who combined historical studies with a keen interest in pan-Germanic politics.

Friedjung studied at Prague, Berlin, and Vienna, attended the Institute of Austrian Historical Research (1871–75), and taught at the Commercial Academy in Vienna (1873–79). Friedjung favoured close economic and social connections between Austria and Germany and was unsympathetic to Slav and Hungarian nationalist movements in Austria-Hungary. He also wanted a centralized and liberal government. His *The Settlement with Hungary* (1877), based on these views, led to dismissal from the Commercial Academy. He then became a political journalist, associated with the nationalist Georg von Schönerer until Schönerer's anti-Semitism made him break away (Friedjung was Jewish). He also continued his historical studies and writing, his chief historical work being *The Struggle for Supremacy in Germany* (1897–98; 10th ed. 1916–17).

During the Bosnian Crisis of 1909, Friedjung published an article based on documents supplied by the Austrian foreign office accusing leaders of the Serbo-Croatian movement of treasonable practices. The men who were attacked sued Friedjung, and the subsequent trial showed that the documents were forgeries. Friedjung had used them in good faith but without adequate scrutiny, and his reputation as a historian suffered.

Friedland, Battle of (June 14, 1807), victory for Napoleon that compensated for a setback the preceding February at Eylau and led to the Treaty of Tilsit between Napoleon and Alexander I of Russia. It was fought at Friedland (modern Pravdinsk, Russian S.F.S.R.), 27 miles (43 km) southeast of Königsberg in East Prussia.

About 80,000 troops of Napoleon's Grand Army (including Polish, Dutch, Italian, and German units) confronted about 58,000 Russians under the command of General Leonty Leontyevich Bennigsen. Most of the Russian troops crossed to the west bank of the Alle River at Friedland and early on June 14 attacked the seemingly isolated French corps of Marshal Jean Lannes. Outnumbered by more than two to one, Lannes held off the Russian attacks, led by Prince P.I. Bagration, for nine hours while Napoleon concentrated his forces. At 5 PM Napoleon launched his main attack, employing about 65,000 men, and in two hours pushed the southern half of the Russian army back into the tiny village of Friedland. There, close-packed, they were cut down by volleys of canister and grapeshot fired by the French guns at close range. The Russians were either killed, captured, or driven into the river, since the bridges had earlier been destroyed by the French. The Russians lost about 19,000 men, and the French about 9,000. Bennigsen's army was shattered, and the next day his ally, the Prussian general Anton Lestocq, with about 25,000 men, abandoned Königsberg and retreated to Tilsit. The French occupied Königsberg.

Friedländer, Ludwig Heinrich (b. July 16, 1824, Königsberg, Prussia [now Kaliningrad, Russian S.F.S.R.]—d. Dec. 16, 1909, Strassburg, Ger. [now Strasbourg, Fr.]), German historian noted for his comprehensive survey of Roman social and cultural history.

Friedländer studied at the University of Leipzig, where, under the influence of Theodor Mommsen and Jacob Burckhardt, he developed an interest in the history of civilization. After a period of work on Greek culture in 1847 and a trip to Italy in 1853–54, he taught philology and archaeology and worked on his masterpiece, the *Darstellungen aus der Sittengeschichte Roms,* 3 vol. (1864–71; "Representations from Roman Cultural History"), a detailed and vivid portrait of the social life, customs, art, and manners of the first two centuries of the Roman Empire. The work remains one of the most complete surveys of Roman life and society.

Friedländer's bacillus (bacterium): *see* Klebsiella pneumoniae.

Friedman, Ignacy (b. Feb. 14, 1882, Podgórze, near Kraków, Pol., Austria-Hungary—d. Jan. 26, 1948, Sydney, Australia), Polish pianist noted for his performances of Frédéric Chopin.

Friedman studied music theory with Hugo Riemann in Leipzig. In Vienna he studied composition with Guido Adler and studied piano with Theodor Leschetizky for four years. After his debut in 1904, he gave more than 2,800 concerts around the world. In 1940 he moved to Sydney. He was a famous interpreter of Chopin, editing the Breitkopf & Härtel annotated edition of his works in 12 volumes; he also edited some works of Robert Schumann and Franz Liszt. He wrote about 100 piano pieces in the popular salon style; the best known of these are in a group of *Fantasiestücke.* He also transcribed for piano some 18th-century orchestral music and wrote a few chamber works. He is remembered mostly for his brilliant concert career.

Friedman, Milton (b. July 31, 1912, Brooklyn, N.Y., U.S.), American laissez-faire economist, professor at the University of Chicago (from 1946), and one of the leading modern exponents of liberalism in the 19th-century European sense. He was awarded the Nobel Prize for Economics in 1976.

In *Capitalism and Freedom* (1962; with his wife, Rose D. Friedman) Friedman argued for a negative income tax, or guaranteed income, to supersede centralized, bureaucratized social welfare services, which in his view are inimical to the traditional values of individualism and useful work. Among his other works, many of which concern the theory of money, are *A Monetary History of the United States, 1867–1960* (1963) and *Monetary Trends of the United States and the United Kingdom* (1981).

Friedman, William F(rederick); and Friedman, Elizebeth S(mith), *née* ELIZEBETH SMITH (respectively b. Sept. 24, 1891, Kishinëv, Russia [now in Moldavian S.S.R.]—d. Nov. 2, 1969, Washington, D.C., U.S.; b. 1892, Huntington, Ind., U.S.—d. Oct. 31, 1980, Plainfield, N.J.), American cryptologists who helped decipher enemy codes from World War I to World War II.

William Friedman was still an infant when

his family immigrated to the United States; he studied genetics at Cornell University (B.S., 1914). Elizebeth Smith majored in English at Hillsdale (Michigan) College (B.A., 1915). They met at the Riverbank Laboratories (Geneva, Ill.), where they both eventually became involved in cryptology, working often for the government in decoding diplomatic messages. In 1917–18 William served in the U.S. Army, partly in France, analyzing German code books.

After the war, in 1921, the Friedmans (they had married in May 1917) moved to Washington, D.C., where, over the years, Elizebeth Friedman worked for several government departments, notably cracking the codes used by rumrunners and other smugglers, and where William Friedman, in the War Department, became the chief cryptoanalyst in the Signal Intelligence Service, notably leading the teams that broke various Japanese codes, including ultimately the Purple machine cipher initiated by Japan in 1939. After World War II, William Friedman worked awhile for the National Security Agency, and Elizebeth Friedman for the International Monetary Fund.

William Friedman wrote *The Index of Coincidence and Its Applications in Cryptography* (1922), one of the standard works in the nomenclature and classification of ciphers. Together, the Friedmans wrote *The Shakespearean Ciphers Examined* (1957), in which they denied Francis Bacon's purported authorship of the William Shakespeare plays and sonnets.

Friedmann, Aleksandr Aleksandrovich, Friedmann also spelled FRIDMAN (b. June 17 [June 29, New Style], 1888, St. Petersburg, Russia [now Leningrad, Russian S.F.S.R.]—d. Sept. 16, 1925, Leningrad), Russian mathematician and physical scientist.

After graduating from the University of St. Petersburg in 1910, Friedmann joined the Pavlovsk Aerological Observatory and, during World War I, did aerological work for the Russian army. After the war he was on the staff of the University of Perm (1918–20) and then on the staffs of the Main Physical Observatory and other institutions until his death in 1925.

Friedmann was first to formulate (1922) the mathematics of a model universe in which the average mass density is constant and all fundamental parameters are known except the expansion factor, or radius of curvature. His model has been of great significance in the mathematical derivation of cosmological models from Albert Einstein's general theory of relativity. Friedmann was also one of the first to postulate (1922, 1924) a "big bang" model for the evolution of the universe. He was also a founder of the science of dynamic meteorology.

Friedmann, Andrei: *see* Capa, Robert.

Friedrich (German personal name): *see under* Frederick, except as below.

Friedrich, Caspar David (b. Sept. 5, 1774, Greifswald, Pomerania [Germany]—d. May 7, 1840, Dresden, Prussia [Germany]), pioneer early 19th-century German Romantic painter. His vast, mysterious landscapes and seascapes proclaimed man's helplessness against the forces of nature and did much to establish the idea of the sublime as central concerns of the Romantic movement.

Friedrich studied from 1794 to 1798 at the academy at Copenhagen but was largely self-taught. Settling at Dresden, he became a member of an artistic and literary circle that included the painter Philipp Otto Runge and the writers Ludwig Tieck and Novalis. His drawings in sepia, executed in his neat early style, won the poet J.W. von Goethe's

Self-portrait, drawing by Caspar David Friedrich; in the Kupferstichkabinett und Sammlung der Zeichnungen, Berlin

By courtesy of the Staatliche Museen zu Berlin

approval and a prize from the Weimar Art Society in 1805. His first important oil painting, "The Cross in the Mountains" (*c.* 1807), established his mature style, characterized by an overwhelming sense of isolation, and was an attempt to replace the traditional symbology of religious painting with one drawn from nature. Other symbolic landscapes, such as "Shipwreck in the Ice" (1822), reveal his fatalism and obsession with death. Though based on close observation of nature, his works were coloured by his imaginative response to the atmosphere of the Baltic coast and the Harz Mountains, which he found both awesome and ominous. In 1824 he was made professor of the Dresden academy. For a long time his work was forgotten; but it was revived when the 20th century recognized its own existential isolation in his work.

Friedrich August (German personal name): *see under* Frederick Augustus.

Friedrich Karl (German personal name): *see under* Frederick Charles.

Friedrich Wilhelm (German personal name): *see under* Frederick William.

Friedrichshafen, city, Baden-Württemberg *Land* (state), southwestern Germany, on the north shore of Lake Constance (Bodensee). It was formed in 1811 by Frederick I of Württemberg through unification of the former free imperial city (1275–1802) of Buchhorn and the monastery and village of Hofen. Hofen (from 1050 a Benedictine convent) became a provostship of monks in 1420, was suppressed in 1802, and passed to Württemberg in 1805. Buchhorn was assigned to Württemberg in 1810.

Before World War II, in which the town was heavily damaged, Zeppelin airships were built there, and it now has a Zeppelin museum. Largely reconstructed, it is a lake resort with an annual fair and ferry connections to Switzerland. Industries include ship and railroad car repair, leatherworking, and the manufacture of cars, textiles, and electrical machinery. Pop. (1989 est.) 52,295.

Friel, Brian (b. Jan. 9, 1929, near Omagh, County Tyrone, N.Ire.), playwright noted for his portrayals of Irish Catholic conditions, in both Ireland and Northern Ireland.

Educated at St. Patrick's College, Maynooth (B.A., 1948), and St. Joseph's Training College, Belfast (1949–50), he taught school in Londonderry for 10 years. After *The New Yorker* began regular publication of his stories, he turned to writing full time in 1960, issuing short stories and radio and stage plays. After a six-month tutelage at the Tyrone Guthrie Theatre in Minneapolis, Minn., U.S., in 1963, he wrote his first dramatic success, *Philadelphia, Here I Come!,* produced first by the Dublin Theatre Festival (1964) and subsequently appearing in New York City and London to critical and popular acclaim. The play told of a young Irishman's mood changes in contemplating emigrating from Ireland to America. Soon, Friel himself was settled in County Donegal, Ireland.

Thereafter he had plays produced almost yearly for the next decade. After writing *The Loves of Cass McGuire* (1966), *Lovers* (1967), *Crystal and Fox* (1968), and *The Mundy Scheme* (1969), he turned more to political themes, relating the dilemmas of Irish life and the troubles in Northern Ireland in such plays as *The Freedom of the City* (1973), *Volunteers* (1975), *Living Quarters* (1977), and *Making History* (1988). Many of his plays—notably *Aristocrats* (1979) and *Translations* (1980)—deal with family ties and with mythmaking as a human need.

Friendly Islands (Pacific Ocean): *see* Tonga.

friendly society, mutual-aid organization formed voluntarily by individuals to protect members against debts incurred through illness, death, or old age. Friendly societies arose in the 17th and 18th centuries and were most numerous in the 19th century. They had their origins in the burial societies of ancient Greek and Roman artisans. In the Middle Ages the guilds of Europe and England extended the idea of mutual assistance to other circumstances of distress, such as illness.

The friendly societies went a step further by attempting to define the magnitude of the risk against which it was intended to provide and how much the members should contribute to meet that risk. Offshoots of the friendly societies include trade unions, fraternal orders (such as the International Order of Odd Fellows), and life insurance companies.

Consult the INDEX *first*

Friends, Society of, also called FRIENDS CHURCH, byname QUAKERS, Christian group that arose in the mid-17th century in England and the American colonies, advocating direct inward apprehension of God without creeds, clergy, or other ecclesiastical forms.

A brief treatment of the Society of Friends follows. For full treatment, *see* MACROPAEDIA: Protestantism.

Quakerism represents the extreme left wing of the 17th-century English Puritan movement. The three chief emphases of its founder, George Fox (1624–91), were the immediacy of Christ's teaching and guidance, the consequent irrelevance of special buildings or ordained ministers, and the application of Christ's teaching to the whole of life. The early Quakers gathered for worship without liturgy or prearrangement of any kind, or any appointed preacher, believing that out of an energetic and expectant silence God might use any one of the worshipers as a minister.

The rapid spread of Quakerism in the north of England was followed by a vigorous expansive movement to London and the rest of England, to Scotland and Ireland, to the continent of Europe, and to North America. The main centres of Quaker missionary activity in the New World were New England, New Amsterdam and Long Island, Maryland, Virginia, and the West Indies. Almost everywhere they went, the Quakers met with persecution for what were considered unconventional Christian practices. Although the Toleration Act (1689) brought an end to the worst violence of

persecution in Great Britain, many disabilities long remained.

During the 18th century, Quaker thought felt the influence of two conflicting tendencies. Quietism, on the one hand, advocated passivity and self-abnegation in deference to divine direction, while the energy and theology of Wesleyanism and other evangelical movements inspired a new fervour. This tension precipitated several separations within Quakerism in the 18th and 19th centuries, most notably in the United States, where followers of Elias Hicks established a number of regional meetings. With the adoption of revivalist methods, of a worship pattern with hymns and set sermons, and of paid pastors, it was inevitable that opposition by traditionalist Friends should lead to further divisions. By the beginning of the 20th century there were thus (1) a group of "orthodox" or evangelical yearly meetings in fellowship, (2) a group of "conservative" yearly meetings in fellowship following the traditional Quaker patterns of worship, speech, and dress, and (3) a group of Hicksite yearly meetings, rigorously separated from all other Quaker groups for 70 years, increasingly interested in "modern thought" and suspected by other groups of being Unitarian in theology. During and after World War I the barriers of suspicion were broken down and cooperation and reunion among different branches ensued.

The Quaker system of church government has remained substantially unaltered since the time of George Fox. The principal unit is the monthly meeting, a body usually meeting once a month and responsible for all matters of membership, for finance and property, and for deliberation on concerns raised by individual members or referred to it by superior meetings. The extreme austerity characteristic of early Quaker worship services has been modified in many areas with the adoption of hymn singing, set prayers, and prepared sermons. Almost alone among Christian bodies, Friends have no form of outward observance of the sacraments. They believe in a spiritual baptism and a spiritual communion.

Friends of Constitutional Government (Japan): *see* Rikken Seiyūkai.

Friends of God, German GOTTESFREUNDE, medieval Christian fellowship that originated during the early part of the 14th century in Basel, Switz., and then spread to Germany and the Netherlands. Primarily a middle-class, democratic lay movement espousing a Christian life of love, piety, devotion, and holiness, the Friends of God presaged the 16th-century Reformation. Some of its leaders, attacking corruption in the Western church and expecting a subsequent intervention of God, were tried and executed for heresy.

Friends of the Constitution, Society of the: *see* Jacobin Club.

Friends of the Rights of Man and the Citizen, Society of the: *see* Cordeliers, Club of the.

Friends World Committee for Consultation (FWCC), international organization of the Society of Friends (Quakers) founded at Swarthmore, Pa., in 1937. It promotes visits, conferences, and study groups among Friends from all parts of the world and maintains contact with various Friends organizations and activities. It is concerned with the work of the United Nations and has a Friends representative to the United Nations in New York City and in Geneva.

Representatives to the FWCC are appointed by the various Friends yearly meetings and other Friends organizations. Meetings are held every three years. It produces several publications, including the *Friends World News,* issued three times a year. The central FWCC office is in Birmingham, Eng.; the European office is in Edinburgh; and American offices are in Philadelphia and Plainfield, Ind.

Fries, Elias (Magnus) (b. Aug. 15, 1794, Femsjö, Swed.—d. Feb. 8, 1878, Uppsala), Swedish botanist, developer of the first system used to classify fungi.

Fries received his Ph.D. from the University of Lund in 1811 and was appointed as a science lecturer there. Later he was appointed professor and demonstrator in botany but left to accept a professorship at the University of Uppsala, from which he retired in 1859 to study fungi.

During his stay at Lund, Fries had begun to collect and describe known species for his *Systema Mycologicum,* 3 vol. (1821–32), in which he introduced a new system for classifying fungi. With the exception of a few changes with respect to microscopic discoveries, the system is still valid for many groups of fungi.

Fries also developed a system for classifying lichens based on the characters of the organs that produce fruit. This system, presented in his *Lichenographia Europaea Reformata* (1831), was widely accepted until the use of the microscope revolutionized knowledge in

Elias Fries
By courtesy of the Kungliga Biblioteket, Stockholm

this field. Fries was the first person to distinguish between lichens with external coverings on the fruit and those without.

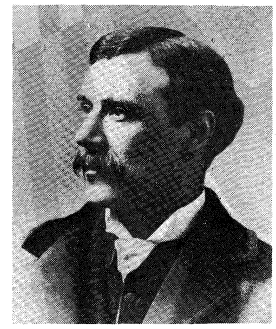
Fries, Jakob Friedrich (b. Aug. 23, 1773, Barby, Saxony [Germany]—d. Aug. 10, 1843, Jena, Thuringia [Germany]), German philosopher.

Fries studied at Leipzig and at Jena, and he became professor of philosophy and elementary mathematics at Heidelberg in 1805. His attitude toward contemporary philosophies is set forth in *Reinhold, Fichte und Schelling* (1803; reprinted 1824 as *Polemische Schriften* ["Polemical Writings"]), *System der Philosophie als evidente Wissenschaft* (1804; "System of Philosophy as Intuitive Science"), and *Wissen, Glaube und Ahndung* (1805; "Knowledge, Belief, and Superstition"). His important *Neue oder anthropologische Kritik der Vernunft,* 3 vol. (1807; "New or Anthropological Critique of Reason") attempted to give a new foundation of psychological analysis to the critical theory of Immanuel Kant, which he sought to reconcile with the philosophy of F.H. Jacobi. His *System der Logik* ("System of Logic") appeared in 1811. In 1816 Fries accepted the chair of theoretical philosophy at Jena, but because of his liberal, nationalist views, he was deprived of his professorship. In 1824 he was recalled to Jena as professor of mathematics and physics, and in 1838 the right of public lecturing on philosophy was restored to him.

Among the most important works of his Jena professorate were the *System der Metaphysik* (1824; "System of Metaphysics") and *Die Geschichte der Philosophie* (1837–40; "The History of Philosophy").

Friese-Greene, William (b. Sept. 7, 1855, Bristol, Gloucestershire, Eng.—d. May 5, 1921, London), British photographer and inventor, sometimes credited with the invention of cinematography.

Friese-Greene constructed a camera for taking a series of photographs on a roll of perforated film moving intermittently behind a shutter, the basic principle of a motion-picture camera. It would appear, however, that the camera was incapable of taking pictures at a sufficient rate for animation, for no successful



Friese-Greene
By courtesy of the Science Museum, London

presentation of moving pictures was given by him, and the credit for a successful cinematographic device must go to Thomas Edison.

Friese-Greene later pioneered stereoscopic and colour cinematography but lacked the technical knowledge necessary to bring his ideas to fruition.

BIBLIOGRAPHY. A biography by Ray Allister (pseud. for Muriel Forth), *Friese-Greene: Close-up of an Inventor* (1948, reprinted 1972), includes photographs from the 1951 film *The Magic Box,* based on this book.

Friesland, coastal *provincie,* northern Netherlands, extending inland from the IJsselmeer and the North Sea (west and north) and including four of the West Frisian Islands (*see* Frisian Islands) off the north coast. The province is drained by a vast system of canals, waterways, and lakes, particularly in the north and west; the principal lakes are Tjeukemeer, Slotermeer, Fluessen, and Sneekermeer. Its area is 1,295 square miles (3,353 square km), rarely exceeding 50 feet (15 m) above sea level, and the population density is less than half the national average. The predominantly Protestant Frisians have maintained both their own language and their own literature to a considerable degree.

The terrain in the southeast, supporting woodlands, orchards, and Frisian cattle, is sandy heathland bordered by fens; some reclamation of peat areas continues. Between fen and coast stretch almost flat clay marshlands and polders, where reclamation continues slowly, chiefly near the north coast. The last serious flooding was in 1825. These lands support potatoes, wheat, sugar beets, and pasture for the Frisian cattle. Agriculture is the basis of the provincial economy; beef and dairy products are sold in large quantities. There is some manufacturing of agricultural machinery in the province, and tourism, largely based on water sports, is an economic asset.

Leeuwarden, the capital, is the only large town, and Harlingen, the only port, serves as its outlet. Other centres are Sneek, Heerenveen, Drachten, Bolsward, Franeker, and Dokkum. There is a nature reserve for seals that is located on the Frisian island of Terschelling. For history, *see* Frisia. Pop. (1988 est.) 599,-104.

Fries's Rebellion (1799), uprising, in opposition to a direct federal property tax, by farmers in eastern Pennsylvania led by John Fries (*c.* 1750–1818). In July of 1798, the Federalist-controlled U.S. Congress, which greatly needed revenues for an anticipated war with France, had voted a direct federal tax on all

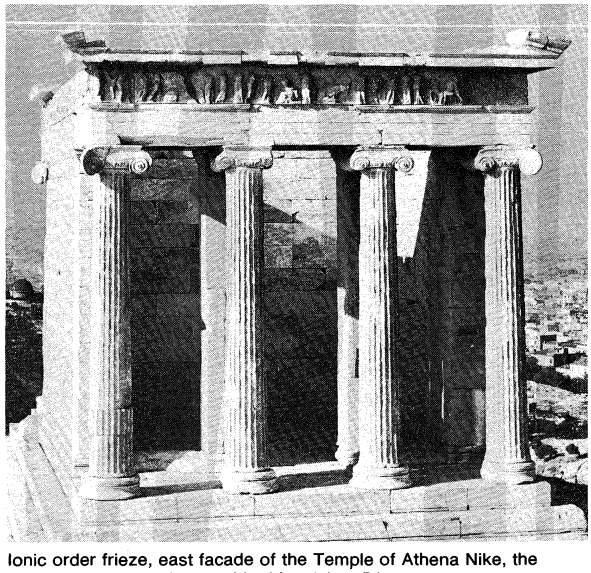
real property, including land, buildings, and slaves. This tax, which caused widespread national resentment against the John Adams administration, infuriated the German farmers of Bucks, Northampton, and Montgomery counties in Pennsylvania. Eventually, several hundred farmers took up arms under the leadership of John Fries. At Bethlehem, Pa., Fries and his men forced, by intimidation rather than by actual violence, the release of a group of tax resisters who had been imprisoned under the custody of the federal marshal.

In response, President Adams called out a group of federal troops and militia, who marched into the rebellious counties and began making wholesale arrests of the insurgents. John Fries was captured and subsequently tried twice, convicted of treason on each occasion, and sentenced to hang. He was pardoned by Adams in April 1800, when the president declared a general amnesty for all those who had been involved in the "rebellion."

frieze, in Greco-Roman classical architecture, the middle of the three main divisions of an entablature (section resting on the capital). The frieze is above the architrave and below the cornice. The term also refers to any long, narrow, horizontal panel or band used for decorative purposes—*e.g.,* on pottery, on the walls of a room, or on the exterior walls of buildings.

The frieze in buildings using the classical Doric order (*see* order) is usually composed of alternate triglyphs (projecting rectangular blocks, each ornamented with three vertical channels) and metopes (spaces). In buildings using the Ionic, Corinthian, or Composite orders, the frieze is ornamented with relief figures, as in the treasury of the Cnidians at Delphi (early 5th century BC) or the choragic monument of Lysicrates at Athens (310 BC). In Roman buildings the frieze is decorated with plant motifs such as anthemions, acanthus foliage, or garlands. In late Roman and in many Renaissance structures the profile of the frieze is a convex curve and is known as a pulvinated frieze.

The most famous of decorative friezes is undoubtedly that carved on the top of the outer wall of the cella of the Parthenon, just under the ceiling of the portico. This frieze, which is 40 inches (101 cm) high and 525 feet (160 m) long, bears a representation of the ritual procession of the Panathenaic festival and is characterized by superb rhythmic design and faultless execution. It is a perfect expression of Greek sculpture of the mid-5th century BC and is the most famous example of classical architectural sculpture.



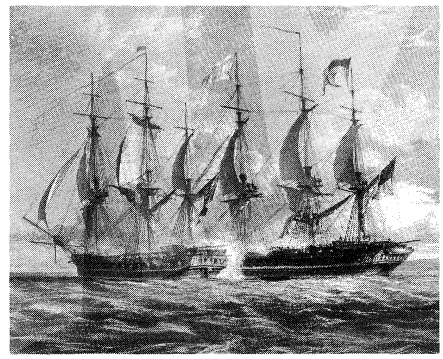
Ionic order frieze, east facade of the Temple of Athena Nike, the Acropolis, Athens, designed by Mnesicles, 5th century BC

By courtesy of the Deutsches Archaologisches Institut, Athens

frigate, either of two different types of warships, of the 17th through the 19th centuries and of World War II and after.

The Seven Years' War (1756–63) marked the definite adoption of the term frigate for a class of vessel that was smaller than the three-decked ship but was still capable of considerable firepower. A frigate was a three-masted, fully rigged vessel, with its armament carried on a single gun deck and with additional guns on the poop and forecastle. The number of guns varied between 24 and 56, but 30 to 40 guns were common. Frigates could not stand up to ships of the line in fleet engagements, but, sailing at greater speed, they served as scouts or as escorts protecting merchant convoys from privateers and enemy raiders; they also cruised the seas as merchant raiders themselves. With the transition from sail to steam the term frigate gradually gave way to cruiser.

During World War II, Great Britain revived the name frigate by assigning it to a small escort ship used to guard convoys from submarines.



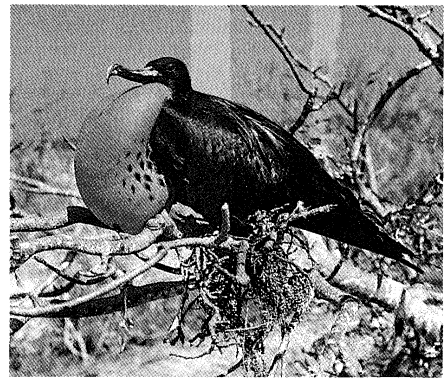
Battle between the frigates HMS *Shannon* and USS *Chesapeake* off Boston during the War of 1812; detail of a lithograph by J.C. Schetky

The National Maritime Museum, London

This vessel displaced about 1,500 tons, was capable of 20 knots, and was equipped with asdic, or sonar, and depth charges. In the postwar decades, the frigate also adopted an antiaircraft role, adding radar and surface-to-air missiles to its antisubmarine gear. Many frigates now carry helicopters to aid in submarine hunting. Such a vessel displaces upward of 3,000 tons, has a top speed of 30 knots or more and carries a crew of about 200.

For three decades after World War II, the U.S. Navy applied the term frigate to a type of escort ship that was somewhat larger than a destroyer. In 1975 these ships were reclassified as cruisers and destroyers, and the United States then used frigate in the same sense as most other navies.

frigate bird, also called MAN-O'-WAR BIRD, any member of five species of large seabirds



Great frigate bird (*Fregata minor*)

Jen and Des Bartlett—Bruce Coleman Inc./EB Inc.

constituting the family Fregatidae (order Pelecaniformes). Frigate birds are about the size of a hen and have extremely long, slender wings, the span of which may reach to about 2.3 m (nearly 8 feet), and a long, deeply forked tail. In general, adult males are all black, and adult females are marked with white below. The birds have a bare-skinned throat pouch, which in courting males becomes bright red and is inflated, for display purposes, to the size of a person's head. Other distinguishing characteristics are the almost helpless tiny feet with four webbed toes, and a long hooked bill that is used in attacking and robbing other seabirds of their fish.

The frigate bird is perhaps the most aerial of all birds except the swift and alights only to sleep or to tend its nest. The adult, with insufficient preening oil to waterproof its plumage, never willingly alights on the water, but it is unbelievably fast and skillful in the air, soaring effortlessly and often diving to recover falling fish dropped aloft by panic-stricken boobies or other seabirds. It also courses low over the water to seize fish.

Found throughout the world along tropical and semitropical coasts and islands, the frigate bird usually keeps within 100 miles (160 km) of land, to which it must return to roost. It breeds in crowded colonies on islands. Both parents incubate the single white egg.

The largest species (to about 115 cm [45 inches]) is the magnificent frigate bird, *Fregata magnificens,* found on both coasts of America, the Caribbean Sea, and Cape Verde. The great and lesser frigate birds, *F. minor* and *F. ariel,* breed on islands worldwide.

Frigg, also called FRIIA, in Norse mythology, the wife of Odin and mother of Balder. She was a promoter of marriage and of fertility. In Icelandic stories, she tried to save her son's life but failed. Some myths depict her as the weeping and loving mother, while others stress her loose morals. Frigg was known also to other Germanic peoples, as Frija (in German) and Frea; her name survives in English in the word Friday.

frigidity, in psychology, the inability of a woman to attain orgasm during sexual intercourse. In popular, nonmedical usage the word has been used traditionally to describe a variety of behaviours, ranging from general coldness of manner or lack of interest in physical affection to aversion to the act of sexual intercourse. Because of the derogatory connotations that have become

associated with the term frigidity, it has been replaced in the vocabulary of sex therapists by the general term hypogyneismus, the inability of a woman to obtain sexual satisfaction under otherwise appropriate circumstances.

The lay term frigidity encompasses three distinct problems recognized by sex therapists: inability to experience a sexual response of any kind; ability to achieve sexual arousal only with great difficulty (hyposexuality); and the inability to achieve orgasm (anorgasmia). Failure of sexual response in females—as in males—may have specific physical sources; such is the case of women who experience vaginal spasms (vaginismus) or pain (dyspareunia) during attempted intercourse. Likewise, female sexual response may be impaired by purely psychological causes, triggered by emotional conflicts outside the sexual relationship or by anxiety and other stresses within the relationship. *See also* sexual dysfunction.

Friis, Johan (b. Feb. 20, 1494, Lundbygaard, Swed.—d. Dec. 5, 1570, Køge, Den.), Danish statesman who, as chancellor under Christian III, king of Denmark and Norway, helped to establish the Lutheran Church as the state church in Denmark and to reform the state and local administrations.

Friis served as secretary at the court of King Frederick I and became successor-designate to the chancellor. When a civil war (the Count's War; 1533–36) broke out over the succession to the throne following Frederick's death (1533), Friis tried to persuade the nobles of

Friis, detail from an oil painting by Jakob Binck, 1551

By courtesy of the Nationalhistoriske Museum paa Frederiksborg, Denmark

Fyn province to join their Jutland colleagues in supporting the claims of Frederick's eldest son, Christian III. He was taken prisoner by forces supporting the deposed (1523) king Christian II but escaped and rejoined Christian III in 1535.

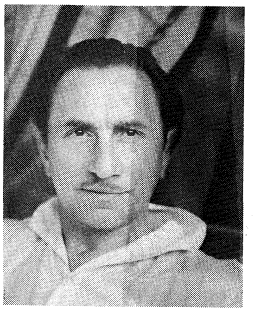
After Christian III's assumption of power in 1536, Friis became the King's principal adviser, helping to carry out his religious and administrative reforms. Friis directly supervised the confiscation of Catholic church property, which helped Christian reduce his war debt.

The growing influence of Friis and the Rigsråd (state council) caused the King to declare war on the emperor Charles V (who wanted to place the daughters of Christian II on the Scandinavian thrones). The war was resolved by the Diet of Speyer (1544), a settlement favourable to Denmark. Friis also overcame objections of the Holstein nobility in 1544 when he divided Schleswig and Holstein among the King and his younger brothers.

Friis inspired Danish nobles to enter careers of public service and was also a great patron of the arts. He sponsored continuation and translation of the work of the 12th- and 13th-century Danish historian Saxo Grammaticus and introduced Renaissance architecture to Denmark in the building of his own houses. He was disappointed by the outbreak of the Seven Years' War of the North (1563), believing that war could have been avoided if his advice to Christian III and to Christian's successor, Frederick II, to assert Danish power in Scandinavia had been heeded.

frilled lizard: *see* Chlamydosaurus.

Friml, (Charles) Rudolf (b. Dec. 7, 1879, Prague—d. Nov. 12, 1972, Hollywood), U.S.



Rudolf Friml, *c.* 1932

The Granger Collection, New York City

composer of operettas showing strong European musical influences and suggesting pre-World War I European lightheartedness.

After study under the Czech composer Antonín Dvořák at the Prague Conservatory, Friml served as piano accompanist for the violinist Jan Kubelík in Europe and the United States, where he remained from 1906. In 1912 he was hired to replace Victor Herbert as composer of an operetta proposed for the singer Emma Trentini. The result, *The Firefly* (book and lyrics by Otto Harbach), was highly successful. In the 1920s Friml achieved his greatest popularity. *Rose Marie* (1924; book and lyrics by Harbach and Oscar Hammerstein II), best remembered for the song "Indian Love Call," was followed in 1925 by *The Vagabond King* (book and lyrics by Brian Hooker and W.H. Post), with its popular songs "Only a Rose" and "Some Day," and in 1928 by *The Three Musketeers* (book and lyrics by Clifford Grey and P.G. Wodehouse). From 1934 Friml composed for motion pictures. His last important song, "The Donkey Serenade" (composed with Herbert Stothart; words by Chet Forrest and Bob White), was interpolated into a film version (1937) of *The Firefly.*

fringe, interference (physics): *see* interference fringe.

fringe benefit, any nonwage payment or benefit (*e.g.,* pension plans, profit-sharing programs, vacation pay, and company-paid life, health, and unemployment insurance programs) granted to employees by employers. They may be required by law, granted unilaterally by employers, or obtained through collective bargaining. Employers' payments for fringe benefits are included in employee-compensation costs and therefore are not usually liable to corporate income tax. If the cost of fringe benefits were paid directly as wages, the worker would pay personal income tax on this amount and therefore have less to spend on such benefits as he might elect to furnish for himself. Thus, the employer can obtain more benefits for the employee with the same amount of money. He can also take advantage of lower group rates for insurance.

Fringe benefits have generally constituted a higher proportion of total employee compensation in Europe than in the United States. In Europe they are most often the result of legislation, whereas in the United States collective bargaining has been more important in gaining such benefits for workers. The prevalence of fringe-benefit programs increased sharply during World War II because controls on this type of compensation were less stringent than controls on wages.

fringe moss, any of the plants of the genus *Grimmia* (order Bryales), which includes several hundred species distributed throughout the world, primarily on rocks or stone walls. A few species grow on roofs or in streams; *G. maritima* forms cushions up to four centimetres (1½ inches) tall on rocks along seashores. Nearly 50 species of *Grimmia* are native to North America, and about 30 are found in Great Britain. Most fringe mosses are one to three centimetres tall and have blackish-green, lance-shaped phyllids (leaves) about two millimetres (1/12 inch) long, which are sometimes tipped with a white hair.

fringe tree, either of two tree species constituting the genus *Chionanthus* in the family Oleaceae. They get their name from the long, fringy, snow-white flowers that cover the trees in spring. The flowers hang in clusters of about the same length as the leaves and have four narrow petals.

The dark-blue fruits are oval. *C. virginicus,* from southeastern North America, reaches

Fringe tree (*Chionanthus virginicus*)

Gilbert L. Twiest

about 10 metres (33 feet). *C. retusus,* from China, seldom reaches 6 m.

Fringillidae, songbird family, order Passeriformes, sometimes collectively termed New World seedeaters. The group includes grosbeaks, cardinals, longspurs, Galápagos finches, New World sparrows, and Old World buntings. The relationships of seed-eating birds are the subject of great disagreement, many authorities preferring to place certain of these groups in the family Emberizidae (*q.v.*), with a somewhat different family composition.

fringing reef, a coral reef (*q.v.*) consisting of a sea-level flat built out from the shore of an island or continent.

Frio, Cape, Portuguese CABO FRIO, promontory on Brazil's southeast Atlantic coast, Rio de Janeiro state, 70 mi (113 km) east of the city of Rio de Janeiro. Discovered in 1503 by Amerigo Vespucci, the cape became a 16th-century pirate stronghold and now is the site of the towns of Cabo Frio and Arraial do Cabo. The cape attracts tourists for its good weather and the nearby São Mateus Fort, built by the French.

Frioul, Géraud-Christophe-Michel Duroc, duc de (duke of): *see* Duroc, Géraud-Christophe-Michel.

Frisch, Frank, byname of FRANK FRANCIS FRISCH, also called THE FORDHAM FLASH (b. Sept. 9, 1898, Queens, New York City—d. March 12, 1973, Wilmington, Del., U.S.), U.S. professional National League baseball player and manager, who played in 50 World Series games and was on four pennant winners with the New York Giants (1919–26) and four with the St. Louis Cardinals (1927–37).

Frisch played baseball, football, and basketball at Fordham University (New York City) and after graduating went directly to the Giants in 1919. He played the infield, mainly at second base, through the 1926 season and was then traded to the St. Louis Cardinals, where

he played at second and third base through the 1937 season and also managed (1933–38). He hit for an average of .300 or more in 13 of his 19 seasons. He was a switch hitter (batting right- and left-handed) and a very good base runner. He threw right-handed. He led the league in stolen bases for three seasons (1921 [49], 1927 [48], 1931 [28]). His career batting average was .316. He later managed the Pittsburgh Pirates (1940–46) and the Chicago Cubs (1949–51). He was a radio sports broadcaster in the 1940s and a radio and television broadcaster in New York City in the 1950s. He was voted into the Baseball Hall of Fame in 1947.

Frisch, Karl von (b. Nov. 20, 1886, Vienna—d. June 12, 1982, Munich), zoologist whose studies of communication among bees added significantly to the knowledge of the chemical and visual sensors of insects. He shared the 1973 Nobel Prize for Physiology or Medicine with animal behaviourists Konrad Lorenz and Nikolaas Tinbergen.

Frisch received a Ph.D. from the University of Munich in 1910. He was appointed director of the Zoological Institution of the University of Rostock in 1921, and in 1923 he accepted a similar position at the University of Breslau. In 1925 Frisch returned to the University of Munich, where he established the Zoological Institution. When this institution was destroyed during World War II, he joined the staff of the University of Graz in Austria, but he returned to Munich in 1950, remaining there until his retirement in 1958.

About 1910 Frisch initiated a study that proved fishes could distinguish colour and brightness differences. He also later proved that auditory acuity and sound-distinguishing ability in fishes is superior to that in man.

Frisch is best known for his studies of bees, however. In 1919 he demonstrated that they can be trained to distinguish between various tastes and odours. He found that while their sense of smell is similar to that of man, their sense of taste is not as highly developed. He also observed that it is not limited to the quality of sweetness. He found that bees communicate the distance and direction of a food supply to other members of the colony by two types of rhythmic movements or dances: circling and wagging. The circling dance indicates that food is within 75 metres (about 250 feet) of the hive, while the wagging dance indicates a greater distance.

In 1949 Frisch established that bees, through their perception of polarized light, use the Sun as a compass. He also found that they are capable of using this method of orientation when the Sun is not visible, apparently remembering patterns of polarization presented by the sky at different times of the day and the location of previously encountered landmarks.

Frisch, Max (Rudolf) (b. May 15, 1911, Zürich), internationally known German-Swiss dramatist and novelist, noted for his Expressionist depictions of the moral dilemmas of 20th-century life.

In 1933 Frisch withdrew from the University of Zürich, where he had studied German literature, and became a newspaper correspondent. After touring southern and eastern Europe from 1934 to 1936, he returned to Zürich, where he studied architecture. Frisch worked as an architect after service in the Swiss Army during World War II. He abandoned architecture in 1955 to devote himself full-time to writing.

Frisch's play *Santa Cruz* (first performed 1946) established the central theme found throughout his subsequent works: the predicament of the complicated, skeptical individual in modern society. One of Frisch's earliest dramas is the morality play *Nun singen sie wieder* (1945; "Now They Sing Again"), in which Surrealistic tableaux reveal the effects caused by hostages being assassinated by German Nazis. His other historical melodramas include *Die chinesische Mauer* (1946; *The Chinese Wall*) and the bleak *Als der Krieg zu Ende war* (1949; "When the War Was Over"). Reality and dream are used to depict the terrorist fantasies of a responsible government prosecutor in *Graf Öderland* (1951; *Count Oederland*), while *Don Juan oder die Liebe zur Geometrie* (1953; *Don Juan, or The Love of Geometry*) is a reinterpretation of the legend of the famous lover of that name. In his powerful parable play *Biedermann und die Brandstifter* (1958; *The Firebugs*), arsonists invade the house of the self-righteous philistine Biedermann, who allows them to burn his world rather than reveal his real self. Frisch's later plays include *Andorra* (1962), about the destructiveness of anti-Semitic prejudice, and *Biografie* (published 1967; *Biography*), which deals with social relationships and their limitations.

Frisch's novels *Stiller* (1954; *I'm Not Stiller*), *Homo Faber* (1957), and *Mein Name sei Gantenbein* (1964; *A Wilderness of Mirrors*) are concerned with the uncertainties of modern intellectuals and the utter failure confronting those desiring to change their identity or pattern of living. His autobiographical works include two diaries, *Tagebuch 1946–1949* (1965; *Sketchbook 1946–1949*) and *Tagebuch 1966–1971* (1972; *Sketchbook 1966–1971*). His later novels include *Montauk: Eine Erzählung* (1975) and *Der Mensch erscheint im Holozän* (1979; *Man in the Holocene*).

Frisch, Otto Robert (b. Oct. 1, 1904, Vienna—d. Sept 22, 1979, Cambridge, Cambridgeshire, Eng.), physicist who, with his aunt Lise Meitner, described the division of neutron-bombarded uranium into lighter elements and named the process fission (1939). At the time, Meitner was working in Stockholm and Frisch at Copenhagen under Niels Bohr, who brought their observation to the attention of Albert Einstein and others in the United States.

After receiving his doctorate at Vienna (1926), Frisch, with Otto Stern and Immanuel Estermann, measured the magnetic moment of the proton (1933). During World War II he was engaged in atomic research at Los Alamos, N.M. From 1947 he taught at Cambridge and directed the nuclear physics department of the Cavendish Laboratory. His books include *Atomic Physics Today* (1961).

Frisch, Ragnar (Anton Kittil) (b. March 1895, Oslo—d. Jan. 31, 1973, Oslo), pioneer Norwegian econometrician and economist who was a joint winner (with Jan Tinbergen) of the 1969 Nobel Prize for Economics.

Frisch was educated at the University of Oslo, obtaining his Ph.D. in 1926. He was appointed to a specially created professorship at Oslo in 1931, a post he held until his retirement in 1965. Frisch was a pioneer of econometrics—the application of mathematical models in association with statistical techniques to economic data—and is credited with inventing the term. He was one of the founders of the Econometric Society and, for 21 years, editor of *Econometrica.*

Frisch is particularly famous for the development of large econometric modeling linked with economic planning and the associated national income accounting. In this connection he was also influential in the introduction of economics graduates into key civil service positions. Frisch developed a dynamic theory dealing with the adjustment of economic systems to disequilibrium. His analysis of the trade cycle originated from his conflict with John Maurice Clark on the operation of the accelerator (induced investment) in the trade cycle. He later contributed to trade cycle theory by his proposal combining a regular cycle with random shocks. Frisch also made contributions to statistical theory, with the aim of making economics operational, dealing particularly with the problems of multicolinearity, identification, and index numbers. His concern with operationality also led him to reformulate demand theory.

Frisches Haff (Gulf of Danzig): *see* Vistula Lagoon.

Frischlin, Philipp Nikodemus (b. Sept. 22, 1547, Balingen, Württemberg—d. Nov. 29/30, 1590, Hohenurach, near Reutlingen), German philologist, poet, and commentator on Virgil; he was one of the last of the Renaissance Humanists.

Frischlin was educated at the University of Tübingen, where he became (1568) professor of poetry and history. In 1575, for his comedy *Rebecca,* which he read at Regensburg before the emperor Maximilian II, he was rewarded with the laureateship, and in 1577 he was made a count palatine.

In 1582 Frischlin had to leave Tübingen, and he spent two years teaching at Laibach. Shortly after his return to Tübingen in 1585, he was threatened with a criminal prosecution for immoral conduct and fled to Frankfurt am Main (1587). For 18 months he taught in Brunswick, and he appears also to have lived at Strasbourg, Marburg, and Mainz. From Mainz he wrote libelous letters, which led to his arrest in March 1590. He was imprisoned in the fortress of Hohenurach, where, on the night of Nov. 29–30, 1590, he was killed in a fall while attempting to let himself down from the window of his cell.

In his Latin verse Frischlin often successfully imitated classical models. His Latin comedies have freshness and vivacity, and his commentaries on the *Georgics* and *Bucolics* of Virgil were important contributions to the scholarship of his time. He also wrote plays in German.

Frisco (U.S.): *see* San Francisco.

Frisco, The: *see* Saint Louis-San Francisco Railway Company.

Frisi, Paolo (b. April 13, 1728, Milan—d. Nov. 22, 1784, Milan), Italian mathematician, astronomer, and physicist who is best known for his work in hydraulics. His most significant contributions to science, however, were in the compilation, interpretation, and dissemination of the work of other scientists.

Frisi was a member of the Barnabite religious order, a professor at the University of Milan, and a member of most of the major scientific societies of his time. He was held in such esteem by his contemporaries that plans for nearly all the major hydraulic works constructed in northern Italy during his adult life were first shown to him for his inspection. His major work on hydraulics, *Del modo di regolare i fiumi, e i torrenti* (1762; *A Treatise on Rivers and Torrents,* 1818), a summary of the best information in this field, was widely used as an engineering handbook. The commentaries he wrote on the work of such scientists as Galileo Galilei and Sir Isaac Newton were influential in bringing their ideas to the attention of a wide audience.

Frisia, historic region of The Netherlands and Germany fronting the North Sea and including the Frisian Islands. Divided since 1815 into Friesland, a province of The Netherlands, and the Ostfriesland and Nordfriesland regions of northwestern Germany, Frisia is the traditional homeland of the Frisians, a Germanic people who speak a language closely related to English.

A brief treatment of Frisia follows. For full treatment, *see* MACROPAEDIA: Low Countries.

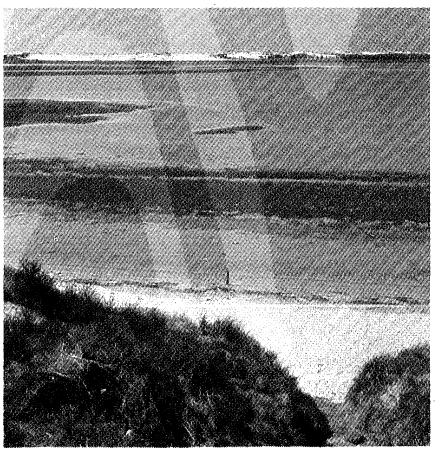
In prehistoric times of uncertain date, the tribal Frisians migrated to the North Sea coastal region between the mouth of the Rhine

River (at Katwijk, north of The Hague) and the mouth of the Ems and ousted the resident Celts. From the 1st to the 5th century AD, they were more or less tributary to the Romans; Frisia was then infiltrated by Angles and Saxons on their way to England and subsequently conquered by the Franks under Charlemagne, who converted the Frisians to Christianity. In subsequent centuries their territory was divided; in the 16th century the western Frisians joined the union that was to become The Netherlands. During the Reformation the Frisians became Protestants.

In modern times the Frisian people have become most famous for their cattle (records from as early as the 1st century BC suggest considerable cattle raising); they also engage in other agriculture. Traditionally, they were also a seafaring and commercial people and had one of the largest textile industries of medieval northwestern Europe. Although the Frisian language appeared for a time to be losing currency, it has experienced a resurgence in recent years; it has been recognized as an official language of The Netherlands and is taught in primary schools throughout the province of Friesland.

Frisian carving, lightly carved ornamentation on furniture made by the Pennsylvania Germans, whose emigration from Hanoverian Friesland to colonial America began in the 17th century. Coming from one of the richest folk cultures in Europe, they attempted to retain both their identity and their traditions by transmitting folk emblems to their new surroundings in this way. Popular motifs were crowned kings, stags and other animals of the chase, stylized lilies, and pairs of unicorns confronting each other.

Frisian Islands, low-lying chain of islands from 3 to 20 miles (5 to 32 km) off the northern European mainland, extending in an arc from near the port of Den Helder (northwestern Netherlands), eastward along the Dutch and German coasts as far as the Elbe River,



Coastline of Texel Island near DeSlufter in the Frisian Islands

P.R. Johanson—Ostman Agency

and turning sharply north along the coast of Schleswig-Holstein (Germany) and the southern part of the Jutland Peninsula coast (Denmark). Although they form a single physical feature, it is customary to subdivide them into the West, East, and North Frisian Islands. After the North Sea established a southwestern outlet to the Atlantic about 7,000–5,000 BC, its southeasterly shore probably coincided with the present curve of the Frisians. Periodic subsidence, storms, and flooding have produced this long chain of islands separated from the mainland by the narrow belt of shallow waters and tidal mud flats generally called *wadden* in Dutch (German *Watten*).

Not surprisingly, many Frisian legends and folk songs tell of drowned villages. The Dutch and German governments have spent large sums not only to protect their seaward coasts but also to reclaim the land from the *wadden* for farming. Fishing, sheep and cattle raising, and rye, oat, and potato growing are the main occupations in most islands; the sandy beaches and resorts attract many tourists.

The West Frisian Islands (Dutch Friese Eilanden), belonging to The Netherlands, include from west to east the inhabited islands of Texel, Vlieland, Terschelling, Ameland, and Schiermonnikoog and the virtually uninhabited group of Simonszand, Boschplaat, Rottumerplaat, and Rottumeroog (Rottum). Extending southeast from the coastal dunes, Texel has an extensive area of polder (land previously under water) reclaimed from Wadden Sea. Very small polder areas also exist in Terschelling, Ameland, and Schiermonnikoog. Eierland in north Texel is partly a nature reserve in which thousands of seabirds nest. Scattered farmsteads with a few villages are typical of the five main islands.

The East Frisian Islands (German Ostfriesische Inseln) belong to Germany and extend from the Ems River estuary eastward to Jade Channel, the outer part of Jade Bay, with two small islands, Scharhörn and Neuwerk, lying near the estuary of the Elbe River. Smaller than most of the West Frisian group, the main islands from west to east are Borkum, Juist, Norderney, Baltrum, Langeoog, Spiekeroog, and Wangerooge, which have scattered farmsteads and small villages. Scharhörn is uninhabited, whereas Neuwerk has only lighthouse keepers and lifeboat crews. In summer, tourists visit the main islands, and Nordseebad Borkum and Norderney (towns) are popular resorts. Holiday steamers ply the islands' sheltered south coasts, many of which have light railways to carry visitors inland.

The North Frisian Islands (German Nordfriesische Inseln) are divided between Germany and Denmark. Apart from the rocky red sandstone island of Helgoland that stands aloof both in location and geologically, the North Frisian Islands run from Trischen, north of the Elbe estuary, northward along the coasts of Schleswig-Holstein and the Jutland Peninsula to Fanø, near the Danish port of Esbjerg. Until 1634 the present German islands of Nordstrand, Nordstrandischmoor, and Pellworm were part of one large island. A similar situation exists farther north with the German islands of Hooge, Nordmarsch-Langeness, Amrum, Föhr, and Sylt. Still north of these lie the Danish islands of Rømø, Manø, and, lastly, Fanø. Rømø and Sylt are connected to the mainland by long embankments, and the entire group underwent extensive land reclamation in the 1970s.

Frisian language, Frisian FRIESISCH, the West Germanic language most closely related to English. Although Frisian was formerly spoken from what is now the province of Noord-Holland (North Holland) in The Netherlands along the North Sea coastal area to modern German Schleswig, including the offshore islands in this area, modern Frisian is spoken in only three small remaining areas, each with its own dialect. These dialects are West Frisian, which is spoken in the province of Friesland in The Netherlands, including the islands of Schiermonnikoog and Terschelling; East Frisian, which is spoken in the Saterland west of Oldenburg, Ger.; and North Frisian, which is spoken along the west coast of Schleswig in Germany and on the offshore islands of Sylt, Föhr, Amrum, the Halligen Islands, and Helgoland.

Written records date from the end of the 13th century and are in Old Frisian, a stage of the language that lasted until the late 16th century. Old Frisian shows all the features that distinguish English and Frisian from the other Germanic languages.

Although Frisian was hardly used at all as a written language for about 300 years after the end of the Old Frisian period, there has been a revival in modern times in the West Frisian area. The language is now used in the schools and courts in the province of Friesland and is acknowledged as an official language by the government of The Netherlands. There is also a Frisian Academy. East and North Frisian are being gradually supplanted by German.

Frisian literature, the literature that is written in West Frisian, a language closely related to Old English, and now spoken primarily by the inhabitants of Friesland, a northern province of The Netherlands. (The languages known as East Frisian and North Frisian made little contribution to Frisian literature. *See* Frisian language.)

Frisian literature, as it is known today, began with Gysbert Japicx (also spelled Japiks; 1603–66) in the 17th century. Friesland's incorporation into the Dutch Republic in 1581 threatened to reduce Frisian to a mere peasant dialect. Japicx, however, through his *Friesche Rymlerye* (1668; "Frisian Verse") and other works proved the richness and versatility of the language and saved it from potential extinction.

It was not until the Romantic period of the 19th century, however, that Frisian literature as a national literature began to flourish. Harmen Sytstra wrote of the heroic past in old Germanic verse forms. Eeltsje Halbertsma contributed much popular poetry and stimulated the rise of a rich folk literature in the second half of the 19th century.

In the 20th century Douwe Kalma launched the Young Frisian Movement in 1915 and challenged younger writers to radically break with the provincialism and didacticism of past Frisian literature. This break had been anticipated in the splendid lyrical poetry and fiction of Simke Kloosterman, the psychological narratives of Reinder Brolsma and plays of R.W. Canne, the intensely personal and artful verse of Rixt (H.A. van Dorssen), and the unpretentious but often penetrating poetry of Obe Postma. Kalma himself made distinguished contributions to poetry, drama, translation, and literary history and criticism. Others who followed Kalma's call toward a more esthetic and universal expression of the Frisian voice, without succumbing to mere estheticism, included R.P. Sybesma, an excellent sonneteer; Fedde Schurer, a versatile artist and for decades the most widely read writer in Friesland; Douwe Tamminga, who chiseled the virile idiom of the people into durable poetic art; and such talented fictionists as Ulbe van Houten and Nyckle J. Haisma, whose themes included the probing of moral conflicts and problems of alienation.

The literature since World War II has largely broken away from the national movement and many traditional conventions, especially through Anne Wadman's leadership as critic, essayist, and novelist. Much of the poetry and fiction reflects the larger western European community of writers in themes and techniques. Especially impressive among the poets have been Sjoerd Spanninga, Jan Wybenga, G.N. Visser, and Tiny Mulder, while such novelists as Trinus Riemersma, Durk van der Ploeg, R.R. van der Leest, Ype Poortinga, and Rink van der Velde fused contemporary existential concerns with literary craftsmanship.

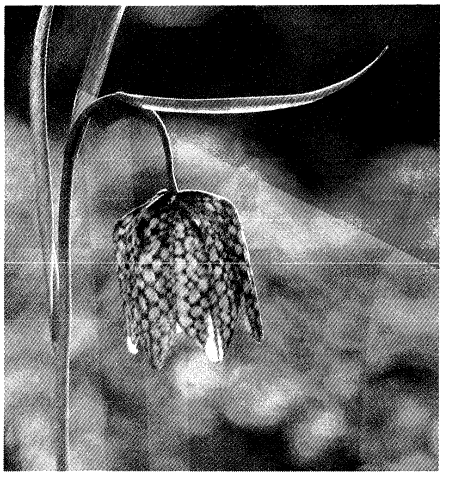
frit fly, also called CHLOROPID FLY, any small fly of the family Chloropidae (order Diptera), destructive to oats, rye, barley, wheat, and other cereal grains. Frit flies, often bright yellow and black, are usually found in grassy areas. The larvae live in developing grain heads and within stems, causing the central leaf to wilt. Some frit flies are carriers of conjunctivitis and yaws. They breed in decaying vegeta-

tion and excrement and feed on pus, blood, and other animal fluids. Because some frit flies (for example, *Hippelates*) are attracted to the eyes, they are called eye gnats.

Frith, William Powell (b. Jan. 9, 1819, Aldfield, Yorkshire, Eng.—d. Nov. 2, 1909, London), English painter famous for his crowded scenes of contemporary English life, executed with a preciseness of technique akin to that of the Pre-Raphaelites.

Frith entered the Royal Academy school in 1837, and in 1840 he exhibited there his first picture, "Malvolio Before the Countess Olivia." He quickly gained wide popularity. Elected associate of the Royal Academy in 1845 and a member in 1852, he established his reputation with a succession of large compositions of everyday English life, the first of which, "Ramsgate Sands" (exhibited 1854), was bought by Queen Victoria. His most memorable works of the period include "The Derby Day" (1858) and "The Railway Station" (1862). Frith later turned to moralizing works exemplified by a series of five paintings under the general title "The Race for Wealth" (1880).

fritillary, any ornamental plant of the genus *Fritillaria* of the family Liliaceae, consisting of about 80 species of bulbous, mostly perennial



Snake's head (*Fritillaria meleagris*)
Ingmar Holmasen

herbs, native primarily to the North Temperate Zone. Members of the genus have bell-shaped, nodding flowers that usually are solitary. The leaves alternate along the stem or are in whorls. A nectar gland is present at the base of each of the six parts of the flower.

In many species the flower has a checkered appearance. The fruit is a three-valved capsule with many seeds. Snake's head, or toad lily (*F. meleagris*), a species with poisonous bulbs, and crown imperial (*F. imperialis*), a strong-smelling plant, are commonly cultivated as garden flowers.

fritter, any of three types of fried foods. Plain fritters are deep-fried cakes of chou paste or a yeast dough. In a second type bits of meat, seafood, vegetables, or fruit are coated with a batter and deep fried. Small cakes of chopped food in batter, such as corn fritters in the southern United States, are also called fritters.

Fritters are found in many cuisines. The French *beignets,* Italian *bigne,* and Greek *loukoumades* are sweet cakes of the first type of fritter. The batter-frying technique was introduced into Japan by the Portuguese and Spanish in the late 16th century; the tempura that developed, a mixed fry of shrimps, herbs, and vegetables, has been totally incorporated into the cuisine. The Indian *pakora* is a savoury deep-fried cake containing bits of cauliflower, eggplant, or other vegetables. *Fritto misto* is an Italian dish of bits of meat, seafood, and vegetables dipped in batter and fried in olive oil. A specialty dish of various local cuisines is the flower fritter, using daylilies, roses, violets, acacia, elder blow, and squash blossoms.

Fritzsche, Hans (b. 1899, Dresden, Ger.—d. Sept. 27, 1953, Cologne), German journalist and broadcaster, a member of the Nazi propaganda ministry, whose nightly commentaries on Nazi radio throughout World War II climaxed in his broadcast of the news of Hitler's suicide.

After attending the universities of Würzburg and Leipzig, he began practicing law. After World War I he joined the virulently anti-British and jingoistic Young Conservative movement and eventually, in 1929, joined the Nazi Party. He became a member of the *Sturmabteilung* (SA; "Storm Troopers") the following year and served mostly in his native Saxony and in Thuringia.

Fritzsche started broadcasting in September 1932 with a daily program called "Hans Fritzsche Speaks." That same year he was named head of the Wireless News services, a government agency. The agency was incorporated into Joseph Goebbels' propaganda ministry on May 1, 1933, and Fritzsche became head of the press division of the ministry in 1938. By November 1942 he had become chief of the ministry's radio division. Throughout his association with the propaganda ministry Fritzsche was subordinate to Goebbels and had no hand in formulation of policy. Captured in Berlin by Soviet troops in May 1945, he was indicted at Nürnberg but was found not guilty under the terms of the indictment. Shortly after, a German court tried and sentenced him to nine years' imprisonment. He was released in 1950 and died three years later of cancer.

Friuli-Venezia Giulia, *regione* of northeastern Italy, bordering north and east on Austria and Yugoslavia, south on the Adriatic Sea, and west on Veneto *regione;* it has an area of 3,030 square miles (7,847 square km) and comprises the *provincias* of Udine, Pordenone, Gorizia, and Trieste. In the north the solid wall of the Carnine Alps, broken only by the Plöcken Pass (Passo di Monte Croce) and the low Tarvisio saddle, form a spectacular backdrop to the Tagliamento River Valley, the heart of Friuli. The southern part of the *regione* is a low coastal plain, some of it occupied by the shallow lagoons of Grado and Caorle. To the southeast, that part of the former Free Territory of Trieste that is now an integral part of Italy extends as a narrow corridor between the Karst (Carso) limestone plateau and the Adriatic Sea, as far as the city of Trieste.

Known in Roman times as the Julian region, the area was divided after the barbarian invasions into a coastal part (dominated by the Byzantines through the city and port of Grado) and an inland zone ruled by the dukes of Friuli and the counts of Gorizia. The rise of the Roman Catholic patriarchate of Aquileia to prominence in the 11th century brought Friuli and the Istrian Peninsula, as well as the seacoast, under the control of this ecclesiastical sovereignty.

The period of Aquileian hegemony ended when Venice became the great power in northeastern Italy (1420) and shared its dominion over the region with Austria (at Gorizia and Trieste). After 1815 all Venezia Giulia and Friuli fell under Habsburg rule, Udine *provincia* (including Pordenone) becoming part of Italy in 1866; the rest of the *regione* (including much of what is now Yugoslavia) was added in 1918. After World War II the Istrian Peninsula, the hinterland of Trieste, and the Karst plateau became part of Yugoslavia, while Trieste and the area surrounding it became a free territory divided into northern and southern (A and B) zones under U.S.–British and Yugoslavian administration, respectively. Udine *provincia* was detached from Veneto and united with Gorizia *provincia* to form Friuli-Venezia Giulia. The London agreement of 1954 restored the city of Trieste and part of A zone to Italy, and the city became the *regione*'s capital. A statute of autonomy for the *regione* was passed on Jan. 31, 1963. The *provincia* of Pordenone was formed in 1968.

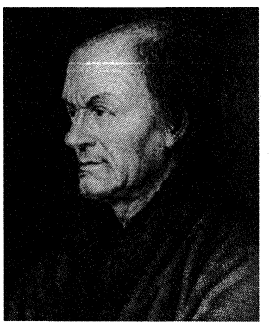
One of the poorer parts of Italy, the *regione* ranges in terrain from rocky uplands and infertile foothills in the north to arid or marshy lowlands in the south, where reclamation has shown little success and much of the land remains in subsistence farms.

The *regione* is one of Italy's most seismically active, as seen in a May 1976 earthquake centred north of Udine that killed more than 1,000 people. Rainfall in the north (the highest in Italy), however, favours the development of natural meadows for livestock; the ham and dairy products of Friuli are famous. Corn (maize) and some other cereals are grown in the valley of the Tagliamento, and there is market gardening around Udine. The larger cities, Udine, Pordenone, Gorizia, Monfalcone, and Trieste, have all experienced considerable industrial development, and Trieste is one of Italy's great ports, although its trade is smaller than it was before 1914, when it served most of central Europe. The *regione* is connected by rail and road with Austria, Yugoslavia, Venice, and thence the rest of Italy. A Friulian separatist movement exists and periodically presses its demands for Friulian autonomy. Friulians represent about three-fifths of the *regione*'s population. Pop. (1987 est.) 1,214,557.

Fröbel, Friedrich (Wilhelm August): *see* Froebel, Friedrich (Wilhelm August).

Froben, Johann, also spelled JOHANNES FROBENIUS (b. *c.* 1460, Hammelburg, Franconia [Germany]—d. October 1527, Basel, Switz.), the most famous of the Basel scholar-printers, whose professional innovations revolutionized printing in Basel and whose publications included many outstanding works of scholarship.

Froben's first publication, a Latin Bible, appeared in 1491. Entering into partnership with Johann Petri (1496), Johann Amerbach (1500), and the bookseller Wolfgang Lachner, whose daughter Gertrud he married, Froben came to control four presses by 1515 and, later, seven. Froben's contributions to printing in



Froben, engraving by B. Hubner, 1795, after a painting by Hans Holbein the Younger
By courtesy of the Bibliotheque Nationale Suisse, Bern

Basel included popularizing roman type, introducing italic and Greek fonts, experimenting with smaller and cheaper books, and employing talented artists, including Hans Holbein, as illustrators. His correctors included many famous scholars who benefited from the proximity of the hitherto little-used manuscript collections of Alsace and the Palatinate.

About 250 of Froben's publications have

been listed. They include, notably, the first New Testament printed in Greek, with a Latin translation (1516) by Erasmus, who after 1513 entrusted the printing of all his works to Froben, and also the works of the Roman historian Velleius Paterculus (1520) and the Latin church father Tertullian (1521), both edited by Beatus Rhenanus.

Frobenius, (Ferdinand) Georg (b. Oct. 26, 1849, Berlin—d. Aug. 3, 1917, Berlin), German mathematician who made major contributions to group theory, especially the concept of abstract groups and the theory of finite groups of linear substitutions, that later found important uses in the theory of finite groups as it applies to quantum mechanics.

Frobenius became assistant professor of mathematics at the University of Berlin in 1874 and the following year was appointed professor of mathematics at the Federal Polytechnic, Zürich. In 1892 he returned to the University of Berlin as professor of mathematics.

Frobenius' findings in abstract group theory were published in the paper "Über Gruppen von vertauschbaren Elementen" (1879; "Concerning Groups of Permutable Elements"), in collaboration with Ludwig Stickelberger. In collaboration with Issai Schur, he developed group theory by means of the theory of finite groups of linear substitutions. Many of his results were published in such papers as "Über die Gruppencharaktere" (1896; "Concerning Group Characters"). He also contributed to the development of a means of solving linear homogenous differential equations.

Frobenius, Leo (Viktor) (b. June 29, 1873, Berlin—d. Aug. 9, 1938, Biganzolo, Italy), German explorer, ethnologist, and one of the originators of the culture-historical approach

Leo Frobenius
Bavaria-Verlag

to ethnology. He advanced a three-stage theory of cultural evolution and was a leading authority on prehistoric art.

Largely self-educated as a social scientist, Frobenius led 12 expeditions to Africa between 1904 and 1935 and explored centres of prehistoric art in the Alps, Norway, Spain, and northern and southern Africa. Early in his career he began addressing himself to the problem of comprehending the essence of culture. He hoped to be able to grasp the whole of human history by an understanding of the origin of culture, the laws governing it, and man's relation to it. Noting a widespread distribution of certain cultural elements, Frobenius attributed a common origin to the cultures of Oceania and West Africa. He advocated the idea of cultural diffusion and arranged areas of the same cultural distribution into what he called *Kulturkreise* (cultural clusters or cultural complexes), which he considered the starting point for further study of the nature of culture. This concept was further extended by Fritz Graebner.

Frobenius began examining the nature of culture in the first volume of his *Probleme der Kultur,* 4 vol. (1899–1901; "Problems of Culture"). Developing a view of culture as living in a biological sense, he characterized it as having stages of youth, maturity, and age. Frobenius wrote many articles and pamphlets and 60 books, including *Und Afrika sprach,* 3 vol. (1912–13; *The Voice of Africa*), and *Erlebte Erdteile,* 7 vol. (1925–29; "Parts of the Earth Experienced"). In 1932 he began teaching cultural anthropology at the University of Frankfurt am Main and from 1934 was director of the Municipal Museum of Ethnology, Frankfurt.

Froberger, Johann Jakob (b. May 18, 1616, Stuttgart, Württemberg [Germany]—d. May 7, 1667, Héricourt, Fr.), German composer, organist, and harpsichordist whose keyboard compositions are generally acknowledged to be among the richest and most attractive of the early Baroque era.

Froberger became a court organist in Vienna in 1637, but the same year he went to Rome to study under Girolamo Frescobaldi. After further employment at the Viennese court (1641–45 and 1653–57) he toured widely. He died while in the service of the duchess Sybille of Württemberg.

Froberger was the earliest important German composer for the harpsichord. His style represents an integration of international styles—the free-voiced style of the lute, the elegant, ornamented pieces of the French dance suites, the formal structure of Jan Pieterszoon Sweelinck's canzoni, the bold harmonies of the Italian composers—with the more austere style of German keyboard music. He was also the first German master of the keyboard suite. His suites show the influence of the Gaultiers, the French lutenists, and of the harpsichord compositions of Jacques Chambonnières. In manuscript they consisted of three movements, often with an interpolated gigue; in the posthumous publication of 1693 they were arranged in the order that became standard for the suite: allemande, courante, sarabande, and gigue. Although the suites are clearly for harpsichord or clavichord, in other works, such as the partitas, it is difficult to say whether the music was intended for harpsichord or organ. In his ricercari he provided two versions, one for each instrument. His canzoni for harpsichord and organ are composed in several sections bound together by a single theme. His powerful and imaginative toccatas and fantasias, composed for the organ, show the influence of Frescobaldi and were highly regarded by J.S. Bach.

Frobisher, Sir Martin (b. *c.* 1535, Yorkshire, Eng.—d. Nov. 22, 1594, Plymouth, Devon), English navigator and early explorer of Canada's northeast coast.

Frobisher sailed from England with three ships in 1576 in search of a Northwest Passage to the Pacific Ocean. He reached Labrador and Baffin Island and returned to England with reports of possible gold mines. On two further expeditions to the same area in 1577 and 1578, he discovered Hudson Bay but found no gold, and his attempts to establish a colony were unsuccessful. In 1585 Frobisher was vice admiral of Sir Francis Drake's expedition to the West Indies, and three years later he played a prominent part in the campaign against the Spanish Armada. In 1591 he commanded a squadron in the Azores that unsuccessfully sought to capture Spanish treasure ships. In 1594 Frobisher was mortally wounded fighting a Spanish force on the west coast of France.

Frobisher Bay, inlet of the North Atlantic extending northwestward from the southeastern tip of Baffin Island, Canada. The bay is about 150 miles (240 km) long and 20–40 miles (32–64 km) wide and has a maximum depth of 400 feet (120 m). It was discovered in 1576 by Sir Martin Frobisher, who believed it to be a strait. It was identified as a bay in 1860.

The town of Iqaluit (formerly Frobisher Bay) at the head of the bay is the headquarters of Baffin region, Northwest Territories, and the largest community in the eastern Arctic. Established as a trading post in 1914, it became an air base during World War II and later was the site of construction camps for the DEW (Distant Early Warning) line. It also has a radio-meteorological station. Iqaluit is an outlet for Eskimo art, and its Nunuuta Sunaqutangit Museum has Arctic displays. Pop. (1986) town, 2,947.

Boat on Frobisher Bay off Baffin Island
Shostal—EB Inc.

Fröding, Gustaf (b. Aug. 22, 1860, Alster, Värmland, Swed.—d. Feb. 8, 1911, Stockholm), lyrical poet who, by uniting colloquial language with a rich musical form, liberated Swedish verse from traditional patterns.

Born into a cultured and gifted family, Fröding studied at Uppsala University, 1880–83, and again in 1885, but did not take a degree. He worked for 10 years as a journalist at Karlstad, Värmland, though he spent long periods in sanatoriums for treatment of nervous disorders. Stimulated by the revolt against naturalism at the end of the 1880s, in 1891 he published his first collection of poems, *Guitarr och dragharmonika* (*Guitar and Concertina*). It was followed by *Nya dikter* (1894; "New Poems") and *Stänk och flikar* (1896; "Splashes and Rags"). These three volumes contain the essential Fröding. Passages in the last led to his prosecution for pornography, and, although he was acquitted, the experience was disastrous to a man so scrupulous and sensitive. He managed to publish two more small books of poems, *Nytt och Gammalt* (1897; "New and Old Pieces") and *Gralstänk* (1898; "Grail Splashes"), before his final breakdown. From 1898 to 1905 he was a patient in a mental hospital at Uppsala, and, although he recovered a measure of sanity, he never recovered his health. A collection of verse and prose, *Efterskörd,* was published in 1910, and a posthumous collection, *Reconvalescentia,* appeared in 1913. Fröding also wrote humorous dialect sketches, literary essays, newspaper causeries, and a short book on Robert Burns.

Fröding, 1896
By courtesy of Albert Bonniers Forlag, Stockholm

Froebel, Friedrich (Wilhelm August), Froebel also spelled FRÖBEL (b. April 21, 1782, Oberweissbach, Thuringia, Ernestine Saxony [Germany]—d. June 21, 1852, Marienthal, near Bad Liebenstein, Thuringia), German ed-

Froebel, detail of a drawing by Friedrich Unger; in the Staatliche Museen, Heidecksburg

By courtesy of the Staatliche Museen, Heidecksburg

ucator who was founder of the kindergarten and one of the most influential educational reformers of the 19th century.

Froebel was the fifth child in an orthodox clergyman's family. He was only nine months old when his mother died. The trauma caused by that loss and his father's absorption in the demands of his parish, as well as his stepmother's indifference, rendered him moody, introspective, slow in learning to read, and unresponsive to intellectual interests. Denied schooling and normal contacts with children of his own age, he developed an obsessive attachment to the world of nature. He learned to observe keenly, made intuitive scientific deductions, and at a very early age formulated a profound personal philosophy concerning the spiritual unity of the universe.

After apprenticeship to a forester, he pursued some informal university courses at Jena until he was jailed for an unpaid debt. At 23, after brief periods as a surveyor, estate manager, and private secretary, he cut short his preparations for architecture and impulsively took a teaching appointment in a progressive model school in Frankfurt that was run on lines advocated by the Swiss educator J.H. Pestalozzi.

A crucial turning point came in June 1806, when he entered the household of Baron von Holtzhausen as tutor to his three sons. The baron's failure to manifest interest in the rearing of his sons confirmed Froebel's conviction of the vital need for both father and mother to participate in the education of children. In the baroness he saw the embodiment of ideal motherhood, and he nurtured an affinity for her, regarding her as his spiritual bride. In June 1811 he suddenly left the household to continue university study, but he kept up a secret correspondence with the baroness for several years.

At the University of Göttingen, Froebel enunciated his "law of the sphere," his symbol of the divine forces operative in the universe, which he dreamed of applying to a comprehensive reconstruction of science and culture. He began by studying crystallography but soon became engulfed in the Napoleonic Wars and while a soldier developed the idea of regenerating Germany through a basic restructuring of its educational system. Returning to the University of Berlin in 1814, he became curator of its mineralogical museum, but two years later he was back in Thuringia, in the village of Griesheim, to establish his own school, which he described as the "Universal German Educational Institution." Three orphaned nephews, a brother, his sister-in-law, and her two sons comprised the household staff and student body. Froebel did not marry until 1818, when he took Wilhelmine Hoffmeister, a refined and spiritually sympathetic partner, as his bride. After a year he moved the school to nearby Keilhau, and it soon expanded into a flourishing institution.

Froebel, unable to win government support for his project, continued to devote himself unstintingly to the school. He wrote numerous articles and in 1826 published *The Education of Man,* a philosophical presentation of principles and methods pursued at Keilhau. In 1828 the Keilhau school became suspect to the authorities as a "nest of demagogues," and, although officially absolved, Froebel was removed from direct control in 1832. After five years in Switzerland, he returned to Germany and realized only two of his ideas: an infant school in Blankenburg originally called the Child Nurture and Activity Institute, which by happy inspiration he later renamed the Kindergarten, and a small boarding school for future teachers. He also started a publishing firm for play and other educational materials, including a collection of *Mother-Play and Nursery Songs,* with lengthy explanations of their meaning and use. This immensely popular book was translated into many foreign languages. He insisted that improvement of infant education was a vital preliminary to comprehensive educational and social reform. His enthusiasm was spurred on by Louise Lewin, a zealous woman 30 years his junior, whom he had helped rear at Keilhau; they were married in 1851 (his first wife having died in 1839).

Froebel won worldwide support of the kindergarten movement, despite its ban as subversive by the Prussian government from 1851 until 1860. The Baroness of Marenholtz-Bülow, deeply impressed by what she had observed of Froebel's kindergarten at Marienthal in Thuringia, established kindergartens in England and throughout Europe. (S.Bl.)

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frog, tailless amphibian (order Anura); used strictly, the term may be limited to any member of the family Ranidae (true frogs), but more broadly the name is often used to distinguish typically smooth-skinned, leaping amphibians from squat, warty, hopping ones, often called toads.

A brief treatment of frogs follows. For full treatment, *see* MACROPAEDIA: Amphibians.

In general, frogs have protruding eyes, no tail, strong, webbed hind feet that are adapted for leaping and swimming, and smooth, moist skins. Many are predominantly aquatic, but some live on land, in burrows, or in trees. A number depart from the typical form. Sedge frogs (*Hyperolius*), for example, are climbing African frogs with adhesive toe disks. The dagger frog (*Babina holsti*) of Okinawa has thumbs developed into sharp, dagger-like spines. The hairy frog (*Astylosternus robustus*) is an aquatic frog of the Cameroons, the male of which possesses a growth of fine, hairlike processes on the flanks and thighs; this "hair" is richly supplied with blood vessels and apparently serves as an aid in respiration through the skin. The flying frogs (*Rhacophorus*) are tree-dwelling, Oriental ranids; they can glide 12 to 15 m (40 to 50 feet) by means of expanded webbing between the fingers and toes.

Costa Rican flying tree frog (*Agalychnis spurrelli*)

Heather Angel

Frogs range in length from less than 2.5 cm (1 inch) in the African *Phrynobatrachus chitialaensis* and *P. capensis* to about 30 cm (12 inches) in the goliath frog, *Conrana goliath,* also of Africa. The male anuran is generally smaller than the female.

Although frogs have poisonous skin glands, these toxins do not usually provide protection from predatory mammals, birds, and snakes. Edible anurans rely on camouflage; some blend with their backgrounds, while others change colours. Several species have bright colours on their underparts that flash when the frog moves, possibly confusing enemies. Most frogs eat insects, other small arthropods, or worms, but a number of them also eat other frogs, rodents, and reptiles.

The annual breeding of frogs usually takes place in fresh water. In the sexual embrace (amplexus) the male clasps the female from behind and extrudes sperm over the eggs as they are ejected by the female. The eggs, laid in numbers varying from a few hundred to several thousand (depending on the species), then float off in clusters or sheets and may become attached to the stems of water plants; the eggs of some species sink. The tadpole hatches in a few days to a week or more and metamorphoses into a frog within two months to three years. During metamorphosis the lungs develop, limbs appear, the tail is absorbed, and the mouth becomes typically froglike. In some Oriental species the eggs are deposited on land and the young hatch as froglets, not tadpoles.

frog orchid (*Coeloglossum viride*), one of two small terrestrial plants in the genus *Coeloglossum,* family Orchidaceae, native to open

Frog orchid (*Coeloglossum viride*)

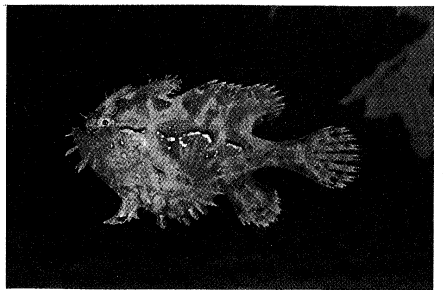
A.J. Huxley

places in Great Britain, northern Eurasia, and northern North America. The flowers usually are green or brownish-green, occasionally tinged with red, and occur in spikes 5 to 30 cm (2 to 12 inches) tall. The frog orchid bears three to five dark-green leaves. There are two tubers below ground that fork into several parts and become threadlike roots.

frogfish, any of about 60 species of small marine fishes of the family Antennariidae (or-

der Lophiiformes), usually found in shallow, tropical waters. Frogfishes are robust, rather lumpy fishes with large mouths and, often, prickly skins. The largest species grow about 30 cm (12 inches) long.

Frogfishes, members of the group known as anglerfishes, are usually provided with a "fishing pole," tipped with a fleshy "bait," located on the snout and derived from the first dorsal fin spine. This lure is used to entice prey fish. Frogfishes vary in colour; often patterned to blend with their surroundings, some are able to change colour. They generally lie quietly on the bottom or crawl slowly about with



Sargassum fish (*Histrio histrio*)

Robert Hermes—The National Audubon Society Collection/Photo Researchers—EB Inc.

their limblike pectoral fins. The sargassum fish (*Histrio histrio*) is patterned very much like the sargassum weed in which it lives.

froghopper, also called SPITTLEBUG, or CUCKOO SPIT INSECT, any of the approximately 2,000 species of small (rarely more than 1.5 cm [0.6 inch]) hopping insects of the family Cercopidae (order Homoptera). The whitish nymph secretes a fluid through the anus that is mixed with a secretion from the abdominal glands. Air bubbles are introduced through a special valve on the abdomen to create spittle, a frothy substance that protects the larva from enemies and desiccation.

Spittlebug nymph in spittle mass

Alexander B. Klots

The meadow spittlebug (*Philaenus leucophthalmus*), froglike in appearance, has grayish-brown wings and is a powerful leaper; it is found in Europe and North America. Some African species occur in enormous numbers and secrete large amounts of spittle, which drips from tree branches like rain. The sugarcane froghopper (*Tomaspis saccharina*) is very destructive in Trinidad. *Aphrophora* species are serious pests of the willow and pine. One group of froghoppers secretes small calcareous tubes that resemble snail shells and were once classified as snails by zoologists.

frogman, member of a naval underwater demolition team. In World War II their efforts reduced troop losses and facilitated the landing of men and supplies on enemy shores. Before an amphibious landing was made, frogmen reconnoitred the beach area. They measured the actual depths of the water, detected natural or man-made obstructions under the surface, and observed the enemy's defensive positions close to the water's edge. One of their most important functions was to destroy dangerous underwater obstructions. Frogmen were carefully chosen volunteers who were intensively

Navy frogmen entering the water to inspect the hull of a Polaris submarine

By courtesy of the U.S. Navy

trained and worked without weapons. After the war they performed research and rescue operations.

frogmouth, any of numerous birds comprising the family Podargidae, in the order Caprimulgiformes, named for their characteristic broad, froglike gape. Frogmouths inhabit the forests of southeastern Asia and Australia. Unlike the weak bill of the nightjars, that of the frogmouths is substantial and slightly hooked. Their food consists of large insects, small lizards, and mice, taken at night; some frogmouths in Australia also eat berries and fruit. They sleep in a crouching position, lengthwise along a branch, during the day. Frogmouths are protectively coloured, reddish brown or grayish, and range in length from about 25 to 55 cm (10 to 22 inches). There are 12 species in two genera.

The large frogmouth (*Batrachostomus auritus*), a 40-centimetre (16-inch) species of the Malay Peninsula and the islands of Sumatra and Borneo, lays a single egg on a pad of down covered with lichens and spiderweb.

The tawny frogmouth (*Podargus strigoides*), of the Australian mainland and Tasmania, sometimes called "morepork," or "mopoke," because of its call, is about 50 cm (20 inches) long. It lays two or three eggs on a flimsy nest of twigs in the crotch of a tree. Other species occur in the Philippines, New Guinea, and the Solomon Islands.

Fröhlich's syndrome, also called ADIPOSOGENITAL DYSTROPHY, rare childhood metabolic disorder characterized by obesity, growth retardation, and retarded development of the genital organs. It is usually associated with tumours of the hypothalamus, causing increased appetite and depressed secretion of gonadotropin. The disease is named for Alfred Fröhlich, the Austrian neurologist who first described its typical pattern.

The syndrome occurs most frequently in boys and, because of the close association between the pituitary and the hypothalamus, may be associated with reduced pituitary function. Impaired vision sometimes results from impingement of the tumour on the optic nerve. Fröhlich's syndrome is treated by removing the tumour and restricting diet until normal weight is achieved.

Many overweight children may appear to have the disorder because of the concurrence of obesity and retarded sexual development; these children have no endocrine disturbances, however, and they mature normally after delayed puberty.

Frohman, Charles (b. June 17, 1860, Sandusky, Ohio, U.S.—d. May 7, 1915, at sea), leading American theatrical manager of his time.

Frohman became interested in theatrical activities through his older brothers, Daniel and Gustave. After several years of part-time positions with local newspapers and theatres, Frohman, in 1883, managed the Wallack Theatre Company on tour. He later opened a theatrical booking office in New York and laid the foundation of the Theatrical Syndicate, which for several years controlled U.S. theatres. Frohman's initial success was Bronson Howard's *Shenandoah* in 1889. In 1892 he engaged John Drew as his star and established the Empire Stock Company. Frohman's encouragement of such playwrights as Clyde Fitch, David Belasco, and Augustus Thomas and stars such as Maude Adams, Ethel Barrymore, Julia Marlowe, Billie Burke, William Gillette, and Otis Skinner was indicative of his ability to perceive theatrical talent. He dominated the American theatre during 25 of its most expansive years, and when he drowned in the sinking of the *Lusitania,* an era ended.

Frohschammer, Jakob (b. Jan. 6, 1821, Illkofen, Bavaria [Germany]—d. June 14, 1893, Bad Kreuth), Roman Catholic priest, prolific writer, and philosopher who was excommunicated for claiming that philosophy and church authority are autonomous.

Ordained in 1847, Frohschammer lectured in philosophy from 1850 at the University of Munich (professor from 1855), where he began publishing his first important and controversial works, *Über den Ursprung der menschlichen Seelen: Rechtfertigung des Generationismus* (1854; "On the Origin of Human Souls: Justification for Generationism") and *Menschseele und Physiologie* (1855; "Human Souls and Physiology"). They were placed on the church's *Index of Forbidden Books* in 1857 because of their expressed views on generationism, a condemned theory stating that the human soul is created from unliving matter in the act of procreation. Though Frohschammer's generationist views were moderate, he was early suspected by the church.

On refusing to retract, he was suspended from Munich in 1862, the year he founded *Athenäum,* a periodical of liberal Catholicism for which he wrote the first adequate account in German of Darwin's theory on the origin of species by means of natural selection. Excommunicated in 1871, he replied with *Der Fels Petri in Rom* (1873; "The Rock of Peter in Rome"), *Der Primat Petri und des Papstes* (1875; "The Primacy of Peter and the Popes"), and *Das Christenthum Christi und das Christenthum des Papstes* (1876; "The Christianity of Christ and the Christianity of the Popes"). His principal later work is considered to be *Die Phantasie als Grundprincip des Weltprocesses* (1877; "Fantasy as the Basic Principle of Earthly Activities"). Frohschammer's *Philosophie des Thomas von Aquino kritisch gewürdigt* (1889) criticizes St. Thomas Aquinas' view that philosophy is the handmaid of theology. J.G. Wüchner's *Frohschammer's Stellung zum Theismus* ("Frohschammer's Attitude Toward Theism") appeared in 1913.

Froissart, Jean (b. 1333?, Valenciennes, Brabant—d. 1400/01, Chimay, Hainaut), European medieval poet and court historian whose *Chronicles* of the 14th century remain the most important and detailed documents of feudal times and the best contemporary exposition of chivalric and courtly ideals.

Froissart (seated) writing his *Chroniques,* miniature from a mid-15th-century manuscript; in the Bibliothèque de l'Arsenal, Paris (Ms. 5190)

By courtesy of the Bibliotheque de l'Arsenal, Paris; photograph, Studio STA Photo

As a scholar, Froissart lived among the nobility of several European courts. In England he served Queen Philippa of Hainaut, King Edward III, and his sons the Black Prince and the Duke of Clarence; he became the chaplain of Guy II de Chatillon, comte de Blois, under whose auspices he was ordained canon of Chimay. He travelled to Scotland, Italy, France, and the Iberian Peninsula.

The main subject of Froissart's *Chronicles* (Eng. trans. by Lord Berners [1523–25], ed. by W.P. Ker, 6 vol., [1901–03]) was the "honourable adventures and feats of arms" of the Hundred Years' War. He used his privileged position to question central figures and observe key events. The firsthand narrative covers weddings, funerals, and great battles from 1325 to 1400. Book I was based on the work of the Flemish writer Jean le Bel and later rewritten; Book II concerns the events in Flanders and the Peace of Tournai; Book III, Spain and Portugal; and Book IV is based on the Battle of Poitiers and a final visit to England, where he was shocked by the weakness of the royal government.

Froissart cites exact dialogues and all available facts, allowing the reader to draw his own conclusions. The splendour and pageantry are emphasized, however, according to the courtly traditions of his patrons, while the victims and causes of suffering are overlooked. A didactic moral tone urges readers to aspire to the ideals of chivalry.

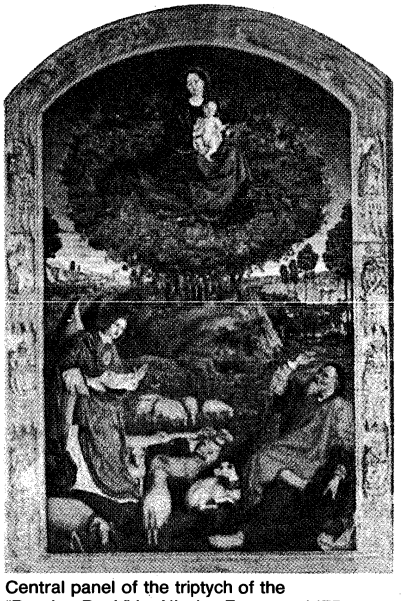
Froissart's allegorical poetry celebrates courtly love. *L'Horloge amoureux* compares the heart to a clock, and *Méliador* is a chivalrous romance. His ballades and rondeaux expose the poet's personal feelings. Despite his fame during his lifetime, Froissart apparently died in obscurity; his tomb has never been discovered.

Frome, Lake, in northeastern South Australia, large, shallow depression 60 mi (100 km) long by 30 mi wide, intermittently filled with water, 280 mi northeast of Adelaide. It is the southernmost of an arc of such salt lakes northeast of the Flinders Range, including Lakes Gregory, Blanche, and Callabonna, all sharing a common origin in a larger ancestral Lake Eyre (to the northwest). Unless it receives water from fluctuating heavy rains in the northern Flinders or an overflow from Lake Callabonna, Frome is a dry salt pan (playa). Sighted in 1840 by Edward J. Eyre, who was seeking new grazing lands, it was considered an extension of Lake Torrens (80 mi west) until 1858. It is named after E.C. Frome, surveyor general of South Australia in the 1840s.

Froment, Nicolas (b. Uzes, Fr.; fl. 1450–90 in the south of France), French painter who shared the responsibility (with Enguerrand Charonton) for introducing Flemish naturalism into French art.

During the 15th century, Italian art was so admired in France that the works of French artists were ignored or disdained. In response, Froment and Charonton around 1450 set up their own school in Avignon, where they formed the core of the realists of the school of primitive artists of Provence. Although many of their works were in demand at the time, they were neglected afterward.

Froment stands out among his colleagues for his rather crude and unpolished style, marked by awkward design and lack of sensitivity to colour. Nonetheless, many appreciated his revolutionary art, which introduced the often macabre Flemish style into French painting, as can be seen in his "Resurrection of Lazarus" (1461; Uffizi, Florence). The "Burning Bush" (1475–76), which illustrates his application of the Flemish style to the legends and landscape of Provence, is perhaps Froment's most illustrious work. The painting was done for King René of Anjou and depicts the King and his wife with several saints.



Central panel of the triptych of the "Burning Bush" by Nicolas Froment, 1475–76; in the Cathédrale de Saint-Sauveur, Aix-en-Provence, Fr.

By courtesy of the Cathedral of the Holy Saviour, Aix-en-Provence, France; photograph, Henry Ely, Aix-en-Provence

Fromentin, Eugène (b. Oct. 24, 1820, La Rochelle, Fr.—d. Aug. 27, 1876, La Rochelle), French painter and author, best known for his depictions of the land and people of Algeria.

Influenced successively by Jean-Baptiste-Camille Corot and Eugène Delacroix, Fromentin abandoned his early stiffness in design and execution and developed into a brilliant colourist. "Fauconnier arabe" and "Chasse au héron" clearly show his debt to Delacroix.

Fromentin's paintings show only one side of a talent that was perhaps even more felicitously expressed in literature; "Dominique," first published in the *Revue des Deux Mondes* in 1862 and dedicated to George Sand, is remarkable among the fiction of the century for imaginative observation. Fromentin's other literary works are *Visites artistiques ou Simples Pélerinages* (1852–56); *Un Été dans le Sahara* (1857); *Une Année dans le Sahel* (1858); and *Les Maîtres d'autrefois* (1876).

Fromm, Erich (b. March 23, 1900, Frankfurt am Main—d. March 18, 1980, Muralto, Switz.), German-born U.S. psychoanalyst and social philosopher who explored the interaction between psychology and society. By applying psychoanalytic principles to the remedy of cultural ills, Fromm believed, mankind could develop a psychologically balanced "sane society."

Fromm

By courtesy of Michigan State University

After receiving his Ph.D. from the University of Heidelberg in 1922, Fromm trained in psychoanalysis at the University of Munich and at the Psycho-Analytic Institute of Berlin. He began practicing psychoanalysis as a disciple of Sigmund Freud but soon took issue with Freud's preoccupation with unconscious drives and consequent neglect of the role of societal factors in human psychology. For Fromm, an individual's personality was the product of his culture as well as his biology. He had already attained a distinguished reputation as a psychoanalyst when he left Nazi Germany in 1933 for the United States. There he came into conflict with orthodox Freudian psychoanalytic circles. From 1934 to 1941 Fromm was on the faculty of Columbia University, where his views became increasingly controversial. In 1941 he was a member of the faculty at Bennington College in Vermont, and in 1951 he was appointed professor of psychoanalysis at the Universidad Nacional Autônoma de México (National Autonomous University of Mexico), Mexico City. From 1957 to 1961 he concurrently held a professorship at Michigan State University, East Lansing, finally returning to New York City in 1962 as professor of psychiatry at New York University.

In several books and essays, beginning with an essay (1930) on the development of Christian doctrine and symbolism (translated into English as *The Dogma of Christ and Other Essays on Religion, Psychology, and Culture,* 1963), Fromm presented the view that an understanding of basic human needs is essential to the understanding of society and mankind itself. Fromm argued that social systems make it difficult or impossible to satisfy the different needs at one time, thus creating both individual psychological and wider, societal conflicts. In Fromm's first major work, *Escape from Freedom* (1941), he charted the growth of human freedom and self-awareness from the Middle Ages to modern times and, using psychoanalytic techniques, analyzed the tendency of modern emancipated man to take refuge from his new insecurities by turning to totalitarian movements such as Nazism.

In *The Sane Society* (1955), Fromm presented his argument that modern man has become alienated and estranged from himself

within consumer-oriented industrial society. Fromm called for a rebirth of enlightenment in a new and perfect society which would allow each person to fulfill his individual needs while maintaining his sense of belonging through bonds of social brotherhood.

Fromm's voluminous writings on human nature, ethics, and love attracted the interest of social scientists and a wide general readership. He also wrote books of criticism and analysis on Freudian and Marxist thought, psychoanalysis, and religion. Others of his books included *Man for Himself* (1947), *Psychoanalysis and Religion* (1950), *The Art of Loving* (1956), *May Man Prevail?* (1961, with D.T. Suzuki and R. De Martino), *Beyond the Chains of Illusion* (1962), *The Revolution of Hope* (1968), and *The Crisis of Psychoanalysis* (1970).

Fronde, the, French LA FRONDE, series of civil wars in France between 1648 and 1653, during the minority of Louis XIV. The Fronde (the name for the "sling" of a children's game played in the streets of Paris in defiance of civil authorities) was in part an attempt to check the growing power of royal government; its failure prepared the way for the absolutism of Louis XIV's personal reign.

The Fronde was a reaction to the policies begun under the Cardinal de Richelieu, chief minister of Louis XIII from 1624 to 1642, who weakened the influence of the nobility and reduced the powers of the judicial bodies, called Parlements. Opposition to the government from these privileged groups gained momentum from 1643 under the "foreign" rule of the queen regent Anne of Austria (Louis XIV's mother) and her Italian-born chief minister, Jules Cardinal Mazarin.

The refusal of the Parlement of Paris to approve the government's revenue measures in the spring of 1648 set off the first phase, the Fronde of the Parlement. The Parlement sought to put a constitutional limit on the monarchy by establishing its power to discuss and modify royal decrees. From June 30 to July 12 an assembly of courts made a list of 27 articles for reform, including abolition of the intendants (officials of the central government in the provinces), tax reductions, approval of all new taxes by the Parlement, and an end to arbitrary imprisonment. On July 31, Mazarin's government—at war with Spain—reluctantly agreed to many of the demands. With news of a victory over the Spanish, however, Anne and Mazarin felt strong enough to arrest two outspoken *parlementaires* on August 26, but an uprising in Paris forced the queen and her minister to release them two days later.

The conflict broke into war in January 1649. A blockade of Paris was not enough to force the surrender of the Parlement, which was supported by Parisian leaders and by some of the high nobility. Faced with disturbances in the provinces and the continuing foreign war, the government negotiated the Peace of Rueil (ratified April 1, 1649), which granted amnesty to the rebels and confirmed the concessions to Parlement.

The Fronde of the Princes, the second phase of the civil war (January 1650 to September 1653), was a complex of intrigues, rivalries, and shifts of allegiance in which constitutional issues gave way to personal ambitions. One common factor among the aristocratic rebels was opposition to Mazarin, who, throughout the Fronde, was the target of fierce attacks by pamphleteers. The Great Condé, a great military leader and cousin of the king, had helped the government in the war against the Parlement. Disappointed in his hope for political power, he became rebellious. When he was arrested, on Jan. 18, 1650, his friends took up arms in a series of uprisings in the provinces, called the first war of the princes. By the end of 1650 the government had dealt successfully with the revolts. In reaction, the supporters of Condé and the Parisian party (sometimes called the Old Fronde) united to bring about the release of Condé and the dismissal of Mazarin (February 1651). Condé was dominant for a brief period.

Anne, however, knew how to exploit the divisions among the Frondeurs. She joined with the Old Fronde and ordered an indictment of Condé in August 1651, an act that decided Condé on war—the second war of the princes (September 1651 to September 1653). A main event of the war was Condé's entrance into Paris in April 1652. Despite Spanish aid, his position soon weakened: he was almost defeated by royal troops outside the walls of Paris (July 2, 1652), lost the support of the Parisian bourgeoisie, and never gained the approval of the Parlement. In the face of opposition, Condé left Paris on October 13 and eventually fled to the Spanish Netherlands. The king entered Paris in triumph on Oct. 21, 1652, followed by Mazarin on Feb. 3, 1653. With many of the nobles in exile and with the Parlement forbidden to interfere in royal administration, the Fronde ended in a clear victory for Mazarin.

Beyond the immediate victory, the Fronde had an impact on French history of the last half of the 17th century: by revealing the selfish interests of the nobility and the Parlement and their inability to offer effective leadership, the Fronde lost for these groups a role as a counterbalance to the king. The Fronde was the last serious challenge to the supremacy of the monarchy in France until the Revolution of 1789.

Consult the INDEX *first*

front, in meteorology, interface or transition zone between two air masses of different density and temperature; the sporadic flareups of weather along this zone, with occasional thunderstorms and electrical activity, was, to the Norwegian meteorologists who gave it its name during World War I, analogous to the fighting along the battle line in Europe. Frontal zones are frequently accompanied by low barometric pressure (a pressure trough), marked changes in wind direction and relative humidity, and considerable cloudiness and precipitation.

There are several different types of front, depending basically on which air mass is displacing the other at the ground. Meteorologists call the leading edge of an advancing mass of relatively cold air a cold front. In middle latitudes of both hemispheres, cold fronts tend to move toward the Equator and eastward, with the most advanced position right at the ground. At a height of about 1.5 km (1 mile), the front usually lies 80 to 160 km (50 to 100 miles) behind its surface position; thus, its slope is $1/50$ to $1/100$. A cold front is usually associated with showers and thunderstorms. As it advances, often quite rapidly (50 to 65 km [30 to 40 miles] per hour), the cold air, which is relatively dense, undercuts the displaced warm air, forcing it to rise. In extreme cases, the resulting instability may lead to the formation of a squall line of severe thunderstorms and possibly tornadoes parallel to and about 80 km ahead of the surface position of the cold front. The precipitation usually stops abruptly after the front passes.

A warm front is the boundary between an advancing mass of warm air and a retreating mass of cold air. At constant atmospheric pressure, warm air is less dense than cold air, and so it tends to override, rather than displace, the cold air. As a result, a warm front usually moves quite slowly, if at all. Warm fronts are often quite diffuse and difficult to locate precisely. Their inclination, or slope, is much less than that of cold fronts. At a height of about 1.5 km, the front usually lies about 320 km (200 miles) ahead (to the north or northeast in the Northern Hemisphere) of its surface position. Warm-front precipitation is generally much more uniform and widespread than that associated with cold fronts. Sometimes in winter, if the warm air overrides cold air at subfreezing temperatures, severe ice storms may develop more than 100 km (62 miles) ahead of the surface position of the warm front.

If, as often happens, a warm front is quickly overtaken by a cold front moving rapidly around a low-pressure centre, the end result is an occluded front, characterized by low temperatures, much cloudiness, and widespread precipitation, often in the form of snow. Cyclonic storms in middle latitudes often start out as an undulation, or wave, on a preexisting frontal boundary between warm and cold air masses. As the wave moves and intensifies, its amplitude increases in much the same way that the amplitude of an ocean wave, starting out as a ripple, increases as it moves shoreward. Eventually, the advancing cold air behind the cold front catches up with the slower-moving cold air under the warm front. The intervening tongue of warm air is pushed aloft, and the wave breaks or becomes occluded. At this point the kinetic energy of the storm, derived from the sinking of cold air and the rising of warm air, usually reaches its maximum intensity. A wave cyclone, with its attendant low atmospheric pressure and stormy weather, occasionally develops on a so-called stationary front (a boundary between air masses with different thermal characteristics that has little or no horizontal motion). Storms affecting the northeastern United States, for example, often develop from a perturbation on a stationary front over the southern or southeastern states; such storms are often quite severe, the energy of motion being provided by the large thermal contrast between cold polar air to the north and warm tropical air to the south.

The variable weather conditions that are typical of middle latitudes are associated largely with fluctuations in the location and intensity of a semipermanent, semicontinuous boundary known as a polar front. Polar fronts, located between 30° and 60° latitude in both hemispheres, average about 160 km (100 miles) in width. Very often a jet stream of strong westerly winds—driven by the large thermal contrast between the cold, dry polar air and the warm, moist tropical air—is located 10 to 12 km (6 to 7 miles) directly above the location of the front. The strong thermal contrast within the front serves as a source of potential energy for the development of cyclonic (centred on a low-pressure area) storm systems along the front.

The region near the Equator in which the trade winds of the two hemispheres meet was once designated the equatorial, or intertropical, front. Although the wind and weather patterns of this region closely resemble those found along fronts in middle latitudes (*i.e.,* they exhibit long lines of cumulonimbus clouds, a rapid wind shift, and a sharp drop in temperature), most modern tropical meteorologists prefer the name equatorial-trough disturbance, because the observed cooling that occurs in the disturbed zone is attributed to evaporation of falling rain and the lack of direct sunlight rather than to the replacement of one air mass by another.

Front Range, easternmost section of the central and southern Rockies, extending about 300 miles (480 km) south-southeastward from near Casper in southeastern Wyoming, U.S., to Fremont County in south-central Colorado.

It is from 40 to 50 miles (65 to 80 km) wide and includes Laramie and Medicine Bow mountains (*qq.v.*), while the Sangre de Cristo Mountains are usually regarded as an extension. Many summits exceed 13,000 feet (4,000 m), including Mount Evans (14,264 feet [4,348 m]; the range's highest peak), Longs Peak (14,256 feet [4,345 m]; highest point in Rocky Mountain National Park), and Pikes Peak (14,110 feet [4,300 m]). Notable passes are Berthoud (11,315 feet [3,449 m]) and Loveland (11,990 feet [3,655 m]).

Lying largely within conservation areas, the Front Range includes parts of the Rocky Mountain National Park and Pike, Arapaho, Routt, Roosevelt, and Medicine Bow national forests. Known for its variety of minerals and recreational appeal, the range serves as a source region for headstreams of the Cache La Poudre and Colorado rivers.

front tooth: *see* incisor.

Frontenac, Louis de Buade, comte de Palluau et de (count of Palluau and of) (b. May 22, 1622, Saint-Germain-en-Laye, near Paris—d. Nov. 28, 1698, Quebec), French courtier and governor of New France (1672–82, 1689–98), who, despite a record of misgovernment, managed to encourage profitable explorations westward and to repel British and Iroquois attacks on New France.

Frontenac's father, Henri de Buade, was colonel of the Régiment de Navarre and a member of Louis XIII's entourage; his mother was Anne Phélypeaux, of the influential Pontchartrain family; Louis XIII was his godfather. He served with the French armies during the Thirty Years' War; in 1643, at the age of 21, he was colonel of the Régiment de Normandie and in 1646 was appointed a *maréchal de camp* (brigadier general). In 1648 he secretly married Anne de La Grange-Trianon, who, in consequence, was disowned by her wealthy father.

Frontenac had great personal charm and much influence at court, but he was also egoistic and unscrupulous, as well as extravagant; by 1663 his debts amounted to more than 350,000 livres. In 1669 he took service as lieutenant general with the Venetian forces defending Crete against the Turks, but he had not been on the island long before he was dismissed from his post for intriguing against his superior officers.

In 1672 he was appointed governor-general of New France. Within a year of his arrival in the colony, he had founded a fur-trading post, Fort Frontenac, on Lake Ontario. Shortly afterward he became associated with the Sieur de La Salle, who, with Frontenac's support, obtained royal consent to continue the explorations of Louis Jolliet down the Mississippi to its mouth. La Salle took advantage of this to found fur-trading posts at the foot of Lake Michigan and on the Illinois River, from which his men, with the connivance of Frontenac, illegally engrossed a large part of the western fur trade. This brought them into conflict with the Montreal fur traders, dividing the colony into two hostile factions. Despite repeated warnings from Louis XIV and his minister J.-B. Colbert, Frontenac also disputed violently with the officials and clergy of New France.

While these conflicts were raging within the colony, a much more serious external problem was developing. Until 1675 the Five Nations of the Iroquois Indian confederacy had remained on good terms with the French because they were under attack from the Andaste and Mohegan tribes; but in that year the Iroquois subdued the other tribes and immediately began to contest the French hold on the western fur trade, their aim being to divert it from Montreal to Albany, with themselves acting as middlemen. When they attacked the tribes allied to the French and threatened the French themselves, Frontenac tried to appease them, doing nothing to strengthen the colony's almost nonexistent defenses. This policy merely encouraged the Iroquois to press their attacks with greater vigour, until the French were in danger of being driven out of the west. During these years, too, the English Hudson's Bay Company established posts in James Bay, posing another threat to the Canadian fur trade, one that Frontenac chose to ignore. In 1682 Louis XIV recalled Frontenac because of his misgovernment. (His successor, Le Febvre de La Barre, attempted with little success to subdue the Iroquois and in 1685 was replaced by the Marquis de Denonville, who brought the Indians to terms.)

When England declared war on France in May 1689, Frontenac was given command of an expedition to conquer the province of New York. At the same time, he was reappointed governor of New France, and Denonville was recalled for service in Europe. Frontenac's expedition was delayed by adverse weather, however, and he did not reach Quebec until October 12. The Iroquois, meanwhile, learning of Anglo-French hostilities before the news reached New France, had launched a furious assault on the unsuspecting colony on August 5, inflicting great damage and killing or capturing about 100 Canadians. This attack, and the lateness of the season when Frontenac reached the colony, made it impossible to invade New York in force; but in January he sent three war parties to attack the English frontier settlements at Schenectady, Fort Loyal, and Salmon Falls. All three places were destroyed with heavy loss of life for the defenders, and as a result the northern English colonies united for an assault on New France. The attacking forces, led by Sir William Phips, were repulsed at Quebec by the French under Frontenac, who distinguished himself by his prudent tactics.

During the next few years the fighting was confined to sporadic raids on the Canadian settlements by the Iroquois, but this did not prevent a rapid expansion into the west by the Canadian fur traders. Frontenac concerned himself far more with the fur trade than with pressing the war to a successful conclusion. Despite Louis XIV's policy of curbing expansion into the interior in order to strengthen the central colony, old fur-trading posts were strengthened and new posts established by Frontenac until French influence extended beyond Lake Superior, and the flood of furs coming down to Montreal glutted the market in France. After much urging from his subordinates and the receipt of explicit orders from the Minister of the Marine, Frontenac finally undertook in 1696 an expedition that destroyed the villages of two of the Iroquois nations. The following year the war between England and France ended, but it was not until 1701 that a peace treaty was ratified with the Iroquois by Frontenac's successor.

Frontenac was one of the more colourful personages in North American history. His connections at the court of Louis XIV enabled him to survive failures that might have destroyed another man and won him credit for the achievements of his subordinates. It was, however, under his regime that the English and Iroquois attacks on New France were finally repulsed and the French extended their North American empire from Montreal to Lake Winnipeg and from Hudson Bay to the Gulf of Mexico. (W.J.E.)

BIBLIOGRAPHY. Francis Parkman, *Count Frontenac and New France Under Louis XIV* (1877, reprinted 1965), a romantic account of Frontenac's career; and W.J. Eccles, *Frontenac: The Courtier Governor* (1959, reprinted 1965), a critical biography.

frontier humour, vital and exuberant literature that was generated by the westward expansion of the United States in the late 18th and the 19th centuries. The spontaneity, sense of fun, exaggeration, fierce individuality, and irreverence for traditional Eastern values in frontier humour reflect the optimistic spirit of pre-Civil War America. Frontier humour appears mainly in tall tales of exaggerated feats of strength, rough practical jokes (especially on sophisticated Easterners and greenhorns), and tales of encounters with panthers, bears, and snakes. These tales are filled with rough, homely wisdom.

Davy Crockett, whose *Narrative* (1834) is a combination of tall tales, comic self-portraiture, and humorous proverbs, is the classic proponent of frontier humour. Others include Mike Fink, king of the Mississippi River keelboatmen, and Paul Bunyan, hero of the northwestern loggers. Representative writers of Southern frontier humour are A.B. Longstreet, Thomas B. Thorpe, Johnson Jones Hooper, and George Washington Harris. Mark Twain represents a culmination of the tradition. *See also* local colour.

Frontinus, Sextus Julius (b. *c.* AD 35—d. *c.* 103), Roman soldier, governor of Britain, and author of the *De aquis urbis Romae,* a history and description of the water supply of Rome, including the laws relating to its use and maintenance and other matters of importance in the history of architecture.

In 70 he was city praetor in Rome, and about five years later he succeeded Petillius Cerealis as governor of Britain. He subdued the Silures, a tribe in southeast Wales, and held the other tribes in check until he was superseded by Agricola (77). In 97 he was appointed superintendent of the aqueducts (*curator aquarum*) at Rome. His treatise *De re militari* is lost. His *Strategematicon libri iii* is a collection of examples of military stratagems from Greek and Roman history; a fourth book, the plan and style of which is different from the rest (more stress is laid on the moral aspects of war, such as discipline), is the work of another writer known as Pseudo-Frontinus. Extracts from a treatise on land surveying ascribed to Frontinus are preserved in C. Lachmann's *Gromatici veteres* (1848).

Fronto, Marcus Cornelius (b. *c.* AD 100, Cirta, Numidia—d. *c.* 166, Rome?), prominent Roman orator, rhetorician, and grammarian whose high reputation—equal in ancient times to those of Cato, Cicero, and Quintilian—was based chiefly on his orations, all of which are lost.

Fronto was educated at Carthage and in Rome, where, under the emperor Hadrian, he rapidly gained considerable fame as an advocate. Emperor Antoninus Pius appointed him tutor to Marcus Aurelius and Lucius Verus; with the former he remained on terms of affectionate friendship. He became *consul suffectus* in 143.

In addition to his orations, Fronto's grammatical and rhetorical studies won him a number of followers, called the Frontoniani. Modern evaluations of Fronto's mastery of language are based on the information contained in the *Noctes Atticae* of Aulus Gellius, a member of Fronto's circle; on the collection of letters (principally to Marcus Aurelius and Lucius Verus); and on miscellaneous pieces discovered in 1815 in the Ambrosian library in Milan. The letters throw useful light on the Antonines and on Fronto's judgments of earlier writers and his precepts about language and style. *Correspondence,* 2 vol. (1919–20), was published in the Loeb Classical Library with Latin text and English translation.

Frosinone, Latin FRUSINO, city, capital (since 1926) of Frosinone *provincia,* Lazio (Latium) *regione,* central Italy, on a hill above the Cosa River, on the Via Casilina. It originated as Frusino, a town of the ancient Volsci people, and became a *colonia* (colony) of the Roman

Empire. There are traces of ancient walls and a Roman amphitheatre, but Frosinone, badly damaged during World War II, is now a primarily modern town. It is the centre of the Ciociaria district (noted for peasant costumes), and agriculture is the economic mainstay. Pop. (1983 est.) mun., 44,799.

frost, atmospheric moisture directly crystallized on the ground and on exposed objects. The term also refers to the occurrence of subfreezing temperatures that affect plants and crops.

Frost crystals, often called hoarfrost in the aggregate, form by the passing of the invisible water vapour of the atmosphere into the ice-crystal phase without going through the intermediate liquid phase. Hoarfrost lightly covers fields and rooftops under conditions that would form dew (*q.v.*) if the temperature were above freezing at the point of formation. Sometimes the freezing temperature will be reached after dew has already formed, producing frozen dew, but this usually cannot be readily distinguished because crystals ordinarily will start forming at about the same time the freezing starts.

The crystalline and other forms of frost deposit are a subject of aesthetic as well as scientific interest. The structures differ in some respects from those of snow (*q.v.*). Granular forms are called rime and are produced by the freezing of droplets of liquid water (technically called supercooled droplets) that are carried in the air at temperatures below freezing. Rime is best developed on mountaintops enveloped in supercooled clouds. It is a common form of icing on aircraft. It also occurs in steam fogs around open springs, streams, lakes, or ponds in very cold weather and, in extreme conditions, around chimneys from the water vapour condensed in the flue gases.

True crystalline hoarfrost is of two classes, one of which assumes columnar forms and the other of which assumes tabular, or platelike, forms. Generally the crystals of these two classes do not occur together on a single night; rather, one or the other will greatly predominate. Columnar or needlelike forms are found at the higher subfreezing temperatures, whereas plate crystals predominate under colder conditions. In their pristine state both forms are hexagonal crystals, the columns having a hexagonal cross section and the plates appearing as flat hexagons. Because they must grow outward from some supporting object, they rarely assume the perfect symmetry found in many snow crystals. Over ice-covered ponds and rivers, beautiful clusters or rosettes of fernlike or jewel-like frost collect on the surface of the ice. At very low temperatures cubical crystals are sometimes found.

In cold weather, striking frost forms are often found on the inner surfaces of windowpanes in buildings. In most cases with heated rooms the vapour condenses as a liquid first, but if the conditions are right, as in an unheated room, the delicate, pure crystalline forms are predominant, evoking a variety of fanciful descriptions.

In gardening and horticulture, frost refers to the freezing of the aqueous solutions in the plant cells, causing these to burst and destroy the plant. Only plants containing plentiful and dilute solutions in their leaves, fruits, etc., are easily damaged. The occurrence of a killing frost without a hoarfrost deposit is sometimes popularly called a black frost.

The most important aspect of frost in relation to plants is its determination of the length of the growing season: the period from the last killing frost in spring to the first killing frost in autumn, with reference to the tenderest crop plants. There are regions of the Earth where the season reaches critically short duration for the maturing of most usable crops and others where the season is so long that more than one planting of such crops as corn (maize) and alfalfa can be brought to harvest. In regions where frost is rare or absent, other factors take on more importance.

One of the most critical situations for frost is encountered in the citrus-fruit regions. There the few killing frosts likely each winter are combatted by a variety of methods, including heating the groves with special burners using oil or a petroleum-derived solid fuel, mixing the air with large fans mounted above the trees, or casting a fine water spray over and on the trees to keep the temperature at or very near the nondamaging level of 32° F (0° C).

Frost, A(rthur) B(urdett) (b. Jan. 17, 1851, Philadelphia—d. June 22, 1928, Pasadena, Calif., U.S.), U.S. illustrator, famous for his drawings of Uncle Remus, Brer Rabbit, and other characters created by Joel Chandler Harris, an American writer of Southern dialect folktales.

In his teens Frost learned something of wood engraving and lithography before moving to New York, where he worked for the *Graphic* in 1875. He later contributed illustrations to *Harper's Weekly, Scribner's Monthly,* and *Collier's* magazines and illustrated Lewis Carroll's

"Lemme Tas'e, Daddy," illustration by A.B. Frost, 1892, for *Uncle Remus and His Friends,* by J.C. Harris

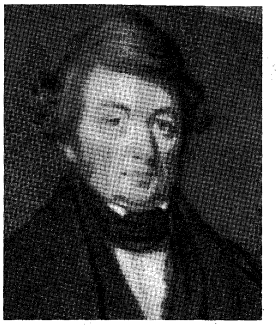
By courtesy of Houghton Mifflin Co.

Rhyme? and Reason? In 1877–78 he worked briefly in London and from 1908 to 1916 in Paris. His work captured the appearance and characteristics of rural and small-town American types. His *Book of Drawings* was published in 1904.

Frost, John (b. May 25, 1784, Newport, Monmouthshire, Eng.—d. July 27, 1877, near Bristol, Gloucestershire), hero of Chartism (a British political reform movement of working-class origin) and leader of the Newport rising of Nov. 4, 1839, in which about 20 Chartists were killed by troops.

A prosperous draper and tailor in Newport, Frost served, despite his radical views, as a member of Newport's first elected town council (from 1835), as magistrate (1836–39), and as mayor (1836–37). A delegate from Monmouthshire to the Chartist convention in London (February–September 1839), he occasionally was convention chairman, in which capacity his tie-breaking vote dissolved the assembly. Returning to Newport, he became involved in militant Chartist activities culminating in the street battle on November 4.

Convicted (Jan. 16, 1840) of high treason, Frost received a death sentence, which was commuted to exile for life to Van Diemen's Land (now Tasmania). Released in 1854 on



John Frost, engraving by W. Read after a painting

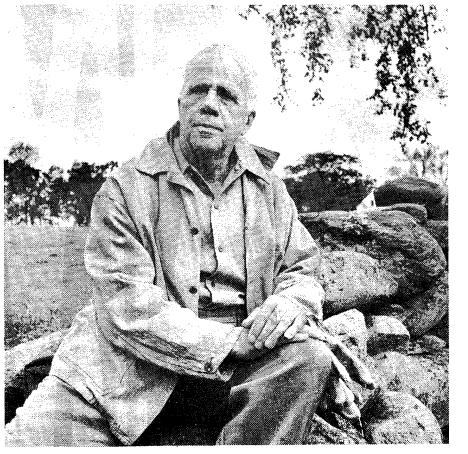
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

condition that he leave British territory, he was granted a full pardon in 1856, whereupon he returned to England and lived in retirement.

Frost, Robert (Lee) (b. March 26, 1874, San Francisco—d. Jan. 29, 1963, Boston), U.S. poet and poet-in-residence at a number of colleges and universities, best known for his use of colloquial language, familiar rhythms, and symbols taken from common life to express the quiet values of New England life.

Life. Frost's father, William Prescott Frost, Jr., a New Englander and a graduate of Harvard College, was serving as headmaster of a private school in Lewistown, Pa., when he met and married a Scottish-born schoolteacher, Isabell Moodie. He took his bride to San Francisco, where he became a newspaper reporter. When Robert Frost's father died of tuberculosis in 1885, the widow and her two children (a daughter had been born in 1876) accompanied the body to Lawrence, Mass., for burial; thereafter, Mrs. Frost, too poor to return to California, supported the family by teaching school in Massachusetts and New Hampshire. She exerted a strong influence on her son's personal and literary development: her Scots loyalties and her intense religious nature may have contributed to the blend of practicality and mysticism in his poetry.

As a boy Frost was fond of baseball and football, not school books. With some difficulty, even with his mother's help, he finished grammar school in Salem, N.H. His attitude changed as soon as he entered high school at Lawrence, from which he was graduated in 1892 as co-valedictorian, sharing the honour with Elinor Miriam White, whom he later married. In his valedictory address he spoke warmly of the poet's responses to experience—a further indication of an interest already well established, for he had published



Robert Frost, 1954

Ruohomaa—Black Star

several poems in the school paper while he was its editor.

Frost's paternal grandfather, who wanted him to become a lawyer, sent him to Dartmouth College at Hanover, N.H., the following fall. But the young man, once more impatient with academic routine, stayed less than a term, departing without notice. During the next few years he lived at home in Lawrence, writing poetry and intermittently earning money as a schoolteacher, mill hand, and newspaper reporter. For two years after his marriage in 1895 he and his wife helped his mother conduct a small private school. Throughout this period he sent poems to periodicals, with little success. The first poem he sold, "My Butterfly: An Elegy," appeared in 1894 in *The Independent,* a weekly literary journal.

In the fall of 1897 Frost entered Harvard College to prepare himself for teaching Latin and Greek at the high school level. He received excellent grades in these subjects, but after less than two years he withdrew because of illness. Warned that he might be tubercular, he changed his way of life drastically, becoming a poultryman at Methuen, Mass. The venture succeeded at first, and in 1900 he moved to a farm at Derry, N.H., purchased for his use by his grandfather. The Frosts' first child had been born in 1896, but the boy died just before the move; their second child, a girl, was less than a year old at the time. Four other children were born to the Frosts at Derry. After Frost failed as a farmer, he turned again to teaching (1906–12).

Many of Frost's best known poems were written at Derry, but editors showed little interest. In 1911 the title to the farm passed to Frost, who had for some years been receiving a small annuity from the estate of his grandfather, who had died in 1901. Frost promptly sold the farm and took his family to England the following year, intending to give all of his time to writing. He settled at Beaconsfield in Buckinghamshire and assembled a collection of the lyric verses he had written at Derry. The manuscript was accepted by the first London publisher to whom he submitted it, and *A Boy's Will* appeared in 1913. The next year the same publisher issued Frost's collection of narrative poems, *North of Boston.* British reviewers responded so enthusiastically that overtures were soon made to him by three American publishers. In England he made the acquaintance of Ezra Pound, Edward Thomas, W.W. Gibson, T.E. Hulme, Lascelles Abercrombie, and others. Invited to a rural setting by the Georgian poets Gibson and Abercrombie, he moved to the Gloucestershire countryside in 1914. After the onset of World War I the Frosts returned to the United States, in February 1915, just when his first two books were being published in New York. He bought a small farm at Franconia, N.H.; and the warm response to his poetry in the United States ended his obscurity.

He served as a professor of English at Amherst College (1916–20); was poet-in-residence at the University of Michigan (1921–23); returned to Amherst (1923–25) and the University of Michigan (1925–26); and thereafter taught part-time at Amherst until 1938. From 1939 to 1943 he was Ralph Waldo Emerson fellow of poetry at Harvard; from 1943 to 1949 he was Ticknor fellow in the humanities at Dartmouth College; and from 1949 to his death he held a sinecure as Simpson lecturer at Amherst.

Relationship between his life and his career. Frost was an extremely complicated man. Those individuals who became well-enough acquainted with him to call him a friend found him a very sympathetic person, outgoing and eager to help. One such friendship began in 1909 with John Bartlett, a student of Frost's at the Pinkerton Academy in Derry Village, N.H., and lasted as long as Bartlett lived; it is recorded in Margaret Bartlett Anderson's *Robert Frost and John Bartlett: The Record of a Friendship* (1963).

During the years on the farm in Derry, Frost demonstrated that he was really not cut out to be a farmer. In later years he repeatedly confessed that he failed as a farmer because he was too lazy. Before he went to the Derry farm he had become an enthusiastic botanist. As a result, he devoted far more time to botanizing on his farm at Derry than to farming. As soon as his children were old enough to share his botanizing interests, he took them on many walks far beyond the limits of his farm. And, indeed, there are more poems concerned with botanizing than with farming in *A Boy's Will.*

Frost's continuing interest in farming can be explained partly by his fondness of playing at farming (so long as it did not involve too much hard work) and by the fact that in his first two books he had repeatedly spoken with the voice of a farmer. In his poetry he deliberately wished to preserve the notion that he was a farmer. Within a few months after he bought the farm in Franconia, however, he accepted a teaching job at Amherst College and took up residence with his entire family in Massachusetts. For the next few years the farm in Franconia was only a retreat.

As he began to give readings farther away from home, Frost still took pleasure in referring to himself not only in his poems but also in his talks as a New England farmer. When he wrote his poem entitled "New Hampshire"(1923), he included the following witticism near the end of the poem:

> I choose to be a plain New Hampshire farmer
> With an income in cash of, say, a thousand
> (From, say, a publisher in New York City).
> . . . At present I am living in Vermont.

By the time the poet wrote these lines, he had bought another farm, at South Shaftsbury, Vt. Although Frost made many boasts to his friends about his plan to raise large crops of apples on his new farm, with the help of his son Carol, the farm never became a financial success.

It would be a mistake to conclude that, because Frost was never a successful farmer, there was only a poetic significance in his desire to associate himself with farms that he actually owned. These farms were much more than a retreat from the social life that he knew as a teacher or as a reader of his poems. There was a religious significance in nature for Frost. Day after day he was content to ramble by himself across the meadows and through the woods of his own farm or beyond to property owned by a friend who would not mind his trespassing. These rambles gave him time for his own thoughts and the discovery of the beginning of new poems. His motions as he walked were really those of a botanist, and the number of wildflowers that he could call by name was extraordinary.

In 1939, the year after the death of his wife, he bought a good-sized farm near the Bread Loaf School of English in Ripton, Vt.

Appraisal. The poetry of Robert Frost appeals to an unusually wide variety of readers because it can be enjoyed in so many different ways. Eschewing the experimentation of many 20th-century poets, Frost repeatedly said he was content with "old ways to be new." From the 19th-century English Romantic poet William Wordsworth he learned that incidents and situations from common life can be described lyrically in a language close to that actually used by ordinary men and women—a point of view that made his work seem "unpoetic" by comparison with the contrived, sentimental verse in vogue before World War I. From another 19th-century English poet, Robert Browning, Frost adapted certain principles of dramatic monologue and dialogue. His study of ancient Greek and Latin authors, particularly Theocritus and Virgil, grounded him in the pastoral conventions of the eclogue, a bucolic poem usually in dialogue.

Many of Frost's readers are content to enjoy his precisely recorded observations of little-noticed details in the appearance of natural objects and the behaviour of rural characters; but his poetry offers much more. From the beginning of his literary career he endowed his rural imagery with symbolic and even metaphysical meaning. As a consequence, his best poems subtly transcend the immediate relationships of the outward individual to the interior self, to others, to nature, and to the universe in a way that illuminates the values on which his profound religious faith was built. Although his wide range of poetic mood includes fear and doubt, the affirmations predominate.

MAJOR WORKS. *Poems. A Boy's Will* (1913), includes "Mowing," "My November Guest," "A Prayer in Spring," "Reluctance," "Storm Fear," and "The Tuft of Flowers"; *North of Boston* (1914), includes "After Apple-Picking," "Death of the Hired Man," "Home Burial," "Mending Wall," and "The Wood-Pile"; *Mountain Interval* (1916), includes "Birches," "The Impulse," "Loneliness," "An Old Man's Winter Night," " 'Out, Out—',' "The Oven Bird," "The Road Not Taken," and "The Sound of Trees"; *New Hampshire* (1923), includes "Dust of Snow," "Fire and Ice," "The Onset," "The Runaway," "Stopping by Woods on a Snowy Evening," and "To Earthward"; *West-Running Brook* (1928), includes "Acquainted with the Night," "Bereft," "Once by the Pacific," "A Soldier," and "Tree at My Window"; *A Further Range* (1936), includes "Departmental," "Desert Places," "Neither Out Far nor In Deep," "Two Tramps in Mud Time," and "A Lone Striker"; *A Witness Tree* (1942), includes "Come In," "The Gift Outright," "The Lesson for Today," "The Most of It," and "The Silken Tent"; *Steeple Bush* (1947), includes "Directive"; *In the Clearing* (1962), includes "Away!"

Verse plays. A Masque of Reason (1945); *A Masque of Mercy* (1947).

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Frost, Sarah Frances: *see* Marlowe, Julia.

frost-free season: *see* growing season.

frost point, temperature, below 0° C (32° F), at which moisture in the air will condense as a layer of frost on any exposed surface. The frost point is analogous to the dew point (*q.v.*), the temperature at which the water condenses in liquid form; both the frost point and the dew point depend upon the relative humidity of the air.

frostbite, a freezing of living tissue, superficial or deep; frostbite occurs whenever heat loss from a tissue is sufficient to permit ice formation. The freezing-thawing process causes mechanical disruption from ice, intracellular and extracellular biochemical changes, tis-

sue dehydration, local oxygen depletion, and eventually disruption of the blood corpuscles, thrombosis, or clotting, within the small blood vessels, and tissue gangrene if these conditions are not relieved.

Chilblains (an inflammatory swelling), trench foot (a painful disorder similar to frostbite), and immersion injury result after prolonged exposure to low but nonfreezing temperatures and may be recognized by changes in the character of the skin, in blood flow, and in motor and sensory responses.

To preserve vital body warmth, man, in his phylogenetic development, has evolved a private "inner climate," with a near-constant temperature of 98.6° F (37° C).

General hypothermia, or depression of the inner body temperature, is critical and often fatal. Below 93° F (34° C), metabolic temperature control is unstable and, if cooling persists, is lost. Coma, cardiorespiratory failure, and death may ensue, even before the level of 88° F (31° C).

Man's constant, cold-repelling temperature is maintained by a complex metabolic furnace. Ingested food is fuel for the furnace, and some of the energy from its oxidation is converted into heat. This heat, transferred as needed throughout the body, principally by the blood, is contained in a skin shell that traps or dissipates warmth. Heat can be further conserved by man-made objects such as shelter and clothing.

Because tissue freezes near 23° to 21° F (−5° to −6° C), the shell of the interior climate must be breached and the temperature must fall from 98.6° F to levels lower than 23° F before freezing occurs at a specific area. This occurs in Arctic and sub-Arctic regions, temperate zones in winter, and high altitudes throughout the world. Cold, wind, and decreasing oxygen supply encourage the condition.

Conditions conducive to frostbite. Frostbite can occur whenever the ambient temperature falls below 32° F (0° C). Without adequate food, clothing, or shelter, heat is lost successively from the interior of the body to the skin, to the layer of still, insulating air surrounding the skin, and finally to the ambient cold air. High velocity wind blowing away the insulating air cover, or the wetting of the skin, hastens the outward transfer of heat. Thus ice fishermen, hunters, trappers, campers, mountain climbers, and others exposed to wind and low temperatures may become victims of frostbite.

All too impressive is the injury and death toll from cold during time of war. Armies that suffered as much from the cold as from the enemy include Xenophon's Greeks in Armenia (400 BC); the Swedish troops of Charles XII in the Ukraine (1708); and the army of Washington at Valley Forge (1777–78). Most classic is the saga of the Napoleonic forces fleeing Russia (1812–13). Pursued by a relentless enemy in the dead of winter, driven onward without food, water, rest, adequate clothing or footwear, thousands of troops suffered frostbite or froze to death. Modern armies in the Crimea, World Wars I and II, and Korea, have fared only a little better.

Three types of individual physical and health factors can contribute to frostbite. They are (1) conditions encouraging heat loss; (2) mechanical or physical impedance of circulation to the extremities; and (3) problems that decrease the ability of the patient to cope with the cold.

Conditions encouraging heat loss are (1) the excessive intake of alcohol, causing capillary dilation, flushing, and dissipation of heat; (2) wet clothing, permitting outward heat conduction, local cooling and freezing, often associated with hyperhidrosis, a condition in which there is an increased tendency to sweating; (3) exposed flesh; (4) fever, with radiation of heat; (5) injury, with hemorrhage, anoxia, and shock, causing general body cooling; and (6) overexercise, as in forced survival marches, draining unreplaced calories and heat.

Factors that mechanically impede circulation to the extremities, and thus favour cooling and subsequent freezing, include (1) tight boots, gloves, or clothing; (2) blood vessel diseases that diminish the flow of blood to the extremities; (3) injury to the blood vessel network causing local tissue oxygen depletion; (4) crushing injury or fracture, resulting in circulatory slowdown; and (5) constriction of small blood vessels as a result of drug action.

Conditions that decrease the ability of a person to avoid cold insult include (1) emaciation, fatigue, and inability to cope with the cold; (2) dehydration, a major problem in the cold, with subsequent blood acidity, mental derangement, coma, and death; (3) neuromuscular disease, or previous freezing or nonfreezing cold injury, with resultant sensory loss, predisposing to further cold injury; and (4) psychosis from any cause, allowing behaviour contributory to freezing, with mental disorganization, loss of thermoregulation, and resultant fall of body temperature.

Recognition and treatment. Frostbite is identified from a history of exposure to freezing temperatures in addition to clinical signs and the appearance of the affected part. Before thawing, the part is hard, cold, white, or bloodless. The skin is rigid and the depth of freezing difficult to determine. Freezing is described as either superficial, involving skin and subcutaneous tissues, or deep, involving muscle, nerve, vessels, cartilage, and bone.

In dealing with frostbite, body temperature is usually restored to as near normal as possible before thawing. Rapid thawing of the hands or feet in warm water baths is a presently favoured method of therapy. Thawing time is determined by the temperature of the bath and the depth of the freezing; thawing is complete when the tip of the extremity flushes pink or red. After rapid thawing small blisters appear rapidly, spontaneously rupturing in 4 to 10 days. A castlike scab, often black, forms after the blisters rupture. Normal tissue may have already formed below. The thawed part is usually protected to avoid both refreezing and excessive heat. Neither bandages nor dressings are used, and the area is cleansed with benign soaps. Constant digital exercises are performed to preserve joint motion. Early surgical removal of unhealthy tissue (debridement) and amputation is avoided. Whirlpool action will debride devitalized tissues.

Antibiotics are used if necessary; toxoid booster injections are a recommended precaution. After thawing, further treatment is aimed at the prevention of infection and preservation of function.

The outlook is logically best when: the frozen state is of short duration; thawing is by rapid rewarming; and blisters develop early, pink and large, and extend to the tips of the hands or toes.

The outlook is uncertain when: thawing is spontaneous, as at room temperature; the frozen state is of long duration; and the freezing is superimposed on top of a fracture or dislocation.

The outlook is poor when: thawing is delayed, as in ice and snow; thawing is by excessive heat—*i.e.*, greater than 115° F (46° C); the blisters are dark or hemorrhagic and do not extend to the distal tips; a nonfreezing cold injury is followed by freezing; and when freezing, then thawing by any means, is followed by refreezing. The last two conditions are disastrous and almost invariably necessitate amputation of the affected part.

Major complications after freezing, and following treatment, may be infection and tissue death, requiring amputation. Less tragic aftereffects are increased sweating, sensory loss, diminished subcutaneous fat pad of the toes and fingers, persistent deep pain, limitation of joint motion, and nail-bed changes. Other permanent effects include fixed scars, wasting of the small muscle, joint deformity, arthritic changes in bone, and neurovascular involvement in the extremities resulting in the inability to protect against lowered temperatures, coupled with increased sensitivity to cold.

Frostbite prevention. The prevention of frostbite is theoretically simple but occasionally impossible to accomplish. To avoid freezing, one obviously needs only to maintain the internal body temperature at the constant physiological level, to provide fuel for continued heat, and to avoid sudden or slow but continuous heat loss from the surface of the body.

Clothing in freezing weather should be dry, layered, and with warm, loose hand wear and footwear. Tight, restricting bands should not be worn. Exposed flesh should be protected from the wind—face masks, hoods, and earmuffs are helpful.

In cold, an individual must remain alert, avoiding the excessive use of alcohol and tobacco or drugs inhibiting mental or physical capability.

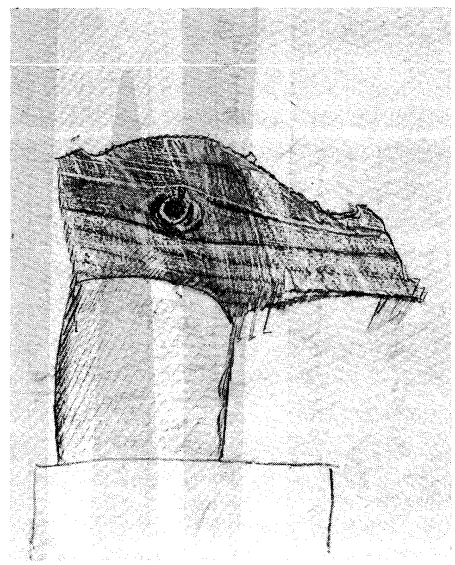
Should freezing follow an accident, whether or not the victim is injured, intoxicated, or otherwise affected, major efforts must be made to avoid further heat loss in order to prevent death, and in any situation in which freezing has occurred, thawing should be prevented if refreezing may take place. Humans survive local freezing of an extremity, even with amputation, but loss of vital temperature may result in hypothermia and death.

By any and all means, the body's internal environment must be kept at its normal temperature. Physically conditioned persons are better able than those who are not to withstand cold and to avoid cold injury, wind chill, and mental and physical fatigue. To maintain body temperature is to survive the cold, no matter what the external environmental temperature.

frosted bat, any of certain bat species of the family Vespertilionidae (*q.v.*).

froth flotation, separation of minerals differing little in density but greatly in wettability by surface-active agents that stabilize a froth formed on the surface of an agitated suspension of the minerals in water. *See* flotation.

frottage (French: "rubbing"), in visual arts, technique of obtaining an impression of the



"Animal Head on a Pedestal," pencil frottage by Max Ernst, 1921–22; in the Kunstmuseum, Basel, Switz.

By courtesy of the Oeffentliche Kunstsammlung, Kupferstichkabinett, Basel, Switz., Karl August Burckhardt-Koechlin-Fonds

surface texture of a material, such as wood, by placing a piece of paper over it and rubbing it with a soft pencil or crayon, as for taking brass rubbings; the name is also applied to the impression so obtained. Frottage was used by Max Ernst and other members of the Surrealist movement, for whom it often provided the starting point for more elaborate compositions such as paintings and collages.

frottola, Italian secular song popular in the late 15th and early 16th centuries. Usually the frottola was a composition for four voice parts with the melody in the top line. Frottole could be performed by unaccompanied voices or by a solo voice with instrumental accompaniment. The frottola had chordal texture and clear-cut rhythm, usually in $\frac{3}{4}$ or $\frac{4}{4}$ metre. The voice parts had narrow ranges and frequently repeated voices. Its musical style was simple, in deliberate contrast to the complexity of more sophisticated vocal music of the period. The frottola, as it developed by 1530, was the direct antecedent of the 16th-century madrigal.

The frottola was aristocratic music, although popular tunes were sometimes incorporated. Under the patronage of Isabella d'Este, the frottola developed at the court at Mantua, and it also became popular at other courts of northern Italy, particularly at Ferrara and Urbino. Serafino dall'Aquila (d. 1500) was an important frottola poet. The most important composers of frottola were Bartolomeo Tromboncino (d. *c.* 1535) and Marchetto Cara (d. *c.* 1530). At times the same person wrote both text and music.

Frottola texts were usually of limited literary value, typically consisting of several six-line verses, each followed by a four-line refrain, using the same music.

The term frottola was also used for a class of compositions, some with specific poetic forms, including the *strambotto,* the *oda,* and the *barzelletta.* Ottaviano dei Petrucci, the first significant printer to use movable music type, printed 11 books of frottole in Venice between 1504 and 1514.

Froude, James Anthony (b. April 23, 1818, Dartington, Devon, Eng.—d. Oct. 20, 1894, Kingsbridge, Devon), English historian and biographer whose *History of England from the Fall of Wolsey to the Defeat of the Spanish Armada,* 12 vol. (1856–70), fundamentally altered the whole direction of Tudor studies. He was immensely prolific, his work ranging from novels through numerous essays on the 16th century and other periods, including a study of the Council of Trent, to works on later imperial developments and some notable biographies. He was for most of his life the subject of continuous controversy, over both his facts and his conclusions.

Froude was, both at home and at Oxford University, which he entered in 1835, dominated by his elder brother Richard Hurrell, famous himself as one of the founders of the Oxford Movement. Froude was influenced also by John Henry Newman, the future cardinal, who was one of his fellow students at Oriel College. After graduating in 1842, he broke with the movement and, with the appearance of *The Nemesis of Faith* in 1849, the third of his novels, which was in effect an attack on the established church, he was obliged to resign his fellowship at Exeter College. He thereafter made his living by his pen until in 1892 he returned to Oxford as regius professor of modern history.

In Froude's historical works there are numerous instances of his careless handling of his texts, yet there is no evidence of deliberate distortion. His errors derive partly from the tremendous speed at which he worked. But they resulted also from a more fundamental cause.

To Froude the 16th century was the crucial period in English history, when the forces of liberty, as expressed by the Reformation, were struggling against the forces of darkness, as represented by the Roman Catholic Church. This theme gives to all his work a vigorous partisan quality. He believed indeed that the Anglo-Catholic revival of the 19th century was merely a later version of the same danger. It was his declared duty to open the eyes of his own generation to the perils that had been faced and overcome by the Tudors.

The other great influence upon his attitude to history was Thomas Carlyle, from whom Froude absorbed the doctrines of the role of the hero in history. Henry VIII was Froude's hero; and his portrait of him was wholly at variance with those drawn by Lord Macaulay, M.A.S. Hume, and John Lingard. Henry, according to Froude, was the man of courage and energy who guided the nation through its gravest crisis. Elizabeth I, by contrast, was a weak, uncertain ruler who needed Lord Burghley—the hero of the later volumes of his *History*—to save her from the consequences of her own follies; and Mary, Queen of Scots, was the treacherous foe of liberty and goodness.

Savage attacks by reviewers had no effect on Froude's methods as a historian or on his popularity with the reading public. There followed, among other works, *The English in Ireland in the Eighteenth Century,* 3 vol. (1872–74), *The Life and Letters of Erasmus,* 2 vol. (1894), and *English Seamen in the Sixteenth Century* (1895). But the great work of the later part of his life was his biography of Carlyle, which appeared in four volumes (1882–84), as well as an edition of Carlyle's papers, 2 vol. (1881). Here, too, he was severely handled by his enemies, again for his inaccuracy but also for his frank analysis of Carlyle's defects of character which, Froude claimed, as an honest biographer he must fully examine.

His narratives contain very little on the economic, social, and constitutional forces that have molded society and a disproportionate amount on the achievements of great men. Though he clearly overstated his case for Henry VIII, he did effectively bring out that the king was no mere lustful tyrant but a statesman of considerable historical importance.

Consult the INDEX *first*

Froude, Richard Hurrell (b. March 25, 1803, Dartington, Devonshire, Eng.—d. Feb. 28, 1836, Dartington), Anglican churchman and theological scholar who played a principal role (with John Keble and John Henry Newman) in initiating (1833) the Oxford Movement, which advocated preserving elements of the early and medieval church as an antidote to doctrinal liberalism and Erastianism (state supremacy in ecclesiastical affairs). His essays in *Tracts for the Times* and the appearance of his diaries in *Remains,* 4 vol. (1838–39), encouraged the development of Anglo-Catholicism and aroused the suspicions of Protestant elements in the Church of England.

Froude, William (b. Nov. 28, 1810, Dartington, Devon, Eng.—d. May 4, 1879, Simonstown, S.Af.), English engineer and naval architect who influenced ship design by developing a method of studying scale models propelled through water and applying the information thus obtained to full-size ships. He discovered the laws by which the performance of the model could be extrapolated to the ship when both have the same geometrical shape. A similar technique later was used by pioneers in aerodynamics.

Educated at Westminster School and Oriel College, Oxford, Froude worked as a railway engineer until 1846, when he began his work on ship hydrodynamics. He learned that rolling of ships can be reduced with a deep bilge keel, a finlike projection stretching horizontally along both sides of a ship below the waterline. The device was adopted by the Royal Navy.

After serving in 1868 on a committee to study naval design, he proposed to the British Admiralty a series of experiments using models to determine the physical laws governing full-scale ships. His proposals were accepted in 1870, and at Froude's home near Torquay a model-testing tank was built. He discovered that the chief components of resistance to motion are skin friction and wave formation. In 1876 he received the Royal Medal of the Royal Society, to which he had been elected as a member six years earlier. His final achievement came with the invention of a dynamometer to measure the power of large marine engines. In 1955 the Institution of Naval Architects published a one-volume edition of his papers.

Froude number, in hydrology and fluid mechanics, dimensionless quantity used to indicate the influence of gravity on fluid motion. It is generally expressed as $F = v/(gd)^{-1/2}$, in which d is depth of flow, g is the gravitational acceleration (equal to the specific weight of the water divided by its density, in fluid mechanics), v is the celerity of a small surface (or gravity) wave, and F is the Froude number. When F is less than 1, small surface waves can move upstream; when F is greater than 1, they will be carried downstream; and when $F = 1$ (said to be the critical Froude number), the velocity of flow is just equal to the velocity of surface waves. The Froude number enters into formulations of the hydraulic jump (rise in water surface elevation) that occurs under certain conditions, and, together with the Reynolds number (*q.v.*), it serves to delineate the boundary between laminar and turbulent flow conditions in open channels.

Fructidor, Coup of 18 (Sept. 4, 1799), the purge of ultraconservatives from the Corps Législatif and other posts during the period of the Directory in France. The Directory, fearing that it was losing favour in the country, called upon Napoleon Bonaparte to send a general to command troops guarding the legislature at the Tuileries. On 18 Fructidor, year V (Sept. 4, 1799), Gen. Pierre-François-Charles Augereau, commanding the troops, purged more than 130 royalists and counterrevolutionaries from the Assembly; and many deputies, journalists, nonjuring priests, and other individuals were deported to Guiana, including the director, the Marquis de Barthélemy. The royalists were thus once more overthrown—but with them the republican constitution itself. The coup still further confirmed the new power of the army and thus went far in preparing the way for the military despotism of Napoleon.

fructose, a member of a group of carbohydrates known as simple sugars, or monosaccharides. It is generally considered the sweetest of the simple sugars. Fructose, along with glucose, occurs in fruits, honey, and syrups; it also occurs in certain vegetables. It is a component, along with glucose, of the disaccharide sucrose, or common table sugar. Phosphate derivatives of fructose (*e.g.,* fructose-1-phosphate, fructose-1,6-diphosphate) are important in the metabolism of carbohydrates.

fructosuria, disturbance of fructose metabolism resulting from a hereditary disorder or intolerance. Normally, fructose is first metabolized in the body to fructose-1-phosphate

by a specific organic catalyst or enzyme called fructokinase. In fructosuria this particular enzyme is defective, and the concentration of fructose increases in the blood and urine. There are no other clinical manifestations or disabilities, and the condition is compatible with normal life expectancy.

fruit, in its strict botanical sense, the fleshy or dry ripened ovary of a plant, enclosing the seed or seeds: thus, apricots, bananas, and grapes; bean pods, corn grains, tomatoes, and cucumbers; and (in their shells) acorns, almonds, and pecans are all technically fruits. Popularly, however, the term is restricted to the ripened ovaries that are sweet and either succulent or pulpy and that are usually eaten as an appetizer or a dessert: of the above-listed items only apricots, bananas, and grapes qualify. The raising of fruit crops is a major agricultural industry worldwide.

A brief treatment of fruit follows. For information on particular fruits, *see* apple, banana, orange, peach, and so on. For full treatment of the fruit as a reproductive structure, *see* MACROPAEDIA: Reproduction and Reproductive Systems. For full treatment of fruit farming, *see* MACROPAEDIA: Farming and Agricultural Technology.

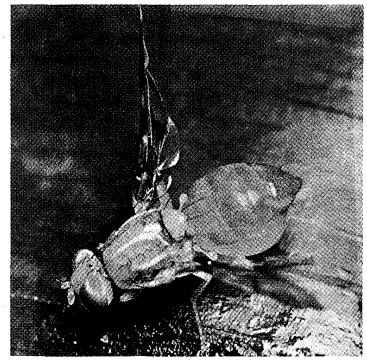
Botanically, the fruit is developed from the ovary of the flower as a result of the fertilization of the contained ovule or ovules (which will then become seeds). In a somewhat broader sense, the fruit of angiosperms consists of the mature ovary and any closely associated parts (*e.g.,* in the apple, mulberry, and pineapple). Fertilization induces various changes: the anthers and stigma wither, the petals drop off, and the sepals may be shed or undergo modifications; the ovary enlarges, and the ovules develop into seeds, each containing an embryo plant. Normally no fruit is produced unless fertilization is effected; but in certain plants, mostly cultivated varieties, this is not the case (*e.g.,* the seedless oranges and grapes, the banana, and the cucumber). The production of fruit without fertilization is known as parthenocarpy (*q.v.*).

Most perennial fruit crops are propagated clonally; *i.e.,* their varieties are multiplied vegetatively (by asexual methods). Many important varieties of fruit plants were selected generations ago, with each subsequent specimen actually a vegetative continuation of the selected individual. But regardless of the age of a fruit-growing industry or the perfection of some of the selected varieties, the continuing search for new varieties is essential because there is always room for improvement in climatic adaptability, in insect and disease resistances, and in the solution of special horticultural or marketing problems.

Although fruit-growing enterprises cover great ranges of climates and plant materials, their technologies are bound together by similar problems and practices. In general, the chief concerns of fruit cultivation are the propagation and improvement of varieties; the microclimatic conditions and soil conditions of the site; planting and spacing systems; training and pruning techniques; soil management, irrigation, and fertilization; pollination; thinning; pest control; and harvesting and postharvest practices. *See also* seed.

fruit bat, any of numerous tropical Old World bats belonging to the family Pteropodidae (*q.v.*).

fruit fly, any insect of the family Trypetidae (order Diptera); the name is also incorrectly used (often as small fruit fly) for species belonging to the genus *Drosophila* of the family Drosophilidae (*see* vinegar fly). The fruit fly, small to medium in size, has wings that are banded or spotted with brown. Many species attack cultivated fruits, causing damage that may lead to significant economic losses. Some fruit flies, such as the European celery fly, are



Fruit fly (Trypetidae)
E.S. Ross

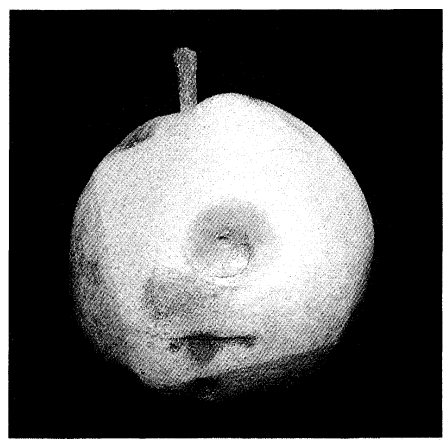
leaf miners; others burrow in plant stems. A species of *Eurosta* causes a common stem gall (swelling) of goldenrod.

The Mediterranean fruit fly (*Ceratitis capitata*) lays as many as 500 eggs in citrus fruits (except lemons and sour limes). The larvae tunnel into the flesh of the fruit and make it unfit for human consumption. Discovered in Florida in 1929, the Mediterranean fruit fly was thought to have been eradicated in the United States by 1930 but reappeared in 1956 and in the early 1960s and again, in California, in 1981. Because of this pest, worldwide quarantine laws were formed to regulate the entry of fruits into countries. The heavy U.S. infestation in 1981 set off heated controversy between fruit growers and environmentalists, and the aerial-spraying program that was finally adopted sparked renewed debates worldwide about the eradication of costly insect pests.

The apple maggot, the larva of *Rhagoletis pomonella,* burrows into apples, causing the fruit to become spongy and discoloured. This species and the closely related cherry fruit fly (*R. cingulata*) cause extensive losses in the northeastern United States.

Other widespread pests of this family include: the Mexican fruit fly (*Anastrepha ludens*), which attacks citrus crops; the Oriental fruit fly (*Dacus dorsalis*), which infests many kinds of subtropical fruits; and the olive fruit fly (*Dacus oleae*), which destroys olives in the Mediterranean region. Control methods vary with the species involved and include spraying of fruits with insecticides during the egg-laying season, destruction of infested fruit, and control by parasites.

fruit spot, symptom of plant disease, usually caused by fungi and bacteria. A spot is a definite, localized area. Spots often enlarge and merge to form a rot, a softening discoloration and often a disintegration of tissue. All fruits are susceptible; infection commonly starts at a wound, the stem end, or the underside. Bacterial decays, caused by *Erwinia* and some *Pseudomonas* species, are watery to mushy and putrid and follow injuries. Other bacterial and fungal decays (except *Pythium* and *Phytophthora*) are usually firm and dry, sometimes with mold growth. Fruit-infecting organisms may attack other plant parts. Insects commonly transmit the infecting microorganisms and provide the entry wounds. Spots and rots develop rapidly in warm, moist storage. *See also* rot; scab; sooty mold.



Fruit spot (*Penicillium expansum*) on pear
Carlo Bevilacqua—SCALA from Art Resource/EB Inc.

fruitworm beetle, any member of the insect family Byturidae (order Coleoptera), which consists of only a few genera. Five species are known in the United States.

A common example of this family of small, hairy, oval beetles is the raspberry fruitworm (*Byturus rubi*). The small, pale larva, which is covered with short fine hairs, attacks the raspberry fruit. The adult, which ranges in colour from reddish yellow to black, is about 4 mm (0.16 inch) long. It feeds on the flowers and leaves of raspberry and blackberry plants.

Frumentius, SAINT, Amharic ABBA SALAMA (fl. 4th century; feast day October 27), Syrian apostle who introduced Christianity into Ethiopia. As first bishop of its ancient capital, Aksum, he structured the emerging Christian church there in the orthodox theology of the Alexandrian school during the 4th-century controversy over Arianism.

A student of philosophy from Tyre, Frumentius and a colleague, Aedesius, were captured by Ethiopians in about 340. They became civil servants at the court of the Aksumite king Ezana, whom Frumentius converted. On the death of the monarch, Frumentius became the royal administrator and tutor to the crown prince and was empowered to grant freedom of religious expression to visiting Christian merchants from the Roman Empire.

After fulfilling his regency Frumentius visited Athanasius, bishop of Alexandria, in about 347 and advised Ethiopia's further Christianization. Athanasius then ordained Frumentius bishop and commissioned him to initiate the cultural adaptation of Greek Christianity's biblical-liturgical texts to Ethiopic symbols and language. The link between the Egyptian Coptic and Ethiopian churches having thus been established, Frumentius, despite the enmity of the Byzantine Roman emperor Constantius II (337–361), repudiated the Arians. The 4th-century church historian Rufinus of Aquileia, by meeting Aedesius later at Tyre, was able to document Frumentius' achievements, noting that the Ethiopians addressed him as "Abuna," or "Our Father," a title that is still used for the patriarch of the Ethiopian Orthodox Church.

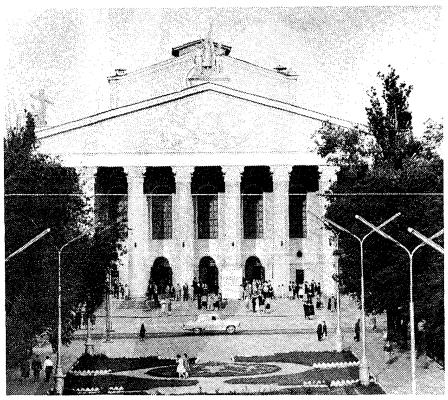
Frundsberg, Georg von, Frundsberg also spelled FREUNDSBERG, or FRONSBERG (b. Sept. 24, 1473, Mindelheim Castle, near Memmigen, Ger.—d. Aug. 20, 1528, Mindelheim Castle), German soldier and devoted servant of the Habsburgs, who fought on behalf of the Holy Roman emperors Maximilian I and Charles V.

In 1499 Frundsberg took part in Maximilian's struggle against the Swiss, and, in the same year, he was among the imperial troops sent to assist Milan against the French. He took part in 1504 in the war over the succession to the duchy of Bavaria–Landshut, and afterward he fought in the Netherlands. Frundsberg is often called the "father of the Landsknechte," because he played a prominent part in the organization of that formidable mercenary infantry, armed with pike and sword, which became Maximilian's most powerful striking force. As commander of the Landsknechte, Frundsberg was of great service to the empire in 1509, 1513, and 1514 against the Venetians

Frundsberg, detail of an oil painting on wood by Christoph Amberger, c. 1520; in a private collection, Kirchheim, Ger.
Fotohaus Sepp Hartmann

and the French, in Picardy in 1521, and in Lombardy in 1522. He was partly responsible for the great victory at Pavia in February 1525.

Frunze, formerly (until 1926) PISHPEK, city and capital of the Kirgiz Soviet Socialist Republic. It lies in the Chu River Valley near the Kirgiz Mountains at an elevation of 2,500–3,000 feet (750–900 m). Frunze is situated along the Alaarcha and Alamedin rivers and



Drama theatre, Frunze, Kirgiz S.S.R.
Novosti Press Agency

is intersected in the north by the Bolshoy (Great) Chuysky Canal. The city was founded in 1878 near the early 19th-century Kokand fort of Pishpek, which was captured by the Russians in 1862. By 1913 the population was 14,000 (mainly Russians), but though it was the administrative centre of a district, it remained essentially a sprawling, dusty village. In 1924 it was chosen as the administrative centre of the new Kirgiz autonomous *oblast* (province). When the latter became the Kirgiz Autonomous Soviet Socialist Republic in 1926, Pishpek became its capital and was renamed Frunze after the revolutionary and Red Army leader Mikhail Vasilyevich Frunze, who was born there in 1885. It developed rapidly into a modern city.

Frunze is laid out on a grid, with wide, tree-lined streets. It has parks and many orchards, and permanently snow-capped mountains are visible to the south. Besides the various government buildings, there are theatres, the Kirgiz S.S.R. Academy of Sciences (founded 1954), the Kirgiz State University (1951), and agricultural, medical, polytechnic, and teacher-training institutes.

The city's industry developed in two stages: until 1941 emphasis was on the food and other light industries using local raw materials, but after the evacuation of heavy industries from western Russia during World War II, an extensive machine-building and metalworking industry came into being. Development was particularly rapid in the 1960s, and the city's population nearly doubled between 1959 and 1970. Pop. (1986 est.) 617,000.

Frunze, Mikhail Vasilyevich (b. Feb. 2 [Jan 21, Old Style], 1885, Pishpek, Kirgizia [now Frunze, Kirgiz S.S.R.]—d. Oct. 31, 1925, Moscow), Soviet army officer and military theorist who is regarded as one of the fathers of the Red Army.

Frunze took part in the Moscow insurrection in 1905 and, after frequent arrests for revolutionary activity, escaped in 1915 to conduct agitation in the Russian Army, first on the western front and, after the February 1917 Revolution, in Belorussia. He became one of the outstanding commanders of the Civil War, commanding, in turn, the eastern front against Admiral A.V. Kolchak in 1919 and the southern front, where General P.N. Wrangel was routed, in 1920. He became deputy people's commissar for war in March 1924 and replaced Leon D. Trotsky as people's commissar for war in January 1925. In 1924 he also became a candidate member of the Politburo.

Frunze was one of a group that opposed Trotsky's views during the Civil War and, in consequence, won the support of Joseph Stalin, who ensured his advance after 1921. He was the author of the "unitary military doctrine," according to which the army should be trained throughout in a spirit of offensive action, united by its ideology and by its determination to carry out the task of the Communist Party—the promotion of world revolution. This could not, in his view, be achieved so long as the army was commanded by officers of the old Imperial Army, whom Trotsky, of practical necessity, had put in command of the new Red Army after 1918. Frunze asserted that the form of the Soviet military establishment should flow directly from the revolutionary and class character of the Soviet state. He helped lay the basis for a permanent and efficient peacetime Soviet military machine by introducing peacetime compulsory military service and by standardizing military formations, drills, and uniforms.

Fry, Christopher, original name CHRISTOPHER HARRIS (b. Dec. 18, 1907, Bristol, Gloucestershire, Eng.), English writer of verse plays.

His father having died when the boy was very young, he adopted his mother's name, Fry, after he became a schoolteacher at age 18. He then held various jobs and was for many years an actor, director, and writer of revues and plays before he gained fame as a playwright with *The Lady's Not for Burning* (1948), an ironic medieval comedy whose heroine is charged with being a witch. *A Phoenix Too Frequent* (1946) retells a tale from Petronius Arbiter. *The Boy with a Cart* (1950), a story of Saint Cuthman, is a legend of miracle and faith in the style of the mystery plays. *A Sleep of Prisoners* (1951) and *The Dark Is Light Enough* (1954) explore religious themes. After many years of translating plays and a 10-year hiatus, Fry wrote *A Yard of Sun,* which was performed in 1970. He also collaborated on the screenplays of a number of epic films, such as *Ben Hur* (1959) and *Barabbas* (1962). His *Can You Find Me: A Family History* was published in 1978.

Christopher Fry, 1950
BBC Hulton Picture Library

Fry, E(dwin) Maxwell; and Drew, Jane (Beverly) (respectively b. Aug. 2, 1899, Wallasey, Cheshire, Eng.—d. Sept. 3, 1987, Cotherstone, Durham; b. March 24, 1911, Thornton Heath, Surrey), British architects, husband and wife (from 1942), who pioneered in modern tropical building and town planning.

Maxwell Fry, one of the earliest British adherents to the modern movement, was trained at the Liverpool University School of Architecture; in 1924 he joined the town-planning firm of Adams and Thompson in London. Renouncing classical architecture, he wrote that he saw "no place for it in a technocratic world." His early work shows the strong influence of Mies van der Rohe, a leading proponent of the International style in architecture. From 1934 to 1936 he was in partnership with Walter Gropius, who had fled Nazi Germany, and, although few of their proposals were accepted, being considered too modern, their Impington Village College (1936) is looked upon as a fine achievement.

Jane Drew, a graduate of the Architectural Association School, London, did specialist studies on kitchen planning for the British Commercial Gas Corporation (1941–43). She married Maxwell Fry in 1942. From 1944 to 1946 she was assistant town-planning adviser to the resident minister for the West African Colonies, while Fry served as the chief town-planning adviser there. In 1946 the two formed the firm of Fry, Drew and Partners, London, specializing in large-scale planning for tropical countries. Among the many tropical buildings they designed are those of the University of Ibadan, Nigeria (1953–59). Their books *Village Housing in the Tropics* (1947; with Harry L. Ford) and *Tropical Architecture in the Humid Zone* (1956) have long been considered standard works.

The French architect Le Corbusier invited Fry and Drew to join him in 1951 on the project to build a new capital at Chandigarh, Punjab, India. In their houses there, Fry and Drew utilized the sun-sheltering properties of canopies and deep recesses.

Among Drew's best-known works are the Institute of Contemporary Arts, London (1964), the School for the Deaf, Herne Hill, London (1968), and the Open University, Milton Keynes (1969–77). Maxwell Fry's important written works are *The Bauhaus and the Modern Movement* (1968) and *Art in a Machine Age* (1969).

Fry, Elizabeth, *née* GURNEY (b. May 21, 1780, Norwich, Norfolk, Eng.—d. Oct. 12, 1845, Ramsgate, Kent), English Quaker philanthropist and one of the chief promoters of prison reform in Europe, who also helped to improve the British hospital system and the treatment of the insane.

The daughter of a wealthy Quaker banker and merchant, she married (1800) Joseph Fry, a London merchant, and combined her work with the care of a large family. Unwearyingly attending to the poor, she was acknowledged as a "minister" by the Society of Friends (1811) and later traveled in Scotland, northern England, Ireland, and much of Europe. There she inspected prisons and wrote reports. Her recommendations for Newgate Prison, for instance, included separation of the sexes, clas-

sification of criminals, female supervision for women, adequate provision for religious and secular instruction, and useful employment. Even in her lifetime her suggestions were increasingly acted upon throughout most of Europe.

Fry, Roger (Eliot) (b. Dec. 14, 1866, London—d. Sept. 9, 1934, London), English art critic and artist, best known as the champion of the movement to which he gave the name Postimpressionism.

Fry was born into a Quaker family and was educated at the University of Cambridge for a career in science. His interest in art grew, however, and he studied painting in Italy and also began to lecture on art. His first book, *Giovanni Bellini,* was published in 1899. Thereafter he published art criticism, and in 1905 his edition of Joshua Reynolds' *Discourses* was published. From 1905 to 1910 he was director of the Metropolitan Museum of Art in New York City.

Fry first came into contact with the work of the French painter Paul Cézanne in 1906, and the experience changed the course of his life. He began to publish articles on the works of Cézanne, Paul Gauguin, Henri Matisse, and Vincent van Gogh, for in these painters he saw a merging of the structural understanding of the classical artists with the colour explorations of the Impressionists. Upon his return to London, Fry became associated with the Bloomsbury group. In November 1910 he organized for the Grafton Galleries the first of two painting exhibitions that were to revolutionize aesthetics in England. The uproar over "Manet and the Post-Impressionists" was considerable; it removed Fry from the ranks of traditional and academic critics and propelled him into the vanguard of art criticism. A second exhibition of a similar nature was opened in October 1912.

In 1913, following a precedent that had been set by William Morris and the Arts and Crafts Movement, Fry organized a group of young artists into a collective called the Omega Workshops, a place for them to design, create, and decorate everyday functional objects (such as drapery, furniture, and china). Omega remained in operation until 1919.

Fry continued to lecture, travel, and paint throughout his life. His legacy is a body of art criticism and theory that includes *Vision and Design* (1920), *Transformations* (1926), *Cézanne* (1927), *Henri Matisse* (1930), and several other collections of lectures. In 1933 he was appointed Slade professor of fine art at Cambridge. A biography, *Roger Fry,* by Virginia Woolf, was published in 1940.

Frycz-Modrzewski, Andrzej (writer): *see* Modrzewski, Andrzej.

Frýdek-Místek, city, Severomoravský *kraj* (Northern Moravia region), Czechoslovakia, on the Ostravice River just south of Ostrava. The town is dominated by the steeple of Frýdek Castle, which was originally a Gothic royal castle but was reconstructed during the 17th and 18th centuries. Also of interest are the twin-tower 18th-century Baroque church and the small St. Jodocus Church. The town is within the sphere of influence of the Ostrava industrial region, with coal and iron deposits in the surrounding area, and heavy industry dominates its economy. Rolled steel, machinery, and cotton textiles are the principal manufactures. Pop. (1985 est.) 63,143.

Frye, (Herman) Northrop (b. July 14, 1912, Sherbrooke, Que., Can.), Canadian educator and literary critic, author of influential theories of criticism.

Frye was educated at the University of Toronto, Emmanuel College in Toronto, and Merton College, Oxford. He taught at Victoria College from 1939, became chairman of the English department there in 1952, and served as principal (1959–67) and chancellor (from 1978) of the college. He was also a visiting professor in many American universities.

In 1947 he published *Fearful Symmetry: A Study of William Blake,* which was a sweeping and erudite study of Blake's visionary symbolism. In *Anatomy of Criticism* (1957), he analyzed various modes of literary criticism and stressed the recurring importance of archetypal symbols in literature. In later works Frye studied T.S. Eliot (1963), Milton's epics (1965), Shakespearean comedy (1965) and tragedy (1967), and English Romanticism (1968). *The Stubborn Structure: Essays on Criticism and Society* appeared in 1970, and *The Great Code: The Bible and Literature,* a study of the mythology and structure of the Bible, was published in 1982. Frye's other critical works similarly emphasize the existence of group myths in literature and the systematic classification of literary symbols, genres, and criticism.

frying, the cooking of food in hot fats or oils, usually done with a shallow oil bath in a pan over a fire or as so-called deep fat frying, in which the food is completely immersed in a deeper vessel of hot oil. Because the food is heated through a greasy medium, some authorities consider frying to be technically a dry-heat cooking process.

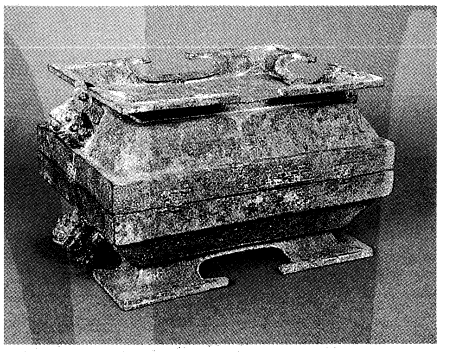
The technique of frying is ancient, ubiquitous, and highly versatile; it has been used since antiquity and in most cultures to prepare meats and fish, vegetables, and breads. This popularity, together with the fairly low cost of large-scale frying, made fried foods the staples of the late 20th-century fast-food industry.

Fatty meats such as bacon and ground beef are usually fried in their own rendered fat. Relatively lean meats, fish, and vegetables are often floured or dipped in batter before being fried. More delicate cooking often calls for meats and vegetables to be sautéed, that is, lightly browned in a small amount of butter, light shortening, or oil. In addition to meat drippings, butter, and lard, once easily rendered in the home, commercially produced corn, peanut, and other seed oils are common frying mediums.

FSH: *see* follicle-stimulating hormone.

Ft.: *see under* Fort.

fu, Pinyin FU, type of Chinese bronze vessel produced largely in the middle Chou period (*c.* 900–*c.* 600 BC), as well as a type of bronze ax made during the Shang (18th–12th century BC) and Chou (1111–255 BC) periods. Rectangular in shape and divided into two parts,



Bronze *fu* with cover, 5th–3rd century BC, Eastern Chou dynasty; in the Art Institute of Chicago

By courtesy of the Art Institute of Chicago, Lucy Maud Buckingham Collection

the vessel is supported by angular feet at each corner; the lid is almost a duplicate of the bottom (in principle much like the *tui* [*q.v.*]). The rather squat shape and the minimal decoration are typical of the middle Chou period.

The cast broad ax may have a tang, or shafthole, for the attachment of a handle, which may be decorated with animal motifs. The shape of the blade varies, but it generally is spatulate with a subtly arced and honed cutting edge. Probably the ax was used most often as a badge or emblem of authority; the ax motif is commonly found among the symbolic patterns on Imperial robes of later periods.

fu, Chinese literary form combining elements of poetry and prose. Developing from the *Li sao* of Ch'ü Yüan (*c.* 343–*c.* 289 BC) during the Han dynasty (206 BC–AD 220), the *fu* was used for description and exposition, in contrast to the more subjective, lyrical *sao.* Its prosody was freer than that of the *sao,* the rhyme pattern being less restrictive. The elements of the *fu* form include a long line, caesura, and the use of balanced parallel phrases. The use of rhyme removes the *fu* from the area of pure prose and places it somewhere between poetry and prose. During Han times it was often abused for purposes of trivial and hackneyed description and was generally characterized by an endless piling up of words, although this technique was used quite skillfully by some writers. Hundreds of years later, during the Sung dynasty (960–1279), the *fu* was enriched by the skill of Ou-yang Hsiu (1007–72) and Su Tung-p'o (1036–1101), who made it more prose than poetry and used it to express philosophical concerns.

Fu-chou, Pinyin FUZHOU, conventional FOO CHOW, city near the east central coast of Fukien Province (*sheng*), China. It is the capital of the province. Fu-chou is situated on the north bank of the estuary of Fukien's largest river, the Min Chiang, which gives access to the interior and to the neighbouring provinces of Kiangsi and Chekiang.

Fu-chou was one of the first places in Fukien to be settled. At the beginning of the 2nd century BC it was called Tung-ye and was the capital of the non-Chinese kingdom of Yüeh. After Han Wu Ti subjugated the area, it became the seat of Yeh County, subordinate to K'uai-chi in Chekiang. In the 1st century AD its name was changed to Hou-kuan, and it became the military seat for the eastern coastal area. From the 3rd century AD onward, it became the seat of the commandery of Chinan. With the Sui conquest of southern China in 581, it was renamed Min County, and under the T'ang dynasty (618–907) it became the seat of Fu-chou Prefecture. After the An Lu-shan rebellion of 755 it became the seat of the civil governor of Fukien; and in 789 the prefectural city was divided into two counties, Min and Hou-kuan. In the 9th and 10th centuries the population of Fukien as a whole rapidly increased.

Briefly the capital of the independent kingdom of Min from 909 to 944, Fu-chou has remained the capital of Fukien ever since. In Sung times (960–1279) much overseas trade was concentrated at Fu-chou, which also became an important cultural centre for the empire as a whole. Fu-chou prospered from the 16th to the 19th century, and its prosperity reached its height when it was opened as a treaty port after the Anglo-Chinese Opium War of 1839–42. It subsequently became the chief port for the tea trade, being much nearer to the producing districts than Canton, to which tea had to be shipped overland. The eclipse of the Canton tea trade was completed when the Taiping Rebellion (1850–64) disrupted the overland route. With the decline of the tea trade, however, Fu-chou's export trade fell by half between 1874 and 1884; tea was gradually rivaled by exports of timber, paper, and foodstuffs. In 1867 the port was the site of one of China's first major experiments with Western technology, when the Fu-chou Navy Yard was established; a shipyard and an arsenal were built under French guidance, and a naval school was opened. A naval academy was also established at the shipyard, and it

became a centre for the study of Western languages and technical sciences. The academy, which offered courses in English, French, engineering, and navigation, produced a generation of Western-trained officers, including the famous scholar-reformer Yen Fu (1854–1921).

The yard was established as part of a program to strengthen China in the wake of the country's disastrous defeat in the trading conflict known as the second Opium War (1856–60). But most talented students continued to pursue a traditional Confucian education, and by the mid-1870s the government began to lose interest in the shipyard; it had trouble securing funds and declined in importance. Fu-chou remained essentially a commercial centre and a port until World War II; it had relatively little industry. The port was occupied by the Japanese during 1940–45.

Since 1949, Fu-chou has grown considerably; its communications have been improved by the clearing of the Min Chiang for navigation by medium-sized craft upstream to Nan-p'ing. In 1956 the railway linking Fu-chou with the interior of the province and with the main Chinese railway system was opened. The port, too, has been improved; Fu-chou itself is no longer accessible to seagoing ships, but Lo-hsing-t'a Mao-ti (anchorage) and another outer harbour at Kuan-t'ou on the coast of the East China Sea have been modernized and improved. The chief exports are timber, fruits, paper, and foodstuffs.

Industry is supplied with power by a grid running from the Ku-t'ien hydroelectric scheme in the mountains to the northwest. It is a centre for industrial chemicals and has food-processing, timber-working, engineering, papermaking, printing, and textile industries. A small iron and steel plant was built in 1958. Handicrafts remain important, and the city is famous for its lacquer and wood products. Among Fu-chou's institutions of higher learning are Fukien Medical College, Fu-chou University, Fukien Normal College, Fukien Agricultural Institute, and a research institute of the Chinese Academy of Science. Pop. (1980 UN est.) 800,000.

Fu-ch'un River, Wade–Giles romanization FU-CH'UN CHIANG, Pinyin FUCHUN JIANG, river flowing through Chekiang Province, China. The lower course and estuary discharging at Hang-chou into Hang-chou Wan (bay) are called the Ch'ien-t'ang Chiang. Above Hang-chou, as far as T'ung-lu, it is called the Fu-ch'un Chiang, and the section above T'ung-lu is known as the T'ung Chiang. Near Chien-te the main river is formed by the junction of two separate river systems.

The westerly system is the Hsin-an Chiang, which flows from southern Anhwei Province, where it rises in the Huang Shan (mountains) near She-hsien. This tributary flows through deep, gorgelike valleys in the rugged, hilly country of the Anhwei–Chekiang border. In the late 1950s this river was dammed above Chien-te to establish the Hsin-an Chiang dam and hydroelectric project, forming a large lake.

The southern and eastern sections of the system are drained by the Lan Chiang. At Lanhsi this is formed by the junction of two rivers, the Chin-hua Chiang system, flowing from central Chekiang to the east, and the Ch'u Chiang, which drains the mountains of the Chekiang–Kiangsi and Chekiang–Fukien border areas.

The Fu-ch'un River system provides the major routes from the Hang-chou and Shanghai area into inland Chekiang, northern Fukien, and Kiangsi, and it was the route by which Southeast China was largely colonized. The rivers themselves, however, are of limited use for navigation. Small steamers can travel as far as T'ung-lu, while river junks can reach Ch'ang-shan (on the Ch'u Chiang) and Chin-hua (on the Chin-hua Chiang). The role of the river has been greatly reduced since the construction of railways in the region.

The mouth of the Fu-ch'un River is famous for its tidal bore, sometimes as much as 20 ft (6 m) high, caused by tidal action in the funnel-shaped Hang-chou Wan. The length of the Fu-ch'un River is estimated to be 239 mi (385 km), and its drainage area is estimated at 16,456 sq mi (42,621 sq km).

Fu Hsi, Pinyin FU XI, formally (Wade–Giles romanization) T'AI HAO (Chinese: The Great Bright One), also called PAO HSI, or MI HSI, first of China's mythical emperors. His miraculous birth, as a divine being with a serpent's body, is said to have occurred in the 29th century BC. Some representations show him as a leaf-wreathed head growing out of a mountain or as a man clothed with animal skins. Fu Hsi is said to have discovered the famous Chinese trigrams used in divination and thus to have contributed, in some uncertain way, to the development of writing. He domesticated animals, taught his people to cook, to fish with nets, and to hunt with weapons made of iron. He likewise instituted marriage and offered the first open-air sacrifice to heaven. A stone tablet dated AD 160 depicts him with Nü Kua, a frequent companion, who was either his wife or sister.

Fu Hsi, painting on silk; in the National Palace Museum, Taipei

By courtesy of the National Palace Museum, Taipei

Fu-hsien, also called (locally) WA-FANG-TIEN, Pinyin FU XIAN, or WAFANGDIAN, city in Liaoning Province (*sheng*), China. A county (*hsien*) seat in Lü-ta Municipality (*shih*), the city is situated in the centre of the Liaotung Peninsula and is an important market centre for the agriculture and fruit industry of the area, which specializes in growing apples, pears, and grapes. It has developed industries producing various industrial chemicals as well as fertilizers and insecticides. It also has a small engineering industry and processes oils and fats. It is connected by railway with Chin-chou and Shen-yang (Mukden). Pop. (mid-1970s est.) 50,000–100,000.

Fu-hsin, Pinyin FUXIN, city, northwestern Liaoning Province (*sheng*), China. It is a prefecture-level municipality (*shih*) with an extensive territory that straddles the border with the Inner Mongolian Autonomous Region. It includes the county (*hsien*) of Fu-hsin and the Fu-hsin Mongolian Autonomous County (*tzu-chih-hsien*), which is responsible for the administration of the large Mongolian population of the border area. Until 1902 the area remained a pasture ground reserved for the Mongolians. It was legally opened to Chinese colonization in that year, although many settlers had already arrived. A county administration was set up in 1904 and moved to its present seat in 1911.

The municipality of Fu-hsin became a market centre on the border between the agricultural zone occupied by Chinese peasants and the pastoral zone inhabited by the Mongolians. During the Japanese occupation of Manchuria (1931–45), important coal deposits were discovered in the area. The mines were badly damaged during the later stages of World War II, and production virtually ceased, but in the early 1950s the mines were reconstructed and reequipped with extensive Soviet aid. The coal fuels a very large thermal generating plant, also constructed with Soviet aid in the mid-1950s. This power facility is linked with the south Manchuria power grid system. The surrounding areas also have large reserves of iron ore. Pop. (1983 est.) 636,000.

Fu Hsing, Pinyin FU XING, in Chinese mythology, star god of happiness, one of the three stellar divinities known collectively as Fu-Shou-Lu. He is one of many Chinese gods who bestow happiness on their worshippers. Some say he is the same as Fu Shen (*q.v.*), the spirit of happiness. If so, Fu Hsing was a historical personage, probably a 6th-century mandarin called Yang Ch'eng, who was deified by the local residents of Tao Hsien in Hunan Province.

Fu Hsing, wood sculpture; in the Musée Guimet, Paris

By courtesy of the Musee Guimet, Paris

Fu-hsing-chen (China): *see* Ssu-mao.

Fu-k'ang-an, Pinyin FUKANGAN (d. June 1796, China), famous military commander of the Ch'ing dynasty (1644–1911/12).

A member of the Manchu forces of Manchuria who had established the Ch'ing dynasty, Fu-k'ang-an inherited a minor post in the government. After distinguishing himself in battle, he was made military governor of Manchuria (1777). Between 1780 and 1795 he served several terms as governor general in different Chinese provinces. A corrupt official, he is said to have greatly enriched himself in his various positions.

In combat, however, he was undefeated. He suppressed rebellions in the western Chinese provinces of Szechwan and Kansu, pacified the recently occupied island of Taiwan, and finally led a Chinese expedition into Tibet. There, on unfamiliar territory, 3,000 miles from his source of supplies in the Chinese capital at Peking, he defeated an army of Gurkha

warriors and drove them 1,000 miles (1,600 km) across one of the highest plateaus of the world, back into their homeland in Nepal, which became a Chinese tributary state. For his services, Fu-k'ang-an was made a prince of the fourth degree, the first Manchu outside the Imperial family to receive that rank.

fu-ping, Pinyin FUBING, peasant "militia" system established in China around the 6th century AD. The *fu-ping* was first begun by the short-lived Western Wei (535–556/557) and Northern Chou (557–581) dynasties in North China in an effort to prevent incursions by the nomadic tribes of Central Asia. Groups of peasants were given military training and organized into armed companies in which they were required to participate in times of emergency. The T'ang dynasty (618–907) took over this system and made it part of the tax services required of all able-bodied peasants. The system began to collapse toward the middle of the T'ang dynasty. Although it was never formally reinstated, the peasant militia system was frequently attempted by local gentry and officials as a way of pacifying the countryside in times of unrest. This was especially true in the latter part of the Ch'ing dynasty (1644–1911/12), when the deterioration of the regular Imperial forces left the militia system as the only method for the government to control the increasing number of local rebellions.

Fu Shen, Pinyin FU SHEN, a Chinese god of happiness, the deification of a 6th-century mandarin. As a generic title, the name Fu Shen denotes the beneficent gods of Chinese mythology.

Yang Ch'eng (or Yang Hsi-chi), who served the Liang Wu Ti emperor (reigned AD 502–549) as a criminal judge in Hunan Province, was deeply disturbed that the ruler was destroying the normal family life of dwarfs by pressing them into service as personal servants and court entertainers. Yang admonished the emperor, pointing out that these unfortunate people were subjects, not slaves. The emperor thereupon called a halt to the practice.

Grateful for Yang's solicitous intercession, the dwarfs set up images of their benefactor and offered sacrifice. The cult of Yang as god of happiness gradually spread throughout China. *Compare* Fu Hsing.

Fu-Shou-Lu, Pinyin FUSHOULU, in Chinese mythology, a collective term for the three so-called stellar gods, taken from their names: Fu Hsing, Shou Hsing, and Lu Hsing (*qq.v.*).

Fu-shun, Pinyin FUSHUN, city in central Liaoning *sheng* (province), northeastern China. It is situated some 25 miles (40 km) east of Shen-yang (Mukden) on the Hun River. In earlier times this area was on the frontier of Chinese settlement. It was the site of a customs station under the T'ang dynasty (618–907) in the 8th century, and again under the Ming dynasty (1368–1644), when it received the name Fu-shun. It was not until 1902 that settlement in the area became legal for Chinese immigrants; the community then became the seat of a civil county administration.

Its modern development depended on the exploitation of huge nearby bituminous coal reserves beginning in 1905, when the Russian Far Eastern Forestry Company began mining coal at Ch'ien-chin-sai. In 1908 the mines were taken over by the South Manchurian Railway company. By 1930 the mines' output amounted to 75 percent of the total coal production of Manchuria. The coal deposits are enormous. The high-quality coal is suitable for coking and is mined mostly by open-cut methods. After World War II the mines were in damaged condition and production fell off. By 1955, however, they had been reequipped, and normal production resumed. By the mid-1970s the mines' output had declined somewhat as extraction became increasingly difficult and greater use was made of underground mining techniques.

The coal deposits are covered by a thick layer of oil-bearing shale. Oil was distilled from this shale on an industrial scale from 1930 onward. The output of chemical by-products of coal and of synthetic petroleum from shale remains important, making Fu-shun an important source of fertilizers and industrial chemicals.

In the late 1950s a large iron and steel plant was constructed in Fu-shun to produce pig iron, ingot steel, and finished steel products. A heavy machinery industry was also established. Fu-shun is also a centre of the aluminum industry, which was founded in the late 1930s to serve the Japanese aircraft industry. The Manchurian Light Metals Company established a large plant at Fu-shun in 1938 and a second one in 1941. This industry has been revived and much expanded since 1949. Other Fu-shun industries include the manufacture of rubber, mining equipment, and cement. The city is connected by rail with Shen-yang and T'ung-hua (in Kirin). Pop. (1986 est.) 1,077,300.

Fu xian (China): *see* Fu-hsien.

Fu Xing (Chinese mythology): *see* Fu Hsing.

Fu'ād I, original name AHMED FUAD PASHA (b. March 26, 1868, Cairo—d. April 28, 1936, Egypt), the first king of Egypt (1922–36) following its independence from Great Britain.

After serving in a number of administrative posts, Fu'ād became sultan of Egypt in 1917, at which time Egypt was still a British protectorate. In 1919 Britain indicated a willingness to negotiate a treaty that would give Egypt more independence. Most Egyptians welcomed this prospect, but they differed over who would formulate and present Egyptian demands to the British. The sultan had strong popular support and was determined to be the leading influence in the direction of governmental affairs; but a strong nationalist movement had emerged—the Wafd party—under the leadership of Sa'd Zaghlūl. Zaghlūl saw himself as the proper person to lead the negotiations with the British.

A stalemate between the supporters of Fu'ād and Zaghlūl resulted in the collapse of Anglo-Egyptian talks. Britain responded in 1922 with a unilateral declaration of Egyptian independence, subject to strong British influence in Egyptian affairs. Accordingly, Fu'ād assumed the title of king in 1922. Dissatisfied with the British unilateral declaration, Fu'ād struggled unsuccessfully throughout his reign to secure a bilateral treaty of independence that would be acceptable to the British and the Egyptians.

In 1923 Fu'ād promulgated a constitution at a time when Zaghlūl was in exile. When Zaghlūl and other exiles returned, however, the king was confronted with an enormously popular Wafd, which used institutions created by the constitution to strengthen its opposition. The Wafd won commanding majorities in national elections held in 1923, 1925, and 1929, but Fu'ād usually managed to form his governments with non-Wafdist ministers who were amenable to his influence. Socially and religiously, Fu'ād aligned himself with the outlook and interests of al-Azhar, Cairo's great institution of Muslim learning, which won him important popular support. In 1930 he made a determined attempt to stabilize his political position: he dissolved the Parliament, revoked the old constitution, and promulgated both a new constitution and a new electoral law. The 1931 elections yielded a cooperative, non-Wafdist parliament, and domestic political tranquillity prevailed until 1935, when, under strong nationalist pressure, Fu'ād restored the original 1923 constitution.

Fuad Paşa, Mehmed (b. 1815, Constantinople [now Istanbul]—d. Feb. 12, 1869, Nice, Fr.), Turkish statesman of the mid-19th century and one of the chief architects of the Tanzimat (Reorganization), aimed at the modernization and westernization of the Ottoman Empire.

The son of a well-known Turkish poet, Fuad Paşa was trained in medicine, but his knowledge of French allowed him to enter the diplomatic service, where he became the first secretary of the Turkish Embassy in London (1840). After holding several diplomatic posts, he served as minister of foreign affairs under Âli Paşa (1852–53) and again in 1855–56.

A confirmed westernizer, Fuad Pasa served on the Commission of Education, which recommended a complete reform of the school system. He assumed the presidency of the Tanzimat Council in 1857. After the accession of Sultan Abdülaziz (1861), Fuad Paşa became grand vizier and foreign minister, and, although dismissed in 1862, he returned to office in 1863. He held the grand viziership until 1867.

A scholar as well as a statesman, he collaborated with the historian Ahmed Cevdet in writing *Kavaid-i Osmaniye* (1851; "The Rules of Ottoman Turkish"), the first Turkish work on Turkish grammar published in the empire and a milestone in the reform of the language.

fubing (China): *see* fu-ping.

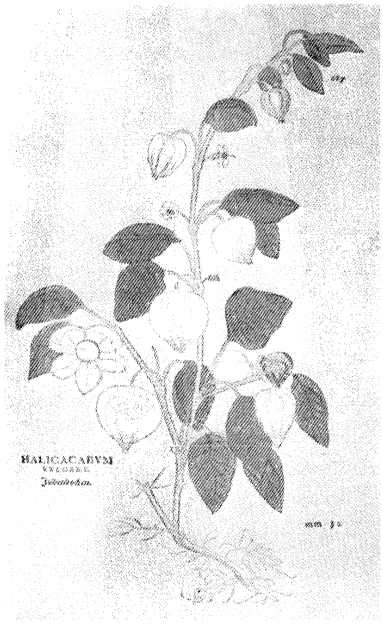
Fuchs, (Emil) Klaus (Julius) (b. Dec. 29, 1911, Rüsselsheim, Ger.—d. Jan. 28, 1988, East Germany), German-born physicist and spy who was arrested and convicted (1950) for giving vital American and British atomic-research secrets to the Soviet Union.

Fuchs studied physics and mathematics at the universities of Leipzig and Kiel and joined the German Communist Party in 1930. He was forced to flee Germany after the Nazis came to power in 1933, and he ended up in Great Britain, where he studied at the University of Edinburgh and received a doctorate there. He was briefly interned as a German at the start of World War II but was soon released in order to do research on the atomic bomb at the University of Birmingham. In 1942 he became a British citizen. When Fuchs realized the importance of the research he was engaged upon, he began passing scientific secrets on to the Soviet Union. In 1943 he was sent to the United States to work on the atomic bomb project at Los Alamos, where he acquired a thorough knowledge of the theory and design of the bomb and passed his knowledge on to the Soviets. His espionage is credited with saving the Soviets at least one year's work in their own program to develop the atomic bomb.

After the war he returned to England, where he became head of the physics department of the British nuclear research centre at Harwell. His espionage activities were finally detected and he was arrested in 1950, upon which he admitted passing information to the Soviet Union since 1943. He was sentenced to 14 years in prison. After his release in 1959 for good behaviour, he went to East Germany, where he was granted citizenship and was appointed deputy director of the Central Institute for Nuclear Research, Rossendorf (near Dresden). He remained a committed Communist and received many honours from the East German Communist Party and the scientific establishment there.

Fuchs, Leonhard (b. Jan. 17, 1501, Wemding, Bavaria [Germany]—d. May 10, 1566, Tübingen, Württemberg [Germany]), German botanist and physician whose botanical work *Historia Stirpium* (1542) is a landmark in the development of natural history because of its organized presentation, the accuracy of its drawings and descriptions of plants, and its glossary.

Fuchs obtained a humanistic education under Catholic guidance but later adhered to Protestantism. He studied medicine and became a professor at Tübingen. He was most interested in the medicinal properties of plants,



Winter cherry (*Physalis alkekengi*), coloured woodcut from *De historia stirpium* by Leonhard Fuchs, 1542

By courtesy of the British Library Board

and his book was intended primarily as a guide for plant collection. Well acquainted with the Greek and Latin classics, and an excellent observer, he gave precise descriptions, and his beautiful woodcuts of plants established the tradition of representing plants by means of accurate illustrations. He presented the plants in alphabetical order; for each one he gave an account of its form and habitat, the best season for collection, and what he called its temperament and powers. Only under the subject of powers did he refer to ancient authorities. His name is commemorated by a genus of flowering plants (*Fuchsia*).

Fuchs, Lukas: *see* Foss, Lukas.

Fuchs, Sir Vivian Ernest (b. Feb. 11, 1908, Isle of Wight, Eng.), English geologist and explorer who led the historic British Commonwealth Trans-Antarctic Expedition in 1957–58. Fuchs's 12-man party completed the first land journey across Antarctica in 99 days despite severe hardships, travelling 2,500 miles (4,000 kilometres) from the Filchner Ice Shelf to McMurdo Sound. The findings of the expedition confirmed earlier theories that a single continent exists beneath the Antarctic polar ice sheet. For his leadership on the expedition and contributions to Antarctic exploration, Fuchs was knighted in 1958.

In 1929 and 1930–31 Fuchs participated in expeditions to East Greenland and the East African lakes, respectively, serving as a geologist. In 1933–34 he led the Lake Rudolf–Rift Valley Expedition that surveyed 40,000 square miles (104,500 square kilometres) of the Ethiopia–Kenya region. Fuchs's thesis on the tectonics (*i.e.*, crustal structure) of the Rift Valley earned him a Ph.D. in geology from Cambridge University in 1935. Selected to head the Falkland Islands Dependencies Surveys in 1947, he became interested in Antarctica. Fuchs and Sir Edmund Hillary, the New Zealand explorer, co-authored the book *The Crossing of Antarctica* (1958).

Füchsel, Georg Christian (b. Feb. 14, 1722, Ilmenau, Thuringia, Holy Roman Empire—d. June 20, 1773, Rudolstadt, Thuringia), German geologist, a pioneer in the development of stratigraphy, the study of rock strata.

Füchsel began medical practice in 1756 and the following year was appointed to organize the natural science collections of Friedrich Carl, later prince of the German principality of Schwarzburg-Rudolstadt, where Füchsel became court physician (1767) and librarian (1770). The originator of the idea of stratigraphic formations, he was one of the first actually to make recorded measurements of sections of stratified rock. He also made the first geological map of Germany and adjacent areas.

Fuchsia, genus of about 100 species of flowering shrubs and trees, in the evening primrose family (Onagraceae), native to the cooler regions of Central and South America and to New Zealand and Tahiti. Several species are grown in gardens as bedding plants, small shrubs, or miniature treelike specimens; others are grown as pot plants or in hanging baskets for indoor or greenhouse cultivation. They are valued for their showy pendulous flowers, tubular to bell-shaped, in shades of red and purple to white. The hanging growth habit and flared shape of the flower gave rise to the popular name ladies' eardrop.

Fuchsia

Malak—Annan Photo Features

The colour fuchsia—a deep reddish-purple, seen in the flowers of some species—is named for the genus. The genus in turn is named for Leonard Fuchs, a 16th-century botanist and physician.

Suitable for growth in hanging baskets are the prostrate *Fuchsia procumbens* and the dwarf and trailing forms of the common hybrids (*F.* × *hybrida*, probably derived from *F. fulgens* and *F. magellanica*). The garden fuchsias, probably derived from *F. fungens, F. magellanica,* and *F. corymbiflora,* are widely grown in shady borders. One tree fuchsia (*F. excorticata*), from New Zealand, up to 15 metres (50 feet) high, has dull-red waxy flowers and papery bark; a Mexican tree fuchsia, *F. arborescens*, up to 10 m, has lilac and purple flower clusters.

Fuchū, city, Tokyo Metropolis (*to*), Honshu, Japan, on the Tama-gawa (Tama River). The capital of Musashi Province about the 7th century AD, it flourished as a post town and regional commercial and administrative centre. Fuchū declined when it was bypassed by the railway between Tokyo and Tachikawa (1889), but it revived with the arrival of two other railways in the late 1920s and the construction of the Tokyo Race Course in 1933. During World War II, army installations were converted into metal-producing plants; heavy industrialization has since steadily continued. Fuchū houses the headquarters of Japan's Air Self-Defense Force and serves as a residential suburb of the Tokyo–Yokohama Metropolitan Area. Its population almost doubled between 1960 and 1970; the rate of population growth slowed after 1970. Pop. (1983 est.) 197,590.

Fucino Basin, Italian CONCA DEL FUCINO, formerly LAGO FUCINO, or LAGO DI CELANO, Latin LACUS FUCINUS, former lake bed in L'Aquila province, Abruzzi region, central Italy, just east of Avezzano. The lake was once 37 mi (59 km) in circumference and about 100 ft (30 m) deep, although its level was subject to great variations because of the lack of an outlet. As early as AD 52 the emperor Claudius had a tunnel constructed, 3½ mi (5½ km) long, as an outlet to the Liri (Liris) River. The tunnel, still evident but no longer in use, fell into disrepair and various attempts to reopen it from 1240 onward were unsuccessful; by 1852 the lake had risen 30 ft above its former level. In 1854–75 Prince Alessandro Torlonia, a Roman banker, aided by French and Swiss engineers, drained the lake, becoming proprietor of the site in return, hence the name *conca* ("basin"). The reclaimed fertile land, belonging to the Torlonia family, was expropriated and divided into numerous small farms (each about 2½ ac [1 ha]) by the Italian Land Reform Acts in 1952–53. Cereals, potatoes, sugar beets, grapes, and fruit are grown. Italy's principal satellite tracking station is located in the Fucino Basin.

Fucus, also called ROCKWEED, genus of brown algae, common on rocky seacoasts and in salt marshes of northern temperate regions. Adaptations to its environment include bladderlike floats (pneumatocysts), disk-shaped holdfasts for clinging to rocks, and mucilage-covered blades for resisting desiccation and temperature changes. The plant is between 25 and 30 centimetres (9.8 to 11.8 inches) in total length; growth of the thallus is localized and occurs at the tip of forked shoots that arise from the holdfasts. The male and female reproductive organs may occur on the same or separate organisms; some species produce eggs and sperm all year long. *Fucus* is a perennial alga with a lifespan of up to four years. In Roman times it was the source of a brown facial cosmetic. Today *Fucus* species, along

Rockweed, or common bladderwrack (*Fucus vesiculosus*)

Douglas P. Wilson

with kelp (*q.v.*), are an important source of alginates—colloidal extracts with many industrial uses similar to those of agar.

fudge, creamy candy made with butter, sugar, milk, and usually chocolate, cooked together and beaten to a soft, smooth texture. Fudge may be thought of as having a consistency harder than that of fondant (*q.v.*) and softer than that of hard chocolate. According to most recipes, the ingredients of fudge are cooked to what is termed in kitchen parlance the soft

ball stage, that point between 234° and 240° F (112° and 115° C) at which a small ball of the candy dropped in ice water neither disintegrates nor flattens when picked up with the fingers. Butter and vanilla are added as the candy cools, then the mass is beaten until creamy, poured into a pan, and cut into squares. Often sour cream is substituted for milk and butter, and nut meats or raisins may be stirred into the fudge.

Although chocolate is the usual base for the candy, fudges are often made with marshmallow cream, peanut butter, vanilla, maple, or butterscotch. Variously flavoured fudges are used as cake icings and ice cream toppings.

Fudō Myō-ō, in Japanese Buddhist mythology, the fierce form of the Buddha Vairocana, and the most important of the Myō-ō class of deities. *See* Myō-ō.

Fuegian local race, a subgroup of the American Indian geographic race comprising the tribes of southern Argentina and Chile. Their

Indian of Tierra del Fuego, Chile, with sheep
Carl Frank

physical characteristics include tall stature, light to moderate skin pigmentation, and aquiline features. They are notable in being highly adapted to a cold climate, partially by means of a heightened metabolic rate, which helps maintain body temperature in the cold. *See also* local race; American Indian geographic race.

Fuehrer (German title): *see* Führer.

fuel cell, any of a class of devices that convert the chemical energy of a fuel directly into electricity by electrochemical reactions. A fuel cell is much more efficient than most other types of energy converters.

A brief treatment of fuel cells follows. For full treatment, *see* MACROPAEDIA: Energy Conversion.

A fuel cell resembles a primary cell—*i.e.,* a voltaic battery. In both types of devices, chemical reactions occur so that electrons are released on one electrode and caused to flow through an external circuit to a second electrode. There is, however, one major difference between batteries and fuel cells. In the former, the active ingredients are incorporated within the electrodes and are chemically altered during the reaction, becoming depleted with use. In fuel cells, a gas or liquid fuel is supplied continuously to one electrode and oxygen or air to the other from an external source. Because of this feature, fuel cells are able to produce electrical energy for a substantially longer period of time than can batteries (*see also* battery).

During the late 1830s, William R. Grove of Great Britain built what is often considered the first fuel cell. His device produced electric current from hydrogen and oxygen reacting on platinum electrodes. Throughout the balance of the century there was a continuing effort to produce electricity from direct electrochemical oxidation of a conventional fuel such as coal or from the carbon monoxide and hydrogen derivable from coal. Molten salts as well as aqueous solutions were tried as electrolytes. Although all the basic principles of operation were recognized and considerable ingenuity applied to development, none of this early work led to devices able to compete with electric generators driven by steam or water power. Reactions were inefficient, rates were too slow, and cell life too short.

After World War II there was a significant increase in interest in the development of practical fuel cells and batteries capable of large-scale electric-power generation. The promise of improvements resulting from new technology, the demanding requirements of military and space-vehicle programs, and the concentrated effort to reduce atmospheric pollution from power plants and internal-combustion engines accelerated fuel-cell research and development by the early 1960s. Many kinds of fuel cells were shown to be operable, and a number of them were refined into practical systems. Hydrogen, methyl alcohol, hydrazine, and some of the simpler hydrocarbons have been used directly as fuels. Air and oxygen have been employed as oxidants. A variety of electrolytes have been utilized: concentrated alkaline or acid solutions usually at temperatures below 150° C (300° F), and molten carbonates and other salts at temperatures of several hundred degrees Celsius. Certain cells have used ionically conducting modified zirconium oxide as a solid electrolyte at temperatures near 1,000° C (1,830° F). In most modern fuel cells, the electrodes consist of porous metal or carbon and at lower temperatures include catalysts to increase reaction rates to reasonable levels.

Some fuel-cell types have been built into systems incorporating a means for storage and controlled supply of fuel and oxidant and for the removal of heat and reaction products. Two such systems, using liquid hydrogen and oxygen, have served as a primary electric-power source for U.S. manned spacecraft. For possible future space flights of long duration (*e.g.,* missions to other planets), solar or nuclear generators are considered more suitable, though regenerative fuel cells (*i.e.,* those whose operation can be reversed to regenerate hydrogen and oxygen) may be used to supplement these devices. Hydrogen-oxygen fuel cells also have been used to power forklift trucks and small automotive vehicles on an experimental basis. Various exploratory attempts have been made to introduce fuel cells into commercial use, but so far none have been particularly successful. Fuel cells that operate on methanol, however, have been employed on a limited scale to power television repeater stations and navigation beacons.

Consult the INDEX *first*

fuel injection, in an internal-combustion engine, introduction of fuel into the cylinders by means of a pump rather than by the suction created by the movement of the pistons. On diesel engines, which have no spark plugs, the heat created by compressing air in the cylinders ignites the fuel, which has been pumped as a spray into the heated air. In engines with spark ignition, fuel-injection pumps are often used instead of conventional carburetors. Fuel injection distributes the fuel more evenly to the individual cylinders than does a carburetor system, so that more power can be developed and undesirable emissions are reduced. In engines with continuous combustion, such as gas turbines and liquid-fueled rockets, which have no pistons to create a pumping action, fuel-injection systems are necessary.

fuel oil, also called FURNACE OIL, fuel consisting mainly of residues from crude-oil distillation. It is used primarily for steam boilers in power plants, on board ship, and in industrial plants. Commercial fuel oils usually are blended with other petroleum fractions to produce the desired viscosity and flash point. Flash point is usually higher than that of kerosine. The term fuel oil ordinarily does not include such fuels as kerosine.

Fuentes, Carlos (b. Nov. 11, 1928, Mexico City), Mexican novelist, short-story writer, playwright, critic, and diplomat whose experimental novels won him an international literary reputation.

The son of a career diplomat, Fuentes traveled extensively with his family in North and South America and in Europe. He learned English at the age of four in Washington, D.C. He studied law at the University of Mexico, Mexico City, and later attended the Institute of Advanced International Studies in Geneva.

Fuentes was a member of the Mexican delegation to the International Labour Organization (ILO) in Geneva (1950–52), was in charge of cultural dissemination for the University of Mexico (1955–56), was cultural officer of the ministry (1957–59), and was ambassador to France (1975–77). He also cofounded and edited several periodicals, including *Revista Mexicana de literatura* (1954–58; "Mexican Review of Literature").

Rebelling against his family's middle-class values early in the 1950s, he became a communist but left the party in 1962 on intellectual grounds while remaining an avowed Marxist. His first collection of stories, *Los días enmascarados* (1954, 2nd ed. 1966; "The Masked Days"), recreates the past realistically and fantastically. His first novel, *La región más transparente* (1958; *Where the Air Is Clear*), which treated the theme of national identity and bitterly indicted Mexican society, won him national prestige. The work was marked by cinematographic techniques, flashbacks, interior monologues, and language from all levels of society, showing influences from many non-Spanish literatures. After this, Fuentes spent most of his time writing but continued to travel widely as he had in his youth.

The novel *Las buenas conciencias* (1959; *The Good Conscience*) emphasized the moral compromises that mark the transition from a rural economy to a complex, middle-class urban one. *Aura* (1962) is a novella that successfully fuses reality and fantasy. *La muerte de Artemio Cruz* (1962; *The Death of Artemio Cruz*), which presents the agony of the last hours of a wealthy survivor of the Mexican Revolution, was translated into several European languages and established Fuentes as a major international novelist.

The novel *Cambio de piel* (1967; *A Change of Skin*) defines existentially a collective Mexican consciousness by exploring and reinterpreting the country's myths. *La nueva novela hispanoamericana* (1969; "The New Hispano-American Novel") is his chief work of literary criticism. The novel *Terra nostra* (1975) explores the cultural substrata of New and Old Worlds, using Jungian archetypal symbolism, in which the author seeks to understand his cultural heritage. *Burnt Water* (1980) is a collection of translations of 12 stories written from 1954. Among his later novels are *La cabeza de la hidra* (1978; *The Hydra Head*), *Una familia lejana* (1980; *Distant Relations*), and *Cristóbal nonato* (1987; "Christopher Unborn").

fuero (from Latin *forum,* "marketplace"), in medieval Spain, a municipal franchise conferred on a community by the crown or by a noble or bishop. It granted legal incor-

poration, confirmed local customs or privileges, and might include rights to taxation or self-government. The word is also applied to a code—the Liber Judiciorum of the Visigoths—known in the Middle Ages as the Fuero Juzgo. Because of the great number and variety of the medieval *fueros municipales* and the tenacity with which the municipalities clung to privileges granted under them, the *fueros* played an important part in the political, administrative, and judicial history of Spain.

During the Christian reconquest of Spain from the Muslims (11th–15th century), the various Christian kings often granted special privileges and exemptions to provide incentives for settlers in newly conquered towns and to modify legal and administrative practice in a way appropriate for frontier towns dependent on the crown but far from the centre of government. Nearly 800 such *fueros* were granted between the 11th and 14th centuries.

The oldest in the west is the *Fuero de León* (*c.* 1020), which contains laws applicable to the kingdom in general and to the city of León in particular. The oldest Aragonese *fuero* was believed to be that of Sorbrarbe (late 11th or early 12th century), though some modern scholars treat it as suspect. The Navarrese *fueros* were modelled on those of Aragon.

A feature of later *fueros* was that some types were preferred or adopted in toto by whole regions. The earliest *fueros* could be short, but by the end of the 12th century they tended to be complicated documents. That of Cuenca (*c.* 1189) is the most elaborate of the Castilian *fueros.*

Fuero Juzgo (Visigothic law code): *see* Liber Judiciorum.

Fuerte Olimpo, capital, Alto Paraguay department, northern Paraguay. Lying across the Paraguay River from Brazil, the city dates from 1792 when a fort called Borbón was established on the present site. In addition to its administrative functions, Fuerte Olimpo serves as the trade centre and principal port for the department, which lies in the thinly populated Chaco Boreal. Livestock raising is the principal economic activity in the region; tanneries and tileworks are located in Fuerte Olimpo. The city is accessible by a branch road running north and east from the trans-Chaco highway, but most travel to Asunción is by river. Pop. (1972) 3,061.

Fuerte River, Spanish RÍO FUERTE, river in northwestern Mexico, formed in Chihuahua state by the junction of the Verde and Urique rivers, and descending generally southwestward through Sinaloa state from the Sierra Madre Occidental to the Gulf of California, 27 mi (43 km) west of Los Mochis at Isla de la Lechuguilla. Waters of the river, controlled in part by the Hidalgo Dam, are used for extensive irrigation projects on the gulf lowlands around Los Mochis. The Fuerte is approximately 175 mi (280 km) long (350 mi [560 km] including the Río Verde).

Fuertes, Dolores Adios (U.S. actress): *see* Menken, Adah Isaacs.

Fuerteventura Island, Spanish ISLA DE FUERTEVENTURA, island, one of the eastern Canary Islands, Las Palmas province, Spain. It lies in the North Atlantic, 65 mi (105 km) west of Cap (cape) Juby, Morocco. This volcanic island, second largest of the Canaries, measures 60 mi in length and has an area of 668 sq mi (1,730 sq km). It lies southwest of Lanzarote (island) across Estrecho (strait) de La Bocaina. The island, rising to 2,648 ft (807 m) at Península de Jandía (southwest) has eroded beaches. It has a warm and dry climate with scanty rainfall occurring mostly in winter. Puerto del Rosario and Gran Tarajal,

Eroded beaches on Fuerteventura Island
Ernst A. Weber—Photo Researchers

both on the east shore, are the largest settlements on the island. There is regular airline service to Gran Canaria and Tenerife. Pop. (1981) 30,185.

fugacity, a measure of the tendency of a component of a liquid mixture to escape, or vaporize, from the mixture. The composition of the vapour form of the mixture, above the liquid, is not the same as that of the liquid mixture, but it is richer in the molecules of that component that has a greater tendency to escape from the liquid phase. The fugacity of a component in a mixture is essentially the pressure that it exerts in the vapour phase when in equilibrium with the liquid mixture.

Fugard, Athol (Harold Lannigan) (b. June 11, 1932, Middleburg, S.Af.), South African dramatist, actor, and director who, despite South African drama's particular vulnerability to censorship, sustained a theatre group in Port Elizabeth that produced plays defiantly indicting the apartheid policy.

Fugard's earliest plays were *No-Good Friday* (1958) and *Nongogo* (1957), but it was *The Blood Knot* (1961), produced for stage and television in both London and New York City, that established his international reputation. *The Blood Knot*, dealing with brothers who fall on opposite sides of the racial colour line, was the first in a sequence Fugard called "The Family Trilogy." It continued with *Hello and Goodbye* (1965) and *Boesman and Lena* (1969) and was later published under the title *Three Port Elizabeth Plays* (1974). *Boesman and Lena,* later filmed with Fugard as Boesman, played to a wider audience than any previous South African play. These penetrating analyses of the South African situation are powerful and essentially pessimistic.

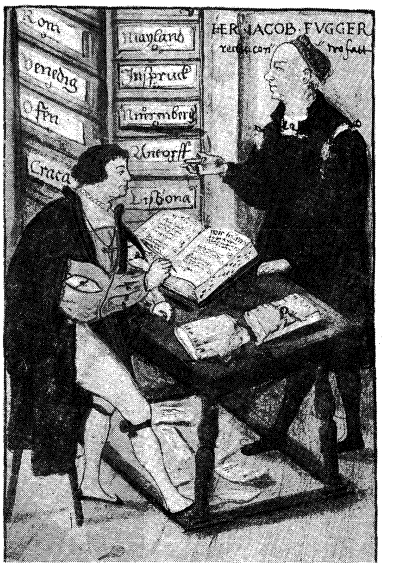
Fugard's willingness to sacrifice character to symbolism caused some critics to question his commitment. Provoked by such criticism Fugard began to question the nature of his art and his emulation of European dramatists. He began a more imagist approach to drama, not using any prior script but merely giving actors what he called "a mandate" to work around "a cluster of images." From this technique derived the imaginative if shapeless drama of *Orestes* (1971), and the documentary expressiveness of *Sizwe Bansi Is Dead* (1972), *The Island* (1972), and *Statements After an Arrest Under the Immorality Act* (1974).

A much more traditionally structured play, *Dimetos* (1975), was performed at the Edinburgh Festival, and *A Lesson from Aloes* (1978) and *Master Harold... & the Boys* (1982) were performed to much acclaim in London and New York City. Fugard's films include *The Guest* (1977) and *Marigolds in August* (1979). *Tsotsi* (1980) is Fugard's only novel.

Fugen-dake (Japan): *see* Unzen-dake.

Fugger FAMILY, German mercantile and banking dynasty that dominated European business during the 15th and 16th centuries, developed capitalistic economic concepts, and influenced continental politics.

The founding fathers. Hans Fugger, a weaver born in the village of Graben in Swabia, established the family in Augsburg in 1367. By twice marrying the daughters of masters of the weavers' guild, the industrious Fugger acquired civic rights and the freedom of the company. He also became a member of the guild's committee of 12 and of the city's great council and conducted a successful textile trade. After his death in 1408, his sons Andreas and Jakob I, both of whom had learned the goldsmith's trade, jointly carried on the family business until they dissolved



Jakob II Fugger the Rich (right), and his chief accountant, Matthäus Schwarz, miniature, 1519; in the Herzog Anton Ulrich-Museum, Braunschweig, Ger.
By courtesy of the Herzog Anton Ulrich-Museum, Braunschweig

their partnership in 1454. Although Andreas, the more enterprising of the two, and his descendants quickly attained great wealth, they went bankrupt in 1499, as a result of an overextension of business activity and the loss of a lawsuit. These Fugger vom Reh (Fuggers of the Doe, from their coat of arms) spread over southern, central, and eastern Germany; as late as 1944, there were Fukier (descendants of the Fuggers) residing in Warsaw.

In 1441 Jakob had married the daughter of a mint master who went bankrupt three years later. Warned by this event, Jakob proceeded carefully in his business; yet by perseverance and industry he succeeded in substantially increasing his profits, and in 1463 he was made a member of the more highly respected merchants' guild. After his death in 1469, two of his seven sons, Ulrich and Georg, profitably expanded the firm's international trade. In 1473 they were granted a coat of arms with a lily, causing this branch of the family to be called Fugger von der Lilie. With the help of their brother Markus in Rome, they handled remittances to the papal court of monies for the sale of indulgences and the procuring of church benefices. From 1508 to 1515 they leased the Roman mint.

Ulrich and Georg established an agency of their own in the German merchants' building in Venice, where their youngest brother, Jakob II the Rich, who had originally been destined for an ecclesiastical career, studied modern bookkeeping from 1478 on. Taking charge of the Fugger agency in Innsbruck in 1485, he showed sound business acumen in making the firm a partner in the Tirolean mines by grant-

ing permanent loans, secured by deliveries of copper and silver, to Archduke Sigismund and King (later Emperor) Maximilian. The large profits realized from this venture encouraged the Fuggers to participate also in mining operations in Silesia. There Jakob, a shrewd and sober yet enterprising merchant, met a mining expert with whom he leased the copper mines in Neusohl (modern Banská Bystrica, Czech.) in 1495, eventually building them up into the greatest mining centre of the time.

In 1494 the Fuggers established their first public company with a capital of 54,385 guilders, a sum that was to be doubled two years later when Jakob persuaded the Prince Bishop of Brixen to join the company as a silent partner. Jakob's aim was to establish a copper monopoly by opening foundries in Hohenkirchen and Fuggerau (named for the family, in Carinthia, now Austria) and by expanding the sales organization in Europe, especially the Antwerp agency. True to his motto, "I want to gain while I can," Jakob, unhappily married since 1498 and without an heir, engaged in all manner of commerce, including the lucrative spice trade. The taciturn and hard-driving merchant had long ago assumed the direction of the firm. The death of his chief creditor, the Prince Bishop of Brixen, whose inheritance was claimed by the Pope, brought about a serious crisis that Jakob managed to solve through shrewd negotiations. Prudently, he divided the company's assets equally into cash holdings, production plants and merchandise, landed properties, and precious stones. In 1504 he thus secretly purchased from the city of Basel a portion of the captured crown jewels of Charles the Bold, duke of Burgundy. Laying the foundation for the family's widely distributed landholdings, he acquired the countships of Kirchberg and Weissenhorn from Maximilian I in 1507. In 1514, the Emperor made him a count.

The chief financial supporter of Maximilian I's policies since 1490, Fugger was identified with these policies for better or for worse, even though he refused to support Maximilian's bid for the papacy. His greatest achievement was the financing of the election of Charles V, Maximilian's successor, as emperor. Of the total election expenses of 852,000 guilders, Jakob Fugger alone raised almost 544,000 in order to eliminate Francis I of France. By skillful negotiations he arranged to have this debt repaid out of the Maestrazgo—the lease of the revenues paid to the Spanish crown by the three great knightly orders. A part of the sum came from the mercury mines of Almadén and the silver mines of Guadalcanal. In 1516 he also made an ally of King Henry VIII of England by granting him various loans.

At the height of his power Jakob Fugger was sharply criticized by his contemporaries, especially by the German Humanist and reformer Ulrich von Hutten and by Martin Luther, for his stand on interest charges (the Fuggers were among the merchant dynasties that urged the Pope to rescind or amend the medieval prohibition on the levying of interest) and the sale of indulgences and benefices, as well as for his loan policies. The imperial fiscal and governmental authorities in Nürnberg brought action against him and other merchants to halt their monopolistic tendencies. Fugger's position was furthermore threatened by social unrest among the miners in the Tirol and at Neusohl in Hungary, by attempts of the Hungarian nobles to nationalize his mines, and by the Peasants' Revolt. At the Augsburg headquarters he was threatened by an uprising of artisans. Fugger mastered these crises through sheer tenacity and fixity of purpose. Albrecht Dürer has immortalized the severe, taciturn countenance of the master merchant. As head of the company, Fugger, who was himself a man of few wants, created monuments to his time that have survived for centuries—in the Fugger buildings and the splendid memorial chapel and above all in the Fuggerei, the world's oldest social settlement, which he endowed as a peaceful haven for his impoverished old servants and fellow citizens. In his last years, seeing his work and his church threatened by the Reformation, he fought the new movement.

Decline of the house. At his death in 1525, Jakob the Rich bequeathed to his nephew Anton Fugger, who had been destined for the succession since 1517, company assets totalling 2,032,652 guilders. The new chief, an ambitious and very talented businessman, guided the company with a firm hand. In 1527 he married Anna Rehlinger, a patrician's daughter who bore him four sons. Most of Anton's time was taken up with the securing of permanent loans for the emperors Charles V and Ferdinand I and for King Philip II of Spain. In accordance with his credo that money is the sinews of war—*pecunia nervus bellorum*—Fugger, a strict Roman Catholic, granted the Emperor credits that proved to be decisive in the struggle against the Protestants and particularly in the war against the Schmalkaldic League of Protestant princes and cities. While large sales of fustian cloth to England and loans extended to its kings proved to be profitable, the formerly rich yield of the Tirolean and Hungarian mines decreased until Anton gave up Neusohl altogether in 1547. With dogged resolution but little success, he tried to make up for these losses by establishing new trade ties with Peru and Chile and by engaging in mining ventures in Sweden and Norway, as well as in the slave trade from Africa to America. He was, however, more successful in the spice trade and the importation of Hungarian cattle. National resentments in Spain forced him to renounce the Maestrazgo lease after 1542 and to give up the silver mines of Guadalcanal. Nonetheless, Anton Fugger had, by 1546, amassed 5,100,000 guilders—the highest capital in the company's history.

His health weakened in 1540, Anton Fugger reacted more acutely to the shifts in his fortunes; since his sons and nephews showed little interest in business, he even considered dissolving the firm. When that proved impossible, he stubbornly tried to carry on, although he could satisfy the demand for credit only by increased borrowing. An inventory taken after his death in 1560 showed assets of 5,600,000 and liabilities of 5,400,000 guilders (2,900,000 in Spain alone). Anton had, however, safeguarded part of his fortune through the timely purchase of Babenhausen and other landed estates. After the personal bankruptcy of his nephew Hans Jakob Fugger, who had become a partner in 1543 and who eventually became Bavarian chancellor, Anton's oldest son, Markus, carried on the business successfully, if on a reduced scale. During the period 1563–1641 the company, which was not completely dissolved until after the Thirty Years' War, earned some 50,000,000 ducats from the production of mercury at Almadén alone.

While Jakob and Anton Fugger had hardly made use of their title as counts, their descendants, showing little mercantile inclination, acquired a Humanistic education at European universities. Marrying within their class, they spent most of their lives on their estates, where they established valuable libraries and built magnificent residences. It is to Jakob and Anton Fugger's land purchases that the three surviving lines of the family (all dating from the mid-16th century)—the counts Fugger-Kirchberg of Oberkirchberg, the prince Fugger-Glött of Kirchheim, and the prince Fugger-Babenhausen of Babenhausen—owe the preservation of a part of the great wealth once held by the family firm.

The Fugger family may be considered a prototype of the trading company of the early capitalistic era. In overcoming the economic concepts of the Middle Ages, they used methods that have evoked, both in their time and in the present, admiration as well as violent criticism. (F.Br.)

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fuging tune, a form of hymnody developed by American composers of the so-called First New England school during the period of the American Revolution (1775–83).

A typical fuging tune places the tune in the tenor voice and harmonizes it with block chords. In the next-to-last phrase, called the fuging section or fuge, each of the four voices enters in turn singing the tune or a slightly varied version of it. The last phrase is again chordal. The fuge, although all four parts follow each other in melodic imitation, is not a classical fugue but merely a passage that uses imitative writing.

The term fuging tune is a shortened form of the English phrase "fuging psalm tune," a type of hymn setting popular in England in the 17th and early 18th century. Minor features of style—angular melodic writing, rhythmic simplicity and precision, and diatonic harmony (*i.e.,* little use of notes foreign to the composition's key)—and the placement of the fuging section in the next-to-last, not the last, line distinguish the American fuging tune from its British parent.

James Lyon's collection *Urania* (1762) contains the first fuging psalm tune published in America. The first fuging tunes appeared in William Billings' *Singing Master's Assistant* of 1778. Other American composers such as Daniel Read, Timothy Swan, Jacob French, and Justin Morgan preferred writing this type of piece until around 1800.

Subsequently, European composers and their works captured the imagination of New England musicians. But the fuging tune, carried to the west and south in various shape-note hymnals (which use a characteristic musical notation), remained popular outside of New England for at least another 50 years.

Fugitive, any of a group of young poets and critics formed shortly after World War I at Vanderbilt University in Nashville, Tenn., some of whom later became distinguished men of letters. The group, led by the poet and critic John Crowe Ransom (*q.v.*), devoted itself to the writing and discussion of poetry and published a bimonthly magazine, *The Fugitive* (1922–25), edited by poet Allen Tate (*q.v.*). Other important members of the group were the poet, essayist, and critic Donald Davidson and the novelist and poet Robert Penn Warren. Outstanding selections from the magazine were collected in the *Fugitive Anthology* (1928).

Acutely aware of their Southern heritage, the Fugitives advocated a form of literary regionalism, concentrating largely on the history and customs of the South in their work. Many of the Fugitives went on to become leaders in

the Agrarian movement of the 1930s, which sought to resist the inroads of industrialism by a return to the agricultural economy of the Old South. Their views were published as a symposium in *I'll Take My Stand* (1930).

Fugitive Slave Acts, in U.S. history, statutes passed by Congress in 1793 and 1850 (and repealed in 1864) that provided for the seizure and return of runaway slaves who escaped from one state into another or into a federal territory. The 1793 law enforced Article IV, Section 2, of the U.S. Constitution in authorizing any federal district judge or circuit court judge, or any state magistrate, to decide finally and without a jury trial the status of an alleged fugitive slave.

The measure met with strong opposition in the Northern states, some of which enacted personal-liberty laws to hamper the execution of the federal law; these laws provided that fugitives who appealed from an original decision against them were entitled to a jury trial. As early as 1810 individual dissatisfaction with the law of 1793 had taken the form of systematic assistance rendered to black slaves escaping from the South to New England or Canada—via the Underground Railroad (*q.v.*).

The demand from the South for more effective legislation resulted in enactment of a second Fugitive Slave Act in 1850. Under this law fugitives could not testify on their own behalf, nor were they permitted a trial by jury. Heavy penalties were imposed upon federal marshals who refused to enforce the law or from whom a fugitive escaped; penalties were also imposed on individuals who helped slaves to escape. Finally, under the 1850 act, special commissioners were to have concurrent jurisdiction with the U.S. courts in enforcing the law. The severity of the 1850 measure led to abuses and defeated its purpose. The number of Abolitionists increased, the operations of the Underground Railroad became more efficient, and new personal-liberty laws were enacted in many Northern states. These state laws were among the grievances officially referred to by South Carolina in December 1860 as justification for its secession from the Union. Attempts to carry into effect the law of 1850 aroused much bitterness and probably had as much to do with inciting sectional hostility as did the controversy over slavery in the territories.

For some time after the beginning of the American Civil War, the Fugitive Slave Acts were considered to still hold in the case of blacks fleeing from masters in border states that were loyal to the Union government. It was not until June 28, 1864, that the acts were repealed.

fugue, musical composition for instruments or voices, characterized by the systematic imitation of one main theme in simultaneously sounding melodic lines (counterpoint), which make up its texture. Fugue is more accurately described as a compositional procedure than a musical form, and its musical working out is traditionally in accordance with a set of fairly strict rules, though each example varies in specific form depending upon its type and the period in which it was written.

A brief treatment of fugue follows. For full treatment, *see* MACROPAEDIA: Musical Forms and Genres.

The roots of the fugue may be traced to the imitative polyphony of the 13th century, although it was not until the 16th century that fugal writing in its accepted sense emerged. It reached the culmination of its formal development and expressive effect in the works of Johann Sebastian Bach.

Fugue proceeds according to a certain pattern. It opens most commonly with the announcement of an unaccompanied theme, or "subject," that is taken up in turn by the other parts, or "voices." The range of this subject is generally contained within one octave, but it may vary in length and character from a terse motif to a florid melody of several dozen notes. This initial announcement and working out of the themes, generally in the tonic key, is known as the "exposition." Its chief characteristic is the appearance of the subject at different pitches in each part. In the typical Baroque fugue, the interval of entry is normally at the fourth or fifth or at the octave to the original entry, and the second entry of the subject is often referred to as the "answer." Another characteristic feature of the fugal exposition is the countersubject, the continuation of the subject that forms the counterpoint to the answer. This theme regularly accompanies the subject on its appearances throughout the fugue. Should a countersubject accompany the first entry of the subject, however, it is known as the second subject and the fugue as a double fugue.

Passages between subsequent entries of the subject are called "episodes." Thematically they may be derived from the subject, countersubject, or codetta—the linking counterpoint between the subject and its answer. Fugues, however, sometimes exist without episodes, and by contrast they can appear with four or more expositions separated from each other by episodes. These middle expositions are often enriched by modulations to related keys with a return to the tonic key for the final exposition. This final section leads to the culmination of the music and may include such devices as stretto (the overlapping of subject and answer to increase intensity) or the pedal (where parts revolve around an elongated note, usually in the bass, to produce a series of dissonances prior to resolution). Such devices may occur in a small extension to the structure known as a coda.

führer, also spelled FUEHRER, German FÜHRER ("Leader"), title used by Adolf Hitler to define his role of absolute authority in Germany's Third Reich (1933–45). As early as July 1921 he had declared the *Führerprinzip* ("leader principle") to be the law of the Nazi Party; and in *Mein Kampf* (1925–27) he asserted that such a dictatorship would be extended to the coming Third Reich.

A personality cult was built around the führer. Hitler's portraits and photographs were displayed everywhere in Germany. "Heil Hitler!" ("Hail Hitler!") became legally obligatory as a common greeting, as did the Hitler salute of the right arm fully thrust forward with the palm facing downward.

Organizationally, the führer stood at the apex of a hierarchy. Directly below him were several *Reichsleiter* ("Reich leaders") with various portfolios, such as finance, propaganda, foreign policy, and law, as well as *Reichsführer* Heinrich Himmler, head of the unified police system. Also directly responsible to (and selected by) the führer were many territorial leaders (43 in greater Germany) known as *Gauleiter* ("district leaders").

Fujairah, Al- (United Arab Emirates): *see* Al-Fujayrah.

Fuji, city, Shizuoka *ken* (prefecture), Honshu, Japan, at the southern foot of Mount Fuji. It was a post station along the Tōkaidō (Eastern Sea Highway) during the Tokugawa period (1603–1867). Because of its location in the delta of the Fuji River, the city has previously had an ample water supply for its large paper industry. Land subsidence resulting from heavy industrial consumption of groundwater has caused the city to turn to rivers in the area for alternative water sources. The arrival of the Tōkaidō Line (railway) in 1909 contributed to rapid commercial and industrial development, and Fuji produces chemicals, electrical machinery, automobiles, and photographic film. Factories have been built on landfill in Sagami Bay. Rice, vegetables, mandarin oranges, and watermelons are cultivated in the surrounding region. Fuji also serves as a base for the ascent of Mount Fuji. Pop. (1987 est.) 217,782.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Fuji, Mount, Japanese FUJI-SAN, also called FUJIYAMA, or FUJI NO YAMA, highest mountain in Japan, rising to 12,388 feet (3,776 m) near the Pacific coast in Yamanashi and Shizuoka *ken* (prefectures), central Honshu, about 60 miles (100 km) southwest of Tokyo. It is a volcano that has been dormant since its last eruption in 1707 but is still generally classified as active by geologists. The mountain's name, of Ainu origin, means "everlasting life." Mount Fuji, with its graceful conical form, has become famous throughout the world and is considered the sacred symbol of Japan. Among Japanese there is a sense of personal identification with the mountain, and thousands of Japanese climb to the shrine on its peak every summer. The mountain is the major feature of Fuji-Hakone-Izu National Park.

According to tradition, the volcano was formed in 286 BC by an earthquake. The truth is somewhat more complex. The age of Fuji is disputed, but it seems to be a Quaternary formation on a Tertiary base, the first eruptions and the first peaks probably occurring some 600,000 years ago. Although Mount Fuji appears to be a simple cone-type volcano, it is in fact three separate volcanoes, Komitake, Ko Fuji, and Shin Fuji. The most recent, Shin Fuji, first became active about 10,000 years ago and has continued ever since to smolder or erupt occasionally. Over the millennia, the lava and other effusions from Shin Fuji have covered over the two older volcanoes, enlarged the slopes to their present expansive girth, and otherwise given the mountain its current tapered form.

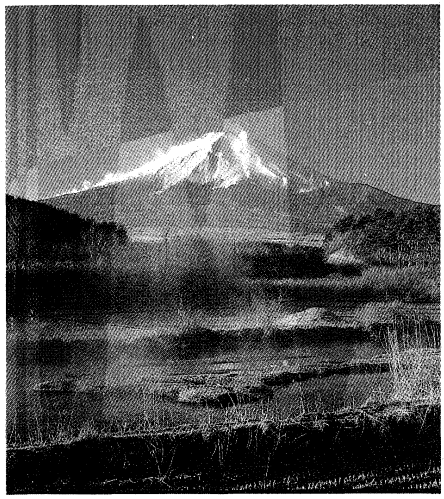
The base of the volcano is about 78 miles (125 km) in circumference. Together with the broad lava fields of the piedmont, the base has a diameter of some 25 to 30 miles (40 to 50 km). At the summit of Mount Fuji the crater spans about 1,600 feet (500 m) in surface diameter and sinks to a depth of about 820 feet (250 m). Around the jagged edges of the crater are eight peaks—Oshaidake, Izudake, Jojudake, Komagatake, Mushimatake, Kengamme, Hukusandake, and Kukushidake. The mountain is part of the Fuji Volcanic Zone, a volcanic chain that extends from the Mariana Islands and the Izu Islands through Izu Peninsula on up to northern Honshu.

On the northern slopes of Mount Fuji lie the Fuji Five Lakes (Fuji Goko), comprising, east to west, Lake Yamanaka (Yamanakako), Lake Kawaguchi (Kawaguchiko), Lake Sai (Saiko), Lake Shōji (Shōjiko), and Lake Motosu (Motosuko), all formed by the damming effects of lava flows. The lowest, Lake Kawaguchi, at 2,726 feet (831 m), is noted for the inverted reflection of Mount Fuji on its still waters. Tourism in the area is highly developed, with Lake Yamanaka, the largest of the lakes (at 2.5 square miles [6.4 square km]), being the focus of the most popular resort area. Southeast of Mount Fuji is the wooded volcanic Hakone region, well-known for its hot-springs resorts at Yumoto and Gōra.

Economically, the area's abundant groundwater and streams facilitate the operation of paper and chemical industries and farming. Cultivation of rainbow trout and dairy farming are other activities.

A sacred mountain (one sect, the Fujikō, accords it virtually a soul), Mount Fuji is surrounded by temples and shrines, there being shrines even at the edge and the bottom of the

crater. Climbing the mountain has long been a religious practice (though until the Meiji Restoration women were not allowed to climb it). The ascent in early times was usually made in the white robes of a pilgrim. Today great



Mount Fuji, Japan
T. Okuda—Aspect Picture Library, London

crowds, numbering more than 100,000 a year, flock there, mostly during the climbing season from July 1 to August 26.

Fuji Bank, Ltd., one of Japan's largest commercial banks, with a network of offices, affiliates, and subsidiaries in Japan and overseas. Headquarters are in Tokyo.

The bank originated in a money-lending operation established in the 1860s by Yasuda Zenjiro, the founder of the Yasuda business combine, or *zaibatsu.* In 1880 the business became the Yasuda Bank, the financial arm of the emergent combine. When the Yasuda *zaibatsu* was broken up after World War II, the bank was reorganized in 1948 under its present name.

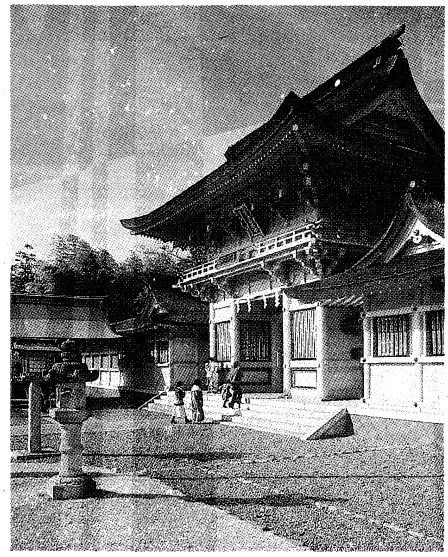
Fuji Bank provides services in retail banking, financial consulting, information, and international banking and finance, including foreign exchange. It has extended its mortgage-loan activities and also offers education loans. The bank is a commissioned bank, which allows it to handle bonds that are issued in yen denominations.

Fujieda, city, Shizuoka *ken* (prefecture), Honshu, Japan, on the Pacific coast, lying at the delta of the Ōi River. It was created by the merger of the towns of Fujieda and Aoshima and four smaller hamlets.

During the Tokugawa period (1603–1867), Fujieda was an important post town on the Tōkaidō (Eastern Sea Highway) and the only ferry station on the Ōi River. It was overshadowed by nearby Yaizu, however, which rose in importance when it became a station on the Tōkaidō Line (railway) in 1889. The city now is a trade centre for the agricultural products (tea, mandarin oranges, and mushrooms) of the region. Pop. (1987 est.) 115,006.

Fujinomiya, city, Shizuoka *ken* (prefecture), Honshu, Japan, at the western foot of Mount Fuji. It developed around the Sengen (Asama) Shrine, the main shrine for the worship of Mount Fuji since the 9th century. During the early part of the Tokugawa period (1603–1867), the ruler Tokugawa Ieyasu built an inner shrine, hall of worship, and tower gate, which were partly reconstructed in 1925.

Fujinomiya has long prospered by the great influx of pilgrims and tourists, who are attracted by its shrine, temples, and beautiful gardens. The opening of a branch railway line to the city brought industrial development after 1868. Industries include the processing of dairy products and the manufacture of paper



The gate to the Sengen (Asama) Shrine at Fujinomiya, Japan
Milt and Joan Mann–CAMERAMANN INTERNATIONAL

pulp, cameras, and photographic materials. Tea, tobacco, vegetables, hogs, and poultry are raised in the surrounding area. Pop. (1987 est.) 114,336.

Fujisawa, city, Kanagawa *ken* (prefecture), Honshu, Japan, on Sagami Bay of the Pacific Ocean. It was a post town during the Tokugawa period (1603–1867) and is the site of the Shojoko Temple (Yugyo Temple; 1325), the main temple of the Buddhist Ji sect. After the Tōkaidō Line (railway) was opened in 1889, Fujisawa grew as a residential suburb of the Tokyo–Yokohama metropolitan area. The northern part of the city was the site of industrial development (automobiles, electric appliances) after World War II. To the south is Kugenuma beach and the resorts of Katase and Eno Island. The yacht harbour on Eno Island was the site of the sailing competitions of the Tokyo Olympic Games of 1964. Pop. (1987 est.) 337,084.

Fujita Tōko (b. May 3, 1806, Mito, Japan—d. Nov. 11, 1855, Edo [Tokyo]), one of the Japanese scholars who inspired the movement that in 1868 overthrew the feudal Tokugawa shogunate, restored direct rule to the emperor, and attempted to strengthen Japan to meet the challenge of Western imperialist powers.

Born into a high samurai family, Fujita succeeded his father in 1827 as the director of the Shōkōkan, the history-compiling institute of the great feudal fief of Mito. He helped Tokugawa Nariaki succeed as daimyo, or lord, of Mito in 1829 and, two years later, accompanied Nariaki to Edo and advised the shogunate to strengthen Japan's defenses and to ban any intercourse or trade with foreign powers. Such views later influenced those coalescing against the shogunate under the slogan "Revere the Emperor; Expel the Barbarians".

Fujita returned to Mito in 1841 and helped strengthen the fief's defenses, an activity that alarmed the shogunate and led to the confinement of Nariaki and Fujita in 1844. Fujita put the time to good use by writing his two-volume *Kōdōkanki jutsugi* (1849), setting forth his views of Japan's unique destiny.

Fujita returned to active politics in 1853, when the shogunate invited Nariaki to advise on defense and diplomatic problems posed by the arrival of a U.S. naval squadron under Commodore Matthew C. Perry, who demanded that Japan end its two centuries of isolation and open trade with the rest of the world. Fujita's exposure to the negotiations with the Americans brought him to the view that concluding treaties with the Western powers would be inevitable. Shortly afterward, he was killed when his house collapsed during an earthquake.

Fujita Tsuguji, also called FUJITA TSUGUHARU, or LEONARD FOUJITA (b. Nov. 27, 1886, Tokyo, Japan—d. Jan. 29, 1968, Zürich, Switz.), Japanese expatriate painter who applied French oil techniques to Japanese-style paintings.

In 1910 Fujita graduated from what is now the Tokyo University of Fine Arts and Music. Three years later he went to Paris, where he became the friend of many of the great forerunners of modern Western art, including Pablo Picasso, Henri Matisse, and Amedeo Modigliani. He lived primarily in France but made periodic trips to Japan. During World War II he returned to Japan, but in 1949 he left and in 1950 took up residence again in France, becoming a French citizen in 1955 and being awarded the Legion of Honour in 1957. He was christened Leonard upon converting to Roman Catholicism in 1966.

Among his representative works, known for their blurred black-ink colouring and smooth, milk-white backgrounds, are "Self-Portrait with a Cat," "The Cat," and "A Nude."

Fujiwara FAMILY, dynastic family that, by shrewd intermarriage and diplomacy, dominated the Japanese imperial government from the 9th to the 12th century.

Basis of power. The power and authority of the Fujiwara family rested not on military prowess but on political strategy and on the family's special relationship to the imperial family, which it carefully cultivated and exploited. This relationship stemmed from the Fujiwara policy of maintaining attachment to the imperial family through the marriage of Fujiwara daughters to emperors. It meant that the Fujiwara daughters were empresses, that their grandsons and nephews were emperors, and that members of their family, including its lesser branches, received all the patronage. Thus, the Fujiwara clan chieftain, whether he held office or not, could manipulate the reins of government.

The Fujiwara also took care to combine with the Buddhist hierarchy in order to increase its influence. A precedent set by pious emperors, who shaved their heads and retired to monasteries, was employed by the Fujiwara to persuade independent-minded emperors to retire from worldly affairs. Nor did the family neglect laying a firm economic foundation for its political power. It encouraged the landed gentry in the provinces to commend land to the Fujiwara, which resulted in greatly reduced taxes for the landowners—sometimes eliminating their tax obligations altogether—and permitted the Fujiwara to divert public revenues to the family coffers.

Beginnings. Although the Fujiwara rise to power was gradual, its founding in the 7th century foretold its future role and importance. Its founder, Nakatomi Kamatari (*see* Fujiwara Kamatari), was already in his day the de facto ruler of the country, for it was he, together with the heir apparent, who had earlier plotted and successfully carried out the overthrow of a powerful rival of the imperial house. It was to Kamatari, therefore, that a grateful prince, who consequently was able to ascend the throne as the emperor Tenji, entrusted the affairs of government. In the year of Kamatari's death, the emperor conferred on him the new family name of Fujiwara ("Wisteria Arbour"), in commemoration of the place where the two had conspired to oust their common rival.

Fuhito (*see* Fujiwara Fuhito), Kamatari's son, was the first to use the new name. And it was he who, by arranging the marriage of a daughter to Emperor Shōmu, began the policy of attaching his own family to the imperial

family. Fuhito's four sons each established a branch of the family, of which the Hokke, or Northern Branch, was to become the most influential.

But it was not until the latter half of the 9th century that Fujiwara power began to be felt. Yoshifusa (*see* Fujiwara Yoshifusa), who was father-in-law to the reigning monarch and grandfather of the heir apparent, at the Emperor's death succeeded in having the heir elevated to the throne as the emperor Seiwa at the age of nine. Yoshifusa, thereupon, had himself appointed regent—the first instance in Japanese history of a person not of royal blood being named to this position. This led to the practice of the Fujiwara persuading emperors to retire at a comparatively early age and of placing on the throne child emperors, for whom the Fujiwara acted as regents. During the next two centuries there were eight such abdications and seven child emperors.

Control of the regency. With a firm grip on the regency, the Fujiwara had seemingly gone as far as they could to become the de facto rulers without actually destroying or displacing the Imperial family. The only drawback to the regency was that it ended when the emperor reached his majority. This was remedied when Yoshifusa's nephew Mototsune (*see* Fujiwara Mototsune) established a new position more prestigious and powerful than that of regent or prime minister—the office of *kampaku* (chancellor), whose function was to serve as the emperor's spokesman and intermediary between the throne and the officialdom. In practice it was a chancellorship and the highest office in the land, second only to the emperor and sought by all subsequent leaders.

The Fujiwara monopoly of government in the 9th century was interrupted only briefly when the emperor Uda, who did not have a Fujiwara mother, ascended the throne in 887. Uda, moreover, managed to reign without a Fujiwara regent and, in the last six years of his reign, without a Fujiwara *kampaku,* because of the death of Mototsune.

Mototsune's son, Tokihira (*see* Fujiwara Tokihira), only 21 years old at his father's death, quickly re-established Fujiwara domination. Tokihira never advanced to the office of *kampaku,* yet he effectively removed or neutralized opposition to the family. Among his rivals was a celebrated and beloved scholar-statesman, Sugawara Michizane, who was falsely accused of conspiring to place his own grandson on the throne and was banished to distant Kyushu. Other rivals were given sinecures to monasteries and lectureships in Chinese history by the resourceful Tokihira and were thus effectively removed from politics. That he was able to accomplish these moves from a relatively low position demonstrated that the Fujiwara, whether in high office or not, were the real rulers of the country.

Peak of Fujiwara power and glory. It was Michinaga (*see* Fujiwara Michinaga), however, who epitomized Fujiwara power and glory. He gave three daughters to emperors and a fourth to an heir apparent who later became emperor. Four grandsons were emperors, and a son was a regent. For 30 years he basked in the splendour and sophistication of court life. His mansions, more magnificent than the palaces of the emperors, were the scene of frequent banquets, concerts, poetry contests, and picnics. It is this brilliant if effete and frivolous court life that Murasaki Shikibu, a contemporary, described in her great novel *Genji monogatari* (*The Tale of Genji,* 1935). Michinaga also inspired still another contemporary romance, the *Eiga monogatari* (*A Tale of Flowering Fortunes,* 1980), by an unknown author.

But, in the midst of Michinaga's glory at the capital, Fujiwara power was rapidly declining in the provinces. As early as the 940s there were two serious rebellions in the provinces, which were suppressed for the government by warrior families allied with the Fujiwara. But the victories served only to increase the power and popularity of the military families, to whom, rather than to the Fujiwara, the landed gentry tended to commend more and more of their lands. The failure of the Fujiwara to check this practice brought the rapid erosion of the economic basis of Fujiwara power and the strengthening of the military families of the outlying provinces.

Last years. The passing of Michinaga in 1027 hastened the decline of the family, which could neither prevent the emperor Go-Sanjo, who did not have a Fujiwara mother, from taking the throne in 1068 nor stop the establishment of a unique scheme of administration aimed at weakening Fujiwara control of the government. Known as *insei,* or "cloistered rule," this scheme called for the emperor to abdicate, leaving an infant on the throne, and to establish a separate administration in a monastery, from where, as a lay priest and free of Fujiwara overlordship, he would attempt to rule.

The *insei* definitely weakened Fujiwara influence in the 11th century, and the Fujiwara family was eliminated as a power at the court in the 12th century. In the Hōgen Disturbance of 1156 the contender supported by the Minamoto, a warrior family allied with the Fujiwara, lost to the emperor Shirakawa, supported by the warrior family of the Taira. In the Heiji Disturbance of 1159, the Minamoto–Fujiwara forces, who attempted to wrest back control of the court from the Taira, were ignominiously defeated. And thus, ironically, the Fujiwara, who for three centuries had eschewed violence and who had looked down contemptuously on the crude, unlettered warrior, were vanquished by violence and replaced as rulers by the very objects of their contempt. If there was any consolation for the Fujiwara, it was the knowledge that the House of Taira promptly adopted and helped to perpetuate the life-style and the political and social institutions that the Fujiwara had established. (M.Sh.)

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Fujiwara Dokai (historian): *see* Jien.

Fujiwara Fuhito (b. 659, Japan—d. Sept. 9, 720, Japan), Japanese statesman whose descendants formed the four houses of the Fujiwara family that dominated Japan between 857 and 1160.

Fuhito was the son of the famous Nakatomi Kamatari (614–669), who was granted the new surname Fujiwara as a reward for having helped plan the coup d'etat that brought the emperor Tenji to the throne. Because of his father's prestige, Fuhito was given high court rank.

In 701 Fuhito headed the committee that drafted the Taihō code. Consisting of 11 volumes of general laws and 6 volumes of criminal laws, it was the first comprehensive law code promulgated in Japan. Revised in 718, it was then retitled the Yōrō code.

Two of Fuhito's daughters became Imperial consorts, and the emperor Shōmu (reigned 724–748) was his grandson—this marital connection between the Fujiwara and Imperial families was the basis of the Fujiwara's rise to power. All of Fuhito's four sons died in a smallpox epidemic in 737, resulting in a temporary eclipse of the family's fortunes. Their sons and grandsons continued the line, however, and, by the middle of the next century, the Fujiwaras dominated the court.

Fujiwara Kamatari, original name NAKATOMI KAMATARI, or KAMAKO (b. 614, Yamato Province, Japan—d. Nov. 14, 669, Yamato Province), founder of the great Fujiwara family that dominated Japan from the 9th to the 12th centuries.

In the early 7th century the powerful Soga family totally dominated the Japanese Imperial court. In 645, however, along with an Imperial prince who later reigned as the emperor Tenji (661–671), Kamatari murdered the head of the Soga family and carried out a coup d'etat. As a reward for his services, Kamatari was given the position of minister of the interior, and in this role he was able to implement a series of far-reaching measures known as the "Reforms of Taika" (*Taika no kaishin*). *Taika,* meaning "great change," was the term adopted for this whole era in accord with the Chinese custom of counting time by arbitrary "year periods" (*nengō*). His reforms helped strengthen the power of the central government and transform the Japanese political and economic system into a small facsimile of T'ang China (618–907). In 669, as a reward for his services, Kamatari was given the new surname of Fujiwara, and under him the Fujiwara clan became firmly ensconced.

Kamatari's reforms were, in fact, an attempt to adapt the entire Chinese political and social system to Japan. Laws were codified, arable land was surveyed, and all households were registered. Both the private holdings of land and the private ownership by agricultural workers were abolished; former owners were appointed to supervise the property they had once owned, although theoretically they were considered employees of the central government, whose power was conspicuously enlarged. A new capital metropolitan region was established; the country was divided into provinces ruled by appointees of the central government; a series of new roads and post stations was constructed to improve communications with outlying districts; and a uniform system of taxes was introduced. These measures helped to complete the process of centralization and Sinicization that the government had begun 100 years earlier.

Fujiwara Michinaga (b. 966, Kyōto—d. Jan. 3, 1028, Kyōto), the most powerful of the Fujiwara regents, during whose reign the Imperial capital in Kyōto achieved its greatest splendour, and the Fujiwara family, which dominated the Japanese court between 857 and 1160, reached the apogee of its rule.

Michinaga was the son of Kaneie, the previous head of the Fujiwara family, and he succeeded to the leadership of the clan after the death of his elder brother in 995. Michinaga never took the title *kampaku* (chancellor) but advanced through the regular Imperial offices until he was named great minister of state (*dajō daijin*) in 1017.

Michinaga was given the honorary title of Nairan, which allowed him access to the private papers of the palace. The emperor's authority was still acknowledged, but the real seat of the government was transferred from the Imperial palace to Michinaga's administration (*mandokoro*). Four separate emperors were forced to marry his daughters; two emperors were his blood nephews and three his grandsons.

Some of Japan's greatest literature was produced during Michinaga's dominance. The magnificence of his palace became the subject of many stories. The famous *Makura no sōshi*

("Pillow Book"), by the court lady Sei Shōnagon, contains many references to Michinaga; Prince Genji, the hero of the great Japanese novel *Genji monogatari* (*The Tale of Genji*), is supposed to be partially modelled on Michinaga.

Conditions in the countryside seriously disintegrated during Michinaga's reign, however, and many powerful warrior families in the provinces refused to acknowledge central control. For a while Michinaga was able to stabilize conditions in the capital by paying warriors of the Minamoto and Taira clans to act as a kind of supplementary police force, but, as the Fujiwaras declined, these bands gradually usurped much of the governmental power.

Fujiwara Mototsune (b. 836, Kyōto—d. Feb. 25, 891, Kyōto), Japanese regent, creator (in 880) of the post of *kampaku,* or chancellor, through which he acted as regent for four adult emperors until his death. This post allowed the Fujiwara family to dominate the Japanese government for more than three centuries.

Mototsune's uncle, and father through adoption, Yoshifusa, had acted as regent for the child emperor Seiwa, who ascended the throne in 858. Succeeding Yoshifusa as head of the Fujiwara family in 812, Mototsune assumed the post of regent when another minor succeeded to the throne four years later. In order to further increase his power, Mototsune created the post of *kampaku,* which allowed him to exercise complete control over the government. When in 884 the emperor Yōzei challenged his rule, Mototsune forced his abdication. Subsequent heads of the Fujiwara family followed Mototsune in dominating Japan, but not all took the title *kampaku.*

Fujiwara Nobuzane (b. 1176, Japan—d. 1265?, Japan), courtier, poet, and the leading Japanese painter in the 13th century, who carried on the tradition of realistic portrait painting begun by his father, Takanobu.

Of the many paintings attributed to Nobuzane, "The 36 Major Poets" is the best

"Zuishin Teiki Emaki," detail of handscroll of colour on paper attributed to Fujiwara Nobuzane, mid-13th century; in the Ōkura Shūkokan Museum, Tokyo

By courtesy of Okura Shukokan Museum, Tokyo

documented. Originally a painting on a single scroll, it was later divided into separate portraits. These portraits are outstanding examples of the *nise-e* ("likeness picture style"): thin angular outlines filled in with masses of dense colour to depict the stiff court robes and a few sketchy lines to evoke the facial features and convey the personality of the subject. *Nise-e* was continued by Nobuzane's son, Tametsugu, and by Tametsugu's son Korenobu and grandson Tamenobu.

Fujiwara Sadaie, also called TEIKA, or FUJIWARA TEIKA (b. 1162, Japan—d. Sept. 26, 1241, Kyōto), one of the greatest poets of his age and Japan's most influential poetic theorist and critic until modern times.

Fujiwara was the son and poetic heir of the gifted and influential Shunzei (or Toshinari, 1114–1204), compiler of the seventh Imperial anthology of Japanese poetry, *Senzaishū* (*c.* 1188; "Collection of a Thousand Years"). Teika hoped not only to consolidate Shunzei's poetic gains and add to them in his own right but also to raise his family in political importance. He did not advance politically, however, until he was in his 50s.

As a literary figure, Teika was a supremely accomplished and original poet. His ideal of *yōen* ("ethereal beauty") was a unique contribution to a poetic tradition that accepted innovation slowly. In his poems of ethereal beauty, Teika employed traditional language in startling new ways, showing that the prescriptive ideal of "old diction, new treatment" inherited from Shunzei might accommodate innovation and experimentation as well as ensure the preservation of the language and styles of the classical past.

Teika's poems attracted the favourable notice of the young and poetically talented former emperor Go-Toba (1180–1239), who appointed him one of the compilers of the eighth Imperial anthology *Shin kokin-shū* (*c.* 1205, "New Collection of Ancient and Modern Times"). In 1232 Teika was appointed sole compiler of the ninth anthology, *Shinchoku-senshū* ("New Imperial Collection"), thereby becoming the first person ever to participate in the compilation of two such anthologies.

During his 40s, Teika underwent a profound inner conflict that greatly hindered his creativity and modified his poetic ideals. The chief poetic ideal of his later years was *ushin* ("conviction of feeling"), an ideal advocating poetry in more direct, simple styles than the technically complex poetry of *yōen.* Teika's achievements in these later styles were impressive, but in his late years he was mainly occupied as a critic, editor, and scholar.

The best known of Teika's treatises and anthologies, regarded as scripture by generations of court poets, are: *Eiga taigai* ("Essentials of Poetic Composition"); *Shūka no daitai* ("A Basic Canon of Superior Poems"); *Hyakunin isshū* ("Single Poems by One Hundred Poets"); *Kindai shūka* (1209; "Superior Poems of Our Time"); and *Maigetsushō* (1219; "Monthly Notes").

Fujiwara style, Japanese sculptural style of the Late Heian period (897–1185), known also as the Fujiwara period. Although many sculptures at the beginning of the period are in essence continuations of the Jōgan style, by the middle of the period a radical change had occurred in the style of the principal icons. This was partly the effect of the advent of the new Jōdō sect of Buddhism, which relied more upon emotional appeal than did the older esoteric sects; one needed simply to adore Amida to be saved.

Kichijō-ten (Sanskrit Mahāśrī; the goddess of good luck), Fujiwara style polychromed wood sculpture, late 12th century, Late Heian period; at Jōruri-ji, near Nara, Japan

Asuka-en, Japan

The sculpted figures were still full and fleshy, but they were also more elegant and appeared to be lighter in weight. There is a complete use of polychrome, with an elaborate development of cut-gold, or *kirikane,* patterns on the draperies. The softness of modelling, quite unlike the powerful forms of earlier periods, is the result of a joined-wood technique invented by the sculptor Jōchō, which allowed the sculptor greater freedom and delicacy of expression. The facial type is aristocratic, almost effeminate, with a small rosebud mouth, high arching eyes, and a narrow, short, sharp nose. Remnants of older traditions persisted in this style, but these were overlaid by the new Fujiwara interest in decorative effect that is seen especially in the applied jewelry, which in earlier periods had been painted or modelled on the surface of the sculpture.

Fujiwara Sumitomo (d. 941, Iyo Province, Japan), notorious Japanese pirate leader. Originally a government official, he was dispatched by the court to eliminate pirates plaguing the Inland Sea, which connects central and south Japan. A traitor to the trust placed in him, Sumitomo became the leader of the pirates and other dissident local bands and thereby gained control of most of the strategic areas along the waterway before he was defeated in 941. His actions helped to weaken Japan's central government.

Fujiwara Tadahira (b. 880, Kyōto—d. Sept. 9, 949, Kyōto), Japanese statesman who assumed the leadership of the Fujiwara family in 909 upon the death of his brother Tokihira. Although in his later years Tokihira had begun to dominate the government, he had never assumed the title of *kampaku* (chancellor). The post had been created and first assumed by their father, Fujiwara Mototsune, and allowed to lapse by the emperor Uda (reigned 887–897), the first Japanese sovereign in several generations whose mother was not a Fujiwara. Under Tadahira's dictatorship rebellions broke out in the provinces, and banditry was so common that not even the Imperial Palace was secure. After Tadahira died, the Fujiwaras continued to hold the regency, except for one three-year period, until 1180.

Fujiwara Takanobu (b. 1142, Kyōto—d. March 19, 1205, Kyōto), leading Japanese portrait artist of his day. He created a type of simple, realistic painting, the *nise-e* ("likeness picture"), popular throughout the Kamakura period (1192–1333). Of his three surviving portrait paintings, all in the Jingō-ji in Kyōto, perhaps the most famous is that of Minamoto Yoritomo, the founder of the Kamakura government. The portrait is notable for its sharp angular outlines and large blocks of dense colour—innovations that were carried on by Takanobu's son, Nobuzane, and his descendants for several generations. Takanobu is also remembered as the half-brother of Fujiwara Sadaie, one of Japan's greatest poets.

Fujiwara Teika: *see* Fujiwara Sadaie.

Fujiwara Tokihira (b. 871, Kyōto—d. April 26, 909, Kyōto), Japanese Imperial minister who checked the efforts of the emperor Uda (reigned 887–897) to halt the domination of the Japanese government by the Fujiwara family. Tokihira's father, Fujiwara Mototsune, had created and occupied the post of *kampaku,* or chancellor, a position that gave him virtual control of Japan by allowing him to issue commands on behalf of the emperor.

Upon Mototsune's death, the 21-year-old Tokihira became the head of the Fujiwara family. The emperor Uda, however, kept the post of *kampaku* vacant, attempting to gov-

ern by relying on advisers from minor noble families. In grudging acknowledgment of Tokihira's administrative talent, Uda did appoint him to a high ministerial position. Uda's abdication in 897 brought to the throne his son, the emperor Daigo, who tried to continue his father's effort to check the power of the Fujiwaras. He was unable to resist the political maneuvering of Tokihira, however, who in 899 received the influential post of minister of the left (*sadaijin*). The post of minister of the right (*udaijin*) was then held by the scholar Sugawara Michizane. In 901 Tokihira managed to have his rival exiled to the distant southern Japanese island of Kyushu. Even though Tokihira never assumed the post of *kampaku,* he did in fact become the virtual ruler of Japan.

In an effort to halt the deterioration of the power of the central government in the countryside, Tokihira drew up a series of edicts designed to eliminate the tax-exempt status of the great lords and their domains. These reforms were unpopular with the elite and were only temporarily successful in checking some of the most flagrant abuses. Tokihira began work on the *Engi-shiki* ("Institutes of the Engi Period"), a compilation of administrative regulations; after his death it was completed by others and was presented at court in 927. Upon Tokihira's death, his brother Tadahira succeeded him and in 941 assumed the office of *kampaku.*

Fujiwara Yorimichi (b. 992, Kyōto—d. March 2, 1074, Uji, Yamashiro province, Japan), imperial courtier who, as regent for three emperors, dominated the Japanese government for 52 years (1016–68). Yorimichi's failure to maintain control over the countryside and to prevent quarrels among his kinsmen, however, furthered the decline of the powerful Fujiwara family.

The central government's control over the countryside had deteriorated under Yorimichi's father, Michinaga, but Yorimichi maintained his father's luxurious court style and ignored the unrest in the countryside. As a result, banditry and rebellions were rife, and brigands even penetrated the capital, plundering the imperial palaces. The great lords in the provinces no longer bothered to send taxes to the capital, and the imperial revenues became so depleted that palace buildings began to fall into disrepair. Although in retirement after 1068, Yorimichi was able to prevent the emperor Go-Sanjō (reigned 1068–72), the first emperor in more than a century whose mother was not a Fujiwara, from supplanting the Fujiwara domination of imperial rule. After Yorimichi's death, however, Go-Sanjō's son, Shirakawa, was able to supplant the Fujiwara clan, and his successors excluded the Fujiwara from imperial power for nearly 100 years.

Yorimichi is credited with converting a former villa at Uji, near Kyōto, into the Byōdō Temple, which is adorned with some of the most outstanding examples of Japanese Buddhist art.

Fujiwara Yoshifusa (b. 804, Kyōto, Japan—d. Oct. 7, 872, Kyōto), imperial courtier under whom the Fujiwara family began its three-century-long domination of the Japanese imperial government.

By the middle of the 9th century the Fujiwara clan had become powerful at court, mainly because of the consistent choice of its women as imperial consorts. In 857 Yoshifusa was appointed to the influential post of great minister of state, a position the court had left vacant for several generations. The following year Yoshifusa had his nine-year-old grandson placed on the throne and managed to have himself assigned as regent, the first instance in Japan in which a commoner was made regent for a child sovereign.

Fujiwara Yukinari (b. 972, Japan—d. 1027, Japan), Japanese calligrapher, known as one of the *sanseki* ("three prints [or traces]"), in effect the finest calligraphers of the age. The others were Ono Tōfū and Fujiwara Sukemasa, and the three perfected the style of writing called *jōdai-yō* ("ancient style").

Yukinari was the son of a courtier. After the death of his father he was raised by his grandfather, Prince Kanenori. He held a succession of high government offices. His extant works include the *Wakan Rōei-shū* ("Collection of Japanese and Chinese Poems"), of which one copy is owned by the imperial household and another by the Yōmei Library; the *Hakushi shi-kan* ("Poetry Volume of Hakushi"; 1020), owned by the Sekido family; and the *Gon-ki* ("Diary of Gon"), his diary.

Fujiyama (Japan): *see* Fuji, Mount.

Fukaya, city, Saitama *ken* (prefecture), Honshu, Japan. It is situated between the Ara River and the Tone River. An early market and post town, it changed little before World War II. Ceramic-tile production was the main traditional industry. After 1960 two consecutive industrial projects were developed in the southern suburbs. A railway and expressway between Tokyo and Takasaki run through the city. Pop. (1985) 89,121.

Fukien, Wade-Giles romanization FU-CHIEN, Pinyin FUJIAN, *sheng* (province), in the People's Republic of China. It is located along China's southeast coast, northwest of the island of Taiwan. Fukien is bordered by the provinces of Chekiang to the north, Kiangsi to the west, and Kwangtung to the southwest and by the East China Sea to the northeast, the Taiwan Strait to the east, and the South China Sea to the southeast. The province's capital is Fu-chou, which means "happy city."

A brief treatment of Fukien follows. For full treatment, *see* MACROPAEDIA: China.

During the Southern Sung dynasty (1127–1279), Fukien became an important shipbuilding and commercial centre for overseas and coastal trade. Since that time Fukienese have settled in great numbers in Southeast Asia. The province declined when the Ming dynasty (1368–1644) banned maritime commerce and when the Ch'ing dynasty (1644–1911/12) pursued a policy of isolation. In 1842, after the first Opium War, the cities of Fu-chou and Amoy were opened to international trade. The province's coastal cities were occupied by the Japanese in World War II. Fukien was taken by the communist-led 3rd Field Army in 1949.

The Fukien region is one of the most picturesque in Asia, with wooded hills and winding streams, orchards, tea gardens, and terraced rice fields on the gentler slopes. About 95 percent of the province is mountainous. Fukien is crossed by several ranges of moderate elevation that run roughly parallel to the coast. The Wu-i Mountains, which form a formidable natural barrier between Fukien and the interior of China, reach a height of about 6,000 feet (1,800 m) in western Fukien. Rivers are of great importance, having for centuries provided the major means of transport. They flow into estuaries that form natural harbours, and their abundant water supplies are used for domestic consumption as well as for irrigation. The climate along the coastal area of the province is semitropical—very hot in summer, cool in winter. Typhoons visit the coast during the late summer and early autumn.

The Han (Chinese) make up 99 percent of the population. There are four principal languages, or dialects, and hundreds of subdialects, making the province one of the most linguistically fragmented in China. Only about one-fifth of the population of Fukien is urban. The province has four large cities: Fu-chou and Amoy, both important seaports; Ch'üan-chou; and Chang-chou.

Fukien is a net importer of food grains. Its chief crops are sugarcane (among the highest yields in China), peanuts (groundnuts), citrus, rice, and tea. Noncrop agricultural output comes from fisheries, animal husbandry, and forestry. The most important woods are fir, pine, and rosewood. Fukien also has considerable mineral wealth, including coal, iron, copper, gold, graphite, and kaolin (China clay) for making porcelain.

Fukien's traditional isolation has been breached by the construction of modern roads and railways linking its cities to those of neighbouring provinces. A rail line tying Fu-chou and Amoy to the Chekiang–Kiangsi main line stimulated the growth of regional industrial centres in Fukien, such as Nan-p'ing (pulp and paper), San-ming (iron and steel), and Lung-yen (coal). Beginning in 1979 Fukien was empowered to establish special economic zones in specific parts of the province to attract foreign investment. Area 47,500 square miles (123,100 square km). Pop. (1988 est.) 28,005,000.

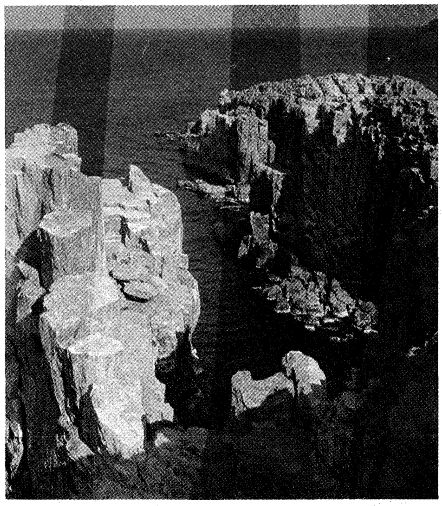
Fukko Shintō, English RESTORATION SHINTO, or REFORM SHINTŌ, school of Japanese religion prominent in the 18th century that attempted to uncover the pure meaning of ancient Shintō thought through philological study of the Japanese classics. The school had a lasting influence on the development of modern Shintō thought.

Kada Azumamaro (1669–1736) was a pioneer in the Fukko Shintō movement. Kamo Mabuchi (1697–1769) rejected both the Buddhist- and Confucian-centred interpretations of Shintō and stressed a morality of pure simplicity in accordance with the order of heaven and earth as preserved in ancient Japanese tradition. Kamo Mabuchi's disciple, Motoori Norinaga, rejected such a Taoist-oriented interpretation and insisted that Shintō was based on the revelation of an exalted deity of creation, Takamimusubi no Kami, by the sun goddess Amaterasu Omikami. Motoori devoted many years to a philological and theoretical interpretation of the *Kojiki* ("Records of Ancient Matters"), completing his commentary to that work in 1798. The last noted Fukko Shintō scholar was Hirata Atsutane (1776–1843), who sought to construct a Shintō theology, leaning heavily on the writings in Chinese of the Jesuits Matteo Ricci and Didacus de Pantoja.

Fukuda Takeo (b. Jan. 14, 1905, Gumma, Japan), Japanese financial specialist who was prime minister from 1976 to 1978.

Born into a wealthy farming family of Gumma *ken* (prefecture), Fukuda attended the finest schools and, upon graduating from Tokyo University (1929), immediately entered the Ministry of Finance. He was a member of the House of Representatives from 1952 on. His political career included tenures as minister of agriculture, of finance (three times), and of foreign affairs. When Fukuda successfully challenged Miki Takeo for the presidency of the Liberal-Democratic Party (LDP), he was also assured the post of prime minister. He assumed office in December 1976 under conditions of unrealistically high popular expectations. During his term in office the economic situation worsened when a new yen–dollar exchange rate was established, the bankruptcy rate rose, and unemployment soared. Trade relations with the West were strained when Japan built up a huge balance of payments surplus. Fukuda's promise to stabilize the economy remained unfulfilled after one year, and the public's trust in his leadership declined further when some LDP members were implicated in the Lockheed bribery scandals. Fukuda was forced to dissolve his Cabinet in 1978.

Fukui, prefecture (*ken*), central Honshu, Japan, on the Sea of Japan coast. Its area of 1,617 sq mi (4,189 sq km) includes the low Fukui-heiya (Fukui Plain), which is backed by high mountains. To the southwest, the prefecture extends along the coast of Wakasa-wan (Wakasa Bay), which is broken by cliffs, deep embayments, and peninsulas. Paddy-rice agriculture on the plain and forestry in the mountains are leading occupations. The prefectural capital, Fukui, and smaller towns on the plain form a major silk and synthetic textile centre. Electrical machinery is also built there. Near Fukui is the Eihei-ji (temple) complex, a headquarters of the Sōtō sect of Zen Buddhism,



The Tojimbo cliffs on the coast of the Sea of Japan in Fukui Prefecture
Akiharu Fujikura—Bon

founded in the 13th century. Pop. (1983 est.) city, 246,098; prefecture, 806,000.

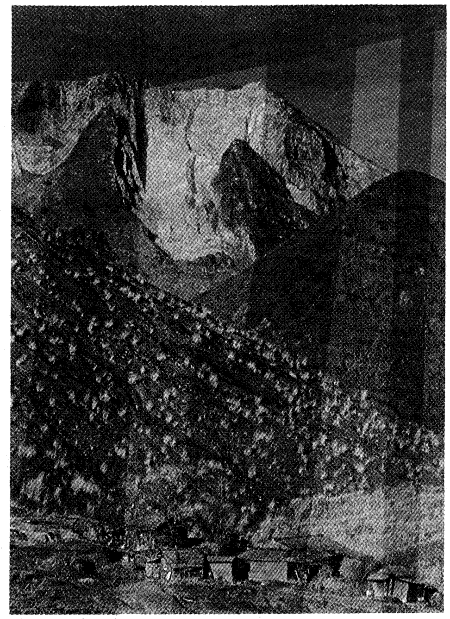
Fukui Kenichi (b. Oct. 4, 1918, Nara, Japan), Japanese chemist, co-recipient with Roald Hoffmann of the Nobel Prize for Chemistry in 1981 for their independent investigations of the mechanisms of chemical reactions.

Fukui took little interest in chemistry before enrolling at Kyoto University, where he studied engineering, receiving a Ph.D. in 1948. He was professor of physical chemistry at Kyoto from 1951.

In 1954 Fukui published his first exposition of the concept that the crucial process in many chemical reactions consists of an interaction between the highest occupied molecular orbital of one compound and the lowest unoccupied orbital of the other. In effect, one molecule shares its most loosely bound electrons with the other, which accepts them at the site where they can become most tightly bound. The interaction results in the formation of a new, occupied orbital that has properties intermediate between those of the two former ones. Fukui designated these labile orbitals "frontier orbitals" and provided examples of their significance in reactions that produce important classes of organic compounds.

Fukuoka, prefecture (*ken*), northern Kyushu, Japan, facing the Inland Sea (northwest), Shimonoseki-kaikyō (Shimonoseki Strait; north), the Tsushima-kaikyō (Tsushima Strait, or Eastern Channel; west), and the Ariake-kai (Ariake Sea; south). It occupies an area of 1,912 sq mi (4,953 sq km). Rivers draining seaward have built up extensive plains. The western coast is heavily indented.

Agriculture is carried out in the south, but Fukuoka is mainly important for its coal mines and industry, which are concentrated in the north. In 1963 the five cities of Moji, Kokura, Tobata, Yahata, and Wakamatsu were amalgamated to form Kita-Kyūshū, the largest city and industrial complex in Kyushu.



Coal mining district in Fukuoka Prefecture, Japan
Hirobumi Sakino

Two tunnels run under the Shimonoseki-kaikyō, connecting the city with Honshu. The city is spanned by the Wakato-ō-hashi (Wakato Grand Bridge).

Fukuoka city, the prefectural capital, incorporates the former city of Hakata and is located on the southern coast of Hakata-wan (Hakata Bay). There, a *kamikaze* ("divine wind") scattered and sank a fleet of invading Mongols in 1281. An ancient port, it is now a regional commercial, industrial, administrative, and cultural centre. The city contains an active fishing (halibut and flounder) port. Kyushu University (1911) is located there. Hakata *ningyo* ("dolls"), elaborately costumed ceramic figurines found in most Japanese homes, are made there. Pop. (1983 est.) city, 1,138,390; prefecture, 4,670,000.

Consult the INDEX *first*

Fukurokuju, also called FUKUROKUJIN (from Japanese *fuku,* "happiness"; *roku,* "wealth"; and *ju,* "longevity"), in Japanese mythology, one of the Shichi-fuku-jin (Seven Gods of Luck); he represents longevity and wisdom.

Fukurokuju, copy of a 15th-century painting; in the Museum für Völkerkunde, Vienna
By courtesy of the Museum fur Volkerkunde, Vienna

Like Jurōjin, another of the seven, with whom he is sometimes confused, he is said to have once lived on Earth as a Chinese Taoist sage. He is depicted frequently in small sculptures and paintings and on craft items as a short old man with a conspicuously high-domed, bald head. He is occasionally accompanied by a crane, or by another animal associated with longevity such as the deer or the tortoise. *See also* Shichi-fuku-jin.

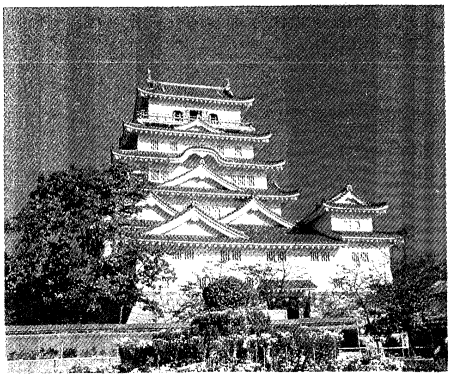
Fukushima, prefecture (*ken*), northeastern Honshu, Japan, facing the Pacific Ocean. Its area of 5,321 sq mi (13,782 sq km) is mostly mountainous, and settlement is concentrated in small interior basins and along the coast. Inawashiro-ko (Inawashiro Lake), 40 sq mi

Drying edible algae on the beach near Hisanohama in Fukushima Prefecture, Japan
W.H. Hodge

in area, occupies the centre of the prefecture. Fukushima Prefecture contains the southern extension of Bandai-Asahi National Park, encompassing the region of volcanic Bandai and Azuma mountains. The lower volcano slopes are dotted with lakes and swamps, many of which were formed by the eruption of Bandai-san in 1888. Numerous spas serve the area.

Fukushima Prefecture is essentially agricultural, producing rice surpluses and such cash crops as tobacco, mulberry (silk), fruits, grains, and vegetables that are resistant to low temperatures. Forestry and fishing and the gathering of seaweed in coastal towns such as Hisanohama are also important. Coal mining is carried on at the Jōban coalfield near Kōriyama city. Industry is concentrated in a few cities such as Fukushima, the prefectural capital, and Kōriyama; cameras, silk and rayon yarn, silk textiles, fruits, *bonsai* trees, and *kokeshi* dolls are produced. Pop. (1983 est.) city, 267,446; prefecture, 2,059,000.

Fukuyama, city, eastern Hiroshima Prefecture (*ken*), Honshu, Japan, on the delta of the Ashida-gawa (Ashida River), facing the Inland Sea. A small fishing village before the construction of the Fukuyama Castle in 1619, it developed as a commercial port for the surrounding region during the Tokugawa era (1603–1868). Its importance grew with the opening of the railway line between Kōbe and Moji in 1901. Fukuyama was heavily damaged during World War II, but industrialization has been rapid since 1964. Besides the traditional spinning industry, the manu-



Fukuyama Castle, Hiroshima Prefecture, Honshu, Japan
Photos Pack—EB Inc.

facture of kotos (Japanese harps), machinery, steel products, rubber, and processed foods is important. Pop. (1983 est.) 354,290.

Fukuzawa Yukichi (b. Jan. 10, 1835, Buzen, Japan—d. Feb. 3, 1901, Tokyo), Japanese author, educator, and publisher who was probably the most influential man outside government service in the Japan of the Meiji Restoration following the overthrow of the Tokugawa family in 1868. He led the struggle to introduce Western ideas to increase, as he repeatedly wrote, Japanese "strength and independence."

As the younger son of an impoverished lower samurai, Fukuzawa had little chance for advancement. Hence he entered school in Nagasaki to study the new techniques of the so-called Dutch learning—the term the Japanese used to describe Western knowledge and science in the years before Matthew Perry's opening of the country in 1854, when the Dutch were the only Westerners in Japan. After going abroad with the first Japanese missions to the West in 1860 and 1862, Fukuzawa wrote *Seiyō jijō* ("Conditions in the West"), a book that became popular overnight because of its simple and clear descriptions of the political, economic, and cultural institutions of the Occident. Continuing his efforts to introduce Western ways into Japan, he developed a lucid writing style and began the first attempts at public speaking and debating in Japan. In the xenophobic years before the Meiji Restoration, Fukuzawa's championing of Western ways provoked many attempts on his life. After the restoration, when the Japanese government began to actively seek foreign knowledge, Fukuzawa was often invited to enter government, but he refused, insisting on the need to develop an independent intelligentsia.

Fukuzawa wrote more than 100 books explaining and advocating parliamentary government, popular education, language reform, women's rights, and a host of other causes. In 1868 he founded Keiō Gijuku, which developed into Keiō University in Tokyo, the first great university independent of government domination and one that was to produce many business leaders. In 1882 he founded the *Jiji Shimpō*, which was for years one of Japan's most influential newspapers and a training ground for many liberal politicians and journalists. Writing in his *Autobiography* (Eng. trans. 1934) shortly before his death in 1901, Fukuzawa declared that the abolition of all feudal privileges by the Meiji government and Japan's victory over China in the Sino-Japanese War of 1894–95 (which gave Japan the status of a world power) had fulfilled his life completely. His only regret was that many of his friends had not lived to see these great accomplishments.

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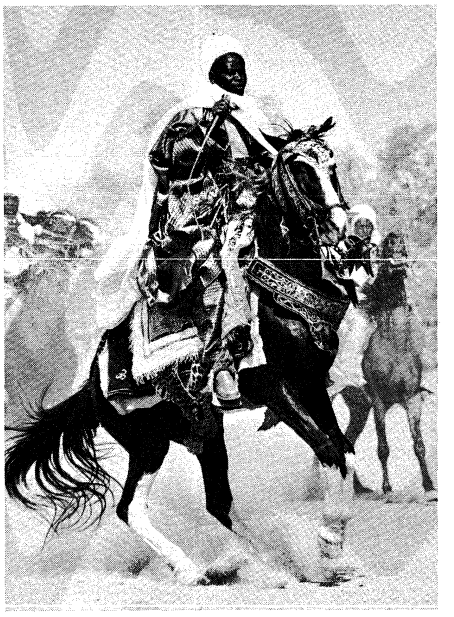
Fūl, Tall al- (Israel): *see* Gibeah.

Fulani, also called PEUL, or FULBE, a Muslim people found scattered in many parts of West Africa, from Lake Chad, in the east, to the Atlantic coast. They are concentrated principally in Nigeria, Mali, Guinea, Cameroon, and Niger. The Fulani language, known as Fulfulde (Fula), is classified within the West Atlantic branch of the Niger-Congo family.

Interaction of the widely dispersed Fulani with disparate other groups has produced a variety of socioeconomic patterns. Originally, the Fulani were a pastoral people, their lives and organization dominated by the needs of their herds. Such pastoral Fulani today enjoy greater prestige than town and sedentary agricultural Fulani as the most truly representative of Fulani culture. Interaction with other groups has sometimes resulted in a considerable degree of cultural absorption. This is most notably the case in northern Nigeria, where perhaps half of the Fulani have adopted the Hausa (*q.v.*) language and culture, and where, as a result of a series of holy wars (1804–10), purporting to purify Islām, they established an empire, instituting themselves



Fulani chieftain riding up to salute the *amir* of Katsina at the end of the Muslim festival of Ramaḍān in northern Nigeria
Ken Heyman—Rapho/Photo Researchers

as a ruling aristocracy. The urban Fulani are the most ardently Muslim; pastoral Fulani are frequently lax and sometimes even pagan. The pastoralists also exhibit a much higher incidence of non-Negroid physical traits. They wander in nomadic groups, making temporary camps of portable huts, some groups relying on makeshift structures of foliage. Some of their dairy produce is usually exchanged at markets for cereal foods; cattle are rarely killed for meat. Many sedentary Fulani, who often have become sedentary as a result of depletion of their herds, also own cattle but rely principally on cultivation.

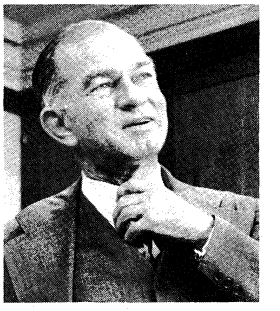
The social structure of the pastoral Fulani is egalitarian, in marked contrast to that of other Muslim groups, such as the Hausa, and to most sedentary Fulani. The influence of Islām on kinship patterns is evident in the general preference for cousin and other intralineage marriages. Most men are polygynous, the typical household unit comprising the family head, his wives, and unmarried children.

Fulani empire, Muslim theocracy of the Western Sudan that flourished in the 19th century. The Fulani, a people of obscure origins, expanded eastward from Futa Toro in Lower Senegal in the 14th century. By the 16th century they had established themselves at Macina (upstream from the Niger Bend) and were proceeding eastward into Hausaland. Some settled in the 19th century at Adamawa (in the northern Cameroons). Many of the Fulani continued to pursue a pastoral life; some, however, particularly in Hausaland, gave up their nomadic pursuits, settled into existing urban communities, and were converted to Islām. In the 1790s a Fulani divine, Usman dan Fodio (1754–1817), who lived in the northern Hausa state of Gobir (northeast of Sokoto) quarrelled with its rulers. Accusing the Hausa kings of being little more than pagans, he encouraged the Hausa people to revolt. Joined both by Hausa commoners and by Fulani pastoralists alike, the *jihād,* or holy war, swept through Hausaland and, repulsed only by the eastern empire of Kanem-Bornu, engulfed Adamawa, Nupe, and Yorubaland to the south. After the invasion by the Fulani of the northern provinces of the Oyo, the emirate of Ilorin to the northeast became the base from which Islām was to spread among the Yoruba. Usman, who was more a scholar than a statesman, ceded the practical direction of the eastern part of the empire to his son Muḥammad Bello, who settled in Sokoto, and the western (with its capital at Gwandu) to his brother Abdullahi. All three continued the Fulani denunciation of Bornu. The empire reached its zenith under Muḥammad Bello, who, like Usman, administered it according to the principles of Muslim law. The decay of this system was to aid the establishment in the late 19th century of British rule over what was later to be known as Northern Nigeria.

Fulbert OF CHARTRES, SAINT (b. *c.* 960, Picardy region, Fr.—d. April 10, 1028, Chartres; feast day April 10), French bishop of Chartres who developed the cathedral school there into one of Europe's chief centres of learning.

Educated at Reims under Gerbert (later Pope Sylvester II), Fulbert was appointed chancellor of the cathedral of Chartres in 990, when he began his work on behalf of the school. His teaching gained him a reputation for erudition and determination in pursuit of the truth. As bishop of Chartres from 1006, Fulbert was sent on diplomatic missions to Rome by King Robert II, whom he supported in his conflict with the nobles of France and with William V of Aquitaine. In 1020 Fulbert began to rebuild the burned cathedral of Chartres, but he died before the work was completed.

Fulbright, James William (b. April 9, 1905, Sumner, Mo., U.S.), U.S. senator who initiated the international exchange program for scholars known as the Fulbright scholarship. He is also known for co-sponsoring



Fulbright
Alfred Eisenstaedt—Time-Life Picture Agency © 1964–72 Time Inc.

the censure resolution against Sen. Joseph R. McCarthy in 1954 and for his vocal and articulate criticism of U.S. policy toward Vietnam during his tenure as chairman of the Senate Foreign Relations Committee.

Fulbright graduated from the University of Arkansas, then went to Oxford—where he earned two degrees—as a Rhodes Scholar. Back in the United States, he received his law degree from George Washington University (Washington, D.C.) and taught law at the University of Arkansas, serving as president of the latter from 1939 to 1941.

In 1942 Fulbright won a seat in the House of Representatives, thus beginning a political career that was to last more than three decades. His most notable achievement in the House was the 1943 Fulbright Resolution, putting the House on record as favouring U.S. participation in a postwar international organization. This organization at its founding in 1945 was named the United Nations.

In 1944 Fulbright ran successfully for the Senate. The following year the Senate passed the Fulbright Act, establishing an educational exchange program between the United States and foreign countries. During the 1950s, he became increasingly skeptical about the "containment" policy and the dominant view that Communism was an aggressive monolith that must be resisted wherever it appeared.

Fulbright voted against funding for Senator McCarthy's anti-Communist investigations, an action that made him popular among liberals. He consistently opposed efforts to integrate schools and promote the civil rights of blacks, however, making it possible for him to be reelected from Arkansas in 1950, 1956, 1962, and 1968.

As chairman of the Senate Foreign Relations Committee (1959–74), Fulbright advised President Kennedy not to invade Cuba, and he vigorously opposed President Johnson's 1965 intervention in the Dominican Republic.

The American public came to know Fulbright best for his probing, articulate opposition to the war in Vietnam. While he voted for the Gulf of Tonkin Resolution (1964; *q.v.*), Fulbright later regretted that vote and claimed he had been deceived by President Johnson. In 1966 his committee held televised hearings on U.S. policy toward Vietnam and China, one result of which was to make antiwar protest respectable.

Viewed as a Washington "insider" at a time when that was considered a liability, Fulbright lost his 1974 bid for reelection. He presented his views of U.S. foreign policy in a number of books, including *Old Myths and New Realities* (1964), *The Arrogance of Power* (1967), and *The Crippled Giant* (1972).

Fulbright scholarship, educational grant under an international exchange scholarship program created to increase mutual understanding between the people of the United States and the people of other countries through the medium of educational and cultural exchange. The program was conceived by Sen. J. William Fulbright of Arkansas and carried forward by the Fulbright Act of 1946 and subsequent legislation, consolidated and expanded in the Mutual Educational and Cultural Exchange Act of 1961, the Fulbright–Hays Act.

The Fulbright program is based on a series of bilateral diplomatic agreements that place ultimate responsibility for operations with the U.S. Department of State. Overseas administration, however, is turned over to educational foundations in which signatory governments and their academic communities participate; some other governments share the program's costs with the United States.

A candidate for a Fulbright grant must be under 35 years of age, have a bachelor of arts degree or its equivalent, be proficient in the language of the country in which he proposes to study, and have general maturity and scholastic competence. Most of the exchanges have been students, but teachers, advanced researchers, trainees, and observers have also qualified.

Fulcher OF CHARTRES (b. *c.* 1059, Chartres, Fr.—d. *c.* 1127, Jerusalem), French chaplain and chronicler of the First Crusade.

Apparently educated for the priesthood in Chartres, Fulcher attended the Council of Clermont and accompanied his overlord, Stephen of Blois, to southern Italy, Bulgaria, and Constantinople in 1096. In June 1097 he became chaplain to Baldwin of Flanders, with whom he remained. He went to Jerusalem in the winter of 1099 with Baldwin and spent the rest of his life there. His *Gesta Francorum Jherusalem peregrinantium* (written in three installments, 1101, 1106, and 1124–27) is a vivid and reliable account of the First Crusade, Baldwin's journey to Jerusalem, and the Kingdom of Jerusalem to 1127.

Despite his loyalty to Baldwin, Fulcher remained quite objective and provided a restrained portrait of the Byzantine Empire.

Fulcodi, Guido (pope): *see* Clement IV.

Fulda, city, Hesse *Land* (state), central Germany, situated on the Fulda River between the Rhön and Vogelsberg mountains. It developed around a Benedictine abbey founded in 744 by Sturmi, a disciple of St. Boniface. The abbey became a missionary centre, and its school was one of Europe's important seats of learning during the early Middle Ages, after Rabanus Maurus (*q.v.*) became its director in 803. It employed 12 manuscript copyists, and its great library survived until the 17th century. Fulda was chartered in 1157 and became a prince-abbacy; it was converted to a prince-bishopric when its abbot acquired the rank of bishop in 1752. It was the seat of a university during 1734–1803. The principality was secularized in 1802, passed to Hesse-Kassel in 1815, and was annexed by Prussia in 1866.

Most of the noteworthy buildings form an integrated Baroque district, including the cathedral (1704–12; with the crypt of St. Boniface); the episcopal palace (1707), now the city hall and museum; and the Orangery, before which stands the Floravase (1728), carved out of a single piece of stone. The Church of St. Michael dates from about 820, and the Probstei Church at Petersburg (just outside Fulda) is also 9th century. The Frauenberg Franciscan monastery (rebuilt 1760) is to the north of the city. Adolphseck Castle (1730–50) nearby, a former summer residence of the prince-bishops, is now a museum. The *Land* library contains a number of books from the monastic library. Fulda is the administrative centre for the neighbouring Hessische Rhön nature park.

Fulda is a substantial banking and financial centre. The major manufactures are textiles and clothing. Pop. (1989 est.) 54,320.

Fulda River, river, central Germany, a tributary of the Weser River. It rises on the Wasserkuppe (mountain) in the Rhön mountains and flows generally northward past the cities of Fulda, Bad Hersfeld, Melsungen, and Kassel. The main tributary is the Eder River, which joins it from the west above Kassel. The Fulda unites with the Werra at Münden to form the Weser River after a course of 135 mi (218 km).

The river valley, flanked on the left by the Vogelsberg, Knüll, and Habichtswald highlands and on the right by the Rhön and the Thüringer Wald, served as a trade route between southern and northern Germany during the Middle Ages, and the upper course of the river formed part of the boundary between East and West Franconia before 1100. Today the Fulda basin, apart from the industrial city of Kassel, is a region of wooded hills, farms, and recreational areas including the Edersee reservoir, ski slopes, and several spas.

Fulgentius OF RUSPE, SAINT (b. *c.* 467, Telepte, North Africa—d. Jan. 1, 533, Ruspe; feast day January 1), African bishop of Ruspe and theological writer who defended orthodoxy in 6th-century Africa against Arianism (*q.v.*). He also wrote polemics against Semi-Pelagianism (*q.v.*), the doctrine condemned at the Council of Orange (529).

Fulgentius became a monk, residing successively in Africa, Sicily, and Rome, then accepted the African bishopric of Ruspe on the Mediterranean coast (507). In 508 the Vandal king Thrasimund, a supporter of Arian beliefs, exiled 60 orthodox African bishops, who settled in Sardinia with Fulgentius as their leader and spokesman. Thrasimund recalled Fulgentius (515), but because of his orthodoxy, Fulgentius was exiled again (517–523). Thrasimund's successor, Hilderich, allowed Fulgentius to return to Africa.

Eight of the numerous, essentially polemical writings ascribed to him elaborating orthodox views are known to be authentic. He was such a fervent disciple of St. Augustine that he has been called the "abbreviated Augustine."

Fulgentius, Fabius Planciades (fl. late 5th and early 6th centuries AD), Christian Latin writer of African origin, a mythographer and allegorical interpreter of Virgil. Though his writings are mediocre and fantastic, they exerted a great deal of influence on scholars of the Middle Ages, who followed his method of using allegory to interpret classical writers.

Fulgentius is the author of the *Mitologiarum libri iii,* containing allegorical interpretations of myths supported by absurd etymologies, and of an *Expositio Vergilianae continentiae secundum philosophos moralis,* in which he makes Virgil himself appear in order to reveal the mystic meaning of the *Aeneid.* He also wrote an *Expositio sermonum antiquorum,* explanations of 62 rare Latin words supported by quotations, some of them from authors and works that never existed; and a *Liber absque litteris de aetatibus mundi et hominis,* a bizarre work in which human history is divided into 23 periods. His youthful poems and a work entitled *Physiologus* are lost.

It was once thought that Fulgentius might be identical with St. Fulgentius of Ruspe, but that idea has been largely abandoned.

fulgurite, a glassy silica mineral (lechatelierite) fused in the heat from a lightning strike. Fulgurite is a common mineral with two varieties. Sand fulgurites, the more common, are branching, more or less cylindrical tubes that are about one centimetre (one-half inch) to several centimetres in diameter; they are commonly less than 3 metres (10 feet) long but sometimes reach 20 m (66 ft). The central cavity is usually lined with glass, and the exterior shows adhering sand grains. The shores of Lake Michigan and the Atlantic coast are typical sites.

Rock fulgurites, the other variety, are thin, glassy crusts on rocks. They generally occur on mountain summits, as at Toluca, Mex., and Mt. Thielsen, Oregon.

Fulham (England): *see* Hammersmith and Fulham.

Fuligo, genus of true slime molds (class Myxomycetes; *q.v.*) whose large fruiting body (compound sporangia), 5 centimetres (2 inches) or more long and about half as wide, occur commonly on decaying wood. The sporangia, on bursting, release fine black spores. *Fuligo septica,* the best-known species, is also called "flowers of tan," from the frequent appearance of its yellow fruiting body in tan bark bits used for tanning hides.

Fulk, also spelled FULKE, French FOULQUES, or FOULQUE, name of rulers grouped below by country and indicated by the symbol •.

ANJOU

• **Fulk III** NERRA, byname FULK THE BLACK, French FOULQUES LE NOIR (b. *c.* 970—d. June 21, 1040, Metz, Fr.), count of Anjou (987–1040), the most powerful of the early rulers of the Angevin dynasty.

Exposed at first to the attacks of the counts of Brittany, Fulk had to fight for a long time to defend his frontiers, finally driving the Bretons back beyond the frontiers of Anjou. Having made himself master in the west, he turned his attention to the east and came into conflict with the count of Blois, Eudes II, over the territory of Saumur and a considerable part of Touraine. He defeated Eudes at Pontlevoy in 1016 and surprised and took Saumur 10 years later.

A ruthless warrior who burned and pillaged the monasteries in his path, Fulk nevertheless felt the need for penance, making three pilgrimages to the Holy Land and founding or restoring several abbeys, including those in or near Angers, Loches, and Saumur. He also built strongly fortified castles of stone (instead of wood) along the border of his territory. For this reason he was called le Grand Bâtisseur ("the Great Builder"). He died on his return from a pilgrimage to the Holy Land, having reigned 53 years.

• **Fulk IV,** byname FULK THE SURLY, French FOULQUES LE RÉCHIN (b. 1043, Château Landon, Fr.—d. April 14, 1109, Angers), count of Anjou (1068–1109).

Geoffrey II Martel, son of Fulk III, pursued the policy of expansion begun by his father but left no sons as heirs. The countship went to his eldest nephew, Geoffrey III the Bearded. But the latter's brother, Fulk, discontented over having inherited only a few small appanages, took advantage of the general discontent aroused by Geoffrey III's inept rule, seized Saumur and Angers (1067), and cast Geoffrey first into prison at Sablé and later in the confines of Chinon castle (1068). Fulk's reign then had to endure a series of conflicts against the several barons, Philip I of France, and the duke of Normandy. He lost some lands but secured, through battle and marriage, the countship of Maine for his son, Fulk V.

• **Fulk V:** *see* Fulk (Jerusalem).

JERUSALEM

• **Fulk,** byname FULK THE YOUNGER, French FOULQUES LE JEUNE (b. 1092—d. November 1143, Acre, Palestine [now 'Akko, Israel]), count of Anjou and Maine as Fulk V (1109–31) and king of Jerusalem (1131–43).

Son of Fulk IV the Surly and Bertrada of Montfort, he was married in 1109 to Arenburga of Maine. Fulk exerted his control over his vassals and was later caught up in dynastic quarrels between the French and English kings. In 1128 his son Geoffrey Plantagenet married Matilda, daughter of Henry I of England, and became the progenitor of England's branch of the Angevin dynasty. Fulk first visited Palestine in 1120 and returned in 1129 to marry Melisend, daughter of King Baldwin II of Jerusalem.

Fulk became king of Jerusalem on Baldwin II's death in 1131 and spent the first year of his reign settling a dispute in Antioch (Turkey) and putting down a revolt led by his wife's lover, Hugh of Le Puiset. In 1137 he allied himself with the Byzantines against a Turkish leader, 'Imād ad-Dīn Zangī, of Mosul (Iraq), and in 1140 helped the Muslims of Damascus ward off Zangī's armies. He protected Jerusalem in the south by constructing a series of fortresses, including Krak of Moab.

Fulk, ARCHBISHOP OF REIMS, French FOULQUES, or FOULQUE, ARCHEVÊQUE DE REIMS (d. June 17, 900), leader of the opposition to the non-Carolingian king Eudes (of the West Franks, or France).

Failing to establish his kinsman, Guy II of Spoleto, as king of the West Franks in 888, Fulk turned unavailingly to Arnulf, king of the East Franks, and then to the young Charles, son of the Carolingian Louis II the Stammerer; he crowned Charles at Reims in 893. His view was that only one of Carolingian blood could rightfully become king. Although Charles had to yield to Eudes, he became king (as Charles III) on the latter's death in 898, and Fulk became his chancellor. Fulk's efforts to keep church property out of the hands of the nobles provoked his assassination in 900 at the instigation of Count Baldwin II of Flanders.

Fuller, Andrew (b. Feb. 6, 1754, Wicken, Cambridgeshire, Eng.—d. May 7, 1815, Kettering, Northamptonshire), English Baptist minister and theologian. He is remembered as a founder and first secretary of the Baptist Missionary Society.

In 1770 Fuller joined the Soham Baptist Church, Cambridgeshire, and five years later became its pastor. After moving in 1782 to Kettering, Fuller became a leader of the Northampton Baptist Association and a close friend of William Carey, John Ryland, and John Sutcliff. This group of young men was responsible, at the instigation of Carey, for the formation in 1792 of the English Baptist Missionary Society, and Fuller's main activities, in addition to his Kettering pastorate, were connected with the affairs of this society. He traveled to all parts of the country, pleaded for money, and conducted an extensive correspondence in the interests of enterprises in Sierra Leone, Ceylon, and Jamaica, as well as India.

Fuller, George (b. Jan. 17, 1822, Deerfield, Mass., U.S.—d. March 21, 1884, Brookline, Mass.), American painter noted for his haunting, dreamlike pictures of figures set in landscape—*e.g.,* "The Tomato Patch."

He began his formal training at the studio of Henry Kirke Brown. At first an itinerant portraitist, he settled in New York City about 1847 and enjoyed moderate success there. After the death of his father and brother in 1859, Fuller retired to Deerfield to assume responsibility for the family farm. He continued to paint for pleasure, and, in 1876, pressed for money, he sent some paintings to Boston. They attracted much attention, and he never thereafter lacked patrons. Fuller is especially remembered for his introspective later works, notably "The Quadroon" and "Romany Girl."

Consult the INDEX *first*

Fuller, Henry Blake (b. Jan. 9, 1857, Chicago, Ill., U.S.—d. July 28, 1929, Chicago), American novelist who wrote about his native city of Chicago.

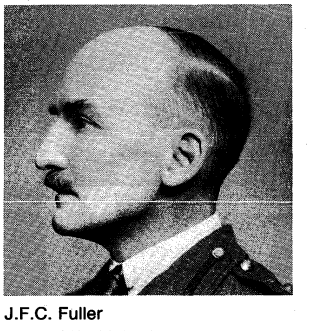
Fuller came from a prosperous Chicago family and attended the city's schools. After a foray into business he lived for a year abroad, mostly in Italy, to which he returned several times. His first two novels—*The Chevalier of Pensieri-Vani* (1890; written under the pseudonym Stanton Page) and *The Chatelaine of La Trinité* (1892)—were gracefully told, brief but unhurried tales about Europe.

Fuller took a decidedly different direction with *The Cliff-Dwellers* (1893), a realistic novel, called the first important American city novel, about people in a Chicago skyscraper. *With the Procession* (1895) was another realistic novel about a wealthy Chicago merchant family and the efforts of some of its members to keep up with the city's wealthy ruling class. His other fiction set in Chicago includes *Under the Skylights* (1901), short stories about the city's artistic life; *On the Stairs* (1918), a novel about two men, one going up in life, the other down; and *Bertram Cope's Year* (1919), which is about an instructor at the University of Chicago. He continued his European-based fiction with *Waldo Trench and Others* (1908), stories about Americans in Italy; and *Gardens of This World* (1929), which extends the tale begun in his first book.

Fuller helped establish the book review section of the *Chicago Evening Post* (1901–02) and wrote editorials from 1911 to 1913 for the Chicago *Record-Herald.*

Fuller, J(ohn) F(rederick) C(harles) (b. Sept. 1, 1878, Chichester, Sussex, Eng.—d. Feb. 10, 1966, Falmouth, Cornwall), British army officer, military theoretician, and war historian who became one of the founders of modern armoured warfare.

Commissioned into the British Army in 1899, Fuller saw service in the South African War and was a staff officer in France during World War I. As chief of staff of the British tank corps from December 1916, he planned the surprise attack of 381 tanks at the Battle of Cambrai on Nov. 20, 1917; this was the first massed tank assault in the history of warfare. After the war he launched a crusade for the mechanization and modernization of the British army. Chief instructor of Camberly Staff College from 1923, he became military assistant to the chief of the imperial general staff in 1926. He was promoted to major general in 1930 and retired three years later to devote himself entirely to writing.



J.F.C. Fuller
Bassano & Vandyk, London

Throughout the interwar period, Fuller wrote voluminously, his most notable works being *Tanks in the Great War* (1920), *The Reformation of War* (1923), *On Future Warfare* (1928), and *Memoirs of an Unconventional Soldier* (1936). His lectures (*Field Service Regulations III,* 1937) were adopted for study by the general staffs of the German, Soviet, and Czechoslovak armies. But in glorifying the tank as an almost independent and irresistible land battleship, Fuller was considered extreme, and his emphasis on the armoured offensive alienated English military tacticians who were still imbued with the defensive doctrines of World War I.

Fuller served as a reporter during the Italian invasion of Ethiopia (1935) and the Spanish Civil War (1936–39) and was the only foreigner present at Nazi Germany's first armed maneuvers in 1935. Seeing his teachings largely vindicated by World War II, he produced *Machine Warfare* in 1942 and wrote one of the first histories of the conflict, *The Second World War 1939–1945* (1948). His most comprehensive work was *A Military History of the Western World,* 3 vol. (1954–56), in which he analyzed Western warfare from its beginnings through World War II.

Fuller, Loie, original name MARIE LOUISE FULLER (b. Jan. 15, 1862, Fullersburg, Ill., U.S.—d. Jan. 1, 1928, Paris), American dancer

who achieved international distinction for her innovations in theatrical lighting as well as

Loie Fuller

By courtesy of the Dance Collection, the New York Public Library at Lincoln Center

for her invention of the "serpentine dance," a striking variation on the popular "skirt dances" of the day.

She made her debut as an actress at the age of four. After touring as a child prodigy, she acted in stock companies, burlesque, vaudeville, and Buffalo Bill's Wild West Show.

A popular, if not authenticated, explanation of the origin of her experimentation with voluminous and luminous draperies claims that, during rehearsals for a play, *Quack, M.D.*, in 1889, Fuller received a gift of a long, full skirt of transparent china silk. Inspired by its billowing folds, she experimented with lengths of silk manipulated under lights of various colours, with spectacular results. She called her creation the "serpentine dance." In her equally successful "fire dance" she danced on a pane of glass, illuminated from below.

Appearing at the Folies-Bergère, Paris, in 1892, Fuller attracted the attention of such artists as Toulouse-Lautrec, Jules Chéret, and Auguste Rodin. She had her own theatre at the Paris Universal Exposition of 1900. In 1909 she toured the U.S. and in 1923 staged an inferno scene for a Paris Opéra production of Berlioz' *Damnation de Faust*. After another tour of the U.S. in 1926, she made her last appearance in London the next year.

Fuller, (Sarah) Margaret, married name MARCHESA (Marchioness) OSSOLI (b. May 23, 1810, Cambridgeport, Mass., U.S.—d. July 19, 1850, at sea), U.S. critic, teacher, and woman of letters whose efforts to civilize the taste and enrich the lives of her contemporaries make her significant in the history of American culture.

Margaret Fuller, engraving by R. Babson and J. Andrews, *c.* 1860

By courtesy of the Library of Congress, Washington, D.C.

Fuller's father, raising her in the fashion of a son, made of her a "youthful prodigy," but later she blamed her father for her broken health, asserting that the vicarious experience of books should never take the place of actual experience tempered with sympathy and interpretation.

Plagued by financial difficulties after her father's death in 1835, she taught in Bronson Alcott's Temple School in Boston, 1836–37, and in Providence, R.I., 1837–39. In 1839 she published a translation of *Eckermann's Conversations with Goethe*; her most cherished project, never completed, was a biography of Goethe. In 1840 her friendship with Ralph Waldo Emerson and her critical essays won her the position of editor of *The Dial*, a magazine launched by the Transcendentalists. She wrote poetry, reviews, and critiques for the quarterly, but in 1842 she had to relinquish the unprofitable editorship to Emerson.

For five winters, 1839–44, she conducted in Boston classes of "conversations" for women on literature, education, mythology, and philosophy, in which venture she was reputed to be a dazzling leader of discussion. Her professed purpose was "to systematize thought"; more generally, she attempted to enrich the lives of women and to dignify their place in society. The same purpose guided her in writing *Woman in the Nineteenth Century* (1845), a tract on feminism that was both a demand for political equality and an ardent plea for the emotional, intellectual, and spiritual fulfillment of women. It was published by Horace Greeley, who had admired her *Summer on the Lakes, in 1843* (1844), a perceptive study of frontier life in Illinois and Wisconsin.

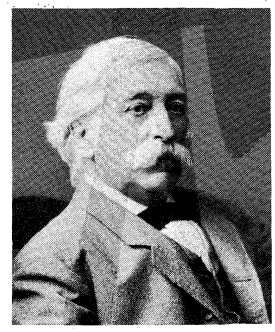
In 1844 Margaret Fuller became literary critic on Greeley's newspaper, the *New York Tribune*. She encouraged American writers and crusaded for social reforms but made her greatest contribution, she thought, as an interpreter of modern European literature.

Before she sailed for Europe in 1846 some of her essays appeared as *Papers on Literature and Art*, which assured the cordial welcome she received in English and French circles. America's first woman foreign correspondent, she reported on her travels for the *Tribune;* the "letters" were later published in *At Home and Abroad* (1856). Settling in Italy in 1847, she was caught up in the cause of the Italian revolutionists, led by Mazzini, and was secretly married to Giovanni Angelo, Marchese Ossoli. Following the suppression of the republic she sailed for America with her husband and infant son, Angelo. They perished in a shipwreck off Fire Island, and with them was lost her manuscript history of the revolution.

Fuller, Melville Weston (b. Feb. 11, 1833, Augusta, Maine, U.S.—d. July 4, 1910, Sorrento, Maine), eighth chief justice of the Supreme Court of the United States (1888–1910) whose amiability, impartiality, and rare administrative skill enabled him to manage court conferences efficiently and to resolve or forestall serious disputes among the justices whom he superintended. Justices Oliver Wendell Holmes and Samuel F. Miller, two outstanding members of the Fuller court, called him the best presiding judge they had ever known.

Graduated from Bowdoin College, Brunswick, Maine (1853), Fuller attended Harvard Law School briefly, was a newspaperman in Augusta for a time, was admitted to the bar in 1855, and from 1856 practiced law in Chicago. He was elected as a Democrat to the Illinois Constitutional Convention of 1861 and to the State House of Representatives in 1862.

Prominent at the Chicago bar but unknown nationally, Fuller was appointed chief justice by Pres. Grover Cleveland in 1888. He successfully administered a court that comprised



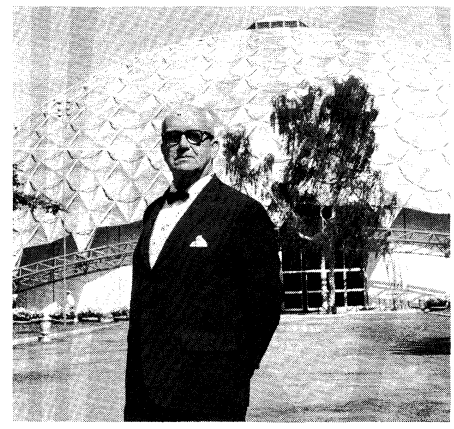
Melville Weston Fuller, 1902

By courtesy of the Library of Congress, Washington, D.C.

such justices as Holmes, Miller, Stephen J. Field, Joseph P. Bradley, and John Marshall Harlan, all of whom overshadowed him in either intelligence or forcefulness. He wrote two important opinions, both in 1895: *U.S.* v. *E.C. Knight Co.*, in which he construed the Sherman Anti-Trust Act of 1890 so narrowly as to prevent its application to almost any business except transportation; and *Pollock* v. *Farmers' Loan and Trust Co.*, in which he declared the federal income tax law of 1894 unconstitutional.

While serving as chief justice, Fuller also was an arbitrator of the Venezuelan boundary dispute between that nation and Great Britain (1897–99), and was a member of the Hague Court of International Arbitration (1900–10). A biography, *Melville Weston Fuller* (1950), was written by Willard L. King.

Fuller, R(ichard) Buckminster (b. July 12, 1895, Milton, Mass., U.S.—d. July 1, 1983, Los Angeles), U.S. engineer and architect who developed the geodesic dome, the only large dome that can be set directly on the ground



R. Buckminster Fuller shown with a geodesic dome constructed as the U.S. pavilion at the American Exchange Exhibit, Moscow, 1959

R. Buckminster Fuller

as a complete structure, and the only practical kind of building that has no limiting dimensions (*i.e.*, beyond which the structural strength must be insufficient). Among the most noteworthy geodesic domes is the United States pavilion for Expo 67 in Montreal. Also a poet and a philosopher, he was noted for unorthodox ideas on global issues.

Life. Fuller was descended from a long line of New England Nonconformists, the most

famous of whom was his great-aunt, Margaret Fuller, the critic, teacher, woman of letters and co-founder of *The Dial,* organ of the Transcendentalist movement. Fuller was twice expelled from Harvard University and never completed his formal education. He saw service in the U.S. Navy during World War I as commander of a crash-boat flotilla. In recognition of his invention of special lifesaving equipment, he was awarded an appointment to the U.S. Naval Academy at Annapolis, Maryland. In 1917 he married Anne Hewlett, daughter of James Monroe Hewlett, a well-known architect and muralist, later a director of the American Academy in Rome. Hewlett had invented a modular construction system using a compressed fibre block, and after the war Fuller and Hewlett formed a construction company that used this material (later known as Soundex, a Celotex product) in modules for house construction. In this operation Fuller himself supervised the erection of several hundred houses; the experience taught him that construction with craft labour is disastrously wasteful: "The experience made me realize that craft building—in which each house is a pilot model for a design which never has any runs—is an art which belongs to the middle ages."

In 1922, soon after the founding of the construction organization, the Stockade Building System, his first daughter, Alexandra, died at the age of four. She had suffered, in succession, influenza, polio, and spinal meningitis—illnesses epidemic at the time, and whose spread Fuller blamed partially on inadequacies of the environment. He concluded that the inadequacies were unnecessary, and that the environment can be controlled and "valved" to human advantage. Fuller's key to controlling the environment was comprehensive anticipatory design.

The Stockade Building System encountered financial difficulties in 1927. Fuller, a minority stockholder, was forced out. He found himself stranded in Chicago, without income, alienated, dismayed, confused. At this point in his life, Fuller made what he called a "blind date with principle." He resolved to devote his remaining years to a nonprofit search for design patterns that could maximize the social uses of the world's energy resources and evolving industrial complex. The inventions, discoveries, and economic strategies that followed were interim factors related to that end.

In 1927, in the course of the development of his comprehensive strategy, he invented and demonstrated a factory-assembled, air-deliverable house, later called the Dymaxion house, which had its own utilities. Regarding air–land–water transportation as a necessary adjunct to his totally autonomous house, he designed in 1928, and manufactured in 1933, the first limited, land-taxiing prototype of his omnidirectional vehicle, the Dymaxion car. This automobile, the first streamlined car, could cross open fields like a jeep, accelerate to 120 miles per hour (190 kilometres per hour), make a 180- degree turn in its own length, carry 12 passengers, and average 28 miles per gallon (12 kilometres per litre) of gasoline. Equipped with all-around bumpers, it provided maximum protection to its occupants in event of collision. In 1943, at the request of the industrialist Henry Kaiser, Fuller developed a new version of the Dymaxion car embodying advantages of the improved technology. The new version was planned to be powered by three separate air-cooled engines, each coupled to its own wheel by a variable fluid drive. The coupling system provided maximum torque with minimum engine size. Once starting inertia was overcome, only a single engine was required to maintain cruising speed. Thus the car could average 40 to 50 miles per gallon of gasoline and could operate with a minimum of pollution. All wheels were steerable; the car consequently could move sidewise like a crab, parking in a space no greater than its own length. The projected 1943 Dymaxion, like its predecessor, was never put into commercial production, possibly because of the resistance of the automotive industry to radical innovations.

Assuming that there is in nature a vectorial, or directionally oriented, system of forces that provides maximum strength with minimum structures, as is the case in the nested tetrahedron lattices of organic compounds and of metals, Fuller developed a vectorial system of geometry that he called "Energetic-Synergetic geometry." The basic unit of this system is the tetrahedron (a pyramid shape with four sides, including the base), which, in combination with octahedrons (eight-sided shapes), forms the most economic space-filling structures. The architectural consequence of the use of this geometry by Fuller was the geodesic dome, a frame the total strength of which increases in logarithmic ratio to its size. Because geodesic domes have no limiting dimensions, they could be used, as Fuller proposed, as "sky breaks" over entire cities, making possible comprehensive environment control, including the economic use of hostile terrain, as in the Arctic or Antarctic.

Many thousands of geodesic domes have been erected in various parts of the world, the most publicized of which was the United States exhibition dome at Expo 67 in Montreal. One houses the tropical exhibit area of a St. Louis botanical garden; another, the Union Tank Car Company's dome, was built in 1958 in Baton Rouge, La. This dome, at the time of its construction the largest clear span structure in existence, is 384 feet (117 metres) in diameter and 116 feet (35 metres) in height.

Other inventions and developments by Fuller included a system of cartography that presents all the land areas of the world without significant distortion; die-stamped prefabricated bathrooms; tetrahedronal floating cities; underwater geodesic-domed farms; and expendable paper domes. Fuller did not regard himself as an inventor or an architect, however. All of his developments, in his view, were accidental or interim incidents in the growth of world strategy, which aimed at a radical solution of world problems by finding the means to do more with less.

He once wrote:

> I did not set out to design a house that hung from a pole, or to manufacture a new type of automobile, invent a new system of map projection, develop geodesic domes or Energetic-Synergetic geometry. I started with the universe—as an organization of energy systems of which all our experiences and possible experiences are only local instances. I could have ended up with a pair of flying slippers.

Comprehensive and anticipatory design initiative alone, he held—exclusive of politics and political theory—can solve the problems of human shelter, nutrition, transportation, and pollution; and it can solve these with a fraction of the materials now inefficiently used. Moreover, energy, ever more available, directed by cumulative information stored in computers, is capable of synthesizing raw materials, of machining and packaging commodities, and of supplying the physical needs of the total global population.

Fuller was research professor at Southern Illinois University (Carbondale) from 1959 to 1968. In 1968 he was named university professor, in 1972 distinguished university professor, and in 1975 university professor emeritus. On recommendation of the Royal Institute of British Architects, Queen Elizabeth II awarded Fuller the Royal Gold Medal for Architecture. He also received the 1968 Gold Medal Award of the National Institute of Arts and Letters, and in 1979 was made a member of the American Academy and Institute of Arts and Letters.

Assessment. Fuller—architect, engineer, inventor, philosopher, author, cartographer, geomatrician, futurist, teacher, and poet—established a reputation as one of the most original thinkers of the second half of the 20th century. He was perhaps the first to attempt to develop, on a global basis, comprehensive, long-range technological and economic plans designed "to make man a success in Universe."

He conceived of man as a passenger in a cosmic spaceship—a passenger whose only wealth consists in energy and information. Energy has two phases—associative (as atomic and molecule structures) and dissociative (as radiation)—and, according to the first law of thermodynamics, the energy of the universe cannot be decreased. Information, on the other hand, is negatively entropic; as knowledge, technology, "know-how," it constantly increases. Research engenders research, and each technological advance multiplies the productive wealth of the world community. Consequently, "Spaceship Earth" is a regenerative system whose energy is progressively turned to human advantage and whose wealth increases by geometric increments. (R.W.M.)

BIBLIOGRAPHY. *Appraisals of Fuller's life and work.* Robert W. Marks, *The Dymaxion World of Buckminster Fuller* (1960, reissued 1973), which contains a detailed explanation of Fuller's energetic-synergetic geometry and technical descriptions of Fuller's inventions and structures prior to 1960; John McHale, *R. Buckminster Fuller* (1962), an evaluation of Fuller's architectural achievements; Sidney Rosen, *Wizard of the Dome* (1969); Hugh Kenner, *Bucky* (1973), a biography with emphasis on his thought; Donald W. Robinson, *Mind's Eye of Buckminster Fuller* (1974); and Alden Hatch, *Buckminster Fuller at Home in the Universe* (1974), a biography stressing his life.

Basic writings of Fuller. Nine Chains to the Moon (1938), an outline of his general technological strategy for maximizing social applications of energy resources. Developments of this central theme, with additional technical data, may be found in *Education Automation: Freeing the Scholar To Return to His Studies* (1962); *Ideas and Integrities: A Spontaneous Autobiographical Disclosure* (1963); *No More Secondhand God, and Other Writings* (1962); *Utopia or Oblivion: The Prospects for Humanity* (1969); *Operating Manual for Spaceship Earth* (1969); *Buckminster Fuller to Children of Earth* (1972); *Earth, Inc.* (1973); *Synergetics,* 2 vol. (1975–79); *It Came To Pass, Not To Stay* (1977); and *Critical Path* (1981).

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Fuller, Roy (Broadbent) (b. Feb. 11, 1912, Oldham, Lancashire, Eng.), British poet and novelist who is best known for the restrained and thoughtful tone of his work.

Educated privately, Fuller became a solicitor in 1934, practicing 1956–69, and was in the Royal Navy during World War II. He was Oxford professor of poetry (1968–73).

In his earlier books of poetry—*The Middle of a War* (1942), *A Lost Season* (1944), and *Epitaphs and Occasions* (1949)—Fuller, like other young British poets of the time, was concerned with social and political conditions. *Collected Poems 1936–61* (1962), *New Poems* (1968), and others of his later collections, however, exhibit an increasing interest in psychological and philosophical subjects and a growing sense of doom.

Fuller's novels—which include *Image of a Society* (1956), *The Ruined Boys* (1959; U.S. title *That Distant Afternoon*), and *My Child, My Sister* (1965)—reveal the influence of Henry James in both tone and study of character.

Fuller has also written fiction for juveniles, and his Oxford lectures on poetry have been published. His autobiography, *Souvenirs*, was published in 1980.

Fuller, Thomas (b. June 19, 1608, Aldwincle, Northamptonshire, Eng.—d. Aug. 16, 1661, London), British scholar, preacher, and one of the most witty and prolific authors of the 17th century.

Fuller was educated at Queens' College, Cambridge (M.A., 1628; B.D., 1635). Achieving a great reputation in the pulpit, he was appointed preacher at the Chapel Royal, Savoy, London, in 1641. He officiated there until 1643 when Cromwell's ascendency suggested to Fuller, who held Royalist views, that it would be advisable to leave London for Oxford.

For a time during the Civil War, he served as chaplain to the Royalist army and, for nearly two years, was in attendance on the household of the infant princess Henrietta at Exeter. He returned to London in 1646 and wrote *Andronicus, or the Unfortunate Politician* (1646), a satire against Cromwell. In 1649 he was given the parish of Waltham Abbey, Essex, where he became a friend of the other leading biographer of the age, Izaak Walton.

Fuller was again appointed to a pulpit in London (1652). There he completed *The Church-History of Britain* (1655), notable for its number of excellent character sketches, and added to it *The History of the University of Cambridge* and *The History of Waltham-Abbey in Essex* (1655). In 1658 he was given the parish of Cranford, near London, and continued to preach in the capital. Upon the reestablishment of the monarchy (1660), all Fuller's ecclesiastical privileges were restored, and he became a doctor of divinity at Cambridge.

By enriching his factual accounts with descriptions of psychological oddities and other

Thomas Fuller, lithograph by C. Kell, 1874, after a portrait by an unknown artist, 1648

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

details of human interest, Fuller widened the scope of English biographical writing. His *History of the Worthies of England,* published posthumously in 1662, was the first attempt at a dictionary of national biography. He was also a historian who gathered facts from original sources, producing works that provide much valuable antiquarian information. He has a reputation for quaintness because his writings abound with epigrams, anecdotes, puns, and other conceits, but he also paid careful attention to literary form.

For the modern reader, Fuller's most interesting work is probably *The Holy State, the Profane State* (1642), an entertaining collection of character sketches important to the historian of English literature.

fuller's earth, any fine-grained naturally occurring earthy substance possessing a high absorptive capacity. Usually consisting chiefly of hydrated aluminum silicate, it is made up of the clay minerals montmorillonite and palygorskite; it characteristically crumbles into mud when mixed with water. Its remarkable power of absorption of water, grease, oil, and colouring matter, combined with its tendency to crumble when mixed, has made fuller's earth a perfect substance, since classical time, for fulling (shrinking and thickening by application of moisture) or whitening of textiles. During the 20th century it has been extensively used as an absorbent and natural bleaching agent in refining and decolourizing oils and fats. Its colour usually ranges from light brown, yellow, and white to light and dark green. It contains more water than ordinary clay, and it is probably formed as a residual deposit by decomposition of rock in place; for example, by devitrification of volcanic glass. The term is applied to material without reference to a particular chemical or mineral composition, or texture and origin.

Fullerton, city, Orange County, southern California, U.S. Laid out in 1887 and named for George H. Fullerton, it developed as a citrus centre after the arrival of the Santa Fe Railroad in 1888. Residential and industrial growth has kept pace with the rapid development of the county since World War II. Fullerton College was founded in 1913, Pacific Christian College in 1928, and the California State University at Fullerton in 1959. Inc. city, 1904. Pop. (1980) 102,034.

fulmar, any of several species of gull-like oceanic birds of the family Procellariidae (order Procellariiformes), which also includes the petrels and the shearwaters. The name fulmar refers especially to the two species of the genus *Fulmarus*. Fulmars fly low over the waves of the open ocean, thus resembling their narrower winged relatives, the shearwaters. Fulmars will eat almost anything; their natural foods are small fish, squid, and crustaceans; but they often take ships' garbage and, unlike most other petrels, will come ashore for carrion.

The northern fulmar, or fulmar petrel (*F. glacialis*), nests in colonies on oceanic cliffs of the Arctic Islands, the British Isles, and the coast of western Europe; in winter it is abundant in offshore waters in the sub-Arctic and temperate zones. The southern fulmar (*F. glacialoides*) has a comparable distribution in the Southern Hemisphere. Both fulmars are typically predominately white with a pearly gray mantle, but darker colour phases occur in some populations.

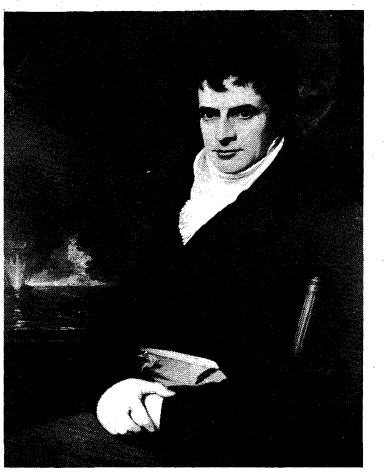
The giant fulmar, also known as the giant petrel (*Macronectes giganteus*), with a length of about 90 centimetres (3 feet) and a wingspread in excess of 200 cm (6½ ft), is by far the largest member of the family. This species nests on islands around the Antarctic Circle and in sub-Antarctic waters. It feeds on live and dead animal matter of all kinds and is a heavy predator on the young of many colonial seabirds. Sailors call it "Nelly" and, because of its especially rank odour, "stinker."

Fulton, city, seat (1825) of Callaway County, central Missouri, U.S., 26 mi (42 km) northeast of Jefferson City. Laid out in 1825 and named Volney, it was renamed shortly thereafter for Robert Fulton, steamboat engineer and inventor. Fulton is the seat of two colleges: Westminster (1851) and William Woods (1870). At Westminster College, Sir Winston Churchill delivered his "Iron Curtain" speech on March 5, 1946. To commemorate the occasion, the college reconstructed on its campus the London church of St. Mary the Virgin, Aldermanbury, designed by Sir Christopher Wren in the 17th century; a bust of Churchill by Jacob Epstein and a document signed by President Kennedy making Churchill an honorary U.S. citizen are among the memorabilia. Fulton is the site of a state mental hospital and of a school for the deaf.

The city is also a service centre for an agricultural area producing hay, grain, and livestock. Manufactures include firebrick made from local clay deposits, farm machinery, electrical equipment, and shoes. Inc. 1859. Pop. (1980) 11,046.

Fulton, Robert (b. Nov. 14, 1765, Lancaster County, Pa.—d. Feb. 24, 1815, New York City), U.S. inventor, engineer, and artist who brought steamboating from the experimental stage to commercial success. He also designed a system of inland waterways, a submarine, and a steam warship.

Fulton was the son of Irish immigrants. When their unproductive farm was lost by mortgage foreclosure in 1771, the family moved to Lancaster, where Fulton's father died in 1774 (not 1786 as is generally written). Having learned to read and write at home, Fulton was sent at age eight to a Quaker school; later he became an apprentice in a Philadelphia jewelry shop,



Fulton, detail of an oil painting by Benjamin West, 1806; in the collection of the New York State Historical Association, Cooperstown

By courtesy of the New York State Historical Association, Cooperstown

where he specialized in the painting of miniature portraits on ivory for lockets and rings.

After settling his mother on a small farm in western Pennsylvania in 1786, Fulton went to Bath, Va., to recover from a severe cough. There the paintings by the young man—tall, graceful, and an engaging conversationalist—were admired by people who advised him to study in Europe. On returning to Philadelphia, Fulton applied himself to painting and the search for a sponsor. Local merchants, eager to raise the city's cultural level, financed his passage to London in 1787.

Although Fulton's reception in London was cordial, his paintings made little impression; they showed neither the style nor the promise required to provide him more than a precarious living. Meanwhile, he became acquainted with new inventions for propelling boats: a water jet ejected by a steam pump and a single, mechanical paddle. His own experiments led him to conclude that several revolving paddles at the stern would be most effective.

Beginning in 1794, however, having admitted defeat as a painter, Fulton turned his principal efforts toward canal engineering. His *Treatise on the Improvement of Canal Navigation,* in 1796, dealt with a complete system of inland water transportation based on small canals extending throughout the countryside. He included details on inclined planes for raising boats—he did not favour locks—aqueducts for valley crossings, boats for specialized cargo, and bridge designs featuring bowstring beams to transmit only vertical loads to the piers. A few bridges were built to his design

in the British Isles, but his canal ideas were nowhere accepted.

Undaunted, he travelled in 1797 to Paris, where he proposed the idea of a submarine, the "Nautilus," to be used in France's war with Britain; it would creep under the hulls of British warships and leave a powder charge to be exploded later. The French government rejected the idea, however, as an atrocious and dishonourable way to fight. In 1800 he was able to build the "Nautilus" at his own expense; he conducted trials on the Seine and finally obtained government sanction for an attack, but wind and tide enabled two British ships to elude his slow vessel.

In 1801 Fulton met Robert R. Livingston, a member of the committee that drafted the U.S. Declaration of Independence. Before becoming minister to France, Livingston had obtained a 20-year monopoly of steamboat navigation within the state of New York. The two men decided to share the expense of building a steamboat in Paris using Fulton's design—a side paddlewheel, 66-foot- (20-metre-) long boat, with an eight-horsepower engine of French design. Although the engine broke the hull, they were encouraged by success with another hull. Fulton ordered parts for a 24-horsepower engine from Boulton and Watt for a boat on the Hudson, and Livingston obtained an extension on his monopoly of steamboat navigation.

Returning to London in 1804, Fulton advanced his ideas with the British government for submersible and low-lying craft that would carry explosives in an attack. Two raids against the French using his novel craft, however, were unsuccessful. In 1805, after Nelson's victory at Trafalgar, it was apparent that Britain was in control of the seas without the aid of Fulton's temperamental weapons. In the same year, the parts for his projected steamboat were ready for shipment to the United States, but Fulton spent a desperate year attempting to collect money he felt the British owed him.

Arriving in New York in December 1806, Fulton at once set to work supervising the construction of the steamboat that had been planned in Paris with Livingston. He also attempted to interest the U.S. government in a submarine, but his demonstration of it was a fiasco. By early August 1807 a 150-foot- (45-metre-) long "Steamboat," as Fulton called it, was ready for trials. Its single-cylinder condensing steam engine (24-inch bore and four-foot stroke) drove two 15-foot-diameter side paddlewheels; it consumed oak and pine fuel, which produced steam at a pressure of two to three pounds per square inch. The 150-mile (240-kilometre) trial run from New York to Albany required 32 hours (an average of almost 4.7 miles [7.6 kilometres] per hour), considerably better time than the four miles per hour required by the monopoly. The passage was epic because sailing sloops required four days for the same trip.

After building an enginehouse, raising the bulwark, and installing berths in the cabins of the now-renamed "North River Steamboat," Fulton began commercial trips in September. He made three round trips fortnightly between New York and Albany, carrying passengers and light freight. Problems, however, remained: the mechanical difficulties, for example, and the jealous sloopboatmen, who through "inadvertence" would ram the unprotected paddlewheels of their new rivals. During the first winter season he stiffened and widened the hull, replaced the cast-iron crankshaft with a forging, fitted guards over the wheels, and improved passenger accommodations. These modifications made it a different boat, which was registered in 1808 as the "North River Steamboat of Clermont," soon reduced to "Clermont" by the press.

In 1808 Fulton married his partner's niece, Harriet Livingston, by whom he had a son and three daughters.

In 1811 the Fulton-designed, Pittsburgh-built "New Orleans" was sent south to validate the Livingston–Fulton steamboat monopoly of the New Orleans Territory. The trip was slow and perilous, river conditions being desperate because of America's first recorded, and also largest, earthquake, which had destroyed New Madrid just below the confluence of the Ohio and Mississippi rivers. Fulton's low-powered vessel remained at New Orleans, for it could go no farther upstream than Natchez. He built three boats for Western rivers that were based at New Orleans, but none could conquer the passage to Pittsburgh.

Fulton was a member of the 1812 commission that recommended building the Erie Canal. With the English blockade the same year, he insisted that a mobile floating gun platform be built—the world's first steam warship—to protect New York Harbor against the British fleet. The "Demologos," or "Fulton," as the ship was alternately called, incorporated new and novel ideas: two parallel hulls, with paddlewheel between; the steam engine in one hull, and boilers and stacks in the other. It weighed 2,745 displacement tons and measured 156 feet (48 metres) in length; a slow vessel, its speed did not exceed 6 knots (6 nautical miles, or 11 kilometres, per hour). Launched in October 1814, the heavily gunned and armoured steamship underwent successful sea trials but was never used in battle; when peace came in December, it was transferred to the Brooklyn Navy Yard, where it was destroyed by an accidental explosion in 1829.

By 1810 three of Fulton's boats served the Hudson and Raritan rivers. His steamboats also replaced the horse ferries that were used for heavily travelled river crossings in New York, Boston, and Philadelphia. He retained the typical broad double-ended hulls that needed no turning for the return passage. Manhattan's crosstown Fulton Street, named in 1816, was the principal thoroughfare connecting the two river terminals.

Fulton spent much of his wealth in litigations involving the pirating of patents relating to steamboats and in trying to suppress rival steamboat builders who found loopholes in the state-granted monopoly. His wealth was further depleted by his unsuccessful submarine projects, investments in paintings, and financial assistance to farmer kin and young artists. After testifying at a legal hearing in Trenton, early in 1815, he became chilled en route home to New York, where he died. His family made claims on the U.S. government for services rendered. A bill of $100,000 for the relief of the heirs finally passed the Congress in 1846 but was reduced to $76,300, with no interest.

A Hudson–Fulton Celebration in 1909 commemorated the success of the "North River Steamboat of Clermont" and the discovery in 1609 of the North River by the English navigator who was the first to sail upstream to Albany. A "Robert Fulton" commemorative stamp was issued in 1965, the bicentenary of his birth, and the two-story farmhouse, his birthplace, was acquired and restored by the Pennsylvania Historical and Museum Commission. (R.S.H.)

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Fulvia (d. 40 BC, Sicyon, Greece), in Roman history, the wife of Mark Antony, and a participant in the struggle for power following the death of Julius Caesar.

Fulvia was the daughter of Marcus Fulvius Bambalio of Tusculum. She was first married to the demagogic politician Publius Clodius. Their daughter Claudia was subsequently the wife of Octavian (the future Augustus). In 52 BC Clodius was murdered by a political rival, Milo; and his body was carried to Rome and placed in the atrium of his house, where Fulvia made a show of her grief and displayed her husband's wounds to the people in order to inflame them against Milo and his party. The result was a brief period of public disorder and the temporary banishment of Milo.

Fulvia next married Caius Scribonius Curio, who died in Africa in 49 BC; and in 44 she married Mark Antony. She apparently was deeply in love with him and had great ambition for him. During the proscriptions of 43 BC, Fulvia was reported to have viewed with pleasure the heads of Rufus and Cicero, Antony's victims.

After Antony and Octavian had deprived Lepidus of his place in the Triumvirate and Antony was living with Cleopatra, Fulvia conspired with Antony's brother, Lucius Antonius, against Octavian. Perhaps out of jealousy, wanting to force Antony's return to Italy, Fulvia induced Lucius Antonius to rebel against Octavian without Antony's consent. During the winter of 41–40 BC, Lucius Antonius was besieged in Perusia and starved into surrender. Fulvia was allowed to escape unharmed and crossed over into Greece, where she met with the returning Antony at Athens. His extreme anger with her over her meddling is supposed to have caused her profound grief. Her death soon after came at an opportune time for Antony, because it made possible his marriage to Octavius' sister, Octavia, which cemented the reconciliation with Octavian that he had achieved upon his return to Italy.

fulvic acid, type of humic acid (*q.v.*) that is slightly polymerized and that produces the soils known as podsol and podsolic soil.

Fumariaceae, the fumitory, or bleeding-heart family, of the order Papaverales, comprising about 19 genera of herbaceous plants, some of them valuable ornamentals, many containing alkaloids. The fumitories include annuals, biennials, and perennials and are found mostly in the Northern Hemisphere.

The flowers are bisexual, with two small sepals and four petals that are arranged in two series. One or both of the outer petals is spurred or lobed, and the lower petals often have thickened tips. Each flower has one pistil and six stamens that are in two bundles of three each (except in the genus *Pteridophyllum,* which has four ungrouped stamens). The ovary is superior (positioned above the point of attachment of the other flower parts—sepals, petals, and stamens), and the carpels (segments of the ovary) are fused. Most species have deeply cut leaves. The fruit is a capsule.

The most widely grown ornamental of the family is the bleeding heart (*q.v.; Dicentra spectabilis*), a native of Japan. Other ornamentals are Dutchman's-breeches (*q.v.; D. cucullaria*), squirrel corn (*q.v.; D. canadensis*), North American eastern and western bleeding hearts (*D. eximia* and *D. formosa*), fumitory (*q.v.; Fumaria officinalis*), Allegheny vine (*Adlumia fungosa*), and the various European and North American members of the genus *Corydalis* (*q.v.*).

Pteridophyllum racemosum is a perennial from the mountains of Japan that has distinctive fernlike leaves and 25-centimetre- (10-inch-) long sprays of white flowers.

fumaric acid, also called TRANS-BUTENEDIDIC ACID, organic compound related to maleic acid (*q.v.*).

fumarole, any vent from which volcanic vapours issue. Water vapour is the dominant constituent of such vapours, but acid gases, such as carbon dioxide and hydrogen sulfide, also characteristically occur.

Fumaroles, like geysers, are manifestations of hot springs, which disperse groundwater from the upper parts of the Earth's crust after it has been heated by magma (molten silicate material) and magmatic gases. As magma begins to solidify to form crystalline rock, its gases become concentrated under ever-increasing pressure in the residual, uncrystallized liquid. When the pressure becomes sufficiently high, this liquid, consisting chiefly of hot water and containing gases and minerals in solution, is forced into cracks in the surrounding solid rock. A fumarole is formed if a crack extends upward and opens at the surface. The intimate connection between fumaroles and simple hot springs is obvious in areas where a strong contrast between dry and wet seasons exists. During the dry season, hot springs are transformed into fumaroles, which become hot springs again during periods of heavy precipitation. *See also* geyser; hot spring.

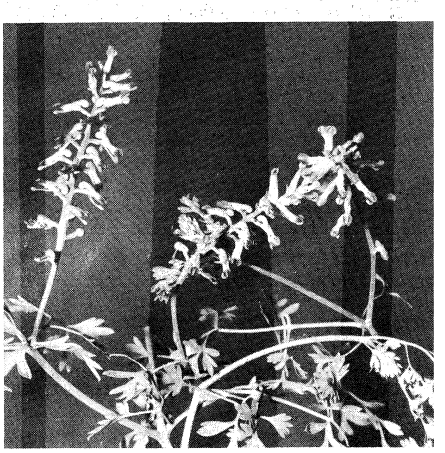
fumigant, any volatile, poisonous substance used to kill insects, nematodes, and other animals or plants that damage stored foods or seeds, human dwellings, clothing, and nursery stock. Soil fumigants are sprayed or spread over an area to be cultivated and are worked into the soil to control disease-causing fungi, nematodes, and weeds.

Fumigants with a high vapour pressure, such as methyl bromide, ethylene oxide, hydrogen cyanide, and hydrogen phosphide, penetrate quickly and are used to treat sealed storage areas or materials enclosed in gasproof sheets. Low-pressure compounds such as ethylene dibromide and ethylene dichloride diffuse more slowly; they are used to treat more open storage areas and as soil fumigants. Common fumigants used to treat stored products or nursery stock include hydrogen cyanide, naphthalene, nicotine, and methyl bromide.

Soil fumigants commonly used as nematocides are methyl bromide, dichloropropane, propylene oxide, dibromochloropropane, organophosphate insecticides, and chloropicrin. Because these substances may kill other soil organisms that ordinarily control nematodes by predation or infection, serious nematode infestations may follow fumigation.

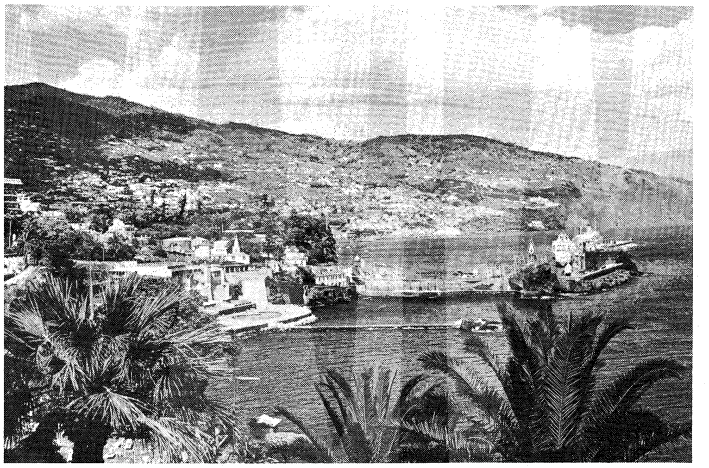
Other compounds used as fumigants include acrylonitrile, carbon disulfide, ethylene, paradichlorobenzene, sulfur dioxide, and sulfuryl fluoride. Fumigants are poisonous to warm-blooded animals, including humans; they should be applied only by trained persons using proper equipment.

fumitory, any of several plant species of the genus *Fumaria* of the fumitory family (Fumariaceae) but, most commonly, *F. officinalis,* a 90-centimetre- (3-foot-) tall, climbing annual plant with lacy leaves and spikelike sprays of white or pinkish tubular flowers. *Fumaria officinalis,* native to Europe and Asia, now grows wild in parts of North America, having escaped from gardens. Once regarded as a medicinal herb, it was also used in Great Britain, boiled in water or milk, as a cosmetic.



Fumitory (*Fumaria officinalis*)
G.E. Hyde—EB Inc.

Climbing fumitory (*Adlumia fungosa*), also known as Allegheny vine, or mountain fringe, is a sprawling, herbaceous biennial that coils its long leafstalks around supports. It reaches 3.5 m (11½ feet) in height and has clusters of white or pinkish tubular flowers borne among delicately cut leaves. The only species of its genus, it is native to moist woodlands and freshly burned areas from eastern to central North America to Japan.



Porto do Funchal, Ilha da Madeira, Madeira Islands
V. Phillips—Shostal/EB Inc.

Funabashi, city, Chiba Prefecture (*ken*), Honshu, Japan, situated on the inner coast of Tokyo Bay. It was formed by the amalgamation of the post town of Funabashi with the fishing village of Katsushika in 1937. With the construction of a major railway along the east coast of the bay in 1894, the city lost its importance as a road transport centre. Army installations erected in the early 20th century contributed to Funabashi's recovery, however, and the later construction of two other railway lines to Tokyo made possible its growth as a residential suburb. After World War II parts of the coast were reclaimed and a seaside industrial zone of iron, steel, and petrochemical plants was developed. The northern part of the city is an agricultural zone producing for the Tokyo market. Pop. (1985) 506,967.

Funafuti Atoll, coral atoll, capital of Tuvalu, in the west-central Pacific Ocean. The atoll comprises some 30 islets, with a total land area of 0.9 square mile (2.3 square km), strung around a lagoon (13.5 by 10 miles [21.7 by 16.1 km]) that affords good anchorage. A U.S. military base was established there in 1943. Despite the infertility of its sandy soil, the atoll produces copra for export. Funafuti, the chief village, has a hotel, a hospital, and an airstrip. The atoll itself, rather than the village, is the capital of Tuvalu. Pop. (1985) 2,810.

Funan, ancient Hindu state in Cambodia that arose in the 1st century AD and was incorporated into the state of Chenla in the 6th century. Funan (a Chinese transcription of *pnom,* "mountain") was the first important Hinduized kingdom in southeast Asia. It covered portions of what are now Vietnam, Thailand, and Kampuchea. Funan had trade relations with India as well as China, to whose emperor the people of Funan sent tribute between the 3rd and 6th centuries. Archaeological evidence shows that Funan was influenced markedly by Indian cultures.

Funchal, city, capital, and municipality (*concelho*) of Funchal district, Portugal, which district (coterminous with the Madeira Autonomous Region) comprises the Madeira Islands (*q.v.*) in the North Atlantic. Funchal lies on the southern coast of the Ilha da Madeira.

Founded in 1421 by the Portuguese navigator João Gonçalves Zarco, the city was briefly under Spanish (1580–1640) and British (1801, 1807–14) control. It is now the headquarters of Madeiran industry, commerce, and communications and is the site of a relay station in the Atlantic submarine cable system. The older part of the city focuses on the Sé cathedral (1485–1514) and has steep, narrow cobblestone streets. The buildings are generally whitewashed and are surrounded by gardens of tropical flowers; they line the curving shore of the Port of Funchal and spread inland on the lower slopes of an amphitheatre of mountains that reach 4,000 feet (1,200 m) in elevation. Stone walls support sloping terraces on which there is year-round cultivation.

Tourism, based on the scenery and the mild year-round climate, is a major economic factor. Exports from Funchal include the famous Madeiran wines, wickerwork, embroidery, fruit, fish, and dairy products. Industries include sugar milling, cabinetmaking, and distilling. Since 1960 Funchal's harbour and cargo-handling facilities have been enlarged and modernized from time to time; it is now an important regional port of call and bunkering facility. The city also has an international airport. Pop. (1981) city, 44,111; *concelho,* 112,746; (1984 est.) district, 250,699.

function, in mathematics, an expression, rule, or law that defines a relationship between one variable (the independent variable) and another variable (the dependent variable). In its most general usage in mathematics the word *function* refers to any correspondence between two classes. For most functions the variables range over classes of numbers. For example, the formula $A = \pi r^2$ gives for each positive real number r the area of the circle with radius r. The expressions $a + bx + cx^2$ and $a_0 + a_1x + \ldots + a_nx^n$ are polynomial functions of x when the coefficients a, b, c, a_0, $a_1, \ldots, a_n$ are given. The short symbols $f(x)$, $g(x)$, $P(x), \ldots,$ are often used for functions of the independent variable x, either for the sake of abbreviation, or because the nature of the function is unknown or unspecified. The quotient of two polynomials $P(x)/Q(x)$ is called a rational function. A polynomial is regarded as a special case of a rational function. The trigonometric functions $\sin x$, $\cos x$, $\tan x$ and others, where x is the measure of

an angle, are defined geometrically in elementary trigonometry; for practical purposes their values are given in tables. Many functions of practical importance are defined only by means of tables, as in statistics. For example, the death rate in each year over a period of years is given in mortality tables used by life insurance companies.

Inverse functions are obtained from given functions by interchanging the roles of the independent and dependent variables. Thus, if the given function is written $y = 2x$, the inverse function would be written $x = y/2$. The two functions determine the same correspondence between the two variables. The exponential function $y = 10^x$ gives a value of y for each real value of x. These values are not easily computed unless x is an integer. In this case the inverse function is written $x = \log_{10} y$ and its values are given in tables of common logarithms.

Functions involving more than two variables occur frequently in applications of mathematics. For example, the formula $A = \frac{1}{2}bh$ gives the area of a triangle in terms of its base b and altitude h.

Functions of a complex variable. The preceding examples dealt with real variables. Practical applications of functions of a complex variable are not so easy to illustrate, but are nevertheless very extensive. They occur, for example, in electrical engineering and aerodynamics. If the complex variable is represented in the form $x = u + iv$, where i is the imaginary unit, and u and v are real, it is possible to set $f(x) = P(u,v) + iQ(u,v)$, where for example $P(u,v) = u^3 + v^2$, $Q(u,v) = 3uv^3 - v$.

Geometric representation of functions. Real-valued functions $y = f(x)$ of one real variable may be given a geometric representation by means of the analytic geometry of René Descartes. The independent variable x is plotted along a number scale on a line called the x-axis, which is usually taken as horizontal, and the dependent variable y is plotted along a number scale on another line called the y-axis which is usually taken as vertical. The graph of the function consists of the points with coordinates (x,y) where $y = f(x)$. For example, the graph of a quadratic function $y = a + bx + cx^2$ is a parabola, if $c \neq 0$. Some functions are given only by their graphs. Examples are the temperature, air pressure, and wind velocity as recorded by weather bureau instruments.

Methods of defining a function. A function may be defined by means of a power series. For example, the series

$$e^x = 1 + x + \frac{x^2}{2!} + \cdots + \frac{x^n}{n!} + \cdots$$

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} \cdots$$

$$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} \cdots$$

could be used to define these functions for all complex values of x. Other types of series and also definite products may be used when convenient. An important case is the series of Fourier, expressing a function in terms of sines and cosines,

$$f(x) = a_0 + a_1 \cos x + a_2 \cos 2x + \cdots + b_1 \sin x + b_2 \sin 2x + \cdots$$

Such representations are of great importance in physics, in the study of wave motion and other oscillatory phenomena.

A function may be defined by the values of y satisfying an equation involving x and y. For example, $y = \sqrt{x}$ is defined by the polynomial equation $y^2 - x = 0$. Every function $y = f(x)$ defined by a polynomial equation between x and y, such as $x^2y^3 - x^3y + x = 1$, is called an algebraic function. Transcendental functions may be defined by other types of equations. For example, if the function $\sin x$ is known, the function $y = \cos x$ is defined by the equation $\sin^2 x + y^2 = 1$ if we take the solution y that has the value $+1$ when $x = 0$. The solution of $x = e^y$ for y gives the inverse function $y = \log_e x$, which is a multiple-valued function having infinitely many values when x is complex. Sometimes functions are most conveniently defined by means of differential equations. For example, $y = \sin x$ is the solution of the differential equation $d^2y/dx^2 + y = 0$ having $y = 0$, $dy/dx = 1$ when $x = 0$; $y = \cos x$ is the solution of the same equation having $y = 1$, $dy/dx = 0$ when $x = 0$.

functional group, any of numerous combinations of atoms that form parts of chemical molecules, that undergo characteristic reactions themselves, and that in many cases influence the reactivity of the remainder of the molecule. In organic chemistry the concept of functional groups is useful as a basis for classification of large numbers of compounds according to their reactions.

Some of the common functional groups are hydroxyl, present in alcohols and phenols; carboxyl, present in carboxylic acids; carbonyl, present in aldehydes, ketones, and quinones; and nitro, present in certain organic nitrogen compounds.

Functionalism, in architecture, the doctrine that the form of a building should be determined by practical considerations such as use, material, and structure, as distinct from the attitude that plan and structure must conform to a preconceived picture in the designer's mind.

Although Functionalism is most closely associated with modern architecture (and to some extent with modern furniture), it is by no means an exclusively modern conception. Apart from the fact that even the most fanciful architecture has practical functions to fulfill, there have been times in the past when functional considerations have been unusually dominant, and the artistic character of the buildings of such times has been directly derived from the way the challenge of function has been met. Historical European examples include the military architecture of the early Middle Ages, certain periods of Gothic ecclesiastical architecture, and much of the industrial and commercial architecture of the 19th century. The expression "the functional tradition" is applied to this emphasis on functionalism, which appears and reappears throughout the history of architecture independently of changes in style.

The Functionalist creed, however, is especially associated with the modern style of architecture, which developed during the second quarter of the 20th century as a result of changes in building technique, new types of buildings required, and changing cultural and aesthetic ideals. In fact, as architects began to show discontent with the historical revivalism that had been paramount in the 19th and early 20th centuries, a type of architecture based on the clear outward expression of the function of the building was bound to develop. The slogan "form follows function," coined in the 1880s by one of the pioneers of modern architectural design, Louis Sullivan, and the dictum of the architect Le Corbusier "a house is a machine for living," which dates from 1920, both state the idea uncompromisingly. The latter assertion, however, although typical of the polemical statements made in the 1920s, when the battle for a more functional approach to architecture was being most strenuously fought, was not meant literally, as other statements of Le Corbusier indicate. The supporters of Functionalism in architecture have on occasion asserted that good architecture is automatically produced by the fulfillment of practical needs; yet in this fulfillment there remain many alternatives among which the architect must choose, and such a choice may determine the difference between good and bad architecture.

Le Corbusier's and similar statements do, nevertheless, reflect the insistence of the modern architect that the process of design begins with an analysis of the building's function and of the best technical means of meeting it and that aesthetic character, instead of being superimposed, emerges as a part of the same process. For this reason, the emphasis on Functionalism in modern architecture implies a reunion of architecture and engineering, which had become separated in the 19th century.

functionalism, in linguistics, the approach to language study that is concerned with the functions performed by language, primarily in terms of cognition (relating information), expression (indicating mood), and conation (exerting influence). Especially associated with the Prague school of linguists prominent since the 1930s, the approach centres on how elements in various languages accomplish these functions, both grammatically and phonologically. Some linguists have applied the findings to work on stylistics and literary criticism.

functionalism, in social sciences, theory based on the premise that all aspects of a society—institutions, roles, norms, etc.—serve a purpose and that all are indispensable for the long-term survival of the society. The approach gained prominence in the works of 19th-century sociologists, particularly those who viewed societies as organisms. The French sociologist Émile Durkheim argued that it was necessary to understand the "needs" of the social organism to which social phenomena correspond. Other writers have used the concept of function to mean the interrelationships of parts within a system, the adaptive aspect of a phenomenon, or its observable consequences. In sociology, functionalism met the need for a method of analysis; in anthropology it provided an alternative to evolutionary theory and trait-diffusion analysis.

A social system is assumed to have a functional unity in which all parts of the system work together with some degree of internal consistency. Functionalism also postulates that all cultural or social phenomena have a positive function and that all are indispensable. Distinctions have been made between manifest functions, those consequences intended and recognized by participants in the system, and latent functions, which are neither intended nor recognized.

The British anthropologist A.R. Radcliffe-Brown explored the theoretical implications of functionalism as a relationship between a social institution and the "necessary conditions of existence" of a social system. He saw the function of a unit as the contribution it makes to the maintenance of a social structure—*i.e.,* the set of relationships among social units.

In an attempt to develop a more dynamic analysis of social systems, the American sociologist Talcott Parsons introduced a structural–functional approach that employs the concept of function as a link between relatively stable structural categories. Any process or set of conditions that does not contribute to the maintenance or development of the system is said to be dysfunctional. In particular, there is a focus on the conditions of stability, integration, and effectiveness of the system.

functionalism, in psychology, a broad school of thought originating in the U.S. during the late 19th century that attempted to counter the German school of structuralism led by Edward B. Titchener. Functionalists, including psychologists William James and James

Rowland Angell, and philosophers George H. Mead, Archibald L. Moore, and John Dewey, stressed the importance of empirical, rational thought over an experimental, trial-and-error philosophy. The group was concerned more with the capability of the mind than the process of thought. The movement was thus interested primarily with the practical applications of research.

The union between theory and application reached its zenith with John Dewey's development of a laboratory school at the University of Chicago in 1896 and his keystone article, "The Reflex Arc Concept in Psychology" (1896), which attacked the philosophy of atomism and the concept of elementarism, including the behavioral theory of stimulus and response. The work of John Dewey and his associates stimulated the progressive school movement, which attempted to apply functionalist principles to education. In the early and mid-20th century, an offshoot theory emerged: the transactional theory of perception, the central thesis of which is that learning is the key to perceiving.

Although functionalism has never become a formal, prescriptive school, it has served as a historic link in the philosophic evolution linking the structuralist's concern with the anatomy of the mind to the concentration on the functions of the mind and, later, to the development and growth of behaviourism.

fundamental interaction, in physics, any of the four basic forces: gravitational, electromagnetic, strong, and weak. All of the known forces of nature can be traced to these fundamental interactions. Gravitation and electromagnetism were recognized long before the discovery of the strong and weak forces because their effects on ordinary objects are readily observed. The gravitational force acts between all objects having mass; it causes apples to fall from trees and determines the orbits of the planets around the Sun. The electromagnetic force is responsible for the repulsion of like and attraction of unlike electric charges; it explains the chemical behaviour of atoms and the properties of light. The strong and weak forces were discovered by physicists in the 20th century when they finally probed into the core of the atom. The strong interaction binds the protons and neutrons of the atomic nucleus together in spite of the intense repulsion of the positively charged protons for each other. The weak interaction manifests itself in certain forms of radioactive decay and in reactions between the lightest subatomic particles (*i.e.,* electrons, muons, and their associated neutrinos).

The four forces are often described according to their relative strengths. The strong force is regarded as the most powerful force in nature. It is followed in descending order by the electromagnetic, weak, and gravitational. Despite its strength, the strong force does not manifest itself in the macroscopic universe because of its extremely limited range. It is confined to an operating distance of about 10^{-13} cm—approximately the diameter of a proton. When two particles that are sensitive to the strong force pass within this distance, the probability that they will interact is high. The range of the weak force is somewhat shorter. Particles that are affected by this force must pass within 10^{-15} cm of one another to interact, and the probability that they will do so is low even at that distance. By contrast, the gravitational and electromagnetic forces operate, at least in theory, at an infinite range. That is to say, gravity acts between all objects of the universe, no matter how far apart they are, and an electromagnetic wave, such as the light from a distant star, travels undiminished through space until it encounters some particle capable of absorbing it.

The difference between the operating distances of the fundamental forces is attributed to the nature of the particles that transmit them. The gravitational and electromagnetic forces are thought to be carried by particles with no mass—gravitons and photons, respectively. This masslessness of the carrier particles is directly linked to the infinite range of their associated forces. On the other hand, the strong force is transmitted by gluons and the weak force by intermediate vector bosons, or weakons (the Wand Z particles). Such particles have mass, which causes the strengths of the forces they transmit to diminish rapidly with distance.

For years physicists have sought to show that the four basic forces are simply different manifestations of the same fundamental force. The most successful attempt at such a unification is the Weinberg–Salam theory, proposed during the late 1960s. It treats the electromagnetic and weak forces in a unified manner, postulating the existence of an "electroweak" force. Research in high-energy physics conducted during the early 1980s provided strong experimental support for the electroweak theory. Many theoretical physicists are seeking to devise even more comprehensive theories—the so-called grand unified theories, or GUTs—that will unify the strong, weak, and electromagnetic forces in the way that electroweak theory does for two of these forces.

Fundamental Laws (1906), laws promulgated by the Russian emperor Nicholas II, ostensibly to carry out the governmental reforms promised in his earlier October Manifesto (*q.v.*).

fundamentalism, conservative movement in American Protestantism arising out of the millenarian movement of the 19th century and emphasizing as fundamental to Christianity the literal interpretation and absolute inerrancy of the Scriptures, the imminent and physical Second Coming of Jesus Christ, the Virgin Birth, Resurrection, and Atonement. Fundamentalism came into its own in the early 20th century in opposition to modernist tendencies in American religious and secular life. In the late 20th century the movement was represented by numerous church bodies, educational institutions, and special-interest organizations. *See also* evangelical church.

Origins. The roots of fundamentalism are found in the history of the American millenarian movement. In the 1830s and 1840s, a great deal of excitement was generated in the United States by expectations of the Second Advent of Christ and an ensuing thousand years of peace ("the millennium"). The initially scattered interest in the subject was concentrated and built into a movement largely through the Niagara Bible Conference. Initiated by James Inglis, a New York City Baptist minister, shortly before his death in 1872, the conference continued under James H. Brookes (1830–97), a St. Louis Presbyterian minister and editor of the influential millenarian periodical *The Truth.* Other early millenarian leaders included George C. Needham, a Baptist evangelist (1840–1902); William J. Erdman (1834–1923), a Presbyterian minister noted for his skill as a biblical expositor; and William R. Nicholson (1822–1901), who left the Episcopal church in 1873 and became a bishop in the small Reformed Episcopal denomination.

Toward the close of the century, the movement attracted leaders such as the prominent Boston Baptist minister Adoniram J. Gordon (1836–95) and Maurice Baldwin (1836–1904), bishop of Huron in the Church of Canada. The group conducted annual summer conferences, which generally met at Niagara-on-the-Lake, Ontario, until 1899. The millenarians associated with the Niagara Conference also sponsored a series of public conferences in major cities beginning in 1878, such as the Bible and Prophetic Conference in New York City.

Development of fundamentalist views. The millenarian movement began to grow within America when confidence in America's destiny first began to wane among some Protestant leaders, faced as they were with labour unrest, social discontent, and the rising tide of Roman Catholic immigration. During the late 1880s and 1890s the challenges posed by the rise of liberal Biblical criticism also won many converts to the millenarian movement.

As the century drew to a close, the Protestant evangelist Dwight L. Moody (1837–99) provided in his Northfield conferences an influential platform for millenarian expression. Millenarians supported foreign-missions work and influenced the surge of missionary zeal that was eventually institutionalized as the Student Volunteer Movement. Also, they found within the Princeton Theological Seminary at Princeton, New Jersey, a group of scholars interested in defending the authority and inspiration of the Bible.

Millenarians invited the Princeton professors to their conferences and adopted their arguments in defense of the Bible. Virtually none of the Princeton faculty adopted millenarianism and some opposed it strongly, but both parties appreciated each other's support on the issue of biblical authority.

The high point of millenarian influence upon the conservative tradition within evangelical Protestantism occurred when millenarians cooperated with other defenders of the inerrancy of the Bible in founding the American Bible League in 1902 and in writing a series of 12 pamphlets entitled *The Fundamentals.* The pamphlets attacked the current theories of biblical criticism and reasserted the authority of the Bible, using the arguments developed at Princeton Seminary. The series was a summary of the previous generation's attempt to oppose biblical criticism and modernism through argument.

Almost all the leaders who had founded the Niagara Conference had died by 1914. The new generation of leaders were not as firmly attached to their denominations as were their predecessors. And their defense of the millenarian cause was more militant and uncompromising. During the last years of the 19th century, disagreements over prophetic interpretation were expressed, but James H. Brookes held the dissident factions together. Within a few years of his death, however, the Niagara Conference was abandoned, and shortly thereafter a paper war broke out between the two leading millenarian periodicals, *Watchword and Truth* and *Our Hope,* that deeply divided the movement.

The fundamentalist-modernist controversy. At the end of World War I, the millenarians, alarmed by the growth of liberalism and disturbed over what they conceived to be social degeneracy, held a number of conferences in New York City and Philadelphia that were successful enough to encourage the formation of a larger and more comprehensive organization in 1919, the World's Christian Fundamentals Association. As a result of this conference, the millenarian movement changed its name without changing its basic character. Furthermore, the 1919 conference placed planks in a platform on which the millenarian-fundamentalist movement would stand for the next 30 years.

The leaders reiterated the creedal basis of the movement, called for the exorcism of modernism and all its associated demons (especially evolution), practically abandoned the universities and placed their faith in the more recently founded Bible institutes, denounced the unitive and cooperative spirit exemplified in the Federal Council of the Churches of Christ in America, and threatened schism if this type of spiritual decline persisted. In spite

of vigorous leadership, however, the association never prospered.

During the late 19th century, the liberal faction in the church had numbered only a few men, most of them professors in seminaries or universities. Their acceptance of higher criticism was for the most part viewed with apprehension by parishioners, the clergy, and officials of their denominations. Where legal machinery existed to examine the new teachings, as it did in the Presbyterian denomination, the verdict was given against the innovations of liberals.

Within a few decades, however, such protests were abandoned as the evidence for the new understanding of the Bible mounted and a new generation of seminarians joined the liberal cause. By 1914, among the Episcopal, Methodist, Baptist, and Presbyterian denominations in the North, liberalism had gained many adherents. The battle to prevent the reception and spread of these new views had been lost. During the 1920s it only remained to be decided whether the liberals could be forced out of the denominations.

The decade of the 1920s in the United States was marked by fears of the menace of communism and of labour unrest. The fundamentalists shared these fears and a mood of intellectual isolationism. But not every Protestant denomination was affected by intellectual controversy during the 1920s. In some, such as the Southern Baptist denomination, modernism had not yet become prominent. In others, such as the Methodist and Episcopal churches, modernism had gained many adherents; but the opposition did not become well enough organized and the governmental structures of the denominations did not lend themselves to the kind of campaign necessary to bring the issue to a focus.

Serious controversy did erupt, however, among the northern Baptists and the Presbyterians in the northern states. Within the Presbyterian church, conservatives reflecting the theological position of Princeton Seminary had, with the help of the millenarians, imposed a set of essential doctrines upon the denomination in 1910, declaring the inerrant inspiration of the Bible, the Virgin Birth of Christ, and the Atonement (redemptive activity), Resurrection, and miracle-working power of Christ necessary to the Christian faith. In 1922, when a New York minister, Harry Emerson Fosdick, soon to become a leading modernist spokesman, protested the activities of millenarians in foreign-mission fields in a sermon entitled "Shall the Fundamentalists Win?" the conservatives and millenarians in the denomination were able to force Fosdick, who was a Baptist, out of his position as pastor of the First Presbyterian Church of New York City.

A withdrawal of the liberals had been the solution desired by millenarians such as James H. Brookes and conservatives such as the Princeton professor J. Gresham Machen. To avoid a schism within the Presbyterian church in the United States, a Commission of Fifteen was appointed to work out a compromise. The report of the commission took the position that the Presbyterian denomination had traditionally tolerated a diversity of opinion and rejected the right of the General Assembly to determine which were the essential doctrines of the Christian faith. The report virtually destroyed the conservatives' position.

The focus of discord within the northern Baptist denomination was in their annual convention, which functioned much like the convention of a political party. Beginning in 1920, a group of Baptists calling themselves the National Federation of Fundamentalists began holding annual preconvention conferences on Baptist fundamentals. Thus organized, they attempted to carry their views into the convention. When the tactics of the National Federation failed to make immediate progress, some of the more militant Baptist fundamentalists founded the Baptist Bible Union. Among the Baptists, however, as among the Presbyterians, divisions among the fundamentalists caused their defeat.

Displeasure with the teaching of evolution, as well as anxiety over the spread of biblical criticism, gained momentum in the 1920s. Fundamentalists, believing that the Bible could not be reconciled with the view of the origin of life taught by Charles Darwin, opposed evolution; but not every opponent of evolution was a fundamentalist. Antievolution crusaders lobbied for legislation to prevent the teaching of evolution in the public schools. Tennessee passed such a statute, which was challenged in the courts in 1925 at the instigation of the American Civil Liberties Union. John T. Scopes, a science teacher in the small town of Dayton, offered to serve as the defendant against the charge of having taught evolution. Two of the foremost public figures of that decade, William Jennings Bryan, a Presbyterian fundamentalist, and Clarence Darrow, a defense counsel in notable criminal trials, made headlines as the assistant prosecuting attorney and the defense attorney, respectively.

Institutional development. During the 1930s and 1940s, fundamentalists gradually withdrew from conflict and from the national spotlight. During this period the institutional structure of modern fundamentalism developed. Some fundamentalists broke away from their denominations to form new churches, such as the Presbyterians, led by J. Gresham Machen, who in 1936 formed the Presbyterian Church in America, or the Baptists, who left the Northern Baptist Convention to establish the General Association of Regular Baptists. Some remained within congregations of the larger denominations. But most fundamentalists joined a congregation of one of the smaller sects that had remained faithful to the creed of biblical literalism and premillennialism, such as the Christian and Missionary Alliance, the Plymouth Brethren, and the Evangelical Free Church, or one of the many independent Bible churches and tabernacles that arose during that period.

Much of the structure of modern fundamentalism is provided by Bible institutes and Bible colleges. Many of these schools, such as the Moody Bible Institute in Chicago or the Bible Institute of Los Angeles, in addition to teaching their students, publish periodicals, broadcast from their own radio stations, hold conferences, and maintain a staff of extension speakers. They operate very much like denominational headquarters, providing a bond between otherwise isolated congregations. In the arts and sciences the strongest bastion has long been Wheaton College, a scholarly college in a suburb of Chicago.

There is also a series of organizations for fundamentalists paralleling the professional and business organizations of American society. Doctors, scientists, athletes, social workers, historians, businessmen, nurses, students, and others may join groups designed especially for their interest or vocational area. Chapters of the Inter-Varsity Christian Fellowship and Campus Crusade for Christ exist on hundreds of university and college campuses to provide religious support similar to that provided by organizations of the major Protestant denominations and Roman Catholics. The American Scientific Affiliation holds meetings and publishes a journal in which the compatibility of science with the Bible and with a Christian worldview is emphasized.

Paralleling the ecumenical bodies of Protestantism are the American Council of Christian Churches (ACCC) founded in 1941 and the National Association of Evangelicals (NAE) founded in 1942. The ACCC was (until 1969) virtually the voice of one man, Carl McIntire, who spoke against larger ecumenical bodies, such as the National Council of Churches, and against the alleged dangers of communism. The NAE operates as a coordinating body for its members but implements no programs of its own.

The most significant influences upon the fundamentalist and evangelical churches in America since World War II have been the prosperity of the postwar decades, the religious revival of the 1950s, and the alleged threat of communist subversion. The new public image of the fundamentalist during this period was perhaps best exemplified by the evangelist Billy Graham.

The issue of communism that divided the public during the 1950s closely resembled the traditional concerns of fundamentalism—namely, biblical criticism and evolution—which fundamentalists believed came from abroad, seemed to spread uncontrollably and subversively, and tended to undermine Christianity. The anticommunist activities of the mid-20th century virtually duplicated the history of the antievolution crusade of the 1920s. The evolution controversy itself resurfaced in the 1960s when creationists (those accepting literal interpretations of the biblical Creation account in Genesis), dismayed by the emphasis on evolutionary theory in biology textbooks, sought again to ban the teaching of evolution in the public schools. In the 1970s creationists campaigned for the mandatory teaching of Genesis whenever evolutionary theory was taught. This was followed by an attempt to mandate the teaching of so-called "creation science," or "scientific creationism," which presumed to present creationism and evolutionary theory as alternative scientific models. All of these movements were successfully challenged in the U.S. courts on constitutional grounds. The fundamentalist creationists gained some ground in conservative areas, and the issue generated a broader controversy concerning the rights of parents to determine what their children are taught. Also during this period the so-called Moral Majority, a fundamentalist citizens' organization under the leadership of Baptist minister Jerry Falwell of Virginia, crusaded against legalized abortion, homosexual rights, and the women's Equal Rights Amendment and crusaded for school prayer, increased defense spending, and a strong anticommunist foreign policy.

Fundamentalist beliefs have not changed significantly since the time of the Niagara conferences. The greatest theological excitement in the history of modern fundamentalism was generated by the theology of Karl Barth, whose emphasis on biblical authority was seen by many to reflect fundamentalist concerns.

Though fundamentalists are not notably ascetic, they do observe certain taboos. Most fundamentalists do not smoke or drink alcoholic beverages and usually do not dance or attend movies and plays. At most Bible institutes and fundamentalist colleges, these practices are strictly forbidden. Worship practices may vary from denomination to denomination but are usually nonliturgical and heavily influenced by revivalism. A sermon with congregational singing and prayer are common elements of fundamentalist services.

(E.R.S./Ed.)

fundamiji (Japanese: "dusted base"), also called KINJI, or KINDAMI, in Japanese lacquerwork, variation of the *jimaki* technique. In this kind of ground decoration, a thick layer of fine gold or silver grains is dusted onto a freshly lacquered surface and, when dry, covered with a clear lacquer. After this has dried, it is polished with powdered charcoal and given a fine finish by fingertip polishing with a mixture of linseed oil and finely powdered mudstone. When completed, the surface resembles burnished gold or silver plate.

Four-case *inrō* with a mountain torrent design done in gold *fundamiji* on a black lacquer base, signed Tōyō, 19th century, Edo period; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

Fine, round grains of gold or silver (*maruko*) are usually used for *fundamiji. Maruko* can be produced by lightly grinding gold or silver flakes between two filelike steel surfaces. A sieve is used to separate the fine grains from the coarse. During the Heian period (794–1185), uneven grains of gold produced by filing solid gold were used; this technique was called *ikakeji.*

Fundi (Italy): *see* Fondi.

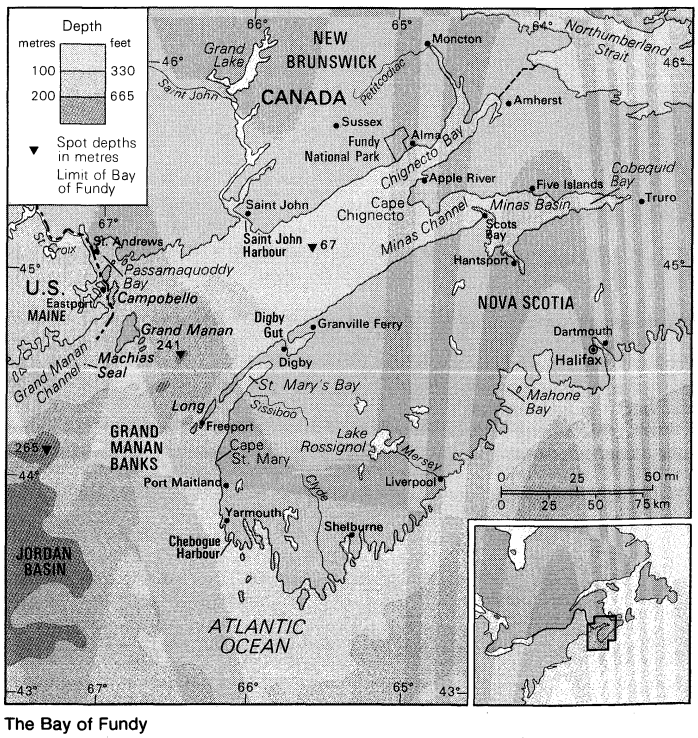
Fundy, Bay of, inlet of the Atlantic Ocean between the Canadian provinces of New Brunswick (north and west) and Nova Scotia (south and east). It extends 94 mi (151 km) inland, is 32 mi wide at its entrance, and is noted for its fast-running tides, which may produce rises as great as 70 ft (21 m), the highest in the world. Aside from the spectacular rock formations and forests of its shorelines and the fine agricultural lands created by dikes from its on-land marshes, the bay has come into prominence as a major potential source of hydroelectricity, but one that continues to present great engineering difficulties and other problems of feasibility.

The bay covers some 3,600 sq mi (9,300 sq km). Its shores are indented by numerous coves and several large deepwater harbours, the main ones at Saint John and St. Andrews in New Brunswick and Digby and Hantsport in Nova Scotia, all harbour towns that burgeoned during the great lumbering, shipping, and shipbuilding activity of the 19th and early 20th centuries. In 1948 an 80-sq-mi section of shore and stream-riven hills in New Brunswick was set aside as Fundy National Park.

Steep bedrock cliffs up to 200 ft high bound the bay and channel its waters until they separate into two narrow niches, Chignecto Bay on the north and Minas Basin on the south. In these, the tide range is magnified by the narrowness and shape of the bay, a rise of 46 ft being common in Chignecto Bay and 53 ft in Minas Basin. When the tide runs out the channels become veins of red mud, reflecting the erosion of the outcrops of red sandstone and shale along the coast. The rising tide produces a "reversing falls" at the mouth of the Saint John River, and the tidal surge up the Petitcodiac River toward Moncton has a bore, or tidal wave, that is 3 to 6 ft high at its crest, with the tide rising a phenomenal 8 to 11 ft per hour.

Passamaquoddy Bay, astride the Maine–New Brunswick border, over several decades has been the focus of investigations into the feasibility of harnessing the hydro potential. This bay's tidal flow is immense—some 70,000,000,000 cu ft (2,000,000,000 cu m) entering and leaving on the twice-daily turn of the tide—more than 10 times the flow of the Rance River Estuary in Brittany (France), site of the only existing tidal-power plant. The possibilities of Passamaquoddy, whose tides average an 18-ft rise and reach 25 ft during spring tide (the tide that occurs at New and Full Moon, when the Sun and Moon are in alignment with the Earth), were studied first in the 1920s, and a large-scale damming project was recommended. It was, however, too ambitious for its time, and economic support collapsed during the Depression of the 1930s. A Work Projects Administration (WPA) plan was blocked by the U.S. Congress in 1937.

After World War II, a joint U.S.–Canadian commission again attacked the problem, and, in the 1960s, an engineering report reconsidered the plans that had been made and the drawbacks that had been brought to light in the previous studies. In addition to the continuing engineering difficulties and the immense costs involved, other factors impeding development include the extensive navigation on Fundy, the tidal currents running as much as 20 ft per second, the increasing concern over possible environmental damage resulting from such development, and the opposition of private power interests to a public power program.



The Bay of Fundy

Fundy National Park, national park in New Brunswick, Canada, on the Atlantic coast overlooking the Bay of Fundy, noted for its unusually high and fast-running tides. The park includes 8 mi (13 km) of the rugged coast, covers 80 sq mi (207 sq km), and reaches an elevation of 1,200 ft (365 m). The tides there run as high as 70 ft, higher than any other known place on Earth.

Funen (Denmark): *see* Fyn.

Funes, city, Navarra province and autonomous community (region), northern Spain, on the Río Arga. It is a centre for sugar-beet cultivation, and there are gypsum quarries in the vicinity.

At the beginning of the 12th century, Funes and the neighbouring town of Viguera were granted a charter that included regulations governing relations between the Christian and Jewish communities; rules of evidence in litigation between Christians and Jews were established; ordeal by battle was forbidden and a high blood price was fixed for the murder of a Jew. Jewish landowners were required to pay tithes to the church, but in 1171 King Sancho VI freed the Jews from payment of all dues in return for an undertaking to maintain the citadel. The Jewish community had its own executive official. A list of fines levied against persons who broke the regulations survives from the 13th century, but little is known of the Jewish community of Funes after that time. Pop. (1981) 1,950.

Fünfkirchen (Hungary): *see* Pécs.

Fung DYNASTY (Nilotic Sudan): *see* Funj dynasty.

Fung Yu-lan, Fung also spelled FENG, Pinyin FENG YOULAN (b. Dec. 4, 1895, Honan, China), outstanding Chinese philosopher of the 20th century.

Fung was educated at Peking (A.B., 1918) and Columbia (Ph.D., 1923) universities and in 1928 became professor of philosophy at Tsinghua University in Peking. His *History of Chinese Philosophy* (2 vol., 1934; Eng. trans., 1937; rev. ed., 1952–53), which utilized Western historical methods, established his reputation.

In 1939 Fung set forth his philosophical system in *Hsin li-hsüeh* ("New Rational Philosophy"), in which he converted certain 12th-century Neo-Confucian assertions about the world into formal logical concepts. These he dealt with in a systematic manner that was new to Chinese philosophy, which traditionally had largely used assertion and metaphor. In 1950, soon after the Communist triumph in China, Fung repudiated his own philosophy as idealistic, abstract, and devoid of historical and practical character, but from 1957 to 1963 he was severely attacked by Marxist-Leninist critics for continuing to advocate an idealistic philosophy.

Fungi imperfecti (fungus form-class): *see* Deuteromycetes.

fungicide, also called ANTIMYCOTIC, any toxic substance used to kill or inhibit the growth of fungi that either cause economic damage to crop or ornamental plants or endanger the health of domestic animals or man. Most fungicides are applied as sprays or dusts. Seed fungicides are applied as a protective covering before germination. Systemic fungicides, or chemotherapeutants, are applied to plants, where they become distributed throughout the

tissue and act to eradicate existing disease or to protect against possible disease.

Bordeaux mixture, a liquid composed of hydrated lime, copper sulfate, and water, was one of the earliest fungicides. Bordeaux mixture and Burgundy mixture, a similar composition, are still widely used to treat orchard trees. Copper compounds and sulfur have been used on plants separately and as combinations. Synthetic organic compounds are now more commonly used because they give protection and control over many types of fungi and are specialized in application.

Cadmium chloride and cadmium succinate are used to control turfgrass diseases. Mercury(II) chloride, or corrosive sublimate, is used as a dip to treat bulbs and tubers. Other substances occasionally used to kill fungi include chloropicrin, methyl bromide, and formaldehyde. Many antifungal substances occur naturally in bark, berries, leaves, and other plant tissues. Creosote, obtained from wood tar or coal tar, is used to prevent dry rot in wood.

fungus, plural FUNGI, any of about 50,000 species of saprophytic and parasitic organisms of the kingdom Fungi, or Mycota, including yeasts, rusts, smuts, molds, mushrooms, and mildews—that lack chlorophyll and the organized plant structures of stems, roots, and leaves.

A brief treatment of fungi follows. For full treatment, *see* MACROPAEDIA: Fungi.

The study of fungi (Latin: "mushrooms") is called mycology (from the Greek *mykes,* "mushrooms") because mushrooms are the most conspicuous members of Fungi. Fungi contribute to the disintegration of organic matter that results in the release of carbon, oxygen, nitrogen, and phosphorus from dead plants and animals into the soil or the atmosphere. Fungi also form symbiotic and parasitic relationships with living organisms. Fifty thousand species of fungi have been described, but it has been estimated that the total number may be as high as 100,000–250,000. They can be found in the water, soil, air, plants, and animals of all regions of the world having sufficient moisture to enable them to grow. Essential to many household and industrial processes, fungi are also used in the production of enzymes, organic acids, vitamins, and antibiotics. Penicillin, a green mold whose abilities to inhibit the growth of bacteria were first discovered by Alexander Fleming in 1928, is just one of many fungi with beneficial effects on the human environment. Fungi also can destroy crops, cause such diseases as athlete's foot and ringworm, and ruin clothing and food with mildew and rot.

The thallus, or body, of a typical fungus consists of a mycelium, which is a mass of branched, tubular filaments called hyphae (singular hypha) through which cytoplasm flows. The cell walls of the hyphae are structurally and compositionally complex and vary in different fungal groups. Most contain either cellulose or a tough carbohydrate substance (chitosan, chitin, or both) similar to cellulose. The cell walls serve a regulatory function in the interchange of materials between the hyphae and their external environment. The mycelium generally reproduces by forming spores, either directly or in special fruiting bodies that are generally the visible part of the fungus.

The simplest method of asexual reproduction is a fragmentation of the thallus, either by breaking off a portion of the network of hyphae or by single-cell fission that occurs in some yeasts. Another method common in yeasts is budding; a process by which the nucleus of the parent cell divides and one of the daughter nuclei migrates into a bud on the surface of the cell and the other remains in the parent cell.

The majority of fungi reproduce asexually by the formation of bodies called mitospores either directly on the hyphae or on special sporiferous (spore-producing) hyphae, which may be grouped into intricate structures called fruiting bodies. More primitive fungi produce spores endogenously in sporangia, which are saclike fruiting bodies whose entire cytoplasmic content divides into spores. These can be either naked and flagellating (zoospores) or walled and nonmotile (aplanospores). Zoospores swim through moisture in aquatic or terrestrial environments, eventually loosing their flagella and forming walls, inside which each zoospore germinates and grows into a system of hyphae.

Spores can also be produced sexually. The type of sporophore that is produced is characteristic of the group to which a fungus belongs. Even when both mitospores (spores formed by asexual means) and meiospores (spores formed by sexual means) are produced by the same fungus as it changes from an asexual to a sexual reproductive phase, they are very different in form and can be easily distinguished.

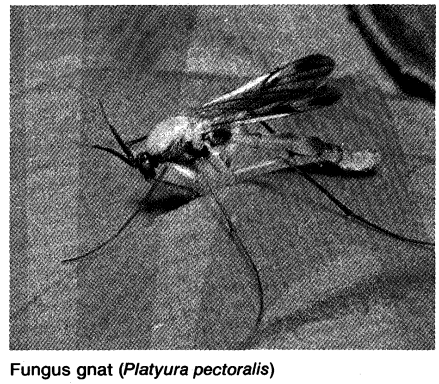
The distribution of fungi is related to the availability of food and to moisture and temperature. The soil provides an ideal habitat for a large number of species. Most aquatic fungi prefer clean, cool waters. The optimum growth temperature is usually between 68° and 86° F (20° and 30° C).

Since fungi possess no chlorophyll, they are unable to photosynthesize and must obtain their carbohydrates by secreting enzymes into the surface on which they are growing. The enzymes digest the food, which is then absorbed directly through the hyphal walls. Saprophytic fungi live off dead organisms and are partly responsible for the decomposition of organic matter. Parasitic fungi invade living organisms to obtain their food, often causing disease and death. Plants are the most common hosts, but humans and lower animals also serve as hosts. Symbiotic relationships include those between fungi and algae (lichen), plants (mycorrhizae), and certain insects.

Fungi were formerly classified in the plant kingdom and are still considered plants in some classification systems. The chitin in their structures and their ability to obtain food from an outside source, however, have caused many taxonomists to propose that they be classified in a separate kingdom, Fungi.

fungus bug (insect): *see* flat bug.

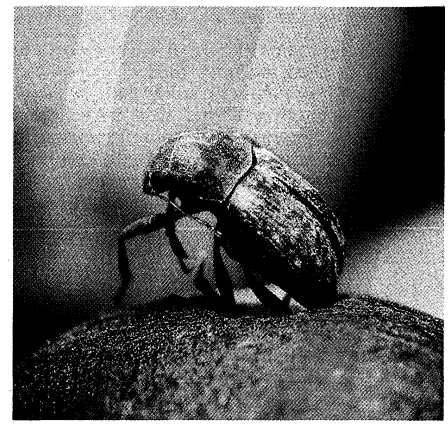
fungus gnat, also called MUSHROOM FLY, any member of the insect families Mycetophilidae and Sciaridae (order Diptera), small mosquitolike flies with maggots (larvae) that feed on fungi. In Sciaridae, the dark-winged fungus gnat family, the eyes of the adults almost touch and the wings are usually dusky. The creamy-white or gray larvae of the genus *Sciara* may travel in armies, migrating in snakelike lines 1 cm (0.4 inch) deep in search of food or when ready to enter a resting stage (pupa). Some species of *Sciara* and some mycetophilids attack mushroom beds, sometimes completely destroying them; *S. tritici* damages the roots of wheat.



Fungus gnat (*Platyura pectoralis*)
William E. Ferguson

The family Mycetophilidae contains a few injurious species. The wingless adult female *Pnyxia scabiei* bores into potato tubers and causes scabs. *Platyura* larvae are predatory, feeding on small insects and worms that are killed by oxalic acid secreted on the loose, slimy webs that the larvae secrete. Larvae of several species are luminous: *Arachnocampa luminosa* lights caves in New Zealand. It spins webs with hanging sticky strands to catch flying insects for food.

fungus weevil, any of the approximately 2,400 species of the beetle family Anthribidae (order Coleoptera) usually found on dead twigs or fungi. These insects are between 0.5 and 50 mm (0.02 and 2 inches) long, and the head is prolonged to form a short beak called a snout.



Coffee bean weevil (*Araecerus fasciculatus*) emerging from a hole in a dried coffee bean
Walter Dawn

Some species have antennae that may be longer than the body; others have short antennae. Fungus weevils occur mainly in the tropics. The coffee bean weevil (*Araecerus fasciculatus*) is an important pest.

Funj DYNASTY, also spelled FUNG, line of kings that ruled in the Nilotic Sudan of Eastern Africa in the 16th–19th century. At its greatest extent, Funj authority stretched westward across the southern Gezira region into Kordofan and southward to the gold-bearing district of Fāzūghlī.

The Funj capital, the city of Sennar, on the left bank of the Blue Nile above its confluence with the White Nile, was founded by ʿAmārah Dunqas in 1504–05. The Funj expanded northward from the region of Sennar at the same time the ʿAbdallabi dynasty was extending its dominion southward from the region of Sūbah.

The two dynasties met and clashed near ʿArbajī (on the Blue Nile in the Gezira), and the victorious Funj ruled thereafter as high kings of the region in partnership with the ʿAbdallabi sheikhs, whose authority, at the time of conflict, extended as far north as the Third Cataract of the Nile. A revolt early in the 17th century by the ʿAbdallabi chief ʿAdjib al-Mandjilak against the Funj sultan ʿAbdlan ibn Unsa strained the Funj-ʿAbdallabi duumvirate until peace was restored by Sheikh Idris ibn Muḥammad al-Arbab (d. 1650).

The Funj dynasty was early converted to Islām; ʿAmara (d. 1533/34) had Muslims in his train, and ʿAbd al-Qādir I (d. 1557/58) bore a Muslim name.

The Funj first expanded westward across the hills of Sakadi and Muya about 1554 and then across the White Nile (whose shores were dominated by the pagan Shilluk), where they

established a bridgehead at al-Ays. Bādī II Abū Daqn (reigned 1644/45–1680) continued the Funj conquest by defeating the Shilluk and by raiding and later imposing tributary status on Takali, a Muslim hill state south of Kordofan. The plains of Kordofan proper did not fall to the Funj until the reign of Bādī IV Abū Shulūkh (reigned 1724–62). Expansion eastward was barred by Ethiopia, with which the Funj waged two wars, the first in 1618–19 and the second, in which the Funj under Bādī IV were victorious, in 1744.

Despite its continuing expansion, the Funj dynasty was racked by internal conflict, marked by the frequent deposition of its kings. The development under Bādī II of a slave army, which subsequently settled around the capital, increased tensions between the Funj dynasty and its warrior aristocracy; the latter rose unsuccessfully against Bādī III in the early 18th century and successfully against his son Unsa III before 1720. During the reigns of Unsa's successor, Nul, who was connected to the Funj through his mother, and Nul's son Bādī IV, the dynasty's authority was restored for some 40 years. But Bādī IV was overthrown *c.* 1762 by his commander and viceroy in Kordofan, Abū Likaylik, and the Funj dynasty, though it continued nominally in power thereafter, had no real authority. In 1821 it was supplanted by the Turkish government of Egypt.

In present-day Sudan the census bureau uses the term Darfunj (Funj tribes) to describe a number of ethnically and linguistically different peoples living in the southeastern part of the country. This area had represented an ethnic–linguistic mixture when the Funj arrived, and the kingdom, by its nature, increased the mix. Among those designated as Funj tribes, the Gule claim that their chiefs are the descendants of the Funj kings.

Funk, Isaac Kauffman (b. Sept. 10, 1839, Clifton, Ohio, U.S.—d. April 4, 1912), American publisher who was also a Lutheran minister, religious journalist, Prohibition Party publicist, and spelling reformer.

Funk graduated from Wittenberg College, Springfield, Ohio, in 1860 and was ordained a Lutheran minister the following year. Resigning his pulpit in 1872 he traveled in Europe and the Middle East. After his return to the United States he helped edit the *Christian Radical.* Funk entered the publishing business in 1876, his first publication being an aid to ministers, the *Metropolitan Pulpit.*

In 1877, with a former classmate, Adam Willis Wagnalls, he founded I.K. Funk & Company, afterward (from 1891) Funk & Wagnalls Company, in New York City. The firm became best known for *A Standard Dictionary of the English Language* (1st ed., 1893; subsequent editions entitled *A New Standard Dictionary of the English Language*).

Funk, Walther (b. Aug. 18, 1890, Trakehnen, East Prussia, Ger.—d. May 31, 1960, Düsseldorf, W.Ger.), German Nazi and economist who was economics minister of the Third Reich from 1938 and president of the Reichsbank from 1939.

Funk attended universities at Berlin and Leipzig before joining the German Army at the outbreak of World War I. He was discharged in 1916 as being unfit for service. Having started in newspaper work in 1912, he became editor of the leading German financial and economic daily, the *Berliner Boersen Zeitung,* in 1922. Shortly thereafter he joined the Nazis and in 1931 was called to Hitler's personal staff as economic adviser; in this post he acted as a middleman between Hitler and the German industrialists.

Funk was appointed economics minister in 1938 but operated under the supervision of Hermann Göring, who was plenipotentiary general of the four-year plan; on Jan. 20, 1939, Funk replaced Hjalmar Schacht as president of the Reichsbank. Funk participated in the economic planning for the attack on the Soviet Union and was active in the Nazi program of discrimination against Jews. Taken prisoner by U.S. troops in May 1945, he was indicted by the International Military Tribunal at Nürnberg, Aug. 29, 1945.

In his defense he described himself as a little man "who was frequently allowed up to the door but not in." Göring himself told the court that Funk was an "insignificant" subordinate. The court, nevertheless, found him guilty of crimes against the peace, war crimes, and crimes against humanity, and on October 1 he was sentenced to life imprisonment. He was released from prison on May 16, 1957.

Funk & Wagnalls dictionaries, family of English-language dictionaries noted for their emphasis on ease of use and current usage.

The first Funk & Wagnalls dictionary was *A Standard Dictionary of the English Language* (1893). It espoused four policies pertinent to its initial and future publications: the ordering of definitions according to current, rather than historical, usage; the appearance of etymologies at the end of definitions, rather than at the beginning; the use of one alphabetical list for all entries, rather than separate sections for geographical, biographical, mythological, or biblical terms; the use of lowercase initial letters for all entry titles except proper nouns.

Isaac Funk, the editor of the *Standard,* believed strongly in accurate phonetics and simplified spellings whenever possible, a policy to which Funk & Wagnalls still adheres. In addition to the present unabridged *New Standard,* the company publishes a line of several dictionaries, most of which are based on the *Standard Dictionary of the English Language* (International Edition), a new work published in 1958. These spinoffs include, among others, the *Comprehensive Standard International Dictionary,* a reprint of the *Standard* with encyclopaedic matter added; and the *Standard College Dictionary,* an abridged version of the *Standard.* The *Standard Encyclopedic Dictionary* is a reprint of the latter with the addition of encyclopaedic matter.

funnel weaver, also called GRASS SPIDER, any of certain members of the spider family Agelenidae (order Araneida). Agelenids are notable for their funnel-shaped webs; they are

Funnel weaver (*Agelena naevia*)
Tom Myers

a common group with many species that are distributed worldwide. The webs are built in the grass, under boards and rocks, and among debris. *Agelena naevia,* a common North American species, varies greatly in size and colour. The body of the male may be up to 8 millimetres (about ⅓ inch) long; the female grows to about 19 millimetres (about ¾ inch). Two wide, dark stripes often extend the length of the anterior part of the body. The body colour ranges from pale yellow to dark reddish brown. The spider lives for one year.

funnel-web spider, any species of spider belonging to several genera in the family Dipluridae. The most important genera are *Evagrus, Brachythele,* and *Microhexura* in North America; *Trechona* in South America; and the poisonous members of the *Atrax* genus in Australia. The spiders are named for their webs, which are shaped like funnels opening wide at the mouth of the tube; insect prey are caught by the spider at the funnel's mouth.

The species *Atrax robustus* and *A. formidabilis* are large, brown bulky spiders that are much feared in southern and eastern Australia because of their venomous bites. Several human deaths from the bites of these aggressive spiders have been recorded in the Sydney area since the 1920s. An antidote to the main toxin in their venom has been developed which is effective if administered to victims soon after they have been bitten.

Fur, people after whom the westernmost province of The Sudan, Darfur, is named. The Fur inhabit the mountainous area of Jebel Marra, the highest region of The Sudan. The languages spoken by Fur groups make up one of the six branches of the Nilo-Saharan family.

They had powerful kingdoms in the 16th century, extending to the Nile. Arab incursions forced them northward into the mountains, where they successfully developed a form of terrace farming. Cotton and tobacco are the main cash crops. Also cultivated are cereals such as wheat and corn (maize), as well as peanuts (groundnuts), beans, hibiscus, tomatoes, potatoes, onions, garlic, and pumpkins. The temperate climate of the mountains permits the growing of apples and strawberries.

At the end of the 16th century an Islāmic sultanate was founded by Suliman Solong, and Arab dress and names have characterized the Fur since. Today they are entirely Muslim. Fur society is divided between wealthy landowners and serfs. Smiths, tanners, and other artisans constitute lower castes. Bridewealth is paid to the daughters' parents in cattle and cloth. Polygyny is practiced by the wealthy few, and divorce is very common.

fur, fine, soft, hairy covering or coat of mammals that has been important to mankind throughout history, chiefly for warmth but also for decorative and other purposes.

The pelts of fur-bearing animals are called true furs when they consist of two elements: a dense undercoat called ground hair, and longer hairs, extending beyond that layer, called guard hair. The principal function of ground hair is to maintain the animal's body temperature; that of guard hair is to protect the underlying fur and skin and to shed rain or snow. Pelts that lack either element are not true furs, although they are still used commercially as furs. Persian lamb, for example, has no guard hair, while kid and pony possess no ground hair.

Furs have been used principally to fashion outergarments; this is also true for the modern fur industry. A variety of animals are bred or trapped for their pelts, including those that bear the luxury furs (sable, chinchilla, ermine, and mink) and others whose fur is of lesser value (such as rabbit and squirrel). Other commercially important furs include the various species of fox and lamb; beaver, marten, raccoon, skunk, otter, and seal; as well as leopard, lynx, ocelot, and wolf.

Animals were originally hunted or trapped for food, and their pelts were rendered to provide protective clothing. As civilization developed, furs became less a necessity and more a luxury. The finer and more exotic furs were a symbol of affluence and status in the ancient societies of China, Greece, and Rome. Over the centuries furs remained a prized and commercially important commodity. The trapping and trading of furs became a major business enterprise among early North Amer-

ican settlers, and those who pursued it were responsible for much of the exploration of the northern United States and Canada.

A large and profitable international market for furs has developed; the major producers are the Soviet Union, the United States, Canada, and the Scandinavian countries. Fur-bearing animals that are bred and raised on fur farms (or ranches) include mink, fox, marten, and chinchilla. Mink pelts constitute some 70 percent of the furs produced annually; the vast majority of them come from mink ranches. Using scientific methods of breeding, planned diets, and other specialized procedures, the operators of farms have been able to produce lustrous furs of the best quality. Controlled breeding has also resulted in thousands of desirable mutations.

Animals commonly trapped for their furs include raccoon, beaver, skunk, and muskrat. The chief trapping method employed is the use of baited and concealed traps that are usually placed during the season that the coat of a particular animal is at its fullest and richest—for most animals, at the beginning of winter. Trapping methods are regulated and catch quotas are set by the governments of many countries in order to preserve the various species of animals. Some aquatic mammals, such as fur and harp seals, are also hunted for their furs.

Raw fur pelts are sometimes sold to skin merchants, who supply manufacturers and retail furriers. Most pelts, however, are sold at auctions to merchants, manufacturers, and their brokers. Major auction centres are New York City, Montreal, London, and Leningrad.

The first step in processing raw pelts is dressing. The dressing of furs involves several steps, the exact number of which is determined by the particular fur being dressed. Generally speaking, a fur is cleaned, softened, fleshed (extraneous flesh is removed), and stretched. The skin is tanned by a process called leathering. Many furs are then dyed, bleached, or tipped (dyeing the guard hair only) using various synthetic compounds called fur bases. These chemicals enable fur dressers to create a wide variety of rich and uniform colours.

The making of dressed furs into such garments as coats, stoles, wraps, hats, and collars is called furriery. The entire process of rendering a garment is done almost entirely by hand. The cutter matches pelts according to colour and texture and cuts the skins to conform to the designer's pattern. After cutting, the skins are made up into sections that are dampened and then stretched and nailed to fit a pattern on a wooden nailing board. They are left to dry on the board and then are sewn together. Sewing, performed on power-driven machines, requires great skill. Many of the custom furriers design, style, manufacture, and sell their furs directly to the consumer.

Fur coats are made by one of two processes: the letting-out technique or the skin-on-skin method. The letting-out process involves slicing a skin into narrow diagonal strips and then sewing them together to form a longer and narrower strip that will run the full length of a coat. The skin-on-skin process is much simpler and consists of sewing one full skin to another. After sewing, a fur is glazed, which is accomplished by dampening the fur, arranging the hair in the desired direction, and then slowly drying it to keep the hairs aligned in that direction.

fur seal, any of several eared seals of the family Otariidae valued for the quality of their fur. The northern fur seal (*Callorhinus ursinus*) is a migratory inhabitant of northern seas, breeding in summer on the Pribilof, Komandorskiye, and other islands. Prized for its chestnut-coloured underfur, it is a gregarious,

Australian fur seal (*Arctocephalus pusillus doriferus*)
Tierbilder Okapia—Frankfurt am Main

vocal animal that feeds on fish and other marine animals. The adult male is deep brown in colour with a grayish mane and grows to about 3.1 metres (10 feet) in length and 300 kilograms (660 pounds) in weight; the female is dark gray and grows to about 1.5 m and 60 kg. In 1911, after more than a century of extensive slaughter, the northern fur seal was placed under protection. With management, the depleted herds increased to the point that more than 60,000 animals could be taken annually during the 1960s. In the 1970s that number was reduced by nearly half, and in 1980 only about 24,000 were taken.

The eight species of southern fur seals (*Arctocephalus*) are distributed in the Southern Hemisphere, except for a herd of Guadalupe fur seals (*A. townsendi*) on Guadalupe Island off the northwest coast of Baja California. Southern fur seals are gray to brown or black in colour with chestnut-coloured underfur. Length averages about 1.2–1.8 m, but the South African, or Cape, fur seal (*A. pusillus*) and the Australian fur seal (*A. pusillus doriferus*) grow to lengths and weights of about 2.5 m and 300 kg in the male, 1.8 m and 120 kg in the female. Like the northern form, southern fur seals are gregarious and carnivorous. By the late 1970s about 14,000 South American (*A. australis*) fur seals were being harvested annually. Other species, including the once-numerous New Zealand fur seal (*A. forsteri*), the Galápagos fur seal (*A. galapagoensis*), and the Juan Fernandez fur seal (*A. philippii*), all of which were hunted nearly to the point of extinction, have been protected by law. The harp seal (*q.v.*) is a fur-bearing northern seal of a different family (Phocidae).

Fur Seal Islands (Alaska, U.S.): *see* Pribilof Islands.

furan, any of a class of organic compounds of the heterocyclic aromatic series characterized by a ring structure composed of one oxygen atom and four carbon atoms. The simplest member of the furan family is furan itself, a colourless, volatile, and somewhat toxic liquid that boils at 31.36° C (88.45° F). It is usually converted by hydrogenation to tetrahydrofuran, which is used as a solvent and for production of adipic acid and hexamethylenediamine, the raw materials for nylon-6,6. Several other members of the furan family are produced on a large scale for use as solvents and chemical raw materials. The first furan compound discovered was pyromucic acid (2-furoic acid), prepared in 1780. The aldehyde furfural, used as a solvent in petroleum refining, is manufactured from corn cobs and oat hulls by treatment with acid.

Many sugars exist in molecular forms called furanoses, possessing the tetrahydrofuran ring system. Important examples are provided by ribose and deoxyribose—which are present in the furanose form in nucleic acids, the heredity-controlling components of all living cells—and fructose.

Furetière, Antoine (b. Dec. 28, 1619, Paris—d. March 14, 1688, Paris), French novelist, satirist, and lexicographer, remarkable for the variety of his writing.

The son of a lawyer's clerk, Furetière entered the legal profession but soon resigned his office and took holy orders to qualify himself for benefices, which provided an income that enabled him to pursue his literary vocation. After publishing three books of comic and satirical verse, he wrote *Nouvelle Allégorique ou Histoire des derniers troubles arrivés au royaume d'Eloquence* (1658), a facetious survey of the contemporary Parisian world of letters, in which he wrote so favourably of the members of the Académie Française that he was, in 1662, himself elected.

He soon forfeited the good will of his colleagues, however. His *Le Roman bourgeois* (1666) was a pioneer work in the history of the French novel because it dealt realistically with the Parisian middle classes instead of "heroic"

Furetière, engraving by G. Edelinck, 1689, after a portrait by Seue
H. Roger-Viollet

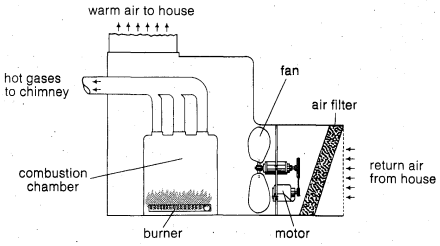
personages or picaresque vagrants. But it gave offense to the academy, not so much by the formlessness of its construction as by its fidelity to a subject matter deemed unworthy of an academician.

Furetière incurred worse displeasure when, late in 1684, he revealed his intention of publishing his own universal dictionary of the French language, on which he had been working for some 40 years. This enterprise infuriated some of his fellow academicians, whose own long-projected dictionary was still incomplete. They expelled him from the academy, and, though King Louis XIV did his best to protect him, the rest of Furetière's life was spent in controversy with his former colleagues. His great *Dictionnaire,* soon to be recognized as more comprehensive and much more useful than the academy's, was first printed in Holland in three volumes in 1690.

Furies (Greco-Roman goddesses): *see* Fury.

furlong, old English unit of length, based on the length of an average plowed furrow (hence "furrow-long," or furlong) in the English open- or common-field system. Each furrow ran the length of the 40 × 4-rod acre, or 660 modern feet. The standardization of such linear units as the yard, foot, and inch—begun in Edward I's statute of 1305—recognized the traditional sizes of rods, furlongs, and acres as fixed and therefore simply redefined them in terms of the newly standardized units. Thus, the furlong, often measured as 625 northern (German) feet, became 660 standard English feet, and the mile, always 8 furlongs, became 5,280 feet. Today, the furlong is used almost exclusively in horse racing.

furnace, structure in which useful heat is produced by combustion or other means. Historically, the furnace grew out of the fireplace and stove, following the availability of coal for heating. A coal furnace is made up of several elements: a chamber containing a grate on which combustion takes place and through which ashes drop for disposal; a chimney to carry away smoke and provide a draft of air; another source of air supply to help burn volatile gases and hydrocarbons; and a metal surface over which the hot gases pass and which transfers heat to circulating water or air. Coal furnaces are still widely used in industry, where they are usually equipped with mechanical stokers.



Forced warm-air furnace

Chemical energy is transformed into heat by burning fuels such as coal, wood, oil, and hydrocarbon gases. Electrical energy is transformed into heat in an electric furnace or an electric burner (*see* electric furnace). Solar radiation energy is used in the solar furnace, a device for concentrating large amounts of solar energy into a small area. Nuclear energy is transformed into heat energy in atomic reactors, so that these function as furnaces in nuclear power stations. Furnaces may apply their heat to other devices, as boilers, ovens, and kilns, or they may apply it directly to material in the course of being processed, as in steel production.

furnace oil: *see* fuel oil.

Furnariidae, bird family, order Passeriformes, containing about 220 species in nearly 60 genera, limited in distribution to Central and South America. This is one of the most diverse bird groups, with many body plans and popular names. Because of the nesting habits of several well-known species, the name ovenbird is often applied to the family generally, but many are called castle-builders, firewood gatherers, earth creepers, foliage gleaners, miners, spine tails, and reed haunters. In appearance, habitat, and food habits, furnariids variously resemble larks, wrens, creepers, nuthatches, titmice, thrushes, and warblers, but the family is united by common features of the skeleton and muscles. Most are brown to rufous and have rufous stripes on the underwing.

Furneaux, Tobias (b. Aug. 21, 1735, Swilly, near Portsmouth, Hampshire, Eng.—d. Sept. 19, 1781, Swilly), British naval officer and explorer who was first to circumnavigate the globe in both directions.

On Capt. Samuel Wallis' westerly-directed circumnavigation in the Royal Navy ship "Dolphin" (1766–68), Furneaux was among the first Europeans to reach Tahiti. As commander of the "Adventure," he took part in Capt. James Cook's second voyage to the Pacific (1771–75). Sailing eastward from the Cape of Good Hope, the "Adventure" became separated from Cook's vessel, the "Resolution," on Feb. 8, 1773. Furneaux then continued into Australian waters and explored and charted the east and south coasts of Tasmania. The ships were reunited at Queen Charlotte Sound, New Zealand, and went on to Tahiti and the Friendly, now Tonga, Islands. On their way back to Queen Charlotte Sound, the vessels again became separated (Oct. 29/30, 1773). In New Zealand 10 of Furneaux's crew were captured, killed, and eaten by Maoris. When the "Adventure" reached England in July 1774, before the arrival of Cook, it had aboard the first South Sea islander to visit the British Isles. Furneaux commanded the "Syren" in the British attack on Charleston, S.C. (June 28, 1776).

Furneaux Group, cluster of islands and rocks in Bass Strait off northeastern Tasmania, Australia. The largest are Flinders (about 800 sq mi [2,080 sq km]), Cape Barren, Clarke, and Chappell. The islands are generally mountainous with rugged coastlines. Major occupations are sheep and cattle breeding and the processing and exporting of muttonbird oil and carcasses. Whitemark, on Flinders Island, is the largest town. The islands were sighted by Tobias Furneaux of HMS "Adventure" in 1773 and were surveyed in 1798 by Matthew Flinders. Pop. (1981) 1,039.

Furnes (Belgium): *see* Veurne.

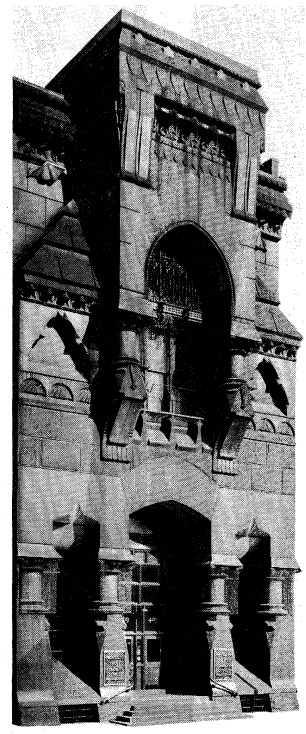
Furness, region, county of Cumbria, England. Except for a narrow coastal plain, the area is predominantly upland, with such eminences as the Old Man of Coniston and Wetherlam. Principal rivers are the Duddon, Leven (draining Windermere), and the Crake (draining Coniston Water), flowing south into Morecambe Bay on the Irish Sea coast. Between the Duddon Estuary and Morecambe Bay is the Isle of Walney, 8 mi (13 km) long and 1 mi wide. Most of Furness is in the Lake District, and Roudsea Wood is a nature reserve.

Furness became important in the Middle Ages because of its abbey, the ruins of which are situated north of Barrow-in-Furness. It was founded in 1127 by Benedictine monks from Savigny in France who later joined the Cistercian order. They were granted the lordship of Furness by Stephen (ruled 1135–54), and the abbey became one of the richest in England. At Conishead was an Augustinian foundation, and at Cartmel is the fine parish church of a former abbey (1188). Ulverston became a market town for the region.

Industry in the area was based on the iron ore of the limestones in the southwest, worked from early times and exploited by the monks of Furness. Production reached a peak in the 1880s and has since declined. Opening of the Furness Railway (1846) initiated industrial development, and Barrow grew as an ore-exporting port and a shipbuilding and iron and steel centre. Decline of these industries in the 20th century resulted in heavy unemployment, and attempts to attract new manufacturing have been handicapped by the region's inaccessibility. Farming remains an important activity, with emphasis on fat lambs and store cattle, while tourism has become increasingly significant. A coastal railway connects Barrow and the region with Carlisle and Lancashire.

Furness, Frank Heyling (b. 1839, Philadelphia—d. June 27, 1912, Media, Pa., U.S.), U.S. architect, significant for the forceful originality of his buildings and for his influence on Louis H. Sullivan, who was a draftsman in 1873 for the Philadelphia firm of Furness and Hewitt (later Furness, Evans, & Company).

The work of Furness, who was familiar with the architectural ideas of Ruskin and Viollet-le-Duc, is largely in the Romantic Revival tradition of the Neo-Gothic. His highly personal style is expressed in his polychromatic decoration and his massive geometric ornamentation, the shapes of which were frequently abstractions of forms found in nature. They contributed much to the development of Sullivan's theories of organic architecture and ornamentation. Furness' major works include the Pennsylvania Academy of the Fine Arts (1872–76), the Provident Life and Trust Company Bank (1878–79; demolished), and an addition (1892–94) to the Broad Street Station of the Pennsylvania Railroad. Besides his Philadelphia works, Furness designed buildings throughout Pennsylvania and also in Delaware and Maryland.


Provident Life and Trust Company Bank, Philadelphia, by Frank Furness, 1879
J.L. Dillon & Co., Inc.

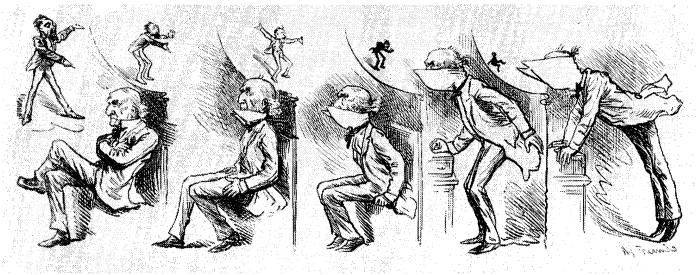
Furness, Horace Howard (b. Nov. 2, 1833, Philadelphia—d. Aug. 13, 1912, Wallingford, Pa., U.S.), U.S. compiler, with his son and others, of variorum editions of 20 of Shakespeare's plays.

Graduated from Harvard in 1854, Furness was admitted to the bar in 1859 but soon devoted himself to the study of Shakespeare. He accumulated a collection of illustrative material of great richness and extent and brought out in 1871 the first volume (*Romeo and Juliet*) of the variorum edition, designed to represent and summarize the textual, critical, and annotative conclusions of the best authorities. Succeeding volumes appeared at regular intervals until the posthumous *Cymbeline* in 1913. Furness was conservative in his methods but sound in his judgments, and he combined erudition with sanity and humour. His wife, Helen Kate Furness (1837–83), compiled *A Concordance to Shakespeare's Poems* (1874); and his son and namesake (1865–1930) was a partner in and successor to his father's work and edited his *Letters* (1922).

Furniss, Harry (b. March 26, 1854, Wexford, County Wexford, Ire.—d. Jan. 14, 1925, Hastings, East Sussex, Eng.), British caricaturist and illustrator, best known for his political and social lampoons.

Mainly self-taught, he settled in London in 1873 and, before turning wholly to free-lance work in 1894, became very popular as a staff artist for *The Illustrated London News* (1876–84) and *Punch*. In his parliamentary cartoons he emphasized idiosyncrasies of face and dress: an amusing example is the strip cartoon "Getting Gladstone's Collar Up." He also designed a famous commercial "tramp" poster for a brand of soap ("I used your soap two years ago and have not used any other since"). Strongly critical of the Royal Academy, he held in 1887 an exhibition of parodies of the work of leading Burlington House exhibitors,

and in 1890 published *Royal Academy Antics.* He illustrated many books, including Lewis Carroll's *Sylvie and Bruno* (1889) and complete editions of Dickens (1910) and Thackeray (1911). In 1912–13 he worked as a film writer, actor, and producer for Thomas Edison in New York City and London; *Our Lady Cinema* (1914) outlined his hopes for that art. He was also a novelist, essayist, and writer of art instructional manuals.



"Getting Gladstone's Collar Up," cartoon by Harry Furniss, *c.* 1876–84
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

furniture, household equipment, usually made of wood, metal, plastics, marble, glass, fabrics, and related materials and having a variety of different purposes. Furniture ranges widely from the simple pine chest or stickback country chair to the most elaborate marquetry work cabinet or gilded console table. The functional and decorative aspects of furniture have been emphasized more or less throughout history according to economics and fashion. Chairs are always for sitting in, but some are more comfortable or more beautiful than others. The ideal of furniture design is to integrate utility, craftsmanship, and beauty into a harmonious whole. Accessory furnishings are smaller subsidiary items such as clocks, mirrors, tapestries, fireplaces, panelling, and other items complementary to an interior scheme.

A brief treatment of furniture follows. For full treatment, *see* MACROPAEDIA: Decorative Arts and Furnishings; Industries, Manufacturing.

Furniture is usually movable, though it can be built-in, as is common in kitchens and bathrooms. It need not be domestic—there is office furniture, hospital furniture, and church furniture. Sometimes lampposts, benches, and fountains are called "street furniture." Curtains, hangings, cushions, and other fabric items are known as soft furnishings. Furniture implies a degree of permanence; however, there is travelling furniture—the military chests of 19th-century England are one example of furniture designed almost as luggage.

Stylistically furniture is closely allied to architecture and to interior design. It has usually followed the architectural fashions of its day—not surprisingly, since furniture was designed, often by architects, to enhance and harmonize with interiors. One of the foremost architects who became celebrated as an interior designer and furniture designer was the Scottish architect Robert Adam of the 18th century. It is a curious feature of 20th-century architecture, particularly that of the modern movement of the 1920s and '30s, that architects turned their attention in particular to the design of chairs, often using "modern" materials such as tubular steel and, later, plastic. Charles Rennie Mackintosh, Le Corbusier, Marcel Breuer, Ludwig Mies van der Rohe, Charles Eames, and Alvar Aalto are among those modern European architects whose chair designs became classics.

Furniture ornamentation usually follows that of architecture, so that in the Middle Ages pointed arches and linenfold panelling were prevalent decorative modes. Later such motifs as columns, arches, friezes, mouldings, and pediments appeared. Twentieth century furniture, like its architectural counterpart, eschewed ornament and instead emphasized utility, line, and materials.

Many crafts may be employed to ornament furniture. These include the making of types of metal hardware, such as drawer and door handles or keyhole surrounds; marquetry, using different coloured woods to create a decorative design; carving; gilding; painting; turning; lacquerwork; and inlays of ivory, tortoiseshell, or porcelain. Clear or mirrored glass may also enhance a piece of furniture.

After a period of relative dormancy in the early Middle Ages, the craft of making furniture was revived in the 14th and 15th centuries with an increase in affluence. About this time many innovative types of cupboards, boxes with compartments, and various sorts of desks began to appear. With the rise of veneering and the growing sophistication of carpentry techniques, the profession of cabinetmaking was born, followed by that of chairmaker, which has remained a separate branch of furniture making ever since.

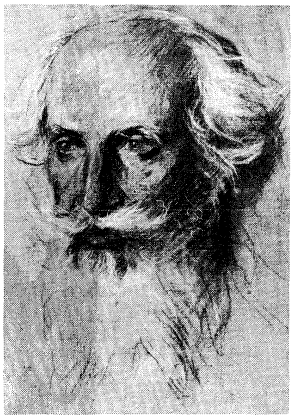
Continued affluence of the 17th and 18th centuries gave the furniture trade another boost. The importance of cabinetmaking, coupled with increased demands for furniture, led in turn to specialization and division of labour. Now instead of one man making an entire cabinet, there were turners, veneer makers, carvers, upholsterers, and finishers—all performing separate operations in sequence. In the 19th century another important division occurred between those who made the furniture and those who sold it.

The modern furniture industry bears a close resemblance to numerous other industries in which mechanization and mass production are central to the manufacturing process. Timber is cut to usable sizes in a main conversion shop and brought to the required moisture content in a kilning section. After drying, the wood proceeds to the planing and jointing shops, where it is reduced to the required sections and any tenoning, dowelling, or dovetailing is performed. It is then veneered and passed to the assembly shop. Furniture assembly lines usually do not move continuously; rather the work is normally pushed by hand over a series of rollers as each stage is finished. Next in sequence are the sanding, finishing, fitting, and finally inspection and shipping.

With the modernization of the furniture-making process, the use of natural wood has declined sharply over the years. Natural wood tends to swell and shrink with changes in atmospheric pressure and humidity. It has also become very expensive because of reduced timber supplies and the high percentage of waste involved during the various cutting operations. As a result, furniture has increasingly been made from plywood, chipboard, plastic and metal, with natural wood going into veneers.

Furnivall, Frederick James (b. Feb. 4, 1825, Egham, Surrey, Eng.—d. July 2, 1910, London), English literary scholar who, partly by his own efforts in textual criticism and partly by founding learned societies, especially the Early English Text Society, was instrumental in initiating a major revival in the study of medieval English literature. Though he first studied law and was called to the bar in 1849, he came to divide his energies between scholarship and social activism, primarily in Christian Socialism and the founding of the Working Men's College, London (1854).

His interest in medieval English works was chiefly literary, but he also valued them for their illumination of social history and considered it a duty to his countrymen to make them available in accurate editions. Of the many editions that he himself prepared, including other of Chaucer's works, the most important was the "Six-Text" edition (1866–82) of the *Canterbury Tales.* He did much to foster the study of Shakespeare, of John Wycliffe, and of the ballad; he also originated the concept and assisted in the preparation of *A New English Dictionary on Historical Principles,* now the *Oxford English Dictionary.*



Furnivall, pencil sketch by Charles Haslewood Shannon, *c.* 1911; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

furo, Japanese-style bath, typically using water heated to 110° F (43.3° C) or hotter. It is claimed that, because the bather may linger in the wooden or metal tub, the *furo* may have properties for the therapeutic relaxation of tensions. To achieve cleanliness, the bather washes before entering the tub. In bathrooms in private Japanese homes and in public bathhouses, the bathing facilities are always constructed separately from the washing and toilet facilities.

The *furo* in a private home has social aspects. Members of a large family usually bathe in strict order, with the older members bathing first. Mothers bathe with children too young to be left alone. Water for the *furo* is usually heated specifically for that purpose, so all the members of a family bathe in close sequence.

The *furo* in a public bathhouse, called a *sento,* is common throughout Japan. It has its counterparts in youth hostels, hotels, dormitories, and inns. An attendant sells tickets at the entrance. Having paid, the bather enters the public dressing room for the appropriate sex. Clothing goes into lockers or into plastic or rattan baskets that are then placed on shelves. The bather passes through another door into the shower or washroom; once cleansed, the bather enters a soaking pool in a separate, attractive room of almost any shape. The bather stands in hot water that is about chest-deep, the pool usually accommodating 10 or more persons.

The *furo,* with its separation of the washing and bathing phases, has sparked the popularity of hot-water soaking in other countries, especially of the hot tub during the late 1970s in the United States. Today several firms specialize

in the construction of wooden Japanese-style bathtubs.

Furphy, Joseph, pseudonym TOM COLLINS (b. Sept. 26, 1843, Yering, near Yarra Glen, Vic., Australia—d. Sept. 13, 1912, Claremont, W. Aus., Australia), Australian author whose novels combine an acute sense of local Australian life and colour with the eclectic philosophy and literary ideas of a self-taught workingman.

Furphy
By courtesy of the Australian Information Service

The son of Irish immigrants, Furphy worked as a thresher, teamster, and gold miner before settling down in 1884 at his brothers' foundry at Shepparton. There he wrote a picaresque novel, *Such Is Life* (1903), written as excerpts from the diary of Tom Collins. Furphy's other major works, *Rigby's Romance* (serialized 1905; published in book form, 1921) and *The Buln Buln and the Brolga* (published posthumously in 1948), were written from chapters cut from the original of *Such Is Life.* His *Poems* were published in 1916.

Furrer, Jonas (b. March 3, 1805, Winterthur, Switz.—d. July 25, 1861, Bad Ragaz), Swiss statesman, president of the Swiss Confederation four times.

A doctor of jurisprudence and lawyer of national renown, Furrer became, after 1839, leader of the Zürich liberals but only reluctantly aspired to political office. In the cantonal assembly, he rose to the vice presidency (1842) and later the presidency (1846), serving also in 1846 as president of the confederation Diet. During the Sonderbund War (1847), in which seven Catholic cantons formed a separatist confederation, he was a partisan of moderation. Following the adoption of a new federal constitution (September 1848), he was elected first president of the confederation (Bundespräsident) and was subsequently re-elected three times (1852, 1855, 1858).

After the European revolutions of 1848, Furrer chose a moderate course in granting asylum to foreign revolutionaries in the face of conflicting demands of foreign powers and native radicals. Between his terms as Bundespräsident, he headed the Department of Justice, where his decisions helped define the proper spheres of federal and cantonal power.

Fursey, SAINT, also called FURSA, Latin FURSEUS (b. *c.* 567, near Lough Corrib?, Ire.—d. *c.* 650, Ponthieu, Fr.; feast day January 16), monk, visionary, one of the greatest early medieval Irish monastic missioners to the Continent. His celebrated visions had considerable influence on dream literature of the later Middle Ages.

First educated under Brendan the Navigator, Fursey later became a monk at the monastery of Clonfert, in County Galway, and was ordained priest. He later founded a monastery at Rathmat (probably in modern County Clare), which became one of Ireland's major monastic centres. The extent of his apostolate is evident in places named for him in Galway, Louth, and Cork.

After 630 Fursey left Ireland with his brothers Foillan and Ultán for Britain, where they were welcomed by the Christian king Sigeberht of East Anglia. They assisted Sigeberht and Felix in Christianizing the kingdom and in introducing monasticism. About 640 Fursey founded the monastery of Cnoberesburgh, near modern Yarmouth, Norfolk, which became the centre of his ministry. He sailed to Gaul some time between 640 and 644 and established himself in Neustria (in present-day Normandy), where he was well received by Clovis II. About 644 he founded a monastery at Lagny, near Paris. On a later journey he died, and afterward his body was transferred to Péronne, where his shrine became a great pilgrimage site; the monastery there remained an Irish centre through the 8th century.

Fursey's visions, which he was said to have experienced throughout his life, became widely known through accounts by the Venerable Bede in his *Ecclesiastical History of the English People* (8th century), which also contains the earliest life of Fursey, written by an anonymous contemporary monk; and by Aelfric Grammaticus (10th century). The visions included demoniac assaults, conversations with angels, divinations, and glimpses of heaven and hell; the accounts of visions influenced medieval vision literature, of which they are considered a prototype.

Fürstenbund (German: League of Princes), league founded on July 23, 1785, under the leadership of King Frederick II the Great of Prussia to preserve the status quo among the several German states and curb the ambitions in Germany of Emperor Joseph II. It represented the final phase of the conflict between Frederick and the Austrian Habsburgs. Earlier, Frederick had thwarted Joseph's plan to annex Bavaria (in the War of the Bavarian Succession, 1778–79); but in the early 1780s, Joseph renewed his attempts. Frederick was able to persuade other princes—of Saxony, Hanover, and later Saxe-Weimar, Saxe-Gotha, Palatinate-Zweibrücken, Brunswick, Baden, Hesse-Kassel, Anhalt, Ansbach, Mecklenburg, the electorate of Mainz, and other lesser states—to join a league in opposition to Joseph. Joseph was daunted and dropped his Bavarian designs rather than risk another military defeat at the hands of Prussia. Though only temporary, the league represented the first organization of German states headed by Prussia, the state that later unified Germany.

Articles are alphabetized word by word, not letter by letter

Fürstenwalde, city, Brandenburg *Land* (state), eastern Germany, on the Spree River near its junction with the Oder-Spree Canal, east of Berlin. Founded between 1252 and 1258 by the margraves of Brandenburg and chartered in 1285, it was the seat of the bishops of Lebus from 1385 to 1571. The cathedral, begun in 1446, was destroyed in 1945. Fürstenwalde's largest enterprise is the nationally owned tire plant; chemicals, metal products, textiles, vehicles, and shoes are also manufactured. Schools for chemical engineering and rubber technology are located there. Pop. (1989 est.) 35,973.

Fürth, city, Bavaria *Land* (state), south-central Germany, situated at the junction of the Pegnitz and Rednitz rivers (which there form the Regnitz), just northwest of Nürnberg. It was originally a Franconian settlement dating from the mid-8th century. The royal palace of Furti (the "Furt") was first mentioned in 1007, when the village was assigned to the newly formed bishopric of Bamberg. In the following centuries both the margraves of Ansbach and the imperial city of Nürnberg claimed seignorial rights over Fürth. Largely destroyed in the Thirty Years' War (1618–48), the town passed to Bavaria in 1806 and was chartered in 1808. The town hall (1840–50) and the 12th- and 14th-century St. Michael's Church are notable.

The Fürth–Nürnberg line (the Ludwigsbahn, 1835) was the first railway in Germany, and Fürth now has a port on the Rhine-Main-Danube Canal. Formerly a centre of the gold-beaters' craft, it still produces gold leaf and beaten metals and aluminum and bronze powders. Other products include glassware, toys, optical instruments, furs, and clothes. Pop. (1989 est.) 98,832.

Furtwangen, city, Baden-Württemberg *Land* (state), southwestern Germany, in the upper valley of the Breg River, in the Black Forest (Schwarzwald), northeast of Freiburg im Breisgau. First mentioned in 1179, it was a possession of the abbey of St. George until it passed to Baden in 1806. It was chartered in 1873. Furtwangen has been a centre of the Black Forest clock industry since 1740 and has a clock museum. The city, at an altitude of 2,887 ft (880 m), is also a climatic health and winter resort. Pop. (1989 est.) 9,794.

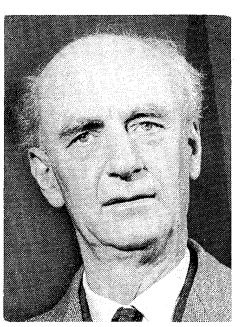
Furtwängler, Adolf (b. June 30, 1853, Freiburg im Breisgau, Baden [Germany]—d. Oct. 10, 1907, Athens, Greece), German archaeologist whose catalogs of ancient Greek sculpture, vase painting, and gems brought thousands of art works into historical order.

In 1878–79 Furtwängler took part in the German excavation of Olympia, site of the ancient Greek games. While serving as museum director for the Berlin Antiquarium (1880–94), he prepared a comprehensive description of Mycenaean vases and pottery fragments from the Aegean area, as well as *Meisterwerke der griechischen Plastik* (1893; *Masterpieces of Greek Sculpture,* 1895).

After becoming professor of archaeology at the University of Munich (1894), he researched the marble sculptures from the Greek island of Aegina and in 1901 went there to begin a systematic excavation of the 5th-century-BC temple of the goddess Aphaea. During his stay he also explored the site of the city of Orchomenus in the ancient district of Boeotia and found evidence of pre-Mycenaean history.

Furtwängler, (Gustav Heinrich Ernst Martin) Wilhelm (b. Jan. 25, 1886, Berlin—d. Nov. 30, 1954, near Baden-Baden, W. Ger.), German conductor, one of the great exponents of Romantic music. Known for his passionate, romantic style, he excelled in the works of Beethoven and Wagner.

The son of archaeologist Adolf Furtwängler, he studied in Munich, where he was assistant to the conductor Felix Mottl (1907–09). He became director of the Mannheim Opera in 1915 and in 1920 succeeded Richard Strauss



Wilhelm Furtwängler
Suddeutscher Verlag

as conductor of the Berlin Opera concerts. In 1922 he followed Arthur Nikisch as conductor of the Gewandhaus Concerts in Leipzig. Other appointments included the directorships of the Berlin Philharmonic Orchestra (1922), the Vienna Philharmonic Orchestra (1930), the

Bayreuth Festivals (1931–32), and the Berlin State Opera (1933). He subsequently toured Europe and England with the Berlin Philharmonic Orchestra.

Furtwängler conducted in Germany during most of the Nazi regime. Although he was offered and accepted the post as conductor of the New York Philharmonic in 1936, public hostility to his alleged Nazi associations caused him to resign. Public sentiment again caused the cancellation of a 1949 appointment as conductor of the Chicago Symphony Orchestra, although he had been formally exonerated of accusations of Nazi complicity.

Furuta Oribe, byname of FURUTA SHIGENARI (b. 1543, Mino Province, Japan—d. 1615), distinguished figure in the history of the Japanese tea ceremony.

After serving as a soldier Oribe was made a *daimyō* (feudal lord) and placed in charge of the Fushimi Castle in Kyōto. There he became the favourite pupil of the famous tea master Sen Rikyū, and, after Rikyū's death in 1591, the foremost tea master in Japan. In 1615, however, Oribe was implicated in a conspiracy against the ruling shogun and was forced to commit suicide.

Oribe's influence on the tea ceremony and associated arts extended to teahouse architecture, tea-garden landscaping, and flower arrangement. He is said to have guided the production of pottery at the Bizen kilns in the district of Seto. From his active interest in pottery comes the term *Oribe yaki* ("Oribe ware"), denoting the type of pottery he preferred to use in his tea ceremony: a simple rustic tea bowl with an irregular shape, thick glaze, and soft monochromatic colour.

Fury, plural FURIES, Latin FURIA, plural FURIAE, Greek ERINYS, plural ERINYES, also called EUMENES (Kind One), plural EUMENIDES, in Greco-Roman mythology, one of a group of goddesses of vengeance. They were probably personified curses, but possibly in origin they were ghosts of the murdered. According to the Greek poet Hesiod they were the daughters of Gaea (Earth) and sprang from the blood of her mutilated spouse Uranus; in Aeschylus they were the daughters of Nyx; in Sophocles, of Darkness and of Gaea. Euripides was the first to speak of them as three in number. Later writers named them Alecto (Unceasing in Anger), Tisiphone (Avenger of Murder), and Megaera (Jealous). They lived in the underworld and ascended to earth to pursue the wicked. Being deities of the underworld, they were often identified with spirits of the fertility of the earth. Because the Greeks feared to utter the dreaded name Erinyes, the goddesses were often addressed by the euphemistic names Eumenides (Kind Ones) or Semnai Theai (Venerable Goddesses).

Fusarium wilt, also called YELLOWS, widespread plant disease caused by many forms of the soil-inhabiting fungus *Fusarium oxysporum.* Several hundred plant species are susceptible at soil temperatures above 75° F (24° C). Infected plants are usually stunted; leaves turn pale green to golden yellow, later wilt, wither, die, and drop off progressively upward from the stem base. Dark streaks occur in vascular tissue (xylem) of the roots and lower stem, while roots may decay and seedlings sometimes wilt and die. Fusaria can live indefinitely in soil without access to living host plants. *See also* damping-off; Panama disease; wilt.

Fusaro, Lake of, Italian LAGO DEL FUSARO, coastal lagoon in Napoli province, Campania region, southern Italy, west of Naples. The lagoon is separated from the sea on the west by sand dunes. As the ancient Palus Acherusia (Acherusian Swamp), it may have been the harbour of nearby Cumae in antiquity. In the first century AD, an outlet was dug at its southern end, with a tunnel under the hill of Torre Gaveta; another outlet was dug in 1858–59. On the hill are the remains of a large villa, probably that of the Roman statesman Servilius Vatia. There is an establishment for oyster cultivation on the bank of the lake and a hydrobiological station in the former Royal Casino (1782) on an island in the centre.

fuse, in electrical engineering, a safety device that protects electrical circuits from the effects of excessive currents. A fuse commonly consists of a current-conducting strip or wire of easily fusible metal that melts, and thus interrupts the circuit of which it is a part, whenever that circuit is made to carry a current larger than that for which it is intended. The most common type of fuse is the screw-plug fuse used in domestic electrical systems. It contains a short bit of wire (the fusible element) enclosed in a fireproof container that has a screw-threaded base; the wire is connected to metal terminals at both the screw base and at the side, and the whole is covered with a transparent glass or mica window for seeing whether the fuse has melted. The cartridge fuse, a type of fuse widely used in industry where high currents are involved, has a fusible element connected between metal terminals at either end of a cylindrical insulating tube.

fuse, also spelled FUZE, in explosives technology, device for firing explosives in blasting operations, in fireworks, and in military projectiles.

The blasting safety fuse, employed to fire an explosive from a distance or after a delay, is a hollow cord filled with a mixture resembling black powder and designed to propagate burning at a slow and steady rate. The far end of the fuse is usually embedded in the explosive charge. Detonating cord, also called Cordeau and Primacord, is a hollow cord filled with an explosive material. It is fired by a detonator and is capable of initiating the detonation of certain other explosives at any number of points and in any desired pattern.

The United States and some other military forces have adopted the "z" spelling for the device in ordnance munitions; the fuze sets off the munition, regulates its functioning, and causes it to perform only under predetermined conditions. It is distinct from the primer or firing pin that initiates the launching of the rocket or artillery shell. Impact fuzes function as they hit the target. Time fuzes delay the functioning for a certain period from the starting time. Command fuzes function on signal from a remote-control point. Proximity fuzes function when the munitions carrying them approach to within a given distance of the target. Inferential fuzes infer that a target is nearby if certain conditions are present.

fusel oil, a mixture of volatile, oily liquids produced in small amounts during alcoholic fermentation. A typical fusel oil contains 60–70 percent of amyl alcohols (*q.v.*), smaller amounts of *n*-propyl and isobutyl alcohols, and traces of other components. Before industrial production of synthetic amyl alcohols began in the 1920s, fusel oil was the only commercial source of these compounds, which are major ingredients of lacquer solvents.

The fusel oil alcohols are apparently produced during fermentation from amino acids. In industrial alcohol plants, fusel oil and ethyl alcohol are recovered from the fermented liquors and separated by distillation. In the beverage industry, fusel oil is ordinarily allowed to remain in the finished products. The amount present in one gallon of a 100 proof distilled alcoholic beverage is typically between 2 and 8 grams (0.07 and 0.3 ounce).

fuselage, central portion of the body of an airplane that is designed to accommodate the crew, passengers, and cargo. It varies greatly in design and size according to the function of the aircraft. In a jet fighter the fuselage consists of a cockpit large enough only for the controls and pilot, but in a jet airliner it includes a much larger cockpit as well as a cabin that has separate decks for passengers and cargo. The predominant types of structures are the monocoque (*i.e.,* kind of construction in which the outer skin bears a major part or all of the stresses) or semimonocoque. These structures provide better strength-to-weight ratios for the fuselage covering than the truss-type construction used in earlier planes.

Fuseli, Henry, original name JOHANN HEINRICH FÜSSLI (b. Feb. 7, 1741, Zürich—d. April 16, 1825, Putney Hill, London), Swiss-born painter whose works are among the most exotic, original, and sensual pieces of his time.

Reared in an intellectual and artistic milieu, Fuseli at first studied theology. Obliged to flee Zürich because of political entanglements, he went first to Berlin, and then settled in London in 1764. Encouraged to become a painter by Sir Joshua Reynolds, he left England in 1768 to study in Italy until 1778. During his stay in Rome he studied the works of Michelangelo and classical art, which became his major stylistic influences; his subject matter was chiefly literary. Fuseli is famous for his paintings and drawings of nude figures caught in strained and violent poses that are suggestive of intense emotion. He also had a penchant for inventing macabre fantasies, such as that in "The Nightmare" (1781). He had a noticeable influence on the style of his younger contemporary, William Blake.

In 1788 Fuseli was elected associate of the Royal Academy, becoming a full academician two years later. During 1799–1805 and again from 1810 he was professor of painting at the Royal Academy. He was appointed keeper of the Academy in 1804.

fusion: *see* nuclear fusion.

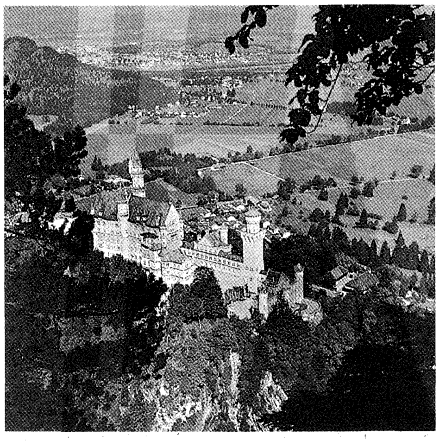
fusion reactor, also called THERMONUCLEAR REACTOR, any of a class of devices capable of producing thermonuclear energy at a level at which it can be conveniently transformed into electrical energy. A fusion reactor requires a high-temperature plasma (a collection of free nuclei and free electrons) for its fuel, since thermonuclear reactions can only occur in such a medium. When a plasma with a high concentration of lightweight nuclei (*e.g.,* the hydrogen isotopes deuterium and tritium) is heated to approximately 100,000,000° C, the nuclei move rapidly enough to penetrate each other's electrical barriers and fuse. In so doing, they form the nuclei of a heavier element and emit substantial quantities of energy.

Since the late 1940s physicists have attempted to find a way of producing an extremely hot plasma of high density and of confining the plasma long enough for it to generate more energy than is needed to produce it. Although several reactor designs have been tested, so far none of them has been developed sufficiently for commercial application. As of the early 1980s, the leading candidate for a practical fusion reactor was the tokamak, a design that generates a toroidal (doughnut-shaped) magnetic field for plasma confinement. Until the late 1960s the U.S. fusion program had invested its largest effort in another toroidal-field device, the stellarator. Disappointing trials of the machine came at the time when the Soviet tokamak began to show positive results, leading to abandonment of the stellarator. In 1980, however, a team of West German researchers revived the system by demonstrating that it can provide the confinement envisioned by its inventor, Lyman Spitzer, a U.S. astrophysicist. Their work indicated that the early stellarators failed not because of some fundamental flaw in concept but because they were not large enough.

In all toroidal reactors there exists a basic magnetic field, the so-called toroidal field, which orbits around the axis of the machine. Retaining the plasma for any appreciable length of time, however, requires another field, the poloidal field, to add a helical twist. The tokamak provides this second field by running a circulating current in the plasma itself. The current heats the plasma as well, helping to boost the temperature in the reactor to the level needed to ignite the fusion of a mixture of deuterium and tritium. In the stellarator, by contrast, helical coils outside the main jacket provide the poloidal field. In the version developed by the West German team an intense, uncharged particle beam is injected into the stellarator, and the beam heats the plasma by colliding with it.

In December 1982, the experimental Tokamak Fusion Test Reactor at Princeton University achieved a milestone when it successfully produced its first magnetically confined plasma. The gas used for the test was ordinary hydrogen, which was heated to 100,000° C for a fraction of a second. The eventual goal would be to bring fuel comprised of deuterium and tritium to the 100,000,000° C level and one-second containment time considered necessary for fusion reactions in the machine to produce enough thermonuclear energy for electric power generation.

Füssen, city, Bavaria *Land* (state), extreme southern Germany, on the Lech River, at the east foot of the Allgäuer Alpen (Allgäu Alps), near the Austrian border. The site of a Roman frontier station, the city developed around the Benedictine abbey of St. Magnus (founded



Neuschwanstein, near Füssen, Ger.
A. Devaney, Inc.

628) and was chartered *c.* 1294. A treaty concluded there in 1745 led to the withdrawal of Bavaria from the War of the Austrian Succession. The small sulfur spa of Faulenbach was incorporated with Füssen in 1921. St. Magnus abbey and church, in their present form, date from 1701 to 1917, although the church has a Romanesque crypt. Other notable landmarks include Hohes Schloss (1270–1505; the former summer residence of the prince-bishops of Augsburg) and several Baroque churches. The turreted castles of Hohenschwangau, high above the Schwansee (Swan Lake), and Neuschwanstein, overlooking Pöllat Gorge, are nearby.

A tourist resort, winter sports centre, and customs station, Füssen manufactures clothing and cordage. Pop. (1989 est.) 13,173.

Füssli, Johann Heinrich: *see* Fuseli, Henry.

Fust, Johann (b. *c.* 1400, Mainz, Principality of Mainz—d. Oct. 30, 1466, Paris), early German printer, financial backer of Johann Gutenberg (the inventor of printing in Europe), and founder, with Peter Schoeffer, of the first commercially successful printing firm.

Fust, a prominent goldsmith, lent Gutenberg 800 guilders in 1450 to perfect his movable-type printing process. An additional loan of 800 guilders was made about two years later. Although Gutenberg's 42-line Bible and his 1457 Psalter were almost completed, Fust sued in 1455 for 2,026 guilders to recover his money with interest. The court made judgment in Fust's favour, and Gutenberg lost his invention and equipment.

With Schoeffer, who was one of Fust's witnesses in the lawsuit, Fust then set up his own printing firm and published the 42-line Bible in 1456. The Psalter, the first example of colour printing, with superb red-ink printing and two-colour initials, was finished the following year. Fust's firm published further works, notably a Benedictine Psalter (1459), Clement V's *Constitutiones,* or *Clementinae* (1460), the 48-line Bible (1462), and Cicero's *De officiis* (1465), the first classic ever printed.

Fusṭāṭ, al-, also spelled AL-FOSTAT, capital of the Muslim province of Egypt during the Umayyad and ʿAbbāsid caliphates and under succeeding dynasties, until captured by the Fāṭimid general Jawhar in 969. Founded in 641 by the Muslim conqueror of Egypt, ʿAmr ibn al-ʿĀṣ, on the east bank of the Nile, south of modern Cairo, al-Fusṭāṭ was the earliest Arab settlement in Egypt and site of the province's first mosque, Jāmiʿ ʿAmr. It grew into a permanent city out of an Arab camp set up for the siege of the Byzantine fortress of Babylon, but it developed rather chaotically. Around a core of permanent structures—mosques, palaces, and administrative offices—grew up a vast confusion of houses and huts, sited to no plan and periodically ravaged by fire and pestilence. The ʿAbbāsid governors thus chose to reside in a northern suburb, al-ʿAskar, while the Ṭūlūnids built a new quarter, al-Qaṭāʾiʿ, to serve as capital. The city's economic prosperity, derived from a lively commerce and a fine glassware and ceramics industry, facilitated al-Fusṭāṭ's survival after 969, when nearby Cairo became capital of Fāṭimid Egypt. In 1168 the town, which had never been fortified, was destroyed by fire to prevent its capture by Frankish armies. It was rebuilt a few years later by Saladin, who joined it with Cairo. The city's very name was gradually replaced by that of al-Qāhirah (Cairo). In modern Egypt it constitutes a quarter of Cairo known as Maṣr al-ʿAtīqah (Old Cairo).

Fusṭāṭ ware, in Islāmic ceramics, style of pottery originating from al-Fusṭāṭ (now part of Cairo), where, however, many deposits of imported ware have also been found. Characteristic qualities are poorish white glaze and excellent lustre pigment varying from lemon to intense copper in colour. Some important pieces are incised and covered with transparent glaze.

Fustel de Coulanges, Numa Denis (b. March 18, 1830, Paris—d. Sept. 12, 1889, Massy, Fr.), French historian, the originator of the scientific approach to the study of history in France.

After studying at the École Normale Supérieure, he was sent to the French school at Athens in 1853 and directed some excavations at Chios. From 1860 to 1870 he was professor of history at the faculty of letters at Strasbourg, where he had a brilliant career as a teacher. Subsequent appointments included a lectureship at the École Normale Supérieure in February 1870, a professorship at the Paris faculty of letters in 1875, the chair of medieval history at the Sorbonne in 1878, and the directorship of the École Normale in 1880.

Fustel's historical thought had two main tenets: the importance of complete objectivity and the unreliability of secondary sources. By his teaching and example he thus established the modern idea of historical impartiality at a time when few people had any qualms about combining the careers of historian and politician. His insistence on the use of contemporary documents led to the very full use of the French national archives in the 19th century. Fustel, however, was no paleographer, and his fondness for manuscript sources was occasionally responsible for major errors of judgment.

Apart from *La Cité antique* (1864), a study of the part played by religion in the political and social evolution of Greece and Rome, most of Fustel's work was related to the study of the political institutions of ancient France and the Germanic invasions under the Roman empire.

fustian, fabric originally made by weaving two sets of cotton wefts, or fillings, on a linen warp, popular during the Middle Ages. The word has come to denote a class of heavy cotton fabrics, some of which have pile surfaces, including moleskin, velveteen, and corduroy.

Fustian probably originated in al-Fusṭāṭ, now part of Cairo, about AD 200, eventually spreading to Spain and Italy, where there were guilds of fustian weavers in the 13th century. As the material became popular its production spread northward; southern Germany and Switzerland had a rising fustian industry in the 14th century, and French weavers were making fringed and roughened fustians in the 16th. These early fustians appear to have been smooth fabrics with a soft raised nap; eventually, a ribbed pile surface was developed. By the 19th century cotton was being used for the warp as well as the filling.

In all fustians one of the sets of filling yarns is made up of floats (yarns that skip over two or more adjacent warp yarns). When a pile fabric is desired, the weft floats must be cut, a process originally performed by hand with a fustian knife but now done mechanically. The pile is brushed, sheared, and singed, and finally the fabric is bleached and dyed.

fustic, either of two natural dyes. Old fustic, or yellowwood, is derived from the heartwood of dyer's mulberry, a large, tropical American tree (*Chlorophora tinctoria* or *Maclura tinctoria*) of the mulberry family, Moraceae. The dye produces yellows on wool mordanted (fixed) with chromium salts.

The dye termed young fustic, zante fustic, or Venetian sumac is derived from the wood of the smoke tree (*Cotinus coggygria* or *Rhus cotinus*), a southern European and Asian shrub of the cashew family, Anacardiaceae. Both old and new fustic have been displaced from commercial importance by synthetic dyes.

Fusulina, genus of extinct fusulinid foraminiferans (protozoans with a shell) found as fossils in marine rocks of Late Carboniferous age (the Late Carboniferous Epoch began 320,000,000 years ago and lasted 34,000,000 years). *Fusulina,* an excellent index fossil for Late Carboniferous rocks, enables widely separated rocks to be correlated.

Fusulinella, genus of extinct fusulinid foraminiferans (protozoans with a shell) found as fossils in Late Carboniferous marine rocks (the Late Carboniferous Epoch began 320,000,000 years ago and lasted 34,000,000 years). Because of its narrow time range and wide geographic distribution, *Fusulinella* is an excellent guide fossil for Late Carboniferous rocks and time.

fusulinid, any of a large group of extinct foraminiferans (single-celled organisms related to the modern amoebas but having complex shells that are easily preserved as fossils). The fusulinids first appeared late in the Early Carboniferous Epoch, which ended 320,000,000 years ago, and persisted until the end of the Permian Period, 245,000,000 years ago. Where they occur, the fusulinids have proven to be extremely useful for correlating different rock

units in widely separated regions and for dividing geologic time into smaller units. Petroleum geologists also use them as keys to the location of economically important deposits of oil and natural gas. Many forms of fusulinids are known, from barely visible species to forms that are easily seen with the naked eye and may be as much as 5 cm (2 inches) long. Many fusulinids resemble grains of wheat; the internal structure, however, is very complex and distinctive. The shell consists of a series of chambers formed about a central longitudinal axis. Complex patterns in the number and arrangement of internal walls and deposits are present and aid in classification and the working out of evolutionary relationships. Most fusulinids lived in clear marine water far from the shore.

Futa Jallon (Guinea): *see* Fouta Djallon.

Futabatei Shimei, pseudonym of HASEGAWA TATSUNOSUKE (b. April 4, 1864, Edo [now Tokyo], Japan—d. May 10, 1909, at sea in Bay of Bengal), Japanese novelist and translator of Russian literature; his *Ukigumo* (1887–89; "The Drifting Clouds," translated, with a study of his life and career, by M. Ryan as *Japan's First Modern Novel: Ukigumo of Futabatei Shimei,* 1967) brought modern realism to the Japanese novel.

Although he wrote three novels and translated many stories, he is best known for *Ukigumo,* his first novel, and for his earliest translations of stories by the Russian writer Ivan Turgenev, *Aibiki* ("The Rendezvous") and *Meguriai* ("Chance Meetings"), both published in 1888. In these works Futabatei used a style called *gembun itchi* (unification of spoken and written language), one of the first attempts to replace classical literary language and syntax with the modern colloquial idiom.

Born to an aristocratic samurai family, Futabatei studied Russian at the Tokyo School of Foreign Languages (1881–86), where he became interested particularly in Ivan Goncharov, Fyodor Dostoyevsky, Turgenev, and Vissarion Belinsky. He began his literary career soon after leaving school, with the help of the critic, novelist, and translator Tsubouchi Shōyō. *Ukigumo,* a story in which an ineffectual idealist loses out in the rude world of rapidly modernizing late 19th-century Japan, and his translations of fiction were well received; but his translations of literary criticism went virtually unnoticed. Futabatei, however, was displeased with his novel and in need of money, so in 1889 he joined the staff of the government gazette *Kampō,* where he remained until 1897. He did not write another novel for nearly 10 years. From 1898 to 1902 he taught Russian and worked for government agencies, later going to Harbin and Peking. After returning to Japan in 1903, he resumed translating fiction professionally and in 1904 became the Tokyo correspondent for the *Ōsaka Asahi* newspaper. Between 1896 and 1909 his output included translations of stories by Turgenev, Nikolay Gogol, Leo Tolstoy, and Maksim Gorky; articles on Esperanto, literary criticism, and social conditions; and two novels, *Sono omokage* (1906; *An Adopted Husband*) and *Heibon* (1907; *Mediocrity*). In 1908 Futabatei traveled to Russia as a correspondent for the *Asahi* but fell ill and died en route from Russia to Japan.

futhark (writing system): *see* runic alphabet.

Futuna Islands, also called ÎLES DE HORNE, or HORNE ISLANDS, pair of volcanic islands (Futuna and Alofi) forming the southwestern part of the French overseas territory of Wallis and Futuna, in the southwestern Pacific Ocean. Their combined land area is 36 square miles (93 square km). Futuna is the site of Mount Singavi (also called Mount Puke; 2,493 feet [760 m]); and Alofi, 2 miles (3 km) southeast across the Sain Channel, includes Mount Bougainville (Kolofau). Sighted (1616) by the Dutch navigator Jakob Le Maire and named after the city of Hoorn in Holland, the islands became a French protectorate in 1888. Both are well watered, and Alofi is heavily wooded, with potentially valuable stands of timber. The main villages are Taoa, Ono, and Kolia on the south coast of Futuna. Alofi is uninhabited. Pop. (1983) 4,324.

futures, commercial contract calling for the purchase or sale of specified quantities of a commodity at specified future dates. The origin of futures contracts was in trade in agricultural commodities, and the term commodity is used to define the underlying asset even though the contract is frequently completely divorced from the product. It therefore differs from a simple forward purchase or sale in the cash market, which involves actual delivery of the commodity at the agreed time in the future.

A brief treatment of futures follows. For full treatment, *see* MACROPAEDIA: Markets.

The common characteristics of futures markets are that they can be made in any commodity that enters into trade on a scale large enough to provide the necessary liquidity, that is available to a broadly standard specification, and that is traded in free market conditions that allow price fluctuations based on the interplay of supply and demand factors and that preclude dominant producers from controlling the market. A futures contract represents a binding agreement to buy a commodity at a specified price on a specified future date. Thus it is possible for a trader to obtain a guarantee for the price he will have to pay for a commodity in the future. A market is made in futures contracts, involving trading in the obligations inherent in the contracts.

Futures developed originally to provide cheap forms of banking and insurance. Farmers in the United States, for example, were able to sell their harvest in advance on the Chicago commodity futures markets at a lower dealing cost than the interest rates charged by the banks. More recently, financial futures have extended the same principle by providing protection for the investor or businessman against changes in interest rates, allowing him to fix the cost today of raising debt that he knows he will need tomorrow when interest rates may have become unfavourable. Bankers and financiers can also use futures to insure against changes in interest rates and currency exchange rates. Futures contracts have been common in the markets for agricultural commodities for a very long period, but it was only in 1972 that financial futures, which treat money as simply a commodity, developed in Chicago, the home of agricultural futures.

There are two basic types of traders in a futures market: hedgers and speculators. Both are necessary to the market in order to generate a sufficient volume of two-way business. Hedgers seek to avoid or minimize the financial risks associated with their current commercial activity by in effect taking out an insurance policy in the shape of a futures contract against adverse price or interest-rate movements. On the other hand, the speculator, in the expectation of making a profit, seeks risk by committing his funds to back his own view of higher or lower prices or interest rates. It is the speculators who supply the necessary liquidity to the futures markets and are instrumental in allowing buyers to be matched with sellers, although the actual contracts are made through the market's central clearinghouse. It is the intervention of the clearinghouse that removes the credit risk and permits standardization of contracts to allow easy buying and selling.

Futurism, Italian FUTURISMO, Russian FUTURISM, an early 20th-century artistic movement that centred in Italy and emphasized the dynamism, speed, energy, and power of the machine and the vitality, change, and restlessness of modern life in general. Although the most significant and influential results of the movement were in the visual arts, there were also manifestations of Futurism in literature, the theatre, and music.

Futurism was first announced on Feb. 20, 1909, when the Paris newspaper *Le Figaro* published a manifesto by the Italian poet and editor Filippo Tommaso Marinetti (*q.v.*). The name Futurism, coined by Marinetti, reflected his emphasis on discarding what he conceived to be the static and irrelevant art of the past and celebrating change, originality, and innovation in culture and society. Marinetti's manifesto glorified the new technology of the automobile and the beauty of its speed, power, and movement. He exalted violence and conflict and called for the sweeping repudiation of traditional cultural, social, and political values and the destruction of such cultural institutions as museums and libraries. The manifesto's rhetoric was passionately bombastic; its tone was aggressive and inflammatory and was purposely intended to inspire public anger and amazement, to arouse controversy, and to attract widespread attention.

Painting and sculpture. With the support of Marinetti, the painters Umberto Boccioni, Carlo Carrà, Luigi Russolo, Giacomo Balla, and Gino Severini published several manifestos on painting in 1910. Like Marinetti, they glorified originality for its own sake and despised inherited traditions of art. Although they were not as yet working in what was to become the Futurist style, they began to emphasize an emotional involvement in the dynamics of modern life, and toward this end they called for rendering the perception of movement and communicating to the viewer the sensations of speed and change. To achieve this, the Futurist painters adopted the Cubist technique of depicting several sides and views of an object simultaneously by means of fragmented and interpenetrating plane surfaces and outlines. But the Futurists additionally sought to portray the object's movement in space, and they tried to achieve this goal by rhythmic spatial repetitions of the object's outlines during its transit, producing an effect akin to that obtained by making multiple and sequential photographic exposures of a moving object. The Futurist paintings differed from Cubist ones in other important ways. While the Cubists favoured still life and portraiture, the Futurists preferred such subjects as speeding automobiles and trains, racing cyclists, dancers, animals, and urban crowds in movement. The resulting paintings had brighter and more vibrant colours than Cubist ones and revealed dynamic, agitated compositions in which rhythmically swirling forms reached crescendos of violent movement.

Boccioni also became interested in sculpture, publishing a manifesto on the subject in the spring of 1912. Soon afterward, he began working in this medium, creating the highly original "Development of a Bottle in Space" (1912) and "Unique Forms of Continuity in Space" (1913). Antonio Sant'Elia formulated a Futurist manifesto on architecture in 1914. His visionary drawings of highly mechanized cities and boldly modern skyscrapers of the future prefigure some of the most imaginative 20th-century architectural planning. Sant'Elia was killed in action in 1916 during World War I, his "soaring buildings" never realized.

Boccioni, who had been the most talented artist in the group, also died during military service in 1916. This event, combined with dilution of the group's daring as a result of expansion of its personnel and the coming of war, brought an end to the Futurist movement as an important historical force. What the Futurists had accomplished, however, continued to influence artists elsewhere. Futurist nihilism

was important to the growth of the Dada spirit. Robert Delaunay and Marcel Duchamp were affected by Futurist painting, as were the exponents of Rayonist and Suprematist painting in Russia. The Italian-born American painter Joseph Stella practiced an impressive form of Futurism in New York City during the second decade of the 20th century.

Literature. Although Marinetti was a poet, novelist, and playwright, it is as a proponent and theorist of Futurism that he is most important. After the initial broad manifesto of 1909, he wrote or had a hand in creating a whole series of manifestos dealing with poetry, the theatre, architecture, music, radio, and musical performance, as well as others dealing with nonartistic subjects. He founded the journal *Poesia* at Paris in 1905 for "the great incendiary poets," who turned out in 1909 to be the Futurist poets; and he later founded a press with the same name to publish their works. On proselytizing visits to England, France, Germany, and Russia, Marinetti influenced the work of the English founder of Vorticism, Wyndham Lewis, and the poet Guillaume Apollinaire.

In Russia the Marinetti visit took root in a kind of Russian Futurism that went beyond its Italian model in a revolutionary social and political outlook. Marinetti influenced the two Russian writers considered the founders of Russian Futurism, Velemir Khlebnikov (*q.v.*), who remained a poet and a mystic, and the younger Vladimir Mayakovsky (*q.v.*), who became "the poet of the Revolution" and the popular spokesman of his generation. The Russians published their own manifesto in December 1912, entitled *A Slap in the Face of Public Taste,* which echoed the Italian manifesto of the previous May. The Russian Futurists advocated the abandonment of Aleksandr Pushkin, Fyodor Dostoyevsky, and Leo Tolstoy and of then-current Russian symbolist verse and called for the creation of new and experimental techniques of writing poetry. Both the Russian and the Italian Futurist poets discarded logical sentence construction and traditional grammar and syntax. Futurist poetry frequently presented an incoherent and anarchic blend of words stripped of their meaning and used for their sound alone. As the first group of artists to identify wholeheartedly with the Bolshevik Revolution of 1917, the Futurists sought to dominate post-Revolutionary culture and create a new art that would be integrated into all aspects of daily life of a revolutionary culture. They were favoured by Anatoly Lunacharsky, the first Soviet commissar of education, and given important cultural posts. But the Russian Futurists' challenging literary techniques and their theoretical premises of revolt and innovation proved too unstable a foundation upon which to build a broader literary movement. The Futurists' influence was negligible by the time of Mayakovsky's death in 1930.

In Italy, the Futurists published both their first manifesto on literature and their first poetry anthology in 1912. The Italian Futurist poets favoured Italy's entry into World War I prematurely and were jailed for advocating it. Their postwar political activity from 1919 led to their identification with Fascism, and by the mid-1920s, the movement languished. The movement did influence later avant-garde trends in poetry, notably that of concrete, or pattern, poetry.

Theatre. The 1909 manifesto had called for a new variety theatre. In 1915, with Emilio Settimelli, Marinetti issued a theatrical manifesto, denouncing all dramatic forms from farce to tragedy. He advocated *teatro sintetico* ("synthetic theatre"), the *syntesi* being improvisatory performances of a few minutes' duration and having little or no text. The plays used few actors. Emphasis was on stage design and costuming, and audience participation was encouraged.

Music. The composer F.B. Pratella wrote several Futurist manifestos on music during the period 1910–12, but the painter Luigi Russolo pushed past him with *L'arte dei rumori* ("The Art of Noises"). Music was to be based not on notes but on sounds related to the noises of everyday life. He invented a series of instruments called *intonarumori* to this effect and gave several concerts with them in London, Milan, and Paris in 1914 and in the 1920s. (The machines were destroyed during World War II.) His instruments and ideas were of interest to such composers as Arthur Honneger, Darius Milhaud, Igor Stravinsky, and Edgard Varèse. Russolo's final and ultimate Futurist musical instrument, the russolofono, combined the effects of earlier devices and had a kind of keyboard control. Futurist music presaged the electronic music and *musique concrète* ("concrete music") that followed World War II.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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futurology, in the social sciences, the study of current trends in order to forecast future developments. While the speculative and descriptive aspects of futurology are traceable to the traditions of utopian literature and science fiction, the methodology of the field originated in the "technological forecasting" developed near the end of World War II, of which the report *Toward New Horizons* (1947) by Theodore von Kármán is an important example.

At the Rand Corporation in California during the 1950s, Herman Kahn and others pioneered the so-called scenario technique for analyzing the relationship between weapons development and military strategy. Later Kahn applied this technique in *On Thermonuclear War* (1960), a book that examines the potential consequences of a nuclear conflict. During the time of Kahn's first studies, the mathematician Olaf Helmer, also at Rand, proposed a theoretical basis for the use of expert opinion in forecasting.

In 1964 the French social scientist Bertrand de Jouvenel published *L'Art de la conjecture* (*The Art of Conjecture*), in which he offered a systematic philosophical rationale for the field. The following year in the United States the American Academy of Arts and Sciences formed its Commission on the Year 2000 "to anticipate social patterns, to design new institutions, and to propose alternative programs"; the commission's 1967 report constituted the first wide-ranging futurological study in the United States.

The field was brought to wide popular attention in 1972 when Dennis Meadows and colleagues at the Massachusetts Institute of Technology published *The Limits to Growth,* based on a study commissioned by the Club of Rome, an international assembly of business leaders. This report focused on hypotheses derived from a computer model of the interaction of various global socioeconomic trends; it projected a Malthusian vision in which the collapse of world order would result if population growth, industrial expansion, and increased pollution, combined with insufficient food production and the depletion of natural resources, were to continue at current rates. To offset these trends, the report called for "a Copernican revolution of the mind," to reevaluate the belief in endless growth and the tacit acceptance of wastefulness. Besides zero population growth and a leveling-off of industrial production, the report also recommended increased pollution control, the recycling of materials, the manufacture of more durable and repairable goods, and a shift from consumer goods to a more service-oriented economy. The U.S. government-commissioned *Global 2000 Report to the President* (1981) reiterated many of these concerns.

Criticism of these and other studies has centred mainly on the limitations of models and the subjective, interpretive nature of projections based on them. Futurologists themselves, while generally acknowledging these difficulties, emphasize the increasing sophistication of their analytic techniques, which draw from such fields as mathematics, economics, environmental research, and computer science.

Other important basic works in futurology include *Future Shock* (1970) by Alvin Toffler, *The Coming of Post-Industrial Society* (1973) by Daniel Bell, and *The Fate of the Earth* (1982) by Jonathan Schell. (J.O'T/Ed.)

Fux, Johann Joseph (b. 1660, Hirtenfeld, Styria, Austria—d. Feb. 13, 1741, Vienna), Austrian composer known for his theoretical work on counterpoint, *Gradus ad Parnassum.*

Fux became organist at the Schottenkirche in Vienna in 1696 and court composer to the emperor Leopold I in 1698. In addition, he held the post of chapelmaster at St. Stephen's Cathedral in Vienna (1705–15).

Fux was a prolific composer of vocal and instrumental music. His works include 19 operas, of which *Costanza e fortezza* (1723) is notable; 29 partitas, including the *Concentus musico-instrumentalis* (1701); 10 oratorios; and 50 masses, of which the *Missa canonica,* (1708), written in canon throughout, is particularly admired. His book *Gradus ad Parnassum* (1725; *Steps to Parnassus*) attempted to systematize contrapuntal practices. It was long the standard textbook on counterpoint and was studied by W.A. Mozart, Joseph Haydn, and other 18th-century composers.

Fuxin (China): *see* Fu-hsin.

fuze: *see* fuse.

Fuzhou (China): *see* Fu-chou.

Fuzuli, Mehmed bin Süleyman, Fuzuli also spelled FUḌŪLĪ (b. *c.* 1495, Karbalā', Iraq—d. 1556, Karbalā'), Turkish poet and the most outstanding figure in the classical school of Turkish literature.

A resident of Baghdad, Fuzuli apparently came from a family of religious officials and was apparently well versed in the thought of his day, but very little is known about his life. Among his early patrons was Shāh Esmāʿīl I, founder of the Ṣafavid dynasty of Iran and conqueror of Baghdad in 1508. Twenty-six years later, when the Ottoman sultan Süleyman I took Baghdad, Fuzuli attempted to curry favour with his new masters and henceforth wrote in the name of the Ottoman sovereign. It seems that he was never able to move to the Ottoman capital Constantinople, however, but remained in Iraq throughout most of his life. He composed his famous *Şikâyetname* ("Complaint"), in which he caustically commented on not being given the status of court poet in Istanbul. Fuzuli composed poetry with equal facility and elegance in Turkish, Persian, and Arabic. Although his Turkish works are written in the Azerbaijani Azeri dialect, he had a thorough knowledge of both Ottoman and Chagatai Turkish literary traditions.

The works for which he is famous include his melodic and sensitive rendition of the great Muslim classic *Leylâ ve Mecnun* (Eng. trans., 1959). This celebrated allegorical romance depicts the attraction of the Majnūn (the human spirit) for Laylā (divine beauty). Fuzuli is the author of two divans (collections of poems), one in Azerbaijani Turkish and one in Persian. These anthologies contain examples of his most lyrical poetry, many concerned with mystical love and others lamenting the ephemeral nature of this world. His poetic expression, characterized by sincerity, passion,

and a pervasive strain of melancholy, transcended the highly formalized classical Islāmic literary aesthetic. Fuzuli's works influenced many poets up to the 19th century.

Fuzzy-Wuzzy (pejorative), any of the black Sudanese warriors, especially of the Hadendoa tribe, who fought against British and Egyptian forces in the Mahdist wars of 1881–99. The name, applied by British soldiers, derived from their elaborate hairdressing, of a "natural" or "frizzy" fashion.

FWCC: *see* Friends World Committee for Consultation.

Fyffe, Will (b. 1885, Dundee, Scot.—d. Dec. 14, 1947, St. Andrews, Fife), Scottish actor, music-hall entertainer, and pantomimist, one of the most popular character comedians of British stage and screen.

As a child Fyffe toured Scotland in his father's stock company; he made his debut as Little Willie in *East Lynne.* A precocious actor, when only 15 he played the aged Polonius in Shakespeare's *Hamlet,* after which he toured with other companies. Though his ability was considerable, he devoted himself to the music hall, going into revue with his sketches of Scottish characters—the Glasgow drunk, the village idiot, the sailor, the centenarian, the railway guard.

Despite discouragements, Fyffe proved his mastery of the art of comic and of truly pathetic impersonation by reaching top billing when he appeared at the London Pavillion in 1921. During the 1930s he took part in a number of films, notably as the Scottish shepherd in *Owd Bob.* For his tireless services in entertaining troops during World War II, he was appointed Commander of the Order of the British Empire.

Fyffe, 1939

By courtesy of the National Film Archive, London

Fylde, district (borough), county of Lancashire, England, occupying an area of 64 sq mi (165 sq km) on the north bank of the estuary of the River Ribble at the Irish Sea below the resort borough of Blackpool. Fylde district is part of the Fylde geographical region, a low coastal plain 18 mi (29 km) wide between Ribble and Morecambe Bay to the north. It is an area of undulating terrain containing unstratified glacial drift and pockets of marshland, now mostly drained. Extensive sand beaches are found at the resort of Lytham St. Anne's where the Ribble meets the sea.

In the 18th century, the agricultural produce of the Fylde geographical region won it the epithet "granary of Lancashire." Dairy farming and poultry raising predominate in the contemporary district.

Lytham St. Anne's, built on sand dunes overlooking the sea, is a residential and family resort community with little industry. International golf matches, including the Ryder Cup and British Open, are sometimes played there. An old windmill and the Jacobean (late 18th-century) Lytham Hall are architectural features. Kirkham, an old market town in the centre of the district, contains the ruins of an abbey founded in 1125 for Augustinian canons by Walter L'Espec, Henry I's itinerant justice in the north. A major British aerospace industry and the only plant in the country producing nuclear fuel elements are located near Kirkham. Pop. (1982 est.) 68,400.

Fyn, *amtskommune* (county), Denmark, comprising 25 inhabited islands between Sjælland and the Jutland peninsula. Its area is 1,346 sq mi (3,486 sq km). Fyn island (Funen) and Langeland (*qq.v.*) are the two largest islands, with more than 90 percent of the population. Odense is the administrative centre and largest city. Road bridges connect the islands of Fyn, Tåsinge, and Langeland; Ærø and smaller islands have ferry connections with the rest of the county. Fyn is a fertile agricultural and fruit-growing county. Pop. (1982 est.) 453,799.

Fyn, also called FUNEN, second largest island (area 1,152 sq mi [2,984 sq km]) of Denmark, between southern Jutland and Sjælland (Zealand), bounded by the Little Belt (strait) to the west and the Great Belt to the east, making up most of Fyn *amtskommune* (county). The fertile clay loams of the rolling morainic landscape ("the Garden of Denmark") support agriculture (grains and sugar beets), gardening, dairy farming, and cattle breeding. Stone Age burial chambers remain, as well as numerous Viking relics, including the famous Ladby-skibet (12 mi [19 km] east of Odense), the burial ship of a Viking chieftain (*c.* 950), and a "ship monument" (grave enclosed by standing stones in the form of a ship) west of Odense. Always a stronghold of Danish aristocracy, Fyn is rich in old castles and manor houses. Two of the finest are Egeskov (1554) and Brahetrolleborg (1568; incorporating parts of a monastery founded in 1172), both in the south. Chief ports are the manufacturing city of Odense, Assens, Svendborg, Nyborg, Kerteminde, Middelfart, and Fåborg. Pop. (1981 est.) 453,626.

Fyodor, also spelled FËDOR, FEDOR, or FEODOR, English THEODORE, name of Russian tsars grouped below chronologically and indicated by the symbol •.

• **Fyodor I,** in full FYODOR IVANOVICH (b. May 31, 1557, Moscow—d. Jan. 17 [Jan. 7, old style], 1598, Moscow), tsar of Russia (1584–98) whose death ended the rule of the Rurik dynasty in Russia.

The son of Ivan IV the Terrible and his first wife, Anastasiya Romanovna Zakharina-Yureva, Fyodor succeeded his father on March 19, 1584. Being both physically weak and feebleminded, however, he took no part in government affairs, which were dominated by his wife's brother, Boris Godunov. Godunov was, therefore, responsible for the major achievements of Fyodor's reign—the elevation of the metropolitan see of Russia to a patriarchate (1589), the recovery in 1595 of lands near the Gulf of Finland that had been lost to Sweden in 1583, and the strengthening of Russia's control over western Siberia and territory in the Caucasus. When Fyodor died childless in 1598, the Rurik dynasty became extinct, and the throne of Russia was transferred, by vote of a *zemsky sobor* ("assembly of the land"), to Godunov.

• **Fyodor II,** in full FYODOR BORISOVICH GODUNOV (b. 1589—d. June 20 [June 10, old style], 1605, Moscow), tsar who ruled Russia briefly (April–June 1605) during the Time of Troubles (1598–1613).

The son of Boris Godunov (reigned 1598–1605), Fyodor received an excellent education and was well acquainted with state affairs when his father unexpectedly died and he ascended the Russian throne (April 23 [April 13, O.S.], 1605). His rule was immediately challenged, however, by the first False Dmitry, a pretender to the throne, who, claiming to be the son of Ivan IV the Terrible (ruled 1547–84) and the legitimate heir to the throne, had invaded Russia in October 1604 in an effort to overthrow Boris Godunov. After Fyodor's military commander shifted his support to the pretender, Fyodor's mother tried to take power and control the situation. Her action, however, aroused the hostility of the boyars (members of the powerful Russian aristocracy), who provoked a Moscow mob to riot and to murder Fyodor and his mother; immediately afterward the first False Dmitry entered Moscow and assumed the throne of Russia.

• **Fyodor III,** in full FYODOR ALEKSEYEVICH (b. June 9 [May 30, old style], 1661, Moscow—d. May 7 [April 27, O.S.], 1682, Moscow), tsar of Russia (ruled 1676–82) who fostered the development of Western culture in Russia and, thereby, made it easier for his successor Peter I the Great (ruled 1682–1725) to enact widespread reforms based on Western models.

The eldest son of Alexis (ruled 1645–76), Fyodor was not only educated in the traditional subjects of Russian and Church Slavonic but was also tutored in Polish and Latin by Simeon Polotsky, a noted theologian who had studied in Kiev and Poland. When Alexis died, Fyodor ascended the throne (Jan. 29 [Jan. 19, O.S.] 1676), but his youth and poor health prevented him from actively participating in the conduct of government affairs. His uncle Ivan B. Miloslavsky assumed the dominant position in Fyodor's government at first, but he was soon displaced by two courtiers, I.M. Yazykov and A.T. Likhachev, who shared Fyodor's educational background and who, despite objections from the Russian Orthodox clergy, promoted the spread of Polish customs, Roman Catholic religious doctrines, and Latin books among the Russian aristocracy. After 1681 Vasily V. Golitsyn became the major figure in Fyodor's administration; under his influence vast military reforms were undertaken, and the system of *mestnichestvo,* by which a noble was appointed to a service position on the basis of his family's rank in the hierarchy of boyars, was abolished (1682).

When Fyodor died childless, he was succeeded, after some dispute, by both his brother, Ivan V (ruled 1682–96), and his half-brother, Peter I; his sister Sophia Alekseyevna served as regent for the two young tsars (1682–89).

fyrd, tribal militia-like arrangement existing in Anglo-Saxon England from approximately 605. Local in character, it imposed military service upon every able-bodied free male. It was probably the duty of the ealderman, or sheriff, to call out and lead the fyrd. Fines imposed for neglecting the fyrd varied with the status of the individual, landholders receiving the heaviest fines and common labourers the lightest. The fyrd was gradually superseded by the gathering of the thanes (feudal lords) and their retainers, but it was occasionally called out for defensive purposes even after the Norman Conquest (1066).

Fyt, Jan (b. 1611, Antwerp—d. Sept. 11, 1661, Antwerp), Flemish painter known for his technical mastery in the rendering of animals.

Apprenticed to a painter when scarcely more than 10 years old, Fyt was accepted into the Guild of St. Luke as a master at 20 and over the next 30 years produced a vast number of pictures with facility and power. His forte was the depiction of animal life in its most varied forms; but for human figures and architectural backgrounds he often relied on collaborators. The masterpieces "Silenus Amongst Fruit and Flowers," "Diana and Her Nymphs with the Produce of the Chase," and "Dead Game and Fruit in Front of a Triumphal Arch" represent collaborations with three different painters.

Fyzabad (India): *see* Faizābād.

G metal: *see* gunmetal.

Ga, also spelled GAN, or GÃ, people of the southeast coast of Ghana, speaking a dialect of the Kwa branch of Niger-Congo languages. The Ga are descended from immigrants who came down the Niger River and across the Volta during the 17th century. The Ga-speaking peoples were organized into six independent towns (Accra, Osu, Labadi, Teshi, Nungua, and Tema). Each town had a stool, which served as the central object of Ga ritual and war magic. Accra became the most prominent Ga town and is now the capital of Ghana.

The original Ga immigrants were farmers, but today fishing and trading in imported goods are the principal occupations. Trading is generally in the hands of women, and a husband has no control over his wife's money. Succession to most offices held by women and inheritance of women's property are by matrilineal descent. Inheritance of other property and succession to male-held public offices are by patrilineal descent. Men of the lineage live together in a men's compound, while women, even after marriage, live with their mothers and children in a women's compound.

Each Ga town has a number of different cults and many gods, and there are a number of annual town festivals.

Gabar, any member of the small Zoroastrian minority in Iran. The name Gabar was formerly applied derogatorily to the Iranian Zoroastrians; the term is linguistically related to the Arabic *kāfir,* meaning "infidel." The Zoroastrians who remained in Persia (modern Iran) after the Arab–Muslim conquest (7th century AD) had a long history as outcasts. Although they purchased some toleration by paying the jizya (poll tax), not abolished until 1882, they were treated as an inferior race, had to wear distinctive garb, and were not allowed to ride horses or bear arms. They were concentrated in Kermān and Yazd, where Zoroastrians still maintain fire temples. Many also live in Teherān. Long isolated, the Iranian Zoroastrians made contact with the Parsis, the wealthy Zoroastrians of India, in the 15th century, and exchanged messages concerning religious lore. Since the 19th century the Parsis have taken a lively interest in improving the depressed condition of their Iranian coreligionists. They organized a society that raised funds to provide general aid and, especially, facilities for education. With the support of British ambassadors, their representatives remonstrated with the Persian government over discrimination against Zoroastrians. Beginning with the reign of Reza Shah (1921–41), the Iranian Zoroastrians enjoyed wider religious tolerance for decades until the Islāmic revolution of 1978–79. They currently number a few thousand.

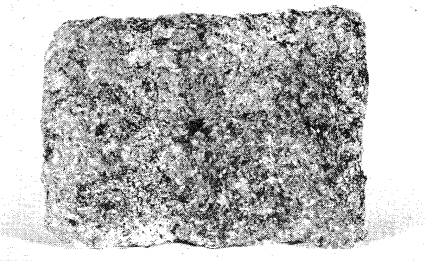
gabardine, any of several varieties of worsted, cotton, silk, and mixed tightly woven fabrics, embodying certain features in common and chiefly made into suits and overcoats. It is a relatively strong and firm cloth, made with a twill weave, and somewhat resembling whipcord but of lighter texture. The weft, or filling, lies entirely at the back and is therefore not visible from the front, a circumstance that allows the use of filling of inferior quality without loss of durability, for only the warp surface is exposed to wear.

Gabardine was originally a type of waterproofed fabric employed for the manufacture of raincoats. A fabric of a more open and much lighter texture, produced entirely of silk, is called silk, or voile, gabardine.

gabbai (Hebrew: "collector"), plural GABBAIM, or GABBAIS, treasurer or honorary official of a Jewish Orthodox congregation, often placed in charge of funds used for charity. The office is a carry-over from former times, when men whose reputations were above reproach collected funds for charity. These *gabba'e tzedaqa* were so esteemed that no financial reports were ever asked for. The Talmud, nonetheless, insisted that they work in pairs to avoid suspicion of wrongdoing.

Originally, gabbaim were men who gathered taxes for the Roman government. In this capacity their reputation as cheats and scoundrels was so notorious that their testimony was not accepted in Jewish courts of law.

gabbro, any of several medium- or coarse-grained rocks that consist primarily of plagioclase feldspar and pyroxene. Essentially, gabbro is the intrusive (plutonic) equivalent of basalt, but whereas basalt is often remarkably homogeneous in mineralogy and composition, gabbros are exceedingly variable. Gabbros are found widely on the Earth and on the Moon as well. Gabbros are sometimes quarried for dimension stone (the black granite of commerce), and the San Marcos Gabbro of southern California is used for gauge blocks, but the



Hornblende gabbro found near Shelby, N.C.
Benjamin M. Shaub

direct economic value of gabbro is minor. Far more important are the primary mineralizations of nickel, chromium, and platinum that occur almost exclusively in association with gabbroic or related ultrabasic (very silica-poor) rocks. Primary magnetite (iron) and ilmenite (titanium) mineralizations are often intimately associated with gabbroic complexes.

Banded, or layered, gabbroic complexes in which monomineral or bimineral varieties are well developed have been described from Montana, the Bushveld in South Africa, and the island of Skye. There are also gabbro complexes that are locally streaky and inhomogeneous and are not regularly layered, as the large, basinlike intrusion at Sudbury, Ont., and some of the larger diabase sills (tabular intrusions), as at Beaver Bay, Minn.; the Palisades, New Jersey; and many of the Karoo (Karroo) diabases in South Africa.

A lopolith at Duluth, Minn., is a notable exception to the rather arbitrary division between layered and unlayered gabbro complexes. The lower part of this mass has the average composition of an olivine gabbro but is strongly banded, with individual bands that vary in composition from anorthosite to peridotite (monomineralic rocks that contain labradorite and olivine). The upper portion is a comparatively homogeneous feldspathic gabbro, locally patchy and streaky but not sharply banded. Between the two major divisions, and again at the top of the feldspathic gabbro, is a zone of granophyre or micropegmatitic granite.

Gabelentz, Hans Conon von der (b. Oct. 13, 1807, Altenburg, Saxe-Gotha-Altenburg [Germany]—d. Sept. 3, 1874, Lemnitz, Ger.), German linguist, ethnologist, and government official who conducted important studies of a large number of languages. He also took some part in political affairs and was prime minister of the duchy of Saxe-Altenburg from 1848 to 1849.

After completing his university studies, Gabelentz did research on the Chinese and Finno-Ugric languages and published *Éléments de la grammaire mandchoue* (1832; "Elements of Manchu Grammar"). Other works include *Grundzüge der syrjanischen Grammatik* (1841; "Principles of Zyryan Grammar") and an edition, with translation, glossary, and grammar (1843–46), of the 4th-century Gothic Bible of Bishop Ulfilas. He also wrote many papers on Swahili, Samoyed, Formosan, and other languages. His *Beiträge zur Sprachenkunde* (1852; "Contributions to Linguistics") included grammars of Dakota and other little-known languages.

In 1864 he published a Manchu translation, with dictionary, of three Mongolian languages. About this time he was preparing *Die melanesischen Sprachen* . . . (1860–73; "The Melanesian Languages . . ."), dealing with the languages of the Fiji, New Hebrides, and other islands of the southwestern Pacific and showing their relation to Indonesian and Polynesian. He reputedly knew 80 languages, 30 of which he spoke fluently.

Gabelich, Gary (b. Aug. 29, 1940, Long Beach, Calif., U.S.—d. Jan. 26, 1984, San Pedro, Calif.), American automobile-racing driver who set a world land speed record of 622.407 miles per hour (1,001.67 km/h) on Oct. 23, 1970 (broken by Stan Barrett in 1979).

Gabelich began racing hot-rod cars while he was in high school. In the late 1950s he competed as a drag racer of both automobiles and boats. In 1969 he set a drag-boat record of 200.44 miles per hour (322.38 km/h). He achieved his 1970 land speed record on the Bonneville Salt Flats (Utah) in a rocket-powered, bullet-shaped car.

gabelle, form of tax in France before the Revolution of 1789—in particular, from the 15th century onward, the tax on salt.

In the 14th century the gabelle denoted any tax on the sale of consumer goods; an ordinance of 1360 made it a permanent tax. In the 15th century the gabelle began to mean specifically the salt tax, that is, a tax on consumption of salt. The nobility, the clergy, and certain other privileged persons were exempted.

The high rate and unequal distribution of the gabelle provoked widespread contraband dealing in salt by smugglers. The gabelle's unpopularity was forcefully expressed in the lists of grievances drawn up for the Estates-General of 1789 on the eve of the revolution. The gabelle was abolished in March 1790.

Gaberones (Botswana): *see* Gaborone.

Gabès (Tunisia): *see* Qābis.

Gabes, Gulf of, Arabic KHALĪJ QĀBIS, French GOLFE DE GABÈS, Latin SYRTIS MINOR, inlet, on the east coast of Tunisia, northern Africa. It is 60 miles (100 km) long and 60 miles wide and is bounded by the Qarqannah (Kerkena) Islands on the northeast and by Jarbah (Djerba) Island on the southeast. Except for the Strait of Gibraltar and the Gulf of Venice, it is the only part of the Mediterranean with a substantial tidal range (about 8 feet [2½ m] at spring tides), causing the uncovering of extensive sandbanks at low water. Sponge and tuna fisheries are located at the main ports of Qābis (Gabès) and Ṣafāqis (Sfax). Oil and natural-gas deposits have been found in the gulf, east of Ṣafāqis.

gabija, also spelled GABIETA (Lithuanian), Latvian UGUNS MĀTE, Old Prussian PANICKE, in Baltic religion, the domestic hearth fire. In pre-Christian times a holy fire (*šventa ugnis*) was kept in tribal sanctuaries on high hills and riverbanks, where priests guarded it constantly, extinguishing and rekindling it once a year at the midsummer festival. Eventually this tradition was moved into the home as the *gabija,* and its care became the responsibility

of the mistress of the house. Every evening she carefully tended the fire lest it go out, then prayed to it to ensure the family's good fortune. During wedding ceremonies the bride was given a fire from her mother's hearth in order that the *gabija* might provide an auspicious beginning for the new family.

Gabin, Jean, original name JEAN-ALEXIS MONCORGÉ (b. May 17, 1904, Paris—d. Nov. 15, 1976, Paris), one of the most popular film actors in France from the 1930s to the 1960s.

Gabin was the son of a music-hall comedian (stage name Jean Gabin). In 1923 he began a theatrical career in the Folies-Bergère but left the stage after his film debut in *Chacun sa Chance* (1931). He achieved fame in *Maria Chapdelaine* (1934) and later in *Pépé le Moko* (1937), directed by Julien Duvivier. One of his most memorable roles was in director Jean Renoir's *Grande Illusion* (1937; *Grand Illusion*), a classic antiwar film. In *Quai des brumes* (1938; U.S. title, *Port of Shadows*) and *Le Jour se lève* (1939; *Daybreak*), both directed by Marcel Carné, Gabin was cast as a tough-willed son of misfortune surviving in a marginal world of social outcasts. In his later films, he often portrayed detective or gangland figures—*e.g.,* Inspector Maigret and competent professional criminals in *Touchez pas au Grisbi* (1953), *Speaking of Murder* (1959), *Money, Money, Money* (1962), and *The Upper Hand* (1967).

Gabinius, Aulus (d. 47 BC, Salonae, Dalmatia [now Split, Yugos.]), Roman politician and a supporter of Pompey the Great.

As tribune in 67 BC Gabinius proposed a law that gave Pompey command of the Mediterranean and all the land within 50 miles (81 km) of its coast as a means of controlling the depredations of pirates. Another Gabinian measure checked the lending of money to foreign ambassadors at Rome. Its object was to prevent the bribing of senators. As consul (58), Gabinius helped to procure the exile of Cicero.

Gabinius, bronze bust; in the Museo Archeologico Nazionale, Naples

Alinari—Art Resource/EB Inc.

As proconsul of Syria (57–54) he reinstated Hyrcanus as high priest at Jerusalem, suppressed revolts, introduced administrative changes in Judaea, and rebuilt several towns. He was sent by Pompey to Egypt, without the consent of the Senate, to restore Ptolemy XII Auletes to his kingdom. During his absence disturbances arose in Syria and Palestine, which he suppressed with some difficulty. He incurred the hostility of the *publicani* ("tax collectors"), and on his return to Rome he first had to face a charge of treason, on which he was acquitted; he was then condemned for extortion and sent into exile (54). Recalled by Julius Caesar in 49, he fought for him in Illyricum (48–47) but died at Salonae (near modern Split).

gable, triangular section of wall at the end of a pitched roof, extending from the eaves to the peak. The gables in classical Greek temples are called pediments (*see* pediment).

The architectural treatment of a gable results from the effort to find an aesthetically pleasing solution to the problem of keeping water out of the intersection of walls and roof. This was accomplished either by carrying the roof out over the top of the end walls or by carrying the end walls up above the roof level and capping them with a waterproof coping. The former method is in general use in wooden and other small buildings with pitched roofs, while the latter method was used in larger and more monumental masonry structures, particularly those in the Gothic style.

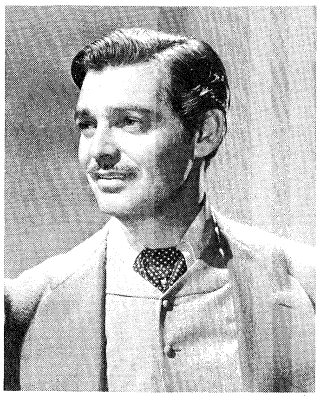
The gable at the end of a ridge-roofed structure, or gable end, usually has straight sides, follows the roof's slope, and is often bounded by the roof's overhanging eaves. If the gable end projects above the roof level to form a parapet, however, its silhouette may be one of many types—such as the crow-stepped, catstepped, or corbiestepped gable—with a stepped outline. In this case, the edge of the parapet is often trimmed to form an ornamental silhouette. In northern and western Europe, where roofs of steep pitch are common, gables were often richly decorated with steplike or curved forms and were further ornamented with urns, statues, obelisks, and scrolls. Among the earliest and most elaborate examples of buildings with parapet gables are the late medieval Dutch town houses of Amsterdam. Gables have also been important features in the traditional architecture of China and Japan. In these countries gables were ornamented with rich projecting roof tiles, grotesque sculptures of animals at the ridge and eaves, and occasionally with surface carving.

Gable, (William) Clark (b. Feb. 1, 1901, Cadiz, Ohio, U.S.—d. Nov. 16, 1960, Hollywood), American film actor who for three decades was one of Hollywood's leading male stars. Gable rose to fame with his creation of a rough, masterful, romantic hero—a role epitomized in his portrayal of Rhett Butler in *Gone with the Wind* (1939).

The only son of an itinerant oil-field worker, Gable worked at a variety of odd jobs as a youth and then joined the Ed Lilly stock company as a callboy. Coached by his first wife, Josephine Dillon, a former actress, he played his first Broadway lead in *Machinal* (1928).

Gable had played bit parts in silent films as early as 1924. With the introduction of sound films, he returned to Hollywood in 1930 and was successful in a series of gangster roles that included *The Finger Points* (1931) and *Night Nurse* (1931). Under contract to Metro-Goldwyn-Mayer studios from 1931 to 1954, he switched gradually to the light-hearted, adventurous parts for which he became famous. During the 1930s, in such pictures as *Red Dust* (1932) and *Saratoga* (1937), two of several films made with actress Jean Harlow, and *Boom Town* (1940) and *San Francisco* (1936), in which he costarred with the prominent actor Spencer Tracy, Gable became the American ideal of virility. He won an Academy Award for his performance in *It Happened One Night* (1934) and was nominated for similar awards for his work in *Mutiny on the Bounty* (1935) and *Gone with the Wind.*

After the death in 1942 of his third wife, the actress Carole Lombard, Gable enlisted in the U.S. Army Air Corps during World War II; he won the Air Medal and achieved the rank of major. He appeared in several films in the late 1940s and '50s, notably in *Mogambo* (1953), a remake of *Red Dust,* and in *Run Silent, Run Deep* (1958). His final film role, completed two weeks before his death, was as an aging cowboy in Arthur Miller's *The Misfits* (1961). A biography, *Long Live the King,* by Lyn Tornabene, was published in 1977.



Gable in *Gone with the Wind,* 1939

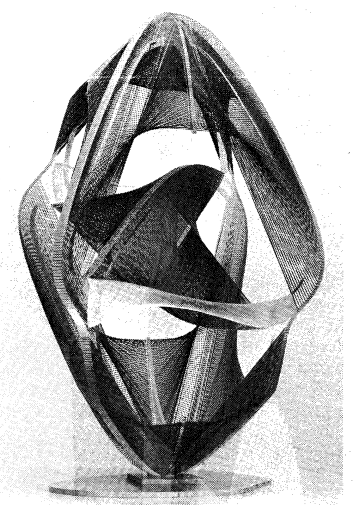
© Metro-Goldwyn-Mayer 1939

Gablonz an der Neisse (Czechoslovakia): *see* Jablonec nad Nisou.

Gabo, Naum, original name NAUM NEEMIA PEVSNER (b. Aug. 5, 1890, Bryansk, Russia—d. Aug. 23, 1977, Waterbury, Conn., U.S.), pioneering Russian-born Constructivist artist whose use in his sculptures of such materials as glass, plastic, metal, and wire signaled a rejection of traditional concepts of mass in favour of a sense of spatial movement.

Gabo studied medicine, natural science, and engineering at the University of Munich. In 1913 he walked from Munich to Florence and Venice, absorbing art and architecture. Early in his life he changed his name to Gabo in order to distinguish himself from his brother, Antoine Pevsner, a painter. While in Paris in 1913/14 he met Archipenko and others involved with the avant-garde movement. In Stockholm in 1915 he produced his first Cubist-influenced sculptures, exemplified by "Head of a Woman" (1916, celluloid and metal). During World War I Gabo lived with his brother in Oslo, where they experimented along the Constructivist lines laid down by their fellow Russian Vladimir Tatlin.

Returning to Russia after the Revolution, Gabo and Pevsner saw political forces redirect art from exploration to propaganda. In 1920 they issued the "Realistic Manifesto" of Constructivism, which they posted and distributed in the streets of Moscow. In it they asserted



"Linear Construction in Space, Number 4," plastic and stainless steel sculpture by Naum Gabo, 1957–58; in the Whitney Museum of American Art, New York City

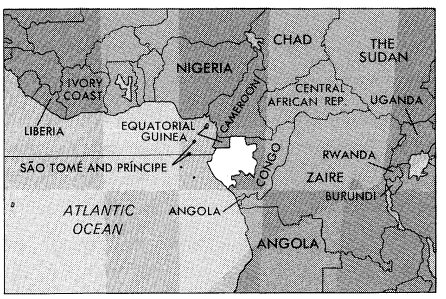
By courtesy of the Whitney Museum of American Art, New York City, gift of the Friends of the Whitney Museum of American Art

their techniques and the artist's right to pursue truth, claiming that an art that struggles for essences must be founded on the concepts of space and time. In 1920 Gabo produced a 17-inch-steel-blade kinetic sculpture that demonstrated his principles.

He left Russia in 1922 and lived for 10 years in Germany, where he worked with Moholy-Nagy and others. In 1932 he went to Paris, then to England from 1936 to 1946. He moved to the United States in 1946 and in 1953–54 taught at the Harvard Graduate School of Architecture.

The motif of Gabo's sculptural work is indicated in its titles: "Spiral Theme" (Museum of Modern Art, New York City), "Translucent Variation on Spheric Theme" (1951; Solomon R. Guggenheim Museum, New York City), "Linear Construction in Space, Number 4" (1957–58; Whitney Museum of American Art, New York City). One of his most impressive works is a sculpture commissioned for the Bijenkorf Building, Rotterdam (1955), unveiled in 1957.

Gabon, officially GABONESE REPUBLIC, French GABON, or RÉPUBLIQUE GABONAISE, country of central Africa straddling the Equator on the west coast of Africa, and covering an area of 103,347 sq mi (267,667 sq km). The capital is Libreville. It is bordered by Equatorial Guinea and Cameroon to the north, Congo to the south and east, and the Atlantic Ocean to the west (São Tomé e Príncipe lies off the coast). The population in 1981 was



Gabon

estimated to be 1,409,000 according to the country. The United Nations' estimate for 1982 was 1,108,000. Relevant statistical information in this article is based on the country's figure.

The article that follows is a summary of significant detail about Gabon. Fuller treatment is provided in the following MACROPAEDIA articles. For geography and history, *see* Central Africa; for information about the country, its history, and its peoples in their regional setting, *see* Africa.

For current history and for statistics on society and economy, *see* the article "World Affairs" and BRITANNICA WORLD DATA, respectively, in the *Britannica Book of the Year.*

The land. Gabon and the basin of its major river, the Ogooué, are nearly coterminous; almost 90 percent of the basin lies within Gabon, comprising the eastern two-thirds of the country. Two lesser regions, the Woleu-Ntem river basin to the north and the coastal plain of the west and southwest (defined by an arc of highlands) separate most of the Ogooué Basin from the Atlantic Ocean. The Ogooué River collects water from a number of lakes below Lambaréné before it empties into the Atlantic via a delta that separates the northern and southern stretches of the coastal plain. Between the southern coastal plain and the Ogooué rises the Massif du Chaillu to an elevation of 3,215 ft (980 m) at the country's highest peak, Mont Iboundji. The southern coastal plain is a continuation from the south of Congo's sand beaches, longshore bars, and coastal lagoons. The northern portion of the coastal plain, generally wider and with more irregular coastline than its southern counterpart, is separated from the Ogooué region by a series of upland plateaus (ranging from 1,000 to 2,000 ft above sea level). The plateaus merge northeastward to join the Monts de Cristal, establishing the divide between the Woleu-Ntem and Ogooué basins in the northwest.

Gabon is characterized by typical equatorial heat and humidity. Rainfall varies from an annual average of 120 in. (3,050 mm) at Libreville to 150 in. on the northwest coast, almost all of it between October and May. Despite the absence of rain, humidity remains high the rest of the year. Temperature shows little seasonal variation, averaging about 81° F (27° C).

About two-thirds of the country is covered by a dense equatorial rain forest containing more than 3,000 species of vegetation, including the okoumé (Gabon mahogany), a hardwood that forms the backbone of Gabon's wood industry. The dense forest vegetation makes the country an animal paradise; antelopes, monkeys, and tropical birds, as well as elephants, flourish.

Gabon's mineral resources are few but important. Its reserve of manganese of some 200,000,000 metric tons ranked fourth in the world (in the early 1980s), following South Africa, the Soviet Union, and Australia. It also had 850,000,000 tons of iron ore (500,000,000 tons of high-grade [65 percent Fe]). Its energy reserves, major within Africa, consisted of about 480,000,000 bbl (66,000,000 metric tons) of petroleum, 490,000,000,000 cu ft (14,000,000,000 cu m) of natural gas, and commercial quantities of uranium.

The people. Gabon has more than 40 ethnic groups with different languages. The Fang, who belong to the larger Pahouin group of Central Africa, live north of the Ogooué River. The largest groups south of the river are the Punu, Sira, and the Nzebi; their less numerous neighbours are the Teke and Kota. One of the smallest ethnic groups is the Omyéné. About 40 percent of the population is Christian, with about three times as many Roman Catholics as Protestants. There are a few Muslims; others have kept traditional African religions. Little more than a third of Gabon's population is under 15 years of age, a relatively old population in a region generally much younger. Population density is about 14 persons per sq mi (5.3 per sq km). Gabon's birth rate is estimated variously at between 31–36 per 1,000. The death rate is about 21–22 per 1,000. The annual rate of natural growth is estimated at between 0.9 and 1.4 percent. The country views these levels and trends as too low. Provision of adequate health services and of maternal and child health programs are given top priority, perhaps in part because of the example set by the hospital that was maintained at Lambaréné by Albert Schweitzer.

Economy. Gabon has a mixed, developing economy based largely on the exploitation of mineral and timber resources. The government has encouraged foreign investors with liberal economic policies, but there is also significant government direction and planning. The gross national product (GNP) reached U.S. $2,568,000,000 in 1980; per capita GNP was the highest in tropical Africa at $2,334 and due only in part to petroleum revenues.

Agriculture employs more than one-half of the work force but declining output accounts for less than 5 percent of the GNP. Farming is primarily subsistence and production is insufficient to meet domestic demand. The staple crop is cassava. Export crops include cocoa, coffee, and palm oil.

Forestry was the primary industry in Gabon until mineral exploitation began in the early 1960s. Forest resources near the coast and rivers are practically exhausted and exploitation of the interior began with the construction of the Transgabon Railroad in the late 1970s. Timber exploitation is carried on partly by large European companies and partly by Gabonese enterprise.

The rapidly developing mining industry is the main source of Gabon's economic growth. Petroleum has become the most important mineral product, accounting for close to three-fifths of the GNP and more than two-thirds of total exports. The Gabonese government maintains a 30 percent share in exploitation, which is carried out by foreign oil companies. Gabon also produces large amounts of manganese and uranium.

Manufacturing accounts for less than 10 percent of the GNP, and a substantial amount of production is represented by timber (okoumé) processing. Light industry has been expanding and diversifying since the opening in 1967 of a petroleum refinery at Port-Gentil. A dramatic increase in annual production of electricity (from 74,000,000 kW-hr in 1968 to 569,000,000 kW-hr in 1980) can be partly attributed to the construction of the first hydroelectric plant at Kinguélé, near Libreville.

Exports, composed almost entirely of petroleum, manganese, uranium, and forest products, generally exceed imports. Principal trading partners include France, the United States, and Germany. Gabon borrowed heavily from France, (then-West) Germany, and the European Economic Community (EEC) for the purpose of building the Transgabon Railroad and initiating other development. At the insistence of creditors, the government is working toward a manageable external debt structure under an International Monetary Fund (IMF) stabilization plan.

Administrative and social conditions. Gabon is a one-party republic, governed by the Parti Democratique Gabonais (PDG). Supreme power is centred in the party's 33-member political bureau, which can issue decrees with the force of law. The constitution, adopted in 1961 and revised in 1981, vests executive power in the president, who is elected on an unopposed ballot by universal adult suffrage. The president appoints a cabinet. Legislative responsibility rests with the 93-member National Assembly; 84 members are elected by universal adult suffrage and 9 are appointed by the president. Highest judicial authority lies in the Supreme Court and the High Court of Justice, which has the power to try the president and other officials. From the late 1960s through the early 1980s, Gabonese politics was dominated by El Hadj Omar Bongo, who has served as both president of the republic and secretary-general of the PDG.

The country's social welfare system provides benefits to employed persons for work injury, maternity, disability, and old age. A family allowance law also offers benefits to employees with one or more children under the age of 16 years.

Like most of tropical Africa, Gabon is plagued by poor health conditions. Diseases spread by insects and vermin are widespread. Many Gabonese have severe respiratory ailments, aggravated by the hot and humid climate. Gabon's infant mortality rate is 122 per 1,000 live births; life expectancy at birth is only about 44 years. The country has more doctors per 10,000 population than many other African countries, but there is a severe shortage of medical personnel in rural areas.

Education in Gabon is compulsory for children between the ages of 6 and 16, and about 80 percent of this age group attends school. The country's major institution of higher learning is Omar Bongo University. Many students, however, go to France for a university education.

All news media are owned and operated by the government.

Traditional Gabonese art is famous throughout Africa for its reliquary figures, ritual

masks, and fetishes. A number of these objects are on display at the Gabon Museum of Arts and Traditions in Libreville. Although it has been independent since 1960, Gabon—formerly one of the four colonies of French Equatorial Africa—has retained close cultural ties with France; Gabonese intellectual and artistic life is often strongly influenced by French cultural developments.

History. Artifacts dating from late Paleolithic and early Neolithic times have been found in Gabon, but it is not known when the major migrations of Bantu speakers that established Gabon's ethnic composition occurred; it may have been as early as the beginning of the Christian era. Pygmies were probably the original inhabitants. The Fang, however, did not arrive before the late 18th century, when they were attracted to the Gabon coastal areas by the presence of European traders.

The Portuguese arrived at the Gabon Estuary in 1472 and were followed by French, Dutch, and English traders who operated along those coastal rivers that had trading networks reaching into the interior. The slave trade dominated commerce throughout the 18th and much of the 19th centuries. The French were the most successful in seeking treaties with the local population, and in 1839–42 they achieved the first transfer of sovereignty from the Mpongwe chieftains. From 1843 to 1886 Gabon was administered by French naval officers in conjunction with the French West Africa administration. In 1886 the colony of French Congo was established to include both Gabon and the Congo. At the turn of the century Gabon became a separate colony within the newly created French Equatorial Africa.

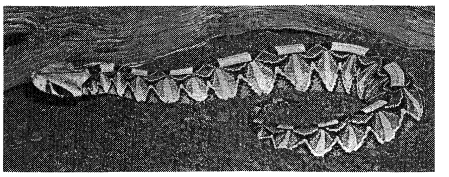
In 1898 Gabon was divided among concessionary companies, which became notorious for their extreme exploitation of both human and natural resources. Despite continued protests, they were not fully dissolved until 1930.

In World War II Free French troops took over Gabon from the Vichy government in 1940, and in 1946 the colony became an overseas territory of France with its own territorial assembly. In 1958 it became an autonomous republic within the French Community. After concluding cooperation agreements with France, Gabon declared its independence on Aug. 17, 1960. The early years of instability, when a coup attempted to overthrow Gabon's first president, Léon M'ba, were followed by years of stable growth and prosperity under his successor, Omar Bongo; his long period of rule after 1967 led to political restiveness by the early 1980s, but Gabon's continuing prosperity provided little incentive for drastic political action.

Gabon Estuary, French ESTUAIRE DU GABON, inlet of the Gulf of Guinea, in western Gabon. It is fed by the Como and Mbeï rivers that rise in the Cristal Mountains to the northeast. The estuary is 40 miles (64 km) long and 9 miles (14 km) wide at its mouth. It was explored in the 1470s by Portuguese navigators who may have named it Gabão ("Hooded Cloak"; hence *Gabon*) because of its shape, and it was long considered the finest harbour of the West African coast.

The main port on the estuary, Libreville, became Gabon's national capital and largest city. Logs are floated down the Como River to Owendo and Libreville on the estuary's northwest shore, and hydroelectric power is provided to the locality by a dam at Kinguélé upstream on the Mbeï River.

Gaboon viper (*Bitis gabonica*), extremely venomous but usually docile snake of the family Viperidae, found in tropical forests of Central Africa. It is the heaviest venomous snake in Africa and grows to a length of 2 m (about 7 feet) and a weight of 8 kg (18 pounds).



Gaboon viper (*Bitis gabonica*)
Cy LaTour at the St. Louis Zoo

The Gaboon viper is a thick-bodied, broad-headed snake with two hornlike projections on its snout. Its body is boldly patterned in rectangles and triangles of buff, purple, and brown.

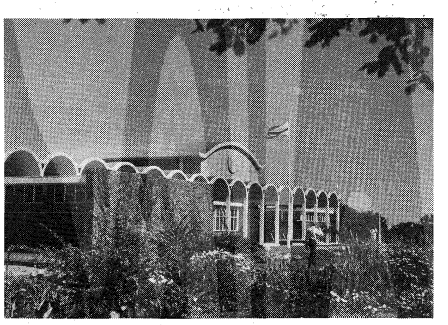
Gabor, Dennis (b. June 5, 1900, Budapest—d. Feb. 8, 1979, London), Hungarian-born electrical engineer and winner of the Nobel Prize for Physics in 1971 for his invention of holography, a system of lensless, three-dimensional photography that has many applications.

A research engineer for the firm of Siemens and Halske in Berlin from 1927, Gabor fled Nazi Germany in 1933 and worked with the Thomson-Houston Company in England (later becoming a British subject). In 1947 he conceived the idea of holography and, by using conventional filtered-light sources, developed the basic technique. Because conventional light sources generally provided too little light or light that was too diffuse, holography did not become commercially feasible until the demonstration, in 1960, of the laser, which amplifies the intensity of light waves. In 1949 Gabor joined the faculty of the Imperial College of Science and Technology, London, where in 1958 he became professor of applied electron physics. His other work included research on high-speed oscilloscopes, communication theory, physical optics, and television. He was awarded more than 100 patents.

Gaboriau, Émile (b. Nov. 9, 1832/33/35, Saujon, Fr.—d. *c.* Oct. 1, 1873, Paris), French novelist, best-known as the father of the *roman policier* (detective novel), who has been described as the Edgar Allen Poe of France.

Gaboriau's prolific imagination and acute observation generated 21 novels (originally published in serial form) in 13 years. He made his reputation with the publication in 1866 of *L'Affaire Lerouge* (*The Widow Lerouge*) after having published several other books and miscellaneous writings. His later books, many of them classics of their kind, include *Le Crime d'Orcival* (1867; *The Mystery of Orcival*), *Monsieur Lecoq* (1868), *Les Esclaves de Paris* (1868; *The Slaves of Paris*), *La Vie infernale* (1870; *The Count's Millions*), and *L'Argent des autres* (1874; *Other People's Money*).

Gaborone, formerly (until 1969) GABERONES, town, capital of Botswana, southern Africa. The seat of government was transferred there from Mafeking (now spelled Mafikeng), South Africa, in 1965, one year before Botswana became independent of Britain. Gaborone is located on the Cape–Zimbabwe railway and is the site of government offices, parliament buildings, health facilities, a thermal power station, and an airport. It is the seat of the University of Botswana (founded 1971) and has a national museum and art gallery (1968), which includes departments of natural history, archaeology, and prehistory. Pop. (1986 est.) 96,100.



The National Assembly building in Gaborone, Botswana
D. Rawson—Photo Researchers/EB Inc.

Gabriel, Hebrew GAVRI'EL, Arabic GIBRĀ'ĪL, in the Bible and the Qur'ān, one of the archangels. Gabriel was the heavenly messenger sent to Daniel to explain the vision of the ram and the he-goat and to communicate the prediction of the Seventy Weeks. He was also employed to announce the birth of John the Baptist to Zechariah and to announce the birth of Jesus to the Virgin Mary. It is because he stood in the divine presence that both Jewish and Christian writers generally speak of him as an archangel. In the Books of Enoch "the four great archangels" are Michael, Uriel, Suriel (Raphael), and Gabriel, though elsewhere they are said to number seven. Gabriel's feast is kept on March 24, the day before the Feast of the Annunciation. Both his name and his functions were taken over by Islām from Judaeo-Christian tradition. His name is mentioned in the Qur'ān only three times, but various epithets in that scripture are widely recognized as referring to him.

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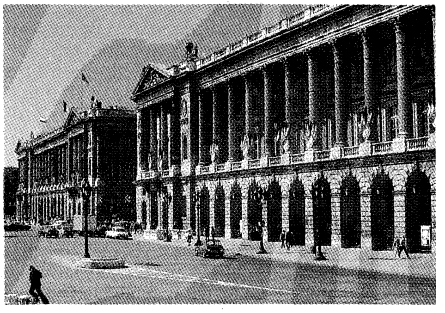
Gabriel, also called GABRIEL PROSSER (b. *c.* 1775, near Richmond, Va.—d. September 1800, Richmond, Va., U.S.), American bondsman who planned the first major slave rebellion in U.S. history (Aug. 30, 1800), which, though aborted, greatly increased the whites' fear of the slave population throughout the South.

Son of an African-born mother, Gabriel grew up as the slave of Thomas H. Prosser. Gabriel became a deeply religious man, strongly influenced by biblical example. In the spring and summer of 1800, he laid plans for a slave insurrection aimed at creating an independent black state in Virginia with himself as king. He planned a three-pronged attack on Richmond, Va., that would seize the arsenal, take the powder house, and kill all whites except Frenchmen, Methodists, and Quakers. Some historians believe that Gabriel's army of 1,000 slaves (estimates range from 2,000 to 50,000), assembled 6 miles (9.5 km) outside the city on the appointed night, might have succeeded had it not been for a violent rainstorm that washed out bridges and inundated roads. Before the rebel forces could be reassembled, Governor James Monroe was informed of the plot and ordered out the state militia. Gabriel and about 34 of his companions were subsequently arrested, tried, and hanged.

Gabriel, Ange-Jacques, also called JACQUES-ANGE GABRIEL (b. Oct. 23, 1698, Paris—d. 1782, Paris), French architect who built or enlarged many châteaus and palaces during the reign of Louis XV. He was one of the most important and productive French architects of the 18th century.

The most celebrated member of a family of architects, he was the son of Jacques V (1667–1742), whom he succeeded as premier architect to Louis XV and director of the Academy of Architecture in 1742. Gabriel was the chief architect for most of the major building projects undertaken during Louis XV's reign. Under him the royal châteaus and palaces were redesigned, enlarged, or renovated in order to satisfy Louis' standards of personal comfort. Among Gabriel's royal

commissions were enlargements or extensions of the châteaus of Fontainebleau (1749), La Muette (1746), Compiègne (1751), and Choisy (1752); additions to the Louvre (1755) in Paris; an ambitious project for the Palace of Versailles (1763), including the completion of its right wing and the building of the Opera House and the Petit Trianon there; and the construction of the École Militaire (1752) in Paris. Gabriel provided virtually all of the royal residences with theatres, also built pavilions and hermitages for some of them, and designed hunting lodges in the major royal forests. The magnificent Place Louis XV (now Place de la Concorde) in Paris (1755) demonstrates his talents as an urban planner.



Place de la Concorde, by Ange-Jacques Gabriel, Paris, 1755

A. Boisuerd/Shostal Associates

Gabriel was not a great innovator but rather was an extremely competent builder whose structures exhibit a "noble simplicity" in the austere but harmonious arrangement of their masses and their subdued classical decoration. He excelled at endowing large structures with majestic proportions, as exemplified in the École Militaire. He was also notable for his use of attached columns in place of pilasters, in both exterior and interior facades. His best-known work is the Petit Trianon at Versailles (1762), which is universally famous for its harmonious proportions and elegant, Palladian-inspired lines.

Gabrieli, Andrea, also called ANDREA DI CANNAREGIO, CANNAREGGIO, or CANAREGGIO (b. *c.* 1510–20, Venice—d. late 1586, Venice), Italian Renaissance composer and organist, known for his madrigals and his large-scale choral and instrumental music for public ceremonies. His finest work was composed for the acoustic resources of the Cathedral of St. Mark in Venice. He was the uncle of Giovanni Gabrieli.

He was born in the Canareggio quarter of Venice, but nothing is known about Andrea Gabrieli until 1536, when he became a singer at St. Mark's Cathedral and a pupil of its music director, the great Franco-Flemish composer Adriaan Willaert. From Willaert he learned the art of writing polyphonic motets and in particular that of composing for separated choirs placed in different parts of the church with consequent stereophonic effect. It is possible that Andrea was a singer at Verona cathedral around 1550.

In 1558 he became organist at the church of S. Geremia in Venice but soon left for an extended period of foreign travel. He served in the Bavarian court chapel at Munich under another great Franco-Fleming, Orlando di Lasso, then visited the court of Graz in Austria, and finally was patronized by the noble Fugger family in Augsburg. In 1564 he returned to Venice to become second organist at St. Mark's, where he remained until 1584, when he succeeded the virtuoso performer Claudio Merulo as first organist—a position he held until his death in 1586. Despite his profession, not much of his output in these years was organ music; there were several volumes of madrigals, socially enjoyable settings of Italian poetry to be sung at private houses or cultural academies, where musical life flourished. And there was the large-scale choral and instrumental music for ceremonies of church and state, for which Andrea is best-known today. His motets and masses exploit the tonal variety possible when instruments are added to a choir. Some of these works were published posthumously in 1587: one of the finest is the *Magnificat* for three choirs and orchestra, doubtless intended to be performed in St. Mark's.

MAJOR WORKS. Madrigals for three to six voices in various collections; masses in six parts, *Primus liber missarum* (1572); *Magnificat* for three choirs; motets; various ricercari and canzoni.

Gabrieli, Giovanni (b. 1556?, Venice—d. Aug. 12?, 1612, Venice), Italian Renaissance composer, organist, and teacher, celebrated for his sacred music, including massive choral and instrumental motets for the liturgy.

Giovanni Gabrieli studied with his uncle, Andrea Gabrieli, whom he regarded with almost filial affection. To the latter's foreign travels and connections Giovanni owed his chance to become known abroad. Giovanni also served (1575–79) under Orlando di Lasso in Munich. In 1584 he returned to Venice and a year later succeeded his uncle as second organist of St. Mark's Cathedral—the post he held for life.

After Andrea's death in 1586, Giovanni quickly assumed the limelight in the field of ceremonial music, though he was never so active as a madrigalist. The publication of his uncle's music in 1587 was a mark of respect but also included some of his own church music. Giovanni's foreign connections included Hans Leo Hassler, the German composer and former pupil of Andrea, who avidly adopted the Venetian style, and patrons, such as the Fugger family and Archduke Ferdinand of Austria. In later years Giovanni became a famous teacher; his most notable student was the German Heinrich Schütz.

After 1587 Giovanni's principal publications were the two immense *Sacrae symphoniae* of 1597 and 1615 (printed posthumously), both of which contained purely instrumental music for church use or massive choral and instrumental motets for the liturgy. Like his uncle, he usually conceived the music for separated choirs but showed an increasing tendency to specify which instruments were to be used and which choirs were to consist of soloists and full choir, as well as to distinguish the musical style of each, thus initiating a completely new approach to the creation of musical colour and orchestration. In the well-known *Sonata pian'e forte,* for eight instruments, directions to play loud and soft are given. Among the motets, his masterpiece is perhaps *In ecclesiis,* for four soloists, four-part choir, violin, three cornets, two trombones, and organ, these forces pitted against one another in an endless variety of combinations.

MAJOR WORKS. Various motets, among them *In ecclesiis;* madrigals in various collections; *Canzoni e sonate* (1615); *Sacrae symphoniae,* book 1 (1597), including the *Sonata pian'e forte; Sacrae symphoniae* (1615); *Concerti di Andrea et di Giovanni Gabrieli a 6–16 voci* (1587, containing pieces by Andrea).

BIBLIOGRAPHY. Egon Kenton, *Life and Works of Giovanni Gabrieli* (1967); and Denis Arnold, *Giovanni Gabrieli and the Music of the Venetian High Renaissance* (1979, reprinted 1986).

Gabrielino, also called SAN GABRIELINO, or GABRIELEÑO, any of two—and possibly three—dialectally and culturally related North American Indian groups who spoke a language of Uto-Aztecan stock and lived in the lowlands, along the seacoast, and on islands in southern California. The Gabrielino proper inhabited what are now southern and eastern Los Angeles County and northern Orange County, as well as the islands of Santa Catalina and San Clemente; they were named after the Franciscan mission San Gabriel Arcángel (and thus have sometimes been called San Gabrielinos). The second group, Fernandino (Fernandeño, or San Fernandinos, named after the mission San Fernando Rey de España), occupied areas in and around the San Fernando Valley and some seacoast. A third apparently related group were the Nicolino (Nicoleño, or San Nicolinos), who inhabited San Nicolas Island. The Gabrielino groups occupied some of the most fertile and pleasant land in California, and, because they were among the wealthiest and most advanced Indians in the region, they exercised considerable influence on all their neighbours. In religion, for instance, the Gabrielino were the source of the jimsonweed cult, a widely practiced southern California religion that involved various sacred and esoteric rituals and the drinking of toloache, a hallucinogen made from the jimsonweed (*Datura stramonium*).

The interior and coastal Gabrielino lived in houses constructed of poles and tule mats and relied on gathering acorns and other plant foods, supplemented by fishing and hunting. Island Gabrielino, especially the Nicolino, often built dwellings of whale ribs covered with sea-lion skins or brush; and for food they relied more on fish, sea mammals and birds, and mollusks. All groups made baskets; and from Santa Catalina Island came soapstone that was made into such items as pots and scoops, ceremonial vessels, artistic carvings, beads, and ornaments. Trade between islanders, coastal people, and interior Indians was extensive, using currency of clamshell beads. Each Gabrielino village had a hereditary chief and shamans.

No identifiable Gabrielino now exist. *See also* Mission Indians.

Gabrilowitsch, Ossip (Salomonovich) (b. Feb. 7, 1878, St. Petersburg [now Leningrad]—d. Sept. 14, 1936, Detroit), Russian-born American pianist noted for the elegance and subtlety of his playing.

After study with two of the outstanding pianists of his day—Anton Rubinstein in St. Petersburg and Theodor Leschetizky in Vienna—Gabrilowitsch toured widely in Europe and the United States. In 1909 he married Mark Twain's daughter, the singer Clara Clemens, with whom he frequently gave recitals. After having conducted in Munich and Vienna he became (1918) conductor of the Detroit Symphony Orchestra.

Gabrovo, town, north-central Bulgaria. It is situated on both banks of the Yantra River, at the foot of the Shipka Pass in the Balkan Mountains. A major industrial centre, Gabrovo has a high in-migration population from the surrounding area. Called the "Bulgarian Manchester," the town has a large textile industry—clothes, leather goods, and accessories. Other manufactures are machine tools, footwear, electrical machinery, and textile machinery.

According to legend, the town was founded in the mid-15th century by an itinerant blacksmith, who was later joined by other craftsmen. In 1835 the first Bulgarian secular school opened there, and in 1877 the town was liberated from the Turks. In the mountains to the south, craft industries are maintained in textiles, woodworking, and carpet making. Pop. (1986 est.) 81,531.

Gabú, formerly NOVA LAMEGO, town, eastern Guinea-Bissau, western Africa. Gabú is situated along the Colufe River, a tributary of the Gêba River, and is an agricultural marketing centre. Peanuts (groundnuts), grown mainly by the Muslim Fulani peoples, are the principal crop of the region. The town is connected by road to Bissau, the national

capital, and to other coastal towns. Pop. (1979 prelim.) town, 7,803.

gaccha, among the Śvetāmbara sect of the Jaina religion of India, a brotherhood of monks and their lay followers. Although some 84 separate *gacchas* are said to have arisen since about the 7th–8th century, only a few have survived as modern orders. Among them are the Kharatara (located mainly in Rājasthān), the Tapā, and the Añcala. The *gacchas* do not differ from one another on any significant aspects of religious belief and are not Śvetāmbara subsects in the same sense as the non-idolatrous Sthānakavāsī (*q.v.*) and Terāpanthī.

In the Digambara sect of Jainism a similar brotherhood is called *gaṇa.* Both *gacchas* and *gaṇas* commonly trace the spiritual genealogies of their leaders back to early and illustrious Jaina figures.

gachupín (Spanish-born Latin American): *see* peninsular.

Gad, one of the 12 tribes of Israel that in biblical times comprised the people of Israel who later became the Jewish people. The tribe was named after the elder of two sons born to Jacob and Zilpah, a maidservant of Jacob's first wife, Leah.

After entering the Promised Land, each tribe was assigned a territory by Joshua, who replaced Moses as leader after the latter's death. The tribe of Gad settled on land east of the Jordan River, gained renown for its military spirit, and was one of the 10 northern tribes that formed a separate kingdom in 930 BC with Jeroboam I as king. Following the Assyrian conquest of 721 BC, the 10 tribes were partially dispersed and eventually assimilated by other peoples. The tribe of Gad thus became one of the Ten Lost Tribes of Israel.

Gadaba language: *see* Gutob language.

Gadadhar Chatterji, also called GADADHAR CHATTOPADHYAYA (Hindu saint): *see* Ramakrishna.

Gadamer, Hans-Georg (b. Feb. 11, 1900, Marburg, Ger.), German philosopher whose system of philosophical hermeneutics, derived in part from concepts of Wilhelm Dilthey, Edmund Husserl, and Martin Heidegger, was influential in 20th-century philosophy, aesthetics, theology, and criticism.

The son of a chemistry professor, Gadamer was educated in the humanities at the universities of Breslau, Marburg, Freiburg, and Munich, earning his doctoral degree in philosophy under Heidegger at Freiburg in 1922. He lectured in aesthetics and ethics at Marburg in 1933, at Kiel in 1934–35, and again at Marburg, where he was named extraordinary professor in 1937. Two years later, he was appointed full professor at the University of Leipzig. He subsequently taught at the universities of Frankfurt am Main (1947–49) and Heidelberg (from 1949). He became professor emeritus in 1968.

Gadamer's most important work, *Wahrheit und Methode* (1960; *Truth and Method,* 1975), is considered by some to be the major 20th-century philosophical statement on hermeneutical theory. His other works include *Kleine Schriften* (1967– ; *Philosophical Hermeneutics,* 1976); *Dialogue and Dialectic* (1980), comprising eight essays on Plato; and *Reason in the Age of Science* (1982), a translation of essays drawn from several German editions.

Gadames (Libya): *see* Ghadāmis.

Gadara, modern UMM QAYS, ancient city of Palestine, a member of the Decapolis, located just southeast of the Sea of Galilee in Jordan. Gadara first appeared in history when it fell to the Seleucid Antiochus the Great (218 BC); the Jewish king Alexander Jannaeus took it after 10 months' siege (*c.* 100 BC). It was restored by the Roman general Pompey, and Augustus gave it to Herod the Great (30 BC). Archaeological remains include three large theatres, a basilica, a temple, and a colonnaded street.

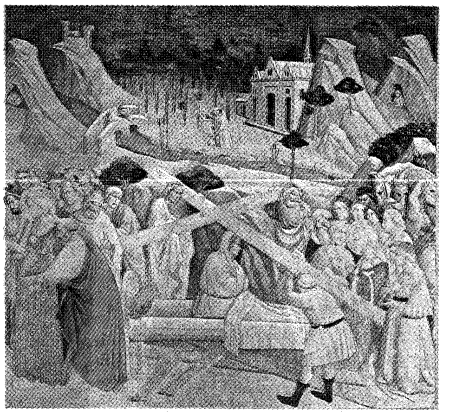
Gadda, Carlo Emilio (b. Nov. 14, 1893, Milan—d. May 21, 1973, Rome), Italian essayist, short-story writer, and novelist outstanding particularly for his original and innovative style, which has been compared with that of James Joyce.

Gadda was educated as an electrical engineer and volunteered in World War I. During the 1920s he worked as an engineer abroad. He began writing in the 1930s and from the first demonstrated a fascination and facility for language as well as a gift for unemotional and acute psychological and sociological analysis. His first works were collected in *I sogni e la folgore* (1955; "The Dreams and the Lightning"). Gadda's most famous and successful novel, *Quer pasticciaccio brutto de via Merulana* (1957; *That Awful Mess on Via Merulana,* 1965), is a story of a murder and burglary in Fascist Rome and of the subsequent investigation, which features characters from many levels of Roman life. The language of the novel, known to Italians as *Il pasticciaccio* ("The Pastiche"), is literary Italian, with an admixture of three Roman dialects and puns, technical jargon, foreign words, parodies, made words, and classical allusions. Gadda's approach is as mercurial as his style: ironic, bitter, outrageously comic, philosophical, and obscene.

La cognizione del dotore (1963, revised 1970; *Acquainted with Grief,* 1969) is autobiographical, transferred from modern Italy to an invented South American country.

Gaddi, Agnolo (b. *c.* 1350, Florence—d. Oct. 16, 1396, Florence), son and pupil of Taddeo Gaddi, the major pupil of the Florentine master Giotto. Agnolo was an influential and prolific artist who was the last major Florentine painter stylistically descended from Giotto.

In 1369 he was employed in Rome as an assistant to his brother Giovanni, a minor painter, in the execution of frescoes for Pope Urban V in the Vatican. In the 1380s he executed his most ambitious works, a series of



"Resurrection of Drusiana," scene from the fresco "Legend of the True Cross," by Agnolo Gaddi, *c.* 1380; in the church of Sta. Croce, Florence
SCALA—Art Resource/EB Inc.

frescoes in the choir of Sta. Croce in Florence illustrating the "Legend of the True Cross." In these frescoes Agnolo sacrifices expression for design, and his overall concern with optical unification of the composition replaces Giotto's concentration on figures, thereby revealing the new approach toward painting of the International Gothic style. Between 1383 and 1386 Agnolo designed medallions representing the Virtues for the Loggia dei Lanzi in Florence, and between 1387 and 1395 his name appears as the designer or gilder of statues for the facade of the cathedral of Florence. In 1394–96 he painted a cycle of scenes from the life of the Virgin in the cathedral of Prato. His death in 1396 left unfinished an altar of the Crucifixion in S. Miniato al Monte outside Florence.

Gaddi, Taddeo (b. *c.* 1300, Florence—d. 1366?, Florence), pupil and most faithful follower of the Florentine master Giotto. A capable artist, although lacking his teacher's comprehensive aesthetic vision, he was, after Giotto's death, the leading Florentine painter for three decades.

His earliest authenticated work is a small triptych with the Virgin enthroned with Child and saints signed and dated 1334 (Staatliche Museen Preussischer Kulturbesitz, Berlin). In 1332, however, and possibly as early as 1328, he had already begun to work with Giotto on the fresco decoration of Sta. Croce in Florence. The earliest of Gaddi's works in Sta. Croce in the Baroncelli Chapel were scenes from the life of the Virgin and the life of Christ, completed in 1338. Less concerned with drama and with monumental compositional clarity than his master, Gaddi gave in these works more attention to picturesque, narrative detail. Although he copied Giotto's heavy, naturally treated figures and bare landscapes and the general sober and impressive tenor of his works, in introducing more complicating elements he went beyond the bounds that Giotto had carefully set for his own art—those of simplicity and unindividualized figures that free his scenes from the particular and allow them a dramatic and universal impact. Gaddi's frescoes are thus less powerful, if more lively, than those of his master, although his innovative spirit led him to experiments with the representation of light that are highly effective, as in his mysteriously radiant "Annunciation to the Shepherds."

Possibly in about 1338 Taddeo Gaddi decorated the sacristy of Sta. Croce with panels representing the lives of Christ and of St. Francis (Accademia, Florence, except for one panel of "A Miracle from the Legend of St. Francis" in the Staatliche Museen Preussischer Kulturbesitz, Berlin). In 1341–42 he seems to have been employed in S. Miniato al Monte outside Florence and in S. Francesco at Pisa. Some time in the 1340s he decorated the walls of the refectory at Sta. Croce, painting there one of his most impressive works, a "Tree of Life" surrounded by scenes from the life of St. Bonaventure, a work of much vigour, with a rich iconography. Like the other refectory frescoes, however, its scenes are composed with a classical simplicity that represents a retreat from Taddeo's earlier stylistic rebellion. After Giotto's death in 1337, he became the leader of Giotto's school in Florence. Between 1347 and 1353 he painted a polyptych for S. Giovanni Fuorcivitas at Pistoia, and in 1355 he executed a signed and dated "Madonna in Glory" (Uffizi, Florence) for S. Lucchese at Poggibonsi. In 1366 Taddeo is mentioned in documents for the last time.

Gaddis, William (b. Dec. 29, 1922, New York City), U.S. novelist whose long, experimental works concern the contemporary human condition.

Gaddis first gained note as an author with publication of his controversial novel *The Recognitions* (1955). The book, rich in language and imagery, began as a parody of Faust but developed into a multilevelled examination of spiritual bankruptcy that has been called both a brilliant masterpiece and incomprehensibly excessive. His second novel, *JR* (1975), which also uses language experimentally, won a National Book Award in 1975. Although it consists chiefly of dialogue, it is more accessible for most readers than its predecessor.

Gaddis' fiction shows the influence of the

writings of James Joyce and, in turn, influenced the work of Thomas Pynchon; it contains long dialogues and monologues related by a minimum of plot and structured by scant punctuation. His books belong to a style of literature characterized by the absence of distinctive incidents and the pervasive use of black humour in dealing with a chaotic mass of associations. They create a radical way of viewing the world by which the reader can reassess his own situation.

Gade, Niels (Vilhelm) (b. Feb. 22, 1817, Copenhagen—d. Dec. 21, 1890, Copenhagen), Danish composer who founded the Romantic nationalist school in Danish music. He studied violin and composition and became acquainted with Danish poetry and folk music. Both Mendelssohn and Schumann, who were

Gade, detail of a lithograph by Josef Kriehuber

By courtesy of the Osterreichische Nationalbibliothek, Vienna

his friends, were attracted by the Scandinavian character of his music. Schumann wrote of him in the *Neue Zeitschrift für Musik,* and in 1843 Mendelssohn conducted Gade's first symphony in Leipzig. Gade conducted in Leipzig from 1844 to 1848 and became conductor of the Copenhagen Musical Society in 1850. In 1866 he became a director of the new Copenhagen Conservatory. Gade's early works, reflecting the spirit of Danish folk tunes, were among the first 19th-century examples of the use of native musical idioms and nationalist themes. Under the influence of Mendelssohn, his later works show greater technical command, often at the expense of the style that had made his earlier works attractive. His compositions include the overtures *Echoes from Ossian* (published as Opus 1) and *In the Highlands;* the cantatas *Zion, The Crusaders,* and *Psyche;* eight symphonies; three ballets; a violin concerto; a string quartet; and other works.

gadfly petrel, any of several species of petrels distinguished from others by their fluttering type of flight. *See* petrel.

Gadifer DE LA SALLE (fl. *c.* 1340–1415), French soldier who, with Jean de Béthencourt, conquered and explored the Canary Islands.

Gadifer won renown in the French campaigns against England during the Hundred Years' War (1337–1453). While on a crusade against Tunis in 1390, he met Béthencourt, who later pledged his lands to finance their expedition to the Canary Islands. In 1402 they occupied Lanzarote, the northernmost inhabited island of the Canaries. Gadifer then explored the archipelago, and Béthencourt left for Cádiz, where he procured reinforcements at the Castilian court. In 1404 Béthencourt returned to the Canaries as king (a title granted by Henry III of Castile in exchange for Béthencourt's homage); Gadifer, slighted, returned to France.

Gadjah Mada (Indonesian leader): *see* Gajah Mada.

gadolinium (Gd), chemical element, rare-earth metal of transition Group IIIb of the periodic table. Silvery white and moderately ductile, the metal reacts slowly with oxygen and water. Below 17° C it is ferromagnetic and at very low temperatures, superconducting. Credit for the discovery of gadolinium is shared by J.-C.-G. de Marignac and P.-É. Lecoq de Boisbaudran. Marignac separated (1880) a new rare earth (metallic oxide) from the mineral samarskite; Lecoq de Boisbaudran obtained (1886) a fairly pure sample of the same earth, which with Marignac's assent he named gadolinia, after a mineral in which it occurs that in turn had been named for the Finnish chemist Johan Gadolin. Gadolinium occurs in many minerals along with the other rare earths but is obtained primarily from monazite. It is found also in the products of nuclear fission. Commercial separation depends upon ion-exchange techniques. The metal has been produced by thermoreduction of the anhydrous chloride or fluoride by calcium.

Gadolinium is used for certain electronic components and high-temperature refractories and as an alloying agent. H. Kamerlingh Onnes first produced (1923) temperatures below 1 K by magnetic cooling using gadolinium sulfate. Gadolinium has the highest absorption cross section for thermal neutrons of any natural isotope of any element (49,000 barns), which suggests its use in nuclear reactor control rods. The seven natural stable isotopes have mass numbers between 152 and 160; the species of highest mass numbers are more abundant.

Gadolinium is trivalent in all of its compounds; it behaves as a typical rare earth. Its salts are white, and its solutions are colourless.

atomic number	64
atomic weight	157.250
melting point	1,311° C
boiling point	3,233° C
specific gravity	7.898 (25° C)
valence	3
electronic config.	2-8-18-25-9-2 or $(Xe)4f^75d^16s^2$

gadrooning (architecture): *see* fluting and reeding.

Gadsden, city, seat (1866) of Etowah County (then Baines County), northeastern Alabama, U.S., on the Coosa River (there dammed to form an 8,000-ac [3200-ha] lake), in the Appalachian foothills. The original farming settlement, founded in 1846 as Double Springs, was renamed for James Gadsden, who negotiated the Gadsden Purchase (1853) of territory from Mexico. Adjacent Alabama City was annexed by Gadsden in 1932. A diversified economy developed with hydropower and the exploitation of local resources (iron, coal, manganese, limestone, and timber). Gadsden is the seat of an extension division of the University of Alabama, the Alabama Technical College, and Gadsden State Junior College. Noccalula Falls in a city park drops 95 ft (29 m) over a ridge of Lookout Mountain into a valley pool. Inc. city, 1871. Pop. (1980) 47,565.

Gadsden, James (b. May 15, 1788, Charleston, S.C., U.S.—d. Dec. 26, 1858, Charleston), U.S. soldier, diplomat, and railroad president, whose name is associated with the Gadsden Purchase (*q.v.*).

He graduated from Yale College in 1806 and engaged in business in his native city until 1812, when he was appointed a lieutenant of engineers in the U.S. Army. In 1820 he was made responsible for the establishment of military posts in Florida and supervised the removal of the Seminole Indians to southern Florida in 1823. Gadsden negotiated the treaty for the removal of the Seminoles to the west in 1832 and served in the war that followed the refusal of some Seminoles to leave Florida. In 1840 he became president of a railroad in South Carolina.

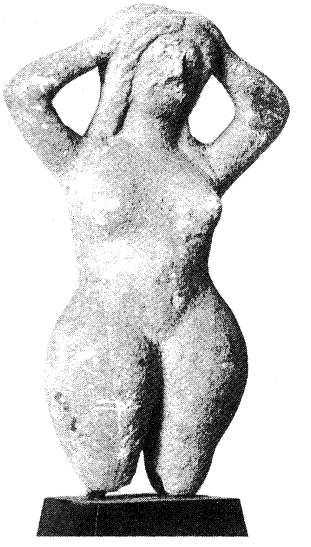
Gadsden's most important public service followed his appointment as U.S. minister to Mexico in 1853. He was instructed to negotiate a treaty for the purchase of territory south of the Gila River through which ran the most desirable route for a railroad from the southern states to the Pacific. He succeeded in adjusting certain minor issues and in gaining a cession of territory in what is now southern New Mexico and Arizona. This added territory, which included the route of the proposed southern railroad, is generally known as the Gadsden Purchase.

Gadsden Purchase (signed Dec. 30, 1853, Mexico City; revised treaty ratified April 25, 1854), transaction that followed the conquest of much of northern Mexico by the United States in 1848. It assigned to the United States nearly 30,000 additional square miles (78,000 square kilometres) of northern Mexican territory, now southern Arizona and southern New Mexico. Prompted by advocates of a southern transcontinental railroad for which the most practical route would pass through the acquired territory, and by demands for U.S. protection of private concessions in the area, the purchase was negotiated by the U.S. minister to Mexico, James Gadsden, for $10,000,000.

Gadus, fish genus of the family Gadidae, including the individuals and groups known as bib, cod, pollock, and whiting (*qq.v.*).

gadwall (*Anas strepera*), small, drably coloured duck of the family Anatidae, a popular game bird. Almost circumpolar in distribution in the Northern Hemisphere, the gadwall breeds above latitude 40° and winters between 20–40°. In North America the densest breeding populations occur in the Dakotas and the prairie provinces of Canada; the coast of Louisiana is a primary wintering area. These brownish gray birds have white patches, visible only during flight, on the rear of the wings. Breeding males are gray with brown shoulders and black posteriors. Their preferred diet consists of stems and leaves of aquatic plants, supplemented by seeds and algae. Gadwalls frequent shallow freshwater ponds and marshes, often in mixed flocks with wigeons. Unlike wigeons, however, they rarely feed on land. The nest is hidden in thicker vegetation than is usual for species of the dabbling duck (*q.v.*) group.

Gaea, also called GE, Greek personification of the Earth as a goddess. Mother and wife of Uranus (Heaven), from whom the Titan



Gaea, terra-cotta statuette from Tanagra; in the Musée Borély, Marseille

Giraudon—Art Resource/EB Inc.

Cronus, her last born child by him, separated her, she was also mother of the other Titans, the Gigantes, the Erinyes, and the Cyclopes (*see* giant; Fury; Cyclops); hence literature and art sometimes made her the enemy of Zeus, for the Titans and Gigantes threatened him. Gaea may have been originally a mother goddess worshipped in Greece before the Hellenes introduced the cult of Zeus. Less widely worshipped in historic times, Gaea was described as the giver of dreams and the nourisher of plants and young children.

Gaekwar DYNASTY, also spelled GAIKWAR, or GAEKWAD, Indian ruling family and title of its head whose capital was at Baroda in Gujarāt state. The state became a leading power in the 18th-century Marāthā confederacy.

The founder of the dynasty was Damaji I who had risen to power by 1740. The last Gaekwar, Sayaji Rao III, died in 1939.

Gaelic football, Irish version of football, an offshoot of Britain's medieval mêlée (*q.v.*), in which entire parishes would compete in day-long matches covering miles of countryside. A code of rules slightly restricting the ferocity of the sport was adopted in 1884, and the Gaelic Athletic Association was formed the same year to govern competition.

Gaelic football forward punching ball toward goal (Down versus Galway, Dublin, 1968)
Fionnbar Callanan, Dublin

In the modern game, sides are limited to 15 each. Players may not throw the ball, but they may dribble with hand or foot, punch, or punt the ball toward their opponent's goal. One point is scored for putting the ball between the goalposts and over the crossbar and three points for putting it between the posts and under the bar into a net. A game is divided into two 30-minute periods. Gaelic football is not played much outside Ireland and the United States; the winners of the annual all-Ireland championship usually visit the United States to play its teams.

Gaelic language: *see* Irish language; Scottish Gaelic language.

Gaelic League: *see* Irish literary renaissance.

Gaelic revival, resurgence of interest in Irish language, literature, history, and folklore inspired by the growing Irish nationalism of the early 19th century. By that time Gaelic had died out as a spoken tongue except in isolated rural areas; English had become the official and literary language of Ireland. The discovery by philologists of how to read Old Irish (written prior to 900) and the subsequent translations of ancient Gaelic manuscripts (*e.g., The Annals of the Four Masters*) made possible the reading of Ireland's ancient literature. Heroic tales caught the imagination of the educated classes. Anglo-Irish poets experimented with verse that was structured according to Gaelic patterns and rhythms and that echoed the passion and rich imagery of ancient bardic verse. In 1842 the patriotic organization known as Young Ireland founded *The Nation,* a paper that published the works of Thomas Osborne Davis, a master of prose and verse, and of such poets as Thomas D'Arcy McGee, Richard D'Alton Williams, and Speranza (the pseudonym of Lady Wilde, mother of Oscar Wilde) and stirred pride in Irish literary achievements. The *Dublin University Magazine* (1833–80), another important literary publication, often included the work of James Clarence Mangan, who translated Gaelic poems into English and also wrote original verse in the Gaelic style. Jeremiah John Callanan was the first to use the Gaelic refrain in English verse, and Sir Samuel Ferguson wrote epic-like poetry recalling Ireland's heroic past. Thomas Moore, Charles Maturin, and Maria Edgeworth also incorporated Irish themes from earlier Gaelic works into their writings.

The Gaelic revival was not a widespread, vigorous movement because political nationalism and the need for land reform overshadowed cultural nationalism. The revival did, however, lay the scholarly and nationalistic groundwork for the Irish literary renaissance (*q.v.*), the great flowering of Irish literary talent at the end of the 19th and beginning of the 20th century.

Gaeta, Latin CAIETA, town, seaport, and archiepiscopal see, Latina province, Lazio (Latium) region, south central Italy, on the Golfo (gulf) di Gaeta, northwest of Naples (Napoli). Gaeta first came under the influence of the Romans in the 4th century BC; a road was built *c.* 184 BC connecting the town with the port, and it became a favoured Roman resort. After the fall of the Roman Empire in the 5th century AD, Gaeta remained loyal to the Byzantine Empire and preserved its independence throughout Gothic, Lombard, and Saracen wars and invasions. A maritime republic in the 8th century and autonomous duchy after 915, it capitulated in 1140 to the Normans, under whom it achieved great importance. In the 15th century it was the centre of struggles for succession to the throne of Naples. Its capitulation to the Kingdom of Italy in 1861 marked the end of the Bourbon Kingdom of the Two Sicilies.

Outside the old walls the town has a modern appearance, but within them the character of a fortified square is preserved. The old town is dominated by the cathedral (1106–1278), which was restored in 1792 and contains a museum; and the Castello, the lower part of which dates from *c.* 1289 and the upper from *c.* 1435. The Monte d'Orlando (a public park) is supposed to be the site of the grave of Caieta (the nurse of Aeneas, mythical hero of Troy and Rome), after whom the town was named.

Gaeta is a fishing port and seaside resort. It has a petroleum refinery and a glassworks. Pop. (1981 prelim.) mun., 22,605.

Gaetani FAMILY: *see* Caetani family.

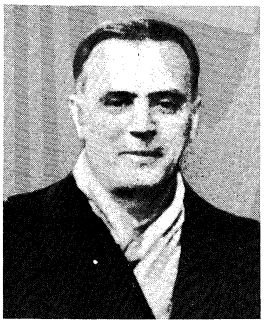
Gaetano (theologian): *see* Cajetan.

Gaetano DA THIENE (Catholic reformer): *see* Cajetan of Thiene, Saint.

Gaëte, Martin-Michel-Charles Gaudin, duc de (duke of): *see* Gaudin, Martin-Michel-Charles.

Gaetulia, ancient district of interior North Africa that in Roman times, at least, was inhabited by wandering tribes, the Gaetuli. The area, not clearly defined, included the southern slopes of the Atlas Mountains, from the Aurès Massif westward as far as the Atlantic; southward it extended to the oases in the northern part of the Sahara. Distinguished from the Negro tribes to the south, the Gaetuli belonged to the Berber peoples who formed the population of Numidia. The tribes were noted for their horse breeding; they dressed in skins and lived on flesh and milk. The only manufacture connected with their name was that of purple dye. The modern nomadic tribes of the area are probably of the same stock.

Gafencu, Grigore (b. Jan. 30, 1892, Bucharest—d. Jan. 30, 1957, Paris), Romanian diplomat, journalist, and politician who as foreign minister at the outbreak of World War II tried to maintain Romania's neutrality.



Gafencu, 1939
Keystone

Educated at Geneva and Paris, Gafencu entered journalism after World War I. In 1924 he became editor and publisher of *Argus,* a leading economic periodical, and during the 1930s founded *Timpul,* which soon became Bucharest's leading daily journal. He also established the Orient-Radio news agency. As a member of the National Peasant Party, he was elected to the Romanian Parliament in 1928 and served in various cabinet-level posts. Appointed foreign minister in December 1938 as a gesture to the Western democracies, he tried to balance Romania's East–West relations but was eventually dismissed to appease the Axis powers (June 2, 1940). During 1940–41 he served as minister to the Soviet Union, but soon after his return to Romania in June 1941 he left for Switzerland. After World War II he settled in Paris. In November 1947, after a Communist government had seized power in Romania, he was sentenced in absentia to 20 years' imprisonment. He wrote *Préliminaires de la guerre à l'Est* (1944; *Prelude to the Russian Campaign,* 1945) and *Derniers jours de l'Europe* (1946; *Last Days of Europe,* 1948).

Gaffney, city, seat of Cherokee County, northern South Carolina, U.S., near the Broad River. Named for Michael Gaffney, an Irish settler who arrived in 1803, it early developed as a resort where plantation owners sought therapeutic treatment at local limestone springs. Its growth as a market centre for cotton and farm produce was sustained by the coming of the Southern Railway in the 1870s. Limestone College was founded there in 1845. Industrial activities include textile milling, metal working, and screen printing. The Revolutionary battlefields of Kings Mountain (commemorated by a military park) and Cowpens are nearby. Inc. 1875. Pop. (1980) 13,453.

Gafsa (Tunisia): *see* Qafṣah.

gag rule, in U.S. history, any of a series of congressional resolutions that tabled, without discussion, petitions regarding slavery; passed by the House of Representatives between 1836 and 1840 and repealed in 1844. Abolition petitions, signed by more than 2,000,000 persons, had inundated Congress after the establishment of the American Anti-Slavery Society (1833). Gag rules, supported by proslavery congressmen, postponed the consideration, printing, and referral of such petitions. Repeal was secured by a House group led by the former president John Quincy Adams and Joshua R. Giddings.

gagaku (Japanese), Korean A-AK, ancient court music. The name is a Japanese pronunciation of the Chinese characters for elegant

music (*ya yueh*). Such music first appeared in Japan as an import from Korea in the 5th century and had become an established court tradition by the 8th century. The various forms of North Asian, Chinese, Indian, Southeast Asian, and indigenous Japanese music were organized in the 9th century into two major categories: *tōgaku,* the so-called music of the left, included Chinese and Indian materials; and *komagaku,* the music of the right, contained the rest. The flute and main drum of the two ensembles differ, and *komagaku* does not use strings. Purely instrumental performances of *gagaku* are called *kangen* (flutes and strings), while dances and their accompaniment are called *bugaku.* Various forms of Shintō ritual or ancient vocal music also survive.

The solo music for the instruments of *gagaku* has been lost, although some notations survive. The mnemonic nature of the notation and the rote methods of teaching the music make it difficult to reconstruct such lost traditions as well as to evaluate the present performance practice of existing ensemble music. Nevertheless, the very continuance of such ancient forms through all the vicissitudes of history gives extremely rare living insights into the probable nature of music and cultural life in East Asia 1,000 years ago. *Gagaku* and Korean *a-ak* not only provide information about traditional national musical forms but also are the major sources for clues concerning the music of China's brilliant T'ang dynasty period (618–907).

Gagarin, Yury Alekseyevich (b. March 9, 1934, near Gzhatsk, Russian S.F.S.R.—d. March 27, 1968, near Moscow), Soviet cosmonaut who in 1961 became the first man to travel into space.

The son of a carpenter on a collective farm, Gagarin graduated as a molder from a trade school near Moscow in 1951. He continued his studies at the industrial college at Saratov and concurrently took a course in flying. On completing this course he entered the Soviet Air Force cadet school at Orenburg, from which he graduated in 1957.

Gagarin's 4¾-ton Vostok 1 spacecraft was launched at 9:07 AM Moscow time on April 12, 1961, orbited the Earth once in 1 hour 29 minutes at a maximum altitude of 187 miles (301 kilometres), and landed at 10:55 AM in the Soviet Union. His spaceflight brought him immediate worldwide fame; he was awarded the Order of Lenin and given the titles of Hero of the Soviet Union and Pilot Cosmonaut of the Soviet Union. Monuments were raised to him and streets renamed in his honour across the Soviet Union.

He never went into space again but took an active part in training other cosmonauts. He made several tours to other nations following his historic flight, and from 1962 he served as a deputy to the Supreme Soviet. Gagarin was killed with another pilot in the crash of a two-seat jet aircraft while on what was described as a routine training flight. His ashes were placed in a niche in the Kremlin wall. After his death in 1968 the town of Gzhatsk was renamed Gagarin.

Gagarin, 1961
Tass—Sovfoto

gage (instrument): *see* gauge.

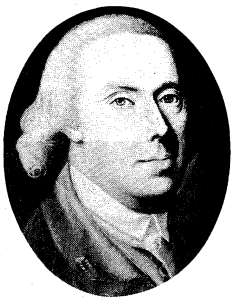
Gage, Matilda Joslyn, *née* JOSLYN (b. March 25, 1826, Cicero, N.Y., U.S.—d. March 18, 1898, Chicago), U.S. women's rights advocate who helped to lead and publicize the U.S. suffrage movement.

Gage, who was married to Henry H. Gage, a merchant, in 1845, settled in Fayetteville, N.Y. She joined the National Woman Suffrage Association in 1869, and in 1875 she became president of both the national and New York state organizations. She subsequently spoke before state legislative and U.S. congressional committees and political conventions on behalf of women's rights. From 1878 to 1881, she also published the *National Citizen and Ballot Box,* the newspaper of the National Woman Suffrage Association.

In 1890, believing that mainstream suffragists were too conservative, Gage founded the Woman's National Liberal Union, a group dedicated to the separation of church and state.

Her most important publication was the monumental *History of Woman Suffrage,* with Susan B. Anthony and Elizabeth Cady Stanton (1881–87); she also wrote *Woman, Church and the State* (1893) and several feminist pamphlets.

Gage, Thomas (b. 1721, Firle, Sussex, Eng.—d. April 2, 1787, England), British general who successfully commanded all British forces in North America for more than 10 years (1763–74) but failed to stem the tide of rebellion as military governor of Massachusetts (1774–75) at the outbreak of the American Revolution.



Thomas Gage, pastel portrait by an unknown artist; in the State House, Boston
By courtesy of the State Library of Massachusetts, Boston

Gage's military career in North America began in 1754, when he sailed with his regiment to serve in the last French and Indian War (1756–63). He participated in Gen. Edward Braddock's disastrous campaign in western Pennsylvania (1754) and in the successful operation against Quebec (1759–60). He was thereupon made governor of Montreal (1760) and promoted to major general (1761).

In 1763 Gage was appointed commander in chief of all British forces in North America—the most important and influential post in the colonies. Headquartered in New York, he ran a vast military machine of more than 50 garrisons and stations stretching from Newfoundland to Florida and from Bermuda to the Mississippi. He exhibited both patience and tact in handling matters of diplomacy, trade, communication, Indian relations, and western boundaries. His great failure, however, was in his assessment of the burgeoning independence movement. As the main permanent adviser to the mother country in that period, he sent critical and unsympathetic reports that did much to harden the attitude of successive ministries toward the colonies.

When resistance turned violent at the Boston Tea Party (1773), Gage was instrumental in shaping Parliament's retaliatory Intolerable (Coercive) Acts (1774), by which the port of Boston was closed until the destroyed tea should be paid for. He was largely responsible for inclusion of the inflammatory provision for quartering of soldiers in private homes and of the Massachusetts Government Act, by which colonial democratic institutions were superseded by a British military government. Thus Gage is chiefly remembered in the U.S. as the protagonist of the British cause while he served as military governor in Massachusetts from 1774 to 1775. In this capacity, he ordered the march of the redcoats on Lexington and Concord (April 1775), which was intended to uncover ammunition caches and to capture the leading Revolutionary agitator, Samuel Adams, who escaped. This unfortunate manoeuvre signalled the start of the American Revolution; after the equally disastrous Battle of Bunker Hill in June, Gage was succeeded by Gen. Sir William Howe. He soon returned to England and was commissioned a full general in 1782.

Gagern, Friedrich (Ludwig Balduin Karl Moritz), Freiherr von (baron of) (b. Oct. 24, 1794, Weilburg, near Mainz—d. April 20, 1848, near Kandern, Baden), Hans Christoph von Gagern's eldest son, a German soldier and administrator, and military commander of several Dutch provinces, who served as chief of staff during the wars against the Belgian rebels opposing Dutch rule. Returning to Germany, he led the fight against the republican revolutionaries in Baden in 1848.

Interrupted in his studies at Göttingen by Napoleon's temporary return to power in 1815, Gagern fought and was wounded at Waterloo. Finishing his education at Heidelberg, he joined the Burschenschaft (German nationalist student movement), whose interests in German unification he was to share for the rest of his life. Gagern then entered the Dutch Army, eventually becoming chief of the general staff and serving under Prince Bernhard of Weimar in the unsuccessful attempt to suppress the Belgian revolt (1830–31). Twice he was military commander, first of North Holland (1842–44), then, after a journey to the Dutch East Indies and around the world, of South Holland, a post he held simultaneously with his governorship of The Hague. Returning to Germany at the outbreak of the 1848 revolution, he led the army against the rebels in Baden but was killed during the first encounter.

Gagern, Hans Christoph, Freiherr von (baron of) (b. Jan. 25, 1766, Kleinniedesheim, near Worms—d. Oct. 22, 1852, Hornau, near Höchst, Ger.), conservative German administrator, patriotic politician, and writer who unsuccessfully called for arming the entire German nation during the French Revolutionary Wars. He represented The Netherlands at the Congress of Vienna (1814–15) and favoured restoring the Holy Roman Empire to protect Germany's smaller principalities from the two large states, Austria and Prussia.

Educated at Leipzig and Göttingen, Gagern entered the Nassau-Weilburg administration (1786), rising rapidly to chief minister. As Nassau's envoy to Paris, he secured (1806) additional territories for his principality within the Confederation of the Rhine, the league of German princes sponsored by Napoleon. After leaving the Nassau administration in 1811, he became foreign policy adviser to the Austrian archduke John. In 1813 the Prussian minister, Karl, Freiherr vom Stein, appointed Gagern to the administrative council for the reconquered Prussian lands in western Germany, and in 1814 he became administrator of the Orange principalities. As the Netherlands' envoy at the Congress of Vienna, Gagern failed in his attempts to tie these ter-

ritories closer to Germany and to restore the old Holy Roman Empire (dissolved in 1806). After the Battle of Waterloo (1815) he unsuccessfully championed the return of Alsace to Germany. Always an advocate of the rights of small states, Gagern was the representative of the Orange principality of Luxembourg at the German Bundestag (diet) from 1816 to 1818. In 1820 he was elected to the lower house of Hesse-Darmstadt, and in 1829 he became a lifelong member of that state's upper house.

Gagern, (Wilhelm) Heinrich (August), Freiherr von (baron of) (b. Aug. 20, 1799, Bayreuth, Ger.—d. May 22, 1880, Darmstadt, Hesse-Darmstadt), second son of Hans Christoph von Gagern, liberal, anti-Austrian German politician and president of the 1848–49 Frankfurt National Assembly, who was one of the leading spokesmen for the Kleindeutsch (Little German) solution to German unification before and during the 1848 revolution.

Heinrich Gagern, detail from a lithograph by Johann Heinrich Hasselhorst, 1825

By courtesy of the Staatsbibliothek, Berlin

Wounded at Waterloo at the age of 16, Gagern studied in Heidelberg, Göttingen, and Jena. A liberal nationalist, he was instrumental in founding the Allgemeine Deutsche Burschenschaft, a student organization dedicated to the unification of Germany. He entered the Hesse-Darmstadt civil service in 1821 and served in the Landtag (lower house) from 1832 to 1836. Reentering politics in 1847, he became chief minister of Hesse-Darmstadt in March 1848. Gagern's role in the revolutionary Vorparlament (pre-parliament) was distinguished, but on May 19, 1848, he was elected president of the national assembly at Frankfurt. He secured the election of the Austrian archduke John as German regent and attempted to persuade Prussia to play the chief role in a unified Germany without eliminating Austria altogether. His proposal to offer the imperial crown to Frederick William IV of Prussia was finally accepted by the assembly, but the Prussian monarch's refusal destroyed his hopes. Gagern left Frankfurt when Archduke John dissolved the assembly on May 10, 1849. Retiring from politics, he served in the German Army against Denmark (1850). Later, he turned to Austria and by 1862 had come to favour the Austria-oriented Grossdeutsch (Greater German) solution. From 1864 to 1872 he served as Hessian minister to Vienna. When Gagern died in 1880, he was a forgotten man.

Gagern, Maximilian (Joseph Ludwig) Freiherr von (baron of) (b. March 25, 1810, Weilburg, Ger.—d. Oct. 17, 1889, Vienna), 10th son of Hans Christoph, liberal Dutch and German diplomat and politician, who played a prominent part in the German Revolution of 1848, attempting to institute the Kleindeutsch ("small German") solution to German unification, which aimed at excluding Austria's non-German territories.

Gagern, like his two prominent brothers, a nationalist and member of the Pan-German student Burschenschaft, was elected to the 1848 Frankfurt national assembly, where he served as vice president of the constitutional committee and undersecretary of state in the German Reich ministry of foreign affairs. In the spring of 1849 he led the unsuccessful "Gagern" mission, which tried to persuade the German princes to offer the imperial crown to the Prussian king Frederick William IV. Disillusioned with Prussia and the failure of the Kleindeutsch solution to German unification, Gagern entered the Austrian foreign service in 1855 but never again held a significant post.

Gagliano, Marco da (b. *c.* 1575, Gagliano, Kingdom of Naples—d. Feb. 24, 1642, Florence), one of the earliest composers of Italian opera.

Gagliano worked in Florence (*c.* 1608–25) as organist to Cosimo II de' Medici. He staged his first opera, *Dafne*, at Mantua in 1608. *Il Medoro*, composed with Jacopo Peri (1619), is lost; *La Flora* was produced in 1628. Gagliano followed the monodic recitative (melodic, half-spoken, half-sung) style of the Florentine Camerata, whose members sought to revive ancient Greek music and drama and produced the earliest operas. His recitative is musically richer than that of his contemporaries Peri and Giulio Caccini, and he provides a greater variety of set numbers. His works were eclipsed, however, by Monteverdi's *Orfeo*. He also published sacred music and madrigals between 1594 and 1630.

Gagnoa, town, administrative headquarters (since 1969) of Gagnoa *département*, southern Ivory Coast. It is the chief collecting point for a forest region that sends coffee, cocoa, and timber (sipo, mahogany) to the coast for export and is a major market centre (rice, bananas, and yams) among the Bete and Gagu (Gagou) peoples. A paved road connects Gagnoa with Abidjan, the Ivory Coast's capital. The town is the site of the government's first rural technical institute (1961), a labour court, a sawmill, and a model housing project. Metalworking is a traditional art among the local Bete, and there are bauxite deposits in the vicinity. Gagnoa has both Roman Catholic and Protestant churches and is the seat of a Catholic diocese. Pop. (1975) town, 42,362; *département*, 256,813.

Gāhaḍavāla DYNASTY, one of the many ruling families of North India on the eve of the Muslim conquests in the 12th–13th century. Its history, ranging between the second half of the 11th century and the mid-13th century, illustrates all the features of early medieval North Indian polity—dynastic hostilities and alliances, feudal-state structure, absolute dependence on Brahminical social ideology, and vulnerability in the face of external aggressions.

The family, perhaps originating in the Vārānasi-Ayodhyā area in Uttar Pradesh, later came to be associated with Kanauj, which had become one of the most crucial political centres in India. The majority of the Gāhaḍavāla epigraphic records were discovered in Uttar Pradesh and issued from Vārānasi. The dynastic power became gradually consolidated in the period of the first three rulers: Yaśovi-Graha, Mahīcandra, and Candradeva (*c.* 1089–1103). By the period of Candradeva, the Gāhaḍavālas had taken control of Vārānasi, Ayodhyā, Kanauj, and Indrasthānīyaka (modern Delhi) and expanded all over Uttar Pradesh—sometimes at the expense of such powers as the Kalacuri. The Gāhaḍavālas sought to ward off the growing menace of Muslim incursions by expedient alliances and the payment of tributes, at least until the period of Candradeva's son Madanapala (reigned *c.* 1104–13), who was, in all probability, the Kanauj king imprisoned and later released during the period of Ghaznavid Sultan Mas'ūd III. Despite the regularity of Muslim attacks, which were at least temporarily repulsed by Govindacandra (reigned *c.* 1113–15), the Gāhaḍavālas endeavoured to spread eastward; Govindacandra expanded to the Patna and Monghyr districts in Bihār, and in 1168–69 southwestern Bihār was being ruled by a feudatory of his son Vijayacandra (reigned *c.* 1155–69). Conventional accounts seem to suggest that Govindacandra had varied relations with an impressive number of Indian and non-Indian countries. Despite obvious exaggeration, hostilities with such powers as the Pālas, Senas, and the Kalacuris appear to be substantially factual.

The weakness of the internal structure of the Gāhaḍavāla kingdom was finally exposed late in the 12th century during the invasions of Mu'izz-ud-Dīn Muḥammad of Ghūr. Jayacandra (reigned *c.* 1170–94), who held Uttar Pradesh and parts of Bihār, had, according to bardic accounts, bitter enmity with the Cāhamānas of Rājasthān. He lost the battle and his life at Chandāwar (Etāwah district, Uttar Pradesh) in an encounter with Muḥammad of Ghūr. Although the Gāhaḍavālas lingered in Hariścandra's reign (*c.* 1194–?) in Kanauj, Jaunpur, and Mirzāpur districts until 1197, the buildup of Muslim expansion in the areas was steady through the early 13th century. Gāhaḍavāla royalty had an obscure death, sometime before the middle of the 13th century, at Nāgod in central India, to which Āḍakkamalla, the last known Gāhaḍavāla, had escaped.

Gahanbar, in Zoroastrianism, any of six festivals, occurring at irregular intervals throughout the year, which celebrate the seasons and possibly the six stages in the creation of the world (the heavens, water, the earth, the vegetable world, the animal world, and man). Each lasting five days, the Gahanbars are: Maidhyaōizaremaya (Midspring), occurring in the month of Artavahisht, 41 days after the New Year; 60 days later is Maidhyoishema (Midsummer), in the month of Tīr; 75 days later, Paitishhahya (Harvest-time), in the month of Shatvairō; 30 days later, Ayāthrima (possibly Time of Prosperity), in the month of Mitrā; 80 days later, Maidhyāirya (Midwinter), in the month of Dīn; and 75 days later, in the last five intercalary or Gatha days of the year, Hamaspathmaēdaya (Vernal Equinox).

Parsis observe the Gahanbar festivals in two stages. Four liturgical rites are first celebrated: the Āfringān, being prayers of love or praise; the Bāj, prayers honouring *yazata*s (angels) or *fravashi*s (guardian spirits); the Yasna, the central Zoroastrian rite, which includes the sacrifice of the sacred liquor, *haoma;* and the Pavi, prayers honouring God and his spirits, performed jointly by the priest and the faithful. A solemn feast then follows, in which the sacrifical offerings made in the preceding liturgies are consumed in ritual purity.

Gahn, Johan Gottlieb (b. Aug. 19, 1745, Voxna, near Söderhamn, Swed.—d. Dec. 8, 1818, Stockholm), Swedish mineralogist and crystallographer who discovered manganese in 1774. His failure to win fame may be related to the fact that he published little. He saved the notes, papers, and letters of his friend Carl Wilhelm Scheele, who discovered chlorine, but not his own. His essays on the balance and use of the blowpipe in analysis were recorded by Jöns Jacob Berzelius of Sweden. Gahn was assistant to Torbern Bergman, pioneer analytical chemist and physicist at the University of Uppsala. With Scheele, Gahn discovered phosphoric acid in bones and prepared phosphorus from bones. He improved copper-smelting processes and studied technical applications of minerals, opening new branches of industry. Gahnite (zinc spinel) is named for him. In 1784 he was appointed assessor of the mining college at Stockholm.

gahnite, the mineral zinc aluminum oxide, a member of the spinel (*q.v.*) series.

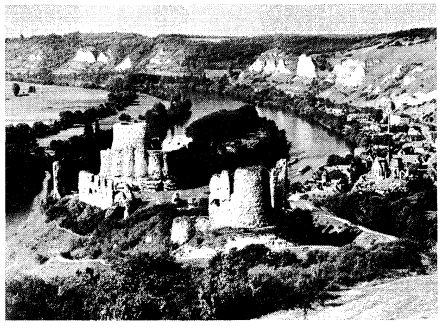
Gai 'wiio (religious movement): *see* Handsome Lake cult.

Gaikwar (Indian history): *see* Gaekwar.

Gailhard, John, also called JEAN GAILHARD (fl. late 17th century), English author of an educational treatise on proper training for the English nobility that is noteworthy for its insights into the educational goals and techniques of the 17th-century English upper classes. Gailhard seems to have spent a number of years as tutor abroad to "several of the nobility and gentry," but nothing is really known of his life.

In his *Compleat Gentleman* (1678), Gailhard supported a broad curriculum, with the emphasis on education to develop character and noble bearing. In the second part of his two-part book, Gailhard detailed the educational advantages of foreign travel and prescribed a tutorial program for use abroad. He recommended prior knowledge of the native language, the keeping of a diary, regular religious devotions and Bible reading, physical exercise, and music. He suggested a three-year grand tour including stops at specific schools to learn the general principles of medicine and law.

Gaillard, Château (French: "saucy castle"), 12th-century castle built by Richard the Lion-Heart on the Andelys cliff overlooking the Seine River in France; substantial portions of it still stand. Château Gaillard, the strongest castle of its age, guarded the Seine Valley approach to Normandy. Skillfully designed and executed, with the base of the keep carved out of the natural rock, and with all approaches fronted with suitable towers and walls, it included an independent strongpoint



Château Gaillard, Les Andelys, Eure département, Fr.
By courtesy of the French Government Tourist Office

(the châtelet) protecting the eastern end of the height, with the main keep occupying the rest of the site.

In 1204 Philip II of France captured Château Gaillard after a siege of eight months. After isolating the fort by a double ditch, the French undermined and collapsed part of the châtelet and penetrated the main fortress through the latrines.

Gaillard Cut, also called CULEBRA CUT, Spanish CORTE DE CULEBRA, artificial channel in Panama forming a part of the Panama Canal. It is an excavated gorge, about 8 mi (13 km) long, across the Cordillera (there a part of the Continental Divide). It is named for David du Bose Gaillard, the American engineer who planned its construction. Overflow from the Río Chagres, which is dammed at Gatun to form Gatun Lake (Lago Gatún) at the north end of the cut, is guided past Gamboa into the cut and south to the Pedro Miguel and Miraflores locks, which permit the descent of ships from the Caribbean Sea to the Pacific Ocean. The cut has to be constantly dredged because of its restricted channel (47 ft [14 m] deep and 500 ft wide); Gamboa is the headquarters for all canal dredging operations. The increasing size of ships and the carrying of hazardous cargo have increased the frequency with which navigation must be restricted to one-way traffic.

Gaillardia, genus of leafy, branching herbs of the family Asteraceae, native to North America. Several summer-blooming species are cultivated as garden ornamentals, especially blanket-flower (*G. aristata*) and annual blanket-flower (*G. pulchella*).

Gaillardia
F.K. Anderson—EB Inc.

They have purple disk flowers and yellow, orange, or white ray flowers that have three or more teeth that give the plant a fringed appearance. Most have hairy leaves that are grouped at the base of the plant or alternate along the stem.

Gaillimh (Ireland): *see* Galway.

Gaines, Joseph: *see* Gans, Joe.

Gaines's Mill, Battle of, in the U.S. Civil War, one of the Seven Days' Battles, which ended the Peninsular Campaign. *See* Cold Harbor, battles of.

Gainesville, city, Alachua County, north central Florida, U.S., 72 mi (116 km) southwest of Jacksonville. White settlement developed around a trading post known as Hog Town (established 1830). When the community became the county seat in 1854, it was renamed for Gen. Edmund Pendleton Gaines, a commander during the War of 1812. Light industry and agriculture (including tung-oil production) are economic factors, and the University of Florida (1903), which incorporated the East Florida State Seminary (1853), has played a major role in the city's growth. Santa Fe Community College was opened there in 1966. Nearby is Newnans Lake. The Florida State Museum is in Gainesville. Inc. town, 1869; city, 1907. Pop. (1980) city, 81,371; metropolitan area (SMSA), 151,348.

Gainesville, city, seat (1818) of Hall County, northeastern Georgia, U.S., on Lake Sidney Lanier (impounded by Buford Dam on the Chattahoochee River), in the foothills of the Blue Ridge Mountains. Settled in 1818, it was named for Gen. Edmund P. Gaines, who served in the War of 1812. It manufactures textiles and furniture and is a leading poultry centre. The city was heavily damaged and many lives were lost in a tornado in 1936. Gainesville is the site of Brenau College (1878, originally for women), the Riverside Military Academy (1907), and Gainesville Junior College (1966). It is headquarters for both the Oconee and Chattahoochee national forests. Inc. 1821. Pop.(1980) 15,280.

Gainsborough, locality, West Lindsey district, county of Lincolnshire, England. It stands on the River Trent, bordering Nottinghamshire. Gainsborough's early importance as a Saxon settlement was augmented when it became a military centre under the Danes (9th–11th centuries). Gainsborough's position on a navigable river and a main road between London and the north of England soon added to its growth when it served as a market centre for the surrounding agricultural district. As a small North Sea river port, it deals mostly with barge traffic. Most of its industries are based on agricultural processing, but many general engineering and light industries connected with hosiery are also important. The town centre was renovated after World War II bombing damage; but some old buildings remain, notably the 18th-century parish church and the 15th-century Old Hall. Pop. (1981 prelim.) 18,691.

Gainsborough (foaled 1915), English racehorse (Thoroughbred) who won the British Triple Crown, comprised of the Two Thousand Guineas at Newmarket, the Derby at Epsom Downs, and the Saint Leger at Doncaster in 1918, and later became a stud of worldwide importance, being the sire of the famous stallion Hyperion. Sired by Bayardo and foaled by Rosedrop, Gainsborough was owned by Lady James Douglas and trained by Alec Taylor. Despite his promising appearance as a two-year-old, he won only one race. In 1918 he won the Two Thousand Guineas by 1½ lengths, becoming the first horse to win a classic race in the racing colours of a woman owner, the Derby, and the Saint Leger to complete the Triple Crown. He lost his last race at the Jockey Club Stakes to Prince Chamay, a horse from his stable. Retired to stud, he became one of the top stallions whose blood lines still are influential. He died at the age of 30.

Gainsborough, Thomas (baptized May 14, 1727, Sudbury, Suffolk, Eng.—d. Aug. 2, 1788, London), portrait and landscape painter, the most versatile English painter of the 18th century. Some of his early portraits show the sitters grouped in a landscape ("Mr. and Mrs. Andrews," *c.* 1750). As he became famous and his sitters fashionable, he adopted a more formal manner that owed something to Van Dyck ("The Blue Boy," *c.* 1770). His landscapes are of idyllic scenes. During his last years he also painted seascapes and idealized full-size pictures of rustics and country children.

Early life and Suffolk period. Gainsborough was the youngest son of John Gainsborough, a maker of woollen goods. When he was 13,

"The Morning Walk," oil on canvas by Thomas Gainsborough; in the National Gallery, London
By courtesy of the trustees of the National Gallery, London

he persuaded his father to send him to London to study on the strength of his promise at landscape. He worked as an assistant to Hubert Gravelot, a French painter and engraver and an important figure in London art circles at the time. From him Gainsborough learned something of the French Rococo idiom, which had a considerable influence on the development of his style. In 1746 in London he married Margaret Burr, the illegitimate daughter of the Duke of Beaufort. Soon afterward he returned to Suffolk and settled in Ipswich in 1752; his daughters Mary and Margaret were born in 1748 and 1752, respectively. In Ipswich Gainsborough met his first biographer, Philip Thicknesse. He early acquired some reputation as a portrait and landscape painter and made an adequate living.

Gainsborough declared that his first love was landscape and began to learn the language of this art from the Dutch 17th-century landscapists, who by 1740 were becoming popular with English collectors; his first landscapes were influenced by Jan Wynants. The earliest dated picture with a landscape background is a study of a bull terrier—"Bumper—A Bull Terrier" (1745; Sir Edward Bacon Collection, Raveningham, Norfolk), in which many of the details are taken straight from Wynants. But by 1748, when he painted "Cornard Wood," Jacob van Ruisdael had become the predominant influence; although it is full of naturalistic detail, Gainsborough probably never painted directly from nature. "The Charterhouse," one of his few topographical views, dates from the same year as "Cornard Wood" and in the subtle effect of light on various surfaces proclaims Dutch influence. In the background to "Mr. and Mrs. Andrews," he anticipates the realism of the great English landscapist of the next century, John Constable, but for the most part fancy held sway. In many of the early landscapes the influence of Rococo design learned from Gravelot is evident, together with a feeling for the French pastoral tradition. "The Woodcutter Courting a Milkmaid" is an Anglicized version of a French theme, which recalls compositions by Jean-Honoré Fragonard. Although Gainsborough preferred landscape, he knew he must paint portraits for economic reasons. The small heads painted in Suffolk, although sometimes rather stiff, are penetrating character studies delicately and freely pencilled, particularly the jaunty self-portrait in a cocked hat at Houghton. Gainsborough painted few full-length portraits in Suffolk. "Mr. William Woollaston," although an ambitious composition, is intimate and informal. The "Painter's Daughters Chasing a Butterfly," composed in the last years at Ipswich, is, in its easy naturalism and sympathetic understanding, one of the best English portraits of children.

As well as straight portraits, he painted in Suffolk a number of delightful spontaneous groups of small figures in landscapes closely related to conversation pieces. "Mr. and Mrs. Andrews," which has been described as the most English of English pictures, is set in a typical Suffolk landscape. "Lady and Gentleman in Landscape" is more Frenchified, with its vivacious Rococo rhythms, but "Heneage Lloyd and His Sister" is more stylized, the charming little figures being posed against a conventional background of steps and decorative urns.

Bath period. To obtain a wider public, Gainsborough moved in 1759 to Bath, where his studio was soon thronged with fashionable sitters. He moved in musical and theatrical circles, and among his friends were members of the Linley family, whose portraits he painted. At Bath he also met the actor David Garrick, for whom he had a profound admiration and whom he painted on many occasions. His passion for music and the stage continued throughout his life. In the west country he visited many of the great houses and at Wilton fell under the spell of Anthony Van Dyck, the predominating influence in his later work. In spite of the demand for portraits, he continued to paint landscapes.

In 1761 he sent a portrait of Earl Nugent to the Society of Artists, and in the following year the first notice of his work appeared in the London press. Throughout the 1760s he exhibited regularly in London and in 1768 was elected a foundation member of the Royal Academy. Characteristically he never took much part in the deliberations.

After he moved to Bath, Gainsborough had less time for landscape and worked a good deal from memory, often drawing by candlelight from little model landscapes set up in his studio. About 1760 Peter Paul Rubens supplanted the Dutch painters as Gainsborough's chief love. This is particularly noticeable in "Peasants Returning from Market," with its rich colour and beautiful creamy pastel shades. The influence of Rubens is also apparent in "The Harvest Wagon" in the fluency of the drawing and the scale of the great beech trees so different from the stubby oaks of Suffolk. The idyllic scene is a perfect blend of the real and the ideal. The group in the cart is based on Rubens' "Descent from the Cross" (1611–14) in Antwerp cathedral, which Gainsborough copied.

In Bath, Gainsborough had to satisfy a more sophisticated clientele and adopted a more formal and elegant portrait style based largely on a study of Van Dyck at Wilton, where he made a free copy of Van Dyck's painting of the Pembroke family. By 1769, when he painted "Isabella Countess of Sefton," it is easy to see the refining influence of Van Dyck in the dignified simplicity of the design and the subtle muted colouring. One of Gainsborough's most famous pictures, "The Blue Boy," was probably painted in 1770. In painting this subject in Van Dyck dress, he was following an 18th-century fashion in painting, as well as doing homage to his hero. The influence of Van Dyck is most clearly seen in the more official portraits. "John, 4th Duke of Argyll" in his splendid robes is composed in the grand manner, and "Augustus John, Third Earl of Bristol" rivals Reynolds' portraits of the kind. Gainsborough preferred to paint his friends rather than public figures, and a group of portraits of the 1760s—Uvedale Price, Sir William St. Quinton, and Thomas Coward, all oldish men of strong character—illustrate Gainsborough's sense of humour and his individual approach to sympathetic sitters.

London period. In 1774 he moved to London and settled in part of Schomberg House in Pall Mall. Fairly soon he began to be noticed by the royal family and partly because of his informality and Tory politics was preferred by George III above the official court painter, Sir Joshua Reynolds. In 1781 he was commissioned to paint the King and Queen.

Gainsborough continued his landscape work. "The Watering Place" was described by Horace Walpole, the English man of letters, as in the style of Rubens, but it also has much of the classic calm of Claude Lorrain, whose etchings Gainsborough owned. In 1783 he made an expedition to the Lake District to see for himself the "wild" scenery extolled by the devotees of the picturesque. On his return he painted a number of mountain scenes that have analogies with the work of Gaspard Dughet, whose works were widely distributed in English country houses. Some sea pieces dating from the 1780s show a new kind of realism, harking back to the Dutch seascape tradition. During his last years Gainsborough was haunted by his nostalgia for Arcadia in the English countryside and painted a series of pictures of peasant life more ideal than real, for example, "The Cottage Door." But one of the latest landscapes, "The Market Cart," is less idealized and more true to nature and looks forward to Constable in its treatment of the light breaking through the massive foliage.

Gainsborough was the only important English portrait painter to devote much time to landscape drawing. He composed a great many drawings in a variety of mediums including chalk, pen and wash, and watercolour, some of them varnished. He was always eager to find new papers and new techniques. He produced a magic lantern to give striking lighting effects; the box is still in the Victoria and Albert Museum, together with some of the slides. In addition Gainsborough made a series of soft-ground etchings and aquatints. He never sold his drawings and, although many of them are closely related to pictures, they are not studies in the ordinary sense but works of art in their own right.

Gainsborough was not methodical in keeping sitter books, and comparatively few of the portraits in the early years in London are dated. In 1777 he exhibited at the Royal Academy the well-known "Mrs. Graham," "C.F. Abel," "William Henry, Duke of Gloucester," and "Maria, Duchess of Gloucester," all deliberately glamorous and painted in richly heightened colour. "Queen Charlotte" is more restrained; the painting of the flounced white dress decorated with ribbons and laces makes her look every inch a queen. It is significant that Gainsborough, unlike most of his contemporaries, did not generally use drapery painters. In 1784 he quarrelled with the Academy because they insisted on hanging the "Three Eldest Princesses" at the normal height from the floor, which Gainsborough maintained was too high to appreciate his lightness of touch and delicate pencilling. In protest he withdrew the pictures he had intended for the exhibition and never showed again at the Academy.

In some of Gainsborough's later portraits of women, he dispensed with precise finish, and, without sacrificing the likeness, he concentrated on the general effect. "Mrs. Sheridan" melts into the landscape, while "Lady Bate Dudley," a symphony in blue and green, is an insubstantial form, almost an abstract. "Mrs. Siddons," on the other hand, shows that Gainsborough could still paint a splendid objective study. Few of the later male portraits are of a pronounced character, but exceptions are two particularly good pictures of musicians, "Johann Christian Fischer" and the unfinished "Lord Abingdon" (private collection).

A new venture in 1783 was "The Mall in St. James' Park," a park scene described by Horace Walpole as "all a flutter like a lady's fan." "The Morning Walk," with romanticized figures strolling in a landscape, is painted in the same spirit. The "fancy pictures" painted in the 1780s gave Gainsborough particular pleasure. They are full-sized, idealized portraits of country children and peasants painted from models—for example, "The Cottage Girl with a Bowl of Milk." The idea appeared in immature form in the little rustic Suffolk figures, and he may have been fired to exploit it further by seeing the 17th-century Spanish painter Bartolomé Murillo's "St. John," which he copied.

He died in 1788 and was buried in Kew churchyard.

Assessment. Of all the 18th-century English painters, Thomas Gainsborough was the most inventive and original, always prepared to experiment with new ideas and techniques, and yet he complained of his contemporary Sir Joshua Reynolds, "Damn him, how various he is." Gainsborough alone among the great portrait painters of the era also devoted serious attention to landscapes. Unlike Reynolds, he was no great believer in an academic tradition and laughed at the fashion for history painting; an instinctive painter, he delighted in the poetry of paint. In his racy letters Gainsborough

shows a warm-hearted and generous character and an independent mind. His comments on his own work and methods, as well as on some of the old masters, are very revealing and throw considerable light on contemporary views of art. (M.Wo.)

MAJOR WORKS. *Paintings.* Portraits: "Lady and Gentleman in Landscape" (1746; Louvre, Paris); "Mr. and Mrs. Andrews" (*c.* 1750; National Gallery, London); "Heneage Lloyd and His Sister" (*c.* 1750; Fitzwilliam Museum, Cambridge, Cambridgeshire); "Mr. William Woollaston" (late 1750s; Christchurch Mansion Museum, Ipswich, Suffolk); "Painter's Daughters Chasing a Butterfly" (*c.* 1758; National Gallery, London); "Ann Ford, Mrs. Philip Thicknesse" (1760; Cincinnati Art Museum, Ohio); "Maria, Duchess of Gloucester" (early 1760s; Los Angeles County Museum); "Gertrude, Lady Alston" (mid-1760s; Louvre); "John, 4th Duke of Argyll" (1767; Scottish National Portrait Gallery, Edinburgh); "Hon. Thomas Needham" (1768; Ascott House, Berkshire); "John, 10th Viscount Kilmorey" (*c.* 1768; Tate Gallery, London); "Augustus John, Third Earl of Bristol" (1768; National Trust, Ickworth, Suffolk); "Isabella, Countess of Sefton" (1769; Croxteth Hall, Lancashire); "The Blue Boy" (*c.* 1770; Henry E. Huntington Library and Art Gallery, San Marino, Calif.); "Penelope, Viscountess Ligonier" (1771; Henry E. Huntington Library and Art Gallery); "Dr. Ralph Schomberg" (1771–72; National Gallery, London); "The Linley Sisters—Mrs. Sheridan and Mrs. Tickell" (*c.* 1772; Dulwich College Picture Gallery, Dulwich); "William Henry, Duke of Gloucester" (*c.* 1775; Chewton Manor, North Somerset, Somerset); "Mrs. Graham" (*c.* 1777; National Gallery of Scotland, Edinburgh); "C. F. Abel" (1777; Henry E. Huntington Library and Art Gallery); "Johann Christian Fischer" (1780; Buckingham Palace, London); "Mrs. Robinson," popularly nicknamed "Perdita" (1781; Wallace Collection, London); "Queen Charlotte" (1781; Windsor Castle); "Lord Rodney" (1783; Earl of Rosebery Collection, Dalmeny, West Lothian); "Mrs. Siddons" (*c.* 1783; National Gallery, London); "Three Eldest Princesses," also called "Princess Charlotte and Her Two Sisters" (1784, painted for the Royal Academy but not exhibited; Buckingham Palace); "Mrs. Sheridan" (*c.* 1785; National Gallery of Art, Washington, D.C.); "Lady Bate Dudley" (1787; Lord Burton Collection, Needwood House, Derbyshire).

Landscapes and "fancy pictures": "The Charterhouse" (1748; Foundling Hospital, London); "Cornard Wood," popularly nicknamed "Gainsborough's Forest" (1748; National Gallery, London); "The Woodcutter Courting a Milkmaid" (1753; Duke of Bedford Collection, Woburn Abbey, Bedfordshire); "Peasants Returning from Market" (*c.* 1767; Toledo Museum of Art, Ohio); "The Harvest Wagon" (*c.* 1770; Barber Institute, Birmingham, Eng.); "The Watering Place" (1777; National Gallery, London); "The Cottage Door" (*c.* 1780; Henry E. Huntington Library and Art Gallery); "The Mall in St. James' Park" (1783; Frick Collection, New York City); "The Morning Walk" (1785; National Gallery, London); "The Cottage with Dog and Pitcher" (1785; Sir Alfred Beit Collection, Russborough, Co. Wicklow, Ire.); "The Cottage Girl with a Bowl of Milk" (1786; South African National Gallery, Cape Town); "The Market Cart" (1786; Tate Gallery); "The Wood Gatherers," also known as "Cottage Children" (1787; Metropolitan Museum of Art, New York City); "Boy with a Cat-Morning" (1787; Metropolitan Museum of Art).

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Gainsborough chair, type of English armchair made in the mid-18th century. A wide chair with a high back, it was normally upholstered in leather. The sides are open, and the short, upholstered arms are set well back from the seat, to which they are connected by a concave curving support. The arm supports and front legs are usually fluted or carved on the front face. The contemporary name was "French chair," a term that covered a variety of designs, the most elaborate based on French Rococo chairs of the Louis XV period.

Gainza Paz, Alberto (b. March 16, 1899, Buenos Aires—d. Dec. 26, 1977, Buenos Aires), editor of the influential Buenos Aires daily *La Prensa* who was exiled for his opposition to dictator Juan Perón.

Gainza Paz received a law degree from the National University at Buenos Aires in 1921 and joined the staff of *La Prensa* under the direction of his uncle, Ezequiel P. Paz, whom he succeeded in 1943. That same year the paper, which by then had gained worldwide prestige, was censured for criticizing the military government. In 1944 criticism of the regime's health program brought a five-day suspension. When Perón gained control of the government in the autumn of 1945, Gainza Paz was briefly arrested, an act which marked the beginning of a long campaign by the Perón regime to control the newspaper. In January 1951 the government-controlled newsdealers' union struck *La Prensa,* forcing it to suspend publication. Matters reached a critical point in March when the Congress ordered Gainza Paz, who had already left for Uruguay, jailed for contempt. *La Prensa* was confiscated in April 1951 and Gainza Paz did not resume management until after Perón was overthrown in 1956. The editor was regarded throughout the West as a symbol of the struggle for freedom of the press against official censorship. He was honoured for his promotion of hemispheric cooperation by the Americas Foundation at the October 1950 meeting of the Inter-American Press Association in New York.

Gairdner, Lake, largest of a group of shallow depressions west of Lake Torrens in central South Australia, 240 mi northwest of Adelaide. It measures 100 mi (160 km) long by 30 mi wide. Lying at the base of the Eyre Peninsula, the lake is a dry salt pan (playa) intermittently filled with water. Visited in 1857 almost simultaneously by Stephen Hack and Peter E. Warburton, it is named after Gordon Gairdner, former chief clerk in the Australian Department of the Colonial Office. The lake is surrounded by large sheep stations set amid sand hills and salt-bush vegetation.

Gaiseric, also spelled GENSERIC (d. 477), king of the Vandals and the Alani (428–477) who conquered a large part of Roman Africa and in 455 sacked Rome.

Gaiseric succeeded his brother Gunderic at a time when the Vandals were settled in Baetica (modern Andalusia, Spain). In May 428 Gaiseric transported all his people, purported by him to number 80,000, to Africa. Evidently he was invited to Africa by the governor, Count Bonifacius, who wished to use the military strength of the Vandals in his struggle against the imperial government.

Gaiseric caused great devastation as he moved eastward from the Strait of Gibraltar across Africa. He turned on Bonifacius, defeated his army in 430, and then crushed the joint forces of the Eastern and Western empires that had been sent against him. In 435 Gaiseric concluded a treaty with the Romans under which the Vandals retained Mauretania and part of Numidia and became *foederati* (allies under special treaty) of Rome.

In a surprise move on Oct. 19, 439, Gaiseric captured Carthage, thus throwing off Roman overlordship and striking a devastating blow at imperial power. In a 442 treaty with Rome the Vandals were recognized as the masters of proconsular Africa, Byzacena, and part of Numidia. Gaiseric's fleet soon came to control much of the western Mediterranean, and he annexed the Balearic Islands, Sardinia, Corsica, and Sicily.

His most famous exploit, however, was the capture and plundering of Rome, June 455. Subsequently the King defeated two major efforts of the Romans to overthrow him, that of the emperor Majorian in 460 and that led by Basiliscus in 468. He was succeeded by his son Huneric.

To make the best use of the Britannica, consult the INDEX *first*

Gaitán, Jorge Eliécer (b. Jan. 26, 1902, Bogotá—d. April 9, 1948, Bogotá), political leader who was considered a champion of the Colombian people and was revered as a martyr after his assassination.

Gaitán studied law at the National University of Colombia, Bogotá, and continued his studies in Rome. There he was greatly influenced by Benito Mussolini, paying careful attention to his techniques for arousing and organizing the populace. Returning to Colombia, he organized a short-lived party called Union Nacional Izquierdista Revolucionaria (Left Revolutionary National Union). His maiden speech as a congressman was a polemic attack on the plantations owned by the United Fruit Company (*q.v.*). He served as mayor of Bogotá (1936) and minister of education (1940).

In 1946, as the leader of the more radical factions of Liberals, he ran for the office of president in opposition to the official Liberal Party candidate Gabriel Turbay. That split among the Liberals gave the victory to the Conservative Party candidate Mariano Ospina Pérez. It was expected that Gaitán would be elected president in the next election, but he was killed by an assassin in 1948 during the International Conference of American States meeting in Bogotá. This murder led to a major popular uprising known as the *bogotazo* and exacerbated a period of civil unrest called the *violencia.*

Gaitskell, Hugh (Todd Naylor) (b. April 9, 1906, London—d. Jan. 18, 1963, London), British statesman, leader of the British Labour Party from December 1955 until his sudden death at the height of his influence.

After teaching political economy at the University of London, Gaitskell served through World War II in the Ministry of Economic Warfare. Entering the House of Commons in 1945, he was appointed minister of fuel and power in 1947, minister of state for economic affairs in 1950, and chancellor of the exchequer (succeeding Sir Stafford Cripps) later the same year, leaving office when the Labour government was defeated in 1951.

Gaitskell, 1955
Keystone

Gaitskell was chosen to succeed Clement

Attlee as Labour leader in 1955, in preference to two more experienced candidates, Herbert Morrison and Aneurin Bevan. He seemed discredited in 1959 when his party lost the general election, and in 1960 when the party executive, which opposed unilateral nuclear disarmament, was defeated on that issue at the annual party conference. At the 1961 party conference, however, he secured a reversal of the decision on nuclear weapons and then was able to reunite the party. In 1962, again at the party conference, he made a notable speech opposing Great Britain's entry into the European Economic Community (Common Market), for which the Conservative government was unsuccessfully negotiating.

Gaius, also spelled CAIUS (ancient Roman personal name, or praenomen): *see under* gens or family name or honorific (*e.g.,* under Catullus for Gaius Valerius Catullus), except as below.

Gaius, also spelled CAIUS (fl. AD 130–180), Roman jurist whose writings became authoritative under the late Roman Empire. In the Law of Citations (426), the Western emperor Valentinian III named him one of the five jurists (the others were Papinian, Ulpian, Modestinus, and Paulus) whose doctrines were to be followed by judges in deciding cases. The Institutes (Latin, Institutiones) of the Byzantine emperor Justinian I (reigned 527–565), which were intended to supersede Gaius' treatise of the same name, were modeled on the older work in style and content, numerous passages being copied verbatim.

Gaius' full name and most of his personal history are unknown. Besides the Institutiones, he wrote a commentary on the Twelve Tables (laws said to have been enacted about 450 BC, under the Roman monarchy), a treatise on the edicts of Roman magistrates, and several other works.

The Institutiones of Gaius, written about AD 161, comprise four books. The first concerns the legal status of persons; the second and third, property rights, including inheritance; and the fourth, forms of legal actions. The text was lost until 1816, when a manuscript, probably of the 5th century, was discovered at Verona, Italy. It was deciphered with great difficulty, because writings of St. Jerome had been superimposed on Gaius' words.

Gaius, SAINT, Gaius also spelled CAIUS (b. Dalmatia?—d. April 22?, 296, Rome; feast day April 22), pope from 283 (possibly December 17) to 296. Nothing about him is known with certainty. Supposedly a relative of the Roman emperor Diocletian, he conducted his pontificate at a period of Diocletian's reign when Christians were tacitly tolerated. Gaius is said, nevertheless, to have carried on his religious work for his last eight years concealed in the catacombs. His epitaph was found in the Cemetery of Calixtus.

Gajah Mada, also spelled GADJAH MADA (d. 1364), prime minister of the Majapahit Empire and a national hero in Indonesia. He is believed to have unified the entire archipelago. The principal poet of the era, Prapanca, eulogized Gajah Mada in an epic, and the first Indonesian university in Jogjakarta was named after him (1946).

No information is available on his early life, except that he was born a commoner. He rose to power on his intelligence, courage, and loyalty to King Jayanagara (1309–28) during a rebellion led by Kuti in 1319. He served as the head of the royal bodyguard that escorted King Jayanagara to Badander, when Kuti captured the capital of Majapahit. After finding a safe place for the King, he returned to the capital and spread the rumour that the King had been killed. He discovered that many officers

Terra-cotta head identified as Gajah Mada; in the Trawulan Site Museum, Indonesia

By courtesy of the Trawulan Museum, Indonesia

were upset by the King's supposed death and that Kuti was apparently unpopular among the people. Knowing, therefore, that the King still had loyal followers, Gajah Mada secretly organized a counterinsurrection, in which Kuti was killed and the King was restored. As a reward, Gajah Mada was appointed as the *patih* (minister) of Daha and, later, the *patih* of Daha and Janggala, a position that made him a member of the ruling elite. Prapanca, a court poet and historian, described Gajah Mada as "eloquent, sharp of speech, upright, and sober-minded."

Gajah Mada's loyalty to Jayanagara waned, however, when the King took possession of his wife. In 1328, when Jayanagara was ill, Gajah Mada instructed Tancha, the court physician, to kill the King during an operation. Upon the death of the King, Tancha was blamed and executed by Gajah Mada. Since the King had no son, his daughter Tribhuvana became ruler.

During the reign of Tribhuvana (1328–50), Gajah Mada gradually became the most powerful figure in Majapahit. In 1331 a rebellion took place in Sadeng (eastern Java). Gajah Mada immediately sent a military expedition to the area, but a minister of Majapahit named Kembar attempted to stop him from entering Sadeng. Gajah Mada broke the blockade and won the battle.

Upon his return, Gajah Mada was appointed as *mapatih,* or prime minister, of Majapahit. At the same time, he took a solemn oath before the council of ministers that he would not enjoy *palapa* (privileges of vacation or the revenue from his fief) before he conquered the whole archipelago for Majapahit. When Kembar and other ministers ridiculed this fantastic boast, Gajah Mada, with the help of the Queen, removed Kembar and his followers from office. In 1343, in accordance with his plans, Gajah Mada led a military expedition that conquered Bali.

Tribhuvana abdicated in 1350 and was succeeded by her son Hayam Wuruk, perhaps the best known king of Majapahit. During his reign, Majapahit reached the zenith of its power and controlled the whole of the Indonesian archipelago. The young King seemed content to leave the direction of affairs entirely in the hands of his prime minister.

The year after Hayam Wuruk's accession, Gajah Mada attempted to spread Majapahit influence to the western Java kingdom of Sunda. He sent a mission to Sunda expressing the wish of Hayam Wuruk to marry the daughter of the King of Sunda. The King consented and brought the Princess, together with some of his noblemen, to Majapahit. They camped in Bubat, north of the capital, in a large field where the wedding was supposed to take place. A disagreement ensued between Gajah Mada and the Sundanese king. The former wanted the King to surrender the Princess to Hayam Wuruk, but the King and his noblemen insisted that the Princess, as the queen of Majapahit, should have a status equal to that of Hayam Wuruk.

Gajah Mada brought in troops and intended to decide the issue by force. The Sundanese noblemen preferred death to dishonour; instead of a happy wedding, a bloody massacre took place. The King of Sunda was killed, as were the Princess and the Sundanese noblemen. After the massacre, Sunda seems to have acknowledged the overlordship of Majapahit for a time but, ultimately, recovered its independence.

To glorify his power, Gajah Mada built a temple on the boundary line of the Singhasāri kingdom in eastern Java to equate himself with the last king of Singhasāri. It was under his patronage that Prapanca began the composition of *Nāgarakertāgama,* the epic of Majapahit. A law book that had a great significance in Javanese history was also compiled under his instructions.

Gajah Mada also played a major role in the direction of internal policy. He occupied numerous positions, including that of chief officer of the palace. The range of his activities was so great that, when he died, Hayam Wuruk found it necessary to appoint four ministers to take over the positions that had previously been the responsibility of Gajah Mada alone. Gajah Mada's death (1364) occurred under mysterious circumstances. Some writers claim that he was poisoned by Hayam Wuruk, who had come to fear his minister's power. The evidence, however, is inconclusive.

Gajah Mada's role in unifying the Indonesian archipelago caused early Indonesian nationalists to consider him a great national hero, and the first Indonesian university in Jogjakarta, established in 1946, was named after him.

(L.Sur.)

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Gajdusek, D(aniel) Carleton (b. Sept. 9, 1923, Yonkers, N.Y., U.S.), American physician and medical researcher, corecipient (with Baruch S. Blumberg) of the 1976 Nobel Prize for Physiology or Medicine for his work implicating slow-acting viruses as causal agents in degenerative neurological disorders.

Gajdusek graduated from the University of Rochester (N.Y.) in 1943. He received his M.D. from Harvard University in 1946 and was a fellow in pediatrics and infectious diseases at Harvard from 1949 to 1952. In the next three years he held positions at the Institute of Research of the Walter Reed Army Medical Center in Washington, D.C., and the Institut Pasteur, Tehrān. It was in 1955, while he was a visiting investigator at the Walter and Eliza Hall Institute of Medical Research in Melbourne, Australia, that Gajdusek began the work which culminated in the Nobel Prize.

Gajdusek codiscovered and provided the first medical description of a unique central nervous system disorder occurring only among the Fore people of New Guinea and known by them as *kuru* ("trembling"). Living among the Fore, studying their language and culture, and performing autopsies on *kuru* victims, Gajdusek came to the conclusion that the disease was transmitted in the ritualistic eating of the brains of the deceased, a Fore funeral custom. Gajdusek became the head of laboratories for virological and neurological research at the National Institutes of Health (NIH) in 1958. After years of further research, much of it conducted with his NIH colleague Clarence Gibbs, Jr., he postulated that the delayed onset of the disease could be attributed to a virus capable of extremely slow action or, perhaps, having the ability to remain dormant for

years. Gajdusek's study proved to have significant implications for research into the causes of multiple sclerosis, Parkinson's disease, and other little-understood degenerative neurological conditions.

In addition to his work in virology, Gajdusek was an expert in the fields of learning and behaviour, child growth and development in primitive cultures, genetics, immunology, and neurological patterning and learning.

Gaki: *see* Akutagawa Ryūnosuke.

gal, unit of acceleration, named in honour of the 16th–17th-century Italian physicist and astronomer Galileo and used especially in measurements of gravity. One gal equals a change in rate of motion of one centimetre (0.3937 inch) per second per second.

Gal Oya, river, eastern Sri Lanka. It rises in the hill country east of Badulla and flows north and east past Inginiyagala to the Indian Ocean 10 miles (16 km) south of Lalmunai. The Gal Oya river is the main source feeding the Gal Oya scheme, a government program that dammed this and smaller rivers to create Senanayake Samudra—the largest tank (reservoir) in Sri Lanka, at Bintenne. The project has opened up 100,000 acres (40,000 hectares) of land to the cultivation of paddy, sugarcane, chilies, potatoes, and other crops throughout the eastern coast. The Gal Oya National Park (founded 1954) has an area of 198 square miles (512 square km) and a wide variety of wildlife, including bear, elephant, and leopard.

galactic cluster, in astronomy, any group of young stars held together by mutual gravitation (*see* star cluster).

galactic coordinate, in astronomy, galactic latitude or longitude. The two coordinates constitute a useful means of locating the relative positions and motions of components of the Milky Way Galaxy. Galactic latitude is measured in degrees north or south of the Galaxy's fundamental plane of symmetry. This plane is defined by the galactic equator, the great circle in the sky best fitting the plane of the Milky Way, as determined by a combination of optical and radio measurements. The galactic equator is inclined at about 62°36′ of arc to the celestial equator, which is the projection of Earth's Equator into the sky.

Galactic longitude is measured in degrees eastward of an imaginary line running across the fundamental plane of the Galaxy and connecting Earth (assumed to be on that plane) with the probable position of the galactic centre in the constellation Sagittarius. Before 1958, galactic longitude was measured from an arbitrarily chosen point, an intersection of the galactic and celestial equators in the constellation Aquila. The development of radio astronomy and rediscussion of optical results led to a more accurate determination of the position of the galactic centre and its adoption in 1958 as the new zero point of longitude.

At the same time, the positions of the galactic poles and equator were redefined, with a change of less than 2° in the positions of the poles. The north galactic pole is now considered to be in the constellation Coma Berenices, at +90° galactic latitude, and with equatorial (Earth-based) coordinates of 12 hours 49 minutes right ascension, 27°24′ north declination.

In the pre-1958 system, the point that is now defined as zero longitude was at longitude 327°41′. Latitude and longitude in the new system are symbolized b^{II} and l^{II}, respectively, to distinguish them from the pre-1958 latitude and longitude (symbols b and l), which are still found in a number of catalogs and charts.

galactic halo, in astronomy, nearly spherical volume of thinly scattered stars, globular clusters of stars, and tenuous gas observed surrounding spiral galaxies, including the Milky Way—the galaxy in which the Earth is located. The roughly spherical halo of the Milky Way is thought to have a radius of some 50,000 light-years (about 5×10^{17} kilometres), and its gas is a source of radio emission, particularly at the 21-centimetre wavelength (*see* 21-centimetre radiation).

galactorrhea, excessive flow of milk from the breast, or lactation that is not associated with childbirth or nursing. The abnormal production of milk in women is usually due to excessive levels of estrogen in the body or to excessive production of prolactin, a hormone that is manufactured by the pituitary gland and that stimulates the production of milk. Galactorrhea may also be caused by a tumour or other disorder occurring in the pituitary gland. The milk of a nursing mother who has galactorrhea may be watery, whitish green in colour, and of poor quality.

In women, persistent lactation without suckling, which follows upon a recent pregnancy, is called the Chiari–Frommel syndrome. Galactorrhea in a woman who has never been pregnant is termed the Ahumada–del Castillo, or the Argonz–del Castillo, syndrome. Such galactorrhea appears to result from excesses of secretion from the pituitary eosinophils.

Galactorrhea in women has been reported from a wide variety of other causes, including encephalitis, pituitary stalk section, various surgical procedures, pneumoencephalography, and chlorpromazine, reserpine, birth-control pill, progesterone, or other drug therapies.

Therapy for galactorrhea includes removal of the cause, when it is known, and regulation of the patient's estrogen and progesterone production.

galactose, a member of a group of carbohydrates known as simple sugars (monosaccharides). It is usually found in nature combined with other sugars, as, for example, in lactose (milk sugar). Galactose is also found in complex carbohydrates (*see* polysaccharide) and in carbohydrate-containing lipids called glycolipids, which occur in the brain and other nervous tissues of most animals.

galactose tolerance test, also called BAUER'S TEST, procedure assessing liver function. The healthy liver is able to convert galactose, one type of sugar, to glucose, the major sugar in the body. In persons with liver disease, this ability is defective; the administration of galactose results in the persistence of abnormal levels of it in the blood for several hours and in the urinary excretion of abnormal amounts of galactose. This test has been advocated for the differential diagnosis between hepatocellular and obstructive jaundice. The test yields abnormal results in persons with hepatocellular jaundice, which is caused by injury to the liver cells, but normal results in persons with obstructive jaundice, which is caused by an impediment to the flow of bile from the liver to the digestive tract.

galactosemia, a hereditary defect in the metabolism of the sugar galactose, which is a constituent of lactose, the main carbohydrate of milk. Infants with this condition appear normal at birth, but, after a few days of milk feeding, they begin to vomit, become lethargic, fail to gain weight, and show an enlargement of the liver. Untreated infants who survive are usually malnourished and stunted in growth; cataracts in the eyes and mental retardation may also occur. When their urine is tested for sugars, galactose invariably is present. In all affected infants, the symptoms of galactosemia regress after milk and milk products are eliminated from their diet.

Normally, galactose is metabolized in the body to glucose, each step in the metabolic pathway being carried out by a specific organic catalyst, or enzyme. In galactosemia, the enzyme that catalyzes the second step, converting galactose-1-phosphate to glucose-1-phosphate, is not active. As a result of this metabolic block, there is an accumulation of galactose-1-phosphate in body tissues, and this compound is believed to be the cause of the cataracts and liver damage. Galactose is present in the blood and urine of persons suffering from galactosemia, and there is decreased formation of glucose in the body, which may result in a lowering of the blood glucose level. The mental retardation that is sometimes observed in galactosemic children may be caused by the high galactose level, the low glucose level, or both. It has been estimated that hereditary intolerance to galactose occurs in approximately one in 18,000 infants.

Galactosemia is transmitted by an autosomal recessive gene. Unaffected carriers of the trait who mate can expect, on the basis of chance, to have one galactosemic child, two children who are unaffected but are carriers, and one normal child for each four children born. Reliable and simple tests are available to detect carriers of galactosemia and galactosemic newborn infants. The condition can be detected before birth by collecting sample fluid from the amniotic sac. When a lactose–galactose-free diet is initiated early in infancy and maintained during the first three years of life, the development of liver disease, cataracts, and mental retardation may usually be prevented. In time, an increased tolerance to galactose may develop.

galago, any of six species of small, arboreal primates, genus *Galago,* family Lorisidae, found in sub-Saharan African forests. Galagos are attractive gray, brown, or reddish- or yellowish-brown animals with large eyes and ears, long hind legs, soft wooly fur, and long tails. They are also characterized by the great elongation of the upper portion of the feet (tarsus) and by the ability to fold their ears. Galagos pass the day in sleep but are active at night, feeding on fruits, insects, and small birds. In the trees, galagos cling and leap about; the smaller forms, such as the bush baby (*G. senegalensis*), are extremely active and agile. When they descend to the ground they sit upright, and they move around by jumping with their hind legs like jerboas. Galagos range in length from about 12–16 centimetres (4½–6 inches), excluding the 18–20-centimetre tail, in Demidoff's dwarf galago, *Galago* (or *Galagoides*) *demidovii,* to about 30–37 centimetres, excluding the 42–47-centimetre tail, in the thick-tailed galago, *G. crassicaudatus.* Known gestation periods are about three to four months; the number of young is usually one or two.

Bush babies (*Galago senegalensis*)
George Holton—Photo Researchers

Galahad, the pure knight in Arthurian romance, son of Lancelot du Lac and Elaine (daughter of Pelles), who achieved the vision of God through the Holy Grail. In the first romance treatments of the Grail story (*e.g.,* Chrétien de Troyes's 12th-century *Conte du Graal*), Perceval was the Grail hero. But during the 13th century a new, austerely spiritual significance was given to the Grail theme,

and a new Grail winner was required whose genealogy could be traced back to the House of David in the Old Testament. Galahad was, moreover, made the son of Lancelot so that achievement inspired by earthly love (Lancelot inspired by Guinevere, whose appearance Elaine had assumed through magic) could be set in contrast to that inspired by heavenly love (Galahad inspired by spiritual fervour). This theological version of the Grail story appeared in the *Queste del Saint Graal,* which forms part of the Prose *Lancelot,* or Vulgate cycle. The *Queste* shows signs of strong Cistercian influence, and similarities can be seen between it and the mystical doctrines of St. Bernard of Clairvaux. *See also* Grail.

Galanthis (Greek mythology): *see* Galinthias.

Galápagos finch, also called DARWIN'S FINCH, distinctive group of birds whose radiation into several ecological niches in the

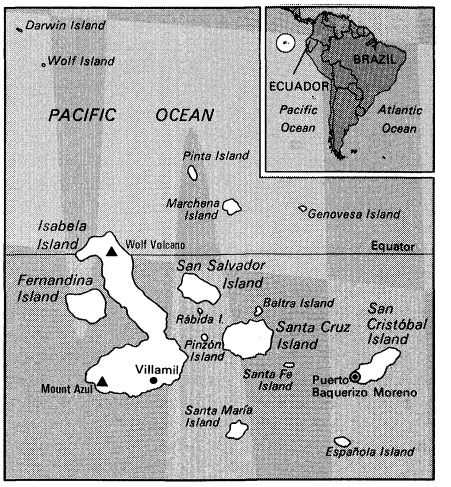
Galápagos finch (*Camarhynchus parvulus*)
Alan Root—Bruce Coleman Inc./EB Inc.

competition-free isolation of the Galápagos Islands and on Cocos Island gave the English naturalist Charles Darwin evidence for his thesis that "species are not immutable." The three genera (*Geospiza, Camarhynchus,* and *Certhidea*), including 14 species, usually are placed in the songbird family Fringillidae (order Passeriformes) and in a distinct subfamily, Geospizinae, but some authors place them in the family Emberizidae. All are 10–20 cm (4–8 inches) long and of brownish or black coloration; they differ greatly, however, in the configuration of their bills, which are suited to their diverse feeding habits. Two species—the woodpecker finch (*Camarhynchus pallidus*) and the mangrove finch (*C. heliobates*)—use cactus spines to probe for grubs.

Galápagos Islands, Spanish ARCHIPIÉLAGO DE COLÓN, island group of the eastern Pacific Ocean, administratively part of Ecuador. The Galápagos are a group of 19 islands with associated islets and rocks lying athwart the equator 600 miles (1,000 km) west of the mainland of Ecuador. Their total land area of 3,086 square miles (7,994 square km) is scattered over some 23,000 square miles (59,500 square km) of ocean.

The Galápagos Islands are formed of lava piles and dotted with shield volcanoes; eruptions have occurred on several of the islands in the 20th century. The striking ruggedness of their landscape is accentuated by high volcanic mountains, craters, and cliffs. The largest of the islands, Isabela (Albemarle), is approximately 82 miles (132 km) long and constitutes more than half of the total land area of the archipelago. The highest point of the Galápagos Islands is Mount Azul, on Isabela Island, at 5,541 feet (1,689 m). The second largest island is Santa Cruz (Indefatigable).

The Galápagos Islands were discovered in



Galápagos Islands

1535 by the bishop of Panamá, Tomás de Berlanga, while he was en route to Peru. He named them Las Encantadas ("The Enchanted"). Sites on several of the islands have yielded Inca pottery fragments providing evidence of pre-Spanish occupation. Numerous Spanish voyagers stopped at the islands during the 16th century; in the late 17th century pirates used the islands as a hideout; and in the early 19th century freebooting gave way to whaling and seal hunting. The islands had been unclaimed for almost 300 years before colonization began on what is now Santa María Island in 1832, when Ecuador took official possession of the archipelago. The islands became internationally famous when visited in 1835 by the English naturalist Charles Darwin; their unusual fauna contributed to the formation of his ideas on natural selection.

The climate of the Galápagos Islands is characterized by low rainfall, low humidity, and relatively low air and water temperatures. The islands have about 700 species of higher plants, of which about 40 percent are endemic. The plant life shows close affinities to that of South and Central America. The archipelago's arid lowlands are covered by an open cactus forest. A transition zone at higher elevations is covered with a forest in which pisonia, fish fuddle, and guava trees dominate. The moist forest region above the transition zone is dominated by a *Scalesia* forest (a relict form of vegetation) with dense underbrush. The treeless upland zone is covered with ferns and grasses. The government of Ecuador made the Galápagos (in part) a wildlife sanctuary in 1935 and again in 1959. In 1968 the sanctuary became the Galápagos National Park, administered by Ecuador with the assistance of the Charles Darwin biological station, which was established on Santa Cruz Island to promote scientific studies and to protect the indigenous vegetation and animal life of the Galápagos.

The archipelago is renowned for its unusual animal life and takes its name from its giant land tortoises (the old Spanish word for which is *galápagos*), thought to have the longest life span of any creature on Earth. The close affinities to the fauna of South and Central America demonstrate that the bulk of the archipelago's animals originated there. The difficulty of crossing the ocean, however, accounts for the paucity of animal life. Amphibians are lacking, reptiles are few, and endemic land mammals are represented by only seven rodents and two bats. There are only about 80 species and subspecies of birds breeding on the islands; most land birds are Galápagos, or Darwin's, finches.

Galápagos animal life is nevertheless of extreme scientific interest for several reasons, which include the following. First, there is a high percentage of endemic forms; all of the reptiles, with the exception of one night lizard, and most of the resident birds are endemic. Second, species have developed subspecies on the different islands. Third, the finches have developed a multitude of adaptive types from one common ancestor. They differ mainly in beak shape and size. Fourth, there are many other types that have evolved by adaptation. The swimming marine iguanas, for example, which feed on seaweed and in some places cover the coastal rocks in hundreds, are unique. Another species of interest is the flightless cormorant. Fifth, the giant tortoises, which once were widespread on the continents but became extinct elsewhere, survive as a relic on the larger islands. In addition, species of Antarctic origin, such as penguins and fur seals, live on the islands side by side with tropical animals.

The islands' human inhabitants, mostly Ecuadorians, live in settlements on San Cristóbal, Santa María, Isabela, and Santa Cruz islands; some of the islands are virtually untouched by humans. Tourism, fishing, and agriculture are the main economic activities, with grouper, coffee, and cattle being exported. Pop. (1989 est.) 9,243.

Galashiels, principal town of Ettrick and Lauderdale district of the Borders region, southeastern Scotland. It is on Gala Water near its junction with the River Tweed, 33 miles (53 km) south-southeast of Edinburgh. Woolen manufacture dates from the close of the 16th century, and the Scottish College of Textiles (1909) is the central institution for the industry that is now mainly confined to the weaving of tweeds and the making of knitwear. There are also pharmaceutical, tanning, and other light industries. Galashiels was originally a village built for accommodation of pilgrims to Melrose Abbey, 4 miles (6.4 km) southeast, and was created into a burgh of barony in 1599. Nearby are two homes of the novelist Sir Walter Scott, Ashiestiel (where he lived 1804–12) and Abbotsford (which he purchased in 1811). Also nearby is an ancient Pictish earthwork, the Catrail or Picts' Work Ditch. Pop. (1981) 12,244.

Galaţi, *judeţ* (county), eastern Romania, occupying an area of 1,708 square miles (4,425 square km), bounded on the east by the Moldavian S.S.R. of the Soviet Union. The county is bordered in the east by the Prut River and in the south and west by the Siret River, both of which drain southeastward. Amid the county's lowlands and rolling hills lies Lake Brateş, Romania's largest freshwater lake, near Galaţi (*q.v.*) city, the county capital. Machinery, iron products, textiles, and canned goods are produced in Galaţi and Tecuci. Galaţi city is Romania's leading producer of ships. Timber industries operate in Comeşti and Ghidigeni. Livestock raising and cereal growing are the major agricultural activities. An agricultural school and a museum of history and science are found in Tecuci. Remains of a 6th–5th-century-BC settlement and a Roman fortress are situated in Barboşi village. Carpina and Ghimia villages are fishing resorts beside Lake Brateş. Galaţi has a university. Galaţi, Tecuci, and Tîrgu Bujor are centres for highway and railroad connections. Pop. (1987 est.) 635,425.

Galaţi, German GALATZ, city, capital of Galaţi *judeţ* (county), southeastern Romania. An inland port about 120 miles (190 km) northeast of Bucharest, it is situated on an eminence among the marshes at the confluence of the Danube and Siret rivers, on the southwestern shore of Lake Brateş.

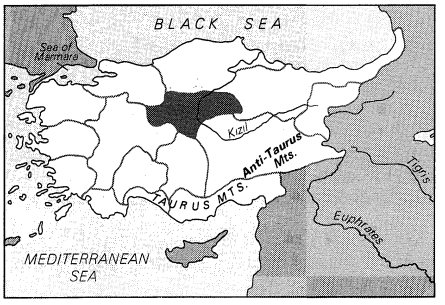
By the beginning of the 15th century a fishing village, referred to as "the village of Galaţi," was documented; a century later, there was a reference to Schela Galaţi (*schela* being an old word for the place where ships are moored for loading and unloading). The port was important for the Turks, who occupied it from the early 16th century until 1829. Its rapid

19th-century development was stimulated by the adoption of free-port status from 1837 to 1883. During World War II, German troops retreating from the Soviet Union in 1944 devastated the town and reduced the population, substantially Jewish, to less than half. Owing to the intensive rebuilding effort since then, Galaţi has large areas of modern buildings.

Galaţi is a centre of culture. The University of Galaţi was founded in 1948. The city has theatres, as well as museums of modern art, history, and natural science. Among historic buildings is the fortified Precista Church (15th century).

The city is one of the chief ports for Romanian imports and the leading exporter of timber. The country's largest shipyard is at Galaţi. Industries include metalworking and the production of chemicals, textiles, building materials, and foodstuffs. In the 1970s Romania's largest ironworks and steelworks were completed there. Pop. (1985 est.) 262,216.

Galatia, ancient district in central Anatolia that was occupied early in the 3rd century BC by Celtic tribes, whose bands of marauders created havoc among neighbouring Hellenistic states. Invited from Europe to participate in a Bithynian civil war (278 BC), the Gallic horde plagued western Anatolia until checked by the Seleucid king Antiochus I at the so-called Ele-



Galatia

From W. Shepherd, *Historical Atlas*, Harper & Row, Publishers (Barnes & Noble Books), New York; revision copyright © 1964 by Barnes and Noble, Inc.

phant Battle (275 BC). At that point the Celts, called Galatae (Galatians) by 3rd-century writers, settled in the territory to which they gave their name. The Galatians, having joined the Seleucids against Rome (winter 190–189 BC), brought upon themselves a Roman punitive expedition (189 BC) from which they never recovered. Passing successively under the rule of Pergamum and Pontus, Galatia became a Roman protectorate (85 BC) ruled by puppet kings. Though originally possessing a strong cultural identity, the Galatians by the 2nd century AD had become absorbed into the Hellenistic civilization of Anatolia.

Galatians, The Letter of Paul to the, also called THE EPISTLE OF ST. PAUL THE APOSTLE TO THE GALATIANS, New Testament writing addressed to Christian churches (exact location uncertain) that were disturbed by a Judaizing faction within the early Christian church. The members of this faction taught that Christian converts were obliged to observe circumcision and other prescriptions of the Mosaic Law. They repudiated Paul's statements to the contrary by denying the legitimacy of his apostolic calling. In rebuttal, Paul vigorously defended his credentials as a true apostle of Jesus Christ and provided important autobiographical information in the process.

In the letter Paul reaffirms his former teaching that the Mosaic Law is obsolete and that a return to Jewish practices would therefore be regressive. Though Christians have a new freedom, they have no license to sin; rather, they assume a responsibility to live lives in accord with the Spirit of God. Historical problems have caused uncertainty about the date of the letter's composition.

Galatz (Romania): *see* Galaţi.

Galaup, Jean-François de: *see* La Pérouse, Jean-François de Galaup, comte de.

galaxy, any of the billions of systems of stars and interstellar matter that make up the Cosmos.

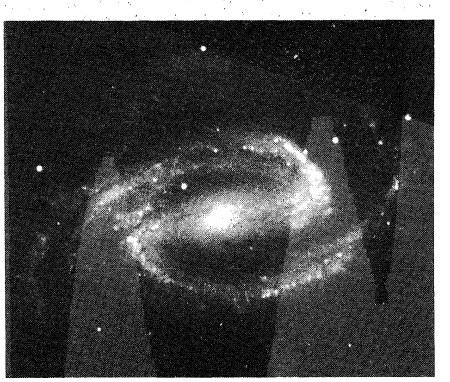
A brief treatment of galaxies follows. For full treatment, *see* MACROPAEDIA: Galaxies.

Galaxies vary considerably in size, composition, and structure, but nearly all of them are arranged in groups, or clusters, of from a few to as many as 10,000 members each. The diameters of galaxies are generally measured in tens of thousands of light-years. The distance between galaxies within a cluster averages approximately 1,000,000–2,000,000 light-years, and the spaces between clusters of galaxies may be a hundred times as great. Each galaxy is composed of innumerable stars—most likely from hundreds of million to more than a trillion stars. In many galaxies, as in the Milky Way Galaxy, clouds of interstellar gas and dust particles known as nebulas can be detected.

The majority of known galaxies fall into one of two major classes: spirals and ellipticals. Roughly 70 percent of the bright galaxies in the sky are of the spiral variety, including the Milky Way Galaxy.

A spiral galaxy has a main disk of stars 50,000 to 150,000 light-years in diameter and a thickness up to a tenth as great. Embedded in the disk are the spiral arms, winding out from the centre like those of a pinwheel. The arms contain the greatest concentration of a spiral galaxy's interstellar gas and dust, and it is in these regions that star formation can occur. Among newly formed stars are the occasional short-lived, highly luminous ones; their presence in the arms makes them conspicuous on telescopic photographs. Surrounding the central nucleus of a spiral galaxy is a large nuclear bulge, which is nearly spherical in most cases and may have a diameter of up to half that of the disk. Outside the nuclear bulge and disk is a sparse, more or less spherical halo of star clusters, individual stars, and perhaps other matter. The halo may extend far beyond the disk and contain most of the galaxy's mass.

Spiral galaxies are generally subdivided into "normal" and "barred" types. In the latter, the arms begin either from the ends of a straight bar of stars and interstellar matter passing through the nucleus or from a circular ring surrounding the bar, rather than from the nucleus. Spirals are still further subdivided according to three well-correlated parameters: the size of the nucleus, the tightness of the winding of the arms, and the smoothness of the arms.



Barred spiral galaxy (NGC 1300) in the constellation Eridanus

By courtesy of Mount Wilson and Palomar Observatories

An elliptical galaxy has a telescopic image that reveals a symmetrical distribution of stars in a spherical or spheroidal shape. Such galaxies range from the rare giant ellipticals, which extend several hundred thousand light-years across, to dwarf ellipticals of only a few million stars. The dwarf ellipticals are by far the most common kind of galaxy, although none is conspicuous in the sky. The projected images of ellipticals range from nearly circular to extremely elongated. Their flattening, however, is not due to rotation, and it is not known whether their true shapes are oblate or prolate spheres.

A small number of galaxies do not fit neatly into the usual scheme, and they are classified as irregular. There are also some special classes, a few of which are considered here. The first of these are the S0 galaxies, which are usually found in rich clusters of galaxies. They resemble spirals but have no spiral arms, possibly because their interstellar matter is stripped away as they move through intracluster gas. A second type of unusual star system is the cD galaxy. Such galaxies are supergiant ellipticals that often occur at or near the centre of rich galactic clusters. They are thought to result from the merging, or fusion, of several galaxies that have collided. Active nuclei galaxies constitute one other notable class of unusual galaxies. Their central nuclei show evidence of spectacular or violent activity. These range from Seyfert galaxies to quasars, the latter generally believed to be exceedingly bright nuclei of very remote galaxies.

Galba, Latin in full SERVIUS GALBA CAESAR AUGUSTUS, original name SERVIUS SULPICIUS GALBA (b. Dec. 24, 3 BC—d. Jan. 15, AD

Galba, marble bust; in the Uffizi, Florence

Alinari—Art Resource/EB Inc.

69, Rome [Italy]), Roman emperor for seven months (AD 68–69). His administration was priggishly upright, though his advisers were allegedly corrupt.

Galba was the son of the consul Gaius Sulpicius Galba and Mummia Achaica, and in addition to great wealth and ancient lineage he enjoyed the favour of the emperors Augustus and Tiberius. He began his senatorial career before the normal age, became consul (AD 33), received command of the Upper German army (39), and served a proconsulship in Africa (45).

Galba was appointed governor of Nearer Spain in 60 and served in that post for eight years. In 68, believing that the emperor Nero was planning his assassination, Galba accepted (and perhaps even prompted) an invitation from Vindex, the governor of Lugdunensis in Gaul, to head a rebellion against Nero. He then recruited troops in Spain and built up a large following in many other regions of the empire, though Vindex himself was defeated in a battle with the Rhine armies. Nero, deserted by his imperial troops (Praetorian Guard), killed himself on June 9, 68, and Galba was formally accepted as emperor by the Senate. Upon his arrival in Rome as emperor,

Galba executed many highly placed Romans, including the praetorian prefect Nymphidius Sabinus, who had been responsible for his accession. His rewards to the Gallic states that had supported Vindex alienated the Lower Rhine army, which on Jan. 2, 69, proclaimed its commander, Vitellius, emperor. Galba had also refused to pay the Praetorians the reward that they claimed for having deserted Nero; and, when he adopted Lucius Piso Licinianus as his successor instead of the former governor of Lusitania, Otho, the latter won the support of the Praetorians, who then killed both Galba and Piso in the Forum.

Galbraith, John Kenneth (b. Oct. 15, 1908, Iona Station, Ont., Can.), American economist and public servant known for his liberal views and for the high literary quality of his popular writings on public affairs.

After study at the University of Toronto (B.S., 1931) and the University of California at Berkeley (Ph.D., 1934), Galbraith taught successively at Harvard and Princeton universities until 1942. During World War II and the postwar period, he held a variety of governmental posts, resuming his academic career at Harvard (1949–75). He established himself as a politically active, liberal academician with a talent for communicating with the reading public. A key adviser to President John F. Kennedy, he served as ambassador to India (1961–63), returning to Harvard in 1963 but continuing his involvement in public affairs. In 1967–68 he served as national chairman of Americans for Democratic Action, and in 1972 he was president of the American Economic Association.

Galbraith's major works include *American Capitalism: The Concept of Countervailing Power* (1951), in which he questioned the devotion to the competitive ideal in industrial organization. In *The Affluent Society* (1958) he faulted the "conventional wisdom" of U.S. economic policies and called for less emphasis on production and more attention to public services. In *The New Industrial State* (1967) he called for intellectual and political innovations to deal with the decline of competition in the U.S. economy and envisaged a growing similarity between "managerial" capitalism and socialism. Among his many other works are *The Great Crash, 1929* (1955), *The Liberal Hour* (1960), *Ambassador's Journal* (1969), *A Life in Our Times: Memoirs* (1981), *The Anatomy of Power* (1983), and *Economics in Perspective: A Critical History* (1987).

Galdan (Mongol leader): *see* Dga'-ldan.

Galdhø Peak, Norwegian GALDHØPIGGEN, highest mountain peak of the Scandinavian peninsula. It lies in the Jotunheim Mountains, western Oppland *fylke* (county), south-central Norway. Rising to 8,100 feet (2,469 m), it is the highest peak of Norway; the nearby Glittert Mountain has a height of 8,045 feet (2,452 m). Galdhø was first climbed in 1850. Surrounded by glaciers, with a scenic view of the other peaks of the Jotunheim Mountains, Galdhø is a tourist mecca during the summer climbing season.

Galdós, Benito Pérez: *see* Pérez Galdós, Benito.

gale, air current that is stronger than a breeze; specifically a current of 28–55 knots (50–102 kilometres per hour), corresponding to force 7 to 10 on the Beaufort scale (*q.v.*).

Gale, Zona (b. Aug. 26, 1874, Portage, Wis., U.S.—d. Dec. 27, 1938, Chicago, Ill.), American novelist and playwright whose *Miss Lulu Bett* (1920) established her as a realistic chronicler of Midwestern village life.

Gale graduated from the University of Wisconsin in 1895 and received her M.A. there in 1899. After two years with various Milwaukee newspapers she became, in 1901, a reporter for the *New York World.* After the publication of her first short story, in 1903, she gave her full time to writing.

Gale's books include *Friendship Village* (1908), *When I Was a Little Girl* (1913), *Heart's Kindred* (1915), *A Daughter of the Morning* (1917), *Birth* (1918), *Faint Perfume* (1923), and *Preface to a Life* (1926). Her early writings were sentimental evocations of the virtues of small-town life and fall within the local-colour tradition. But her later writings reveal her interest in progressive causes and are increasingly critical of small-town provincialism. The dramatization of *Miss Lulu Bett,* a study of a spinster's attempts at self-assertion in the face of a constricting social environment, won Gale the Pulitzer Prize in 1921. Her other plays were *Mister Pitt* (1925), a dramatization of *Birth,* and *Evening Clothes* (1932).

Consult the INDEX *first*

Galen OF PERGAMUM, byname of Greek CLAUDIOS GALENOS, Latin CLAUDIUS GALENUS (b. AD 129, Pergamum, Mysia, Anatolia [now Bergama, Tur.]—d. *c.* 199, Rome [Italy]?), Greek physician who founded experimental physiology and was one of the most distinguished physicians of antiquity. Galen's influence on medical theory and practice was dominant in Europe throughout the Middle Ages and during the Renaissance.

Early life and training. Galen was the son of a gifted architect. The city of his birth, site of a shrine of the healing god Asclepius, significantly affected Galen's education. Many of the most distinguished personalities of the Roman Empire visited the shrine for cures. A medical school was attached to the shrine, and there Galen met important men and observed the treatment of a variety of diseases. The high priest maintained a troop of gladiators, which provided Galen with the opportunities to examine wounds and to judge the effects of medical treatment.

Since theoretical philosophy and practical medicine were closely related, Galen's father decided that he should study both subjects in his native city. His teachers represented the four principal philosophical sects: Platonism, Aristotelianism, Epicureanism, and Stoicism. This doctrinal variety helped to mold the philosophical eclecticism that characterized his entire life. He continued his studies in the educational centres of Smyrna on the west coast of Asia Minor, Corinth in Greece, and Alexandria in Egypt, where he practiced the dissection of animals and broadened his contacts with contemporary physicians. In 157 he returned to Pergamum, where, as chief physician for the gladiators, he increased his practical knowledge of anatomy and tested the best remedies for treating wounds.

In 161 the ambitious Galen, like many other successful Easterners, traveled to Rome, where he cured the ailing Aristotelian philosopher Eudemus, through whom he met many important persons in the capital city. His willingness to take on patients whom other doctors had pronounced incurable, his signal success as physician, and his immodesty concerning his conspicuous achievements aroused his colleagues' envy, which Galen arrogantly described in his books. He was soon admitted to the court of Marcus Aurelius, then coemperor with Lucius Verus, and wrote with pride of the luminaries who attended his public lectures and dissections. These public performances greatly enhanced his prestige.

Galen abruptly ended his sojourn in the capital in 166. Although he claimed that the intolerable envy of his colleagues prompted his return to Pergamum, the plague that entered Rome with Verus' troops after a foreign war was probably a more compelling reason. In 168–169, however, he was recalled by the emperors. When Verus died of a stroke, Marcus appointed Galen as physician to Commodus, his son and the heir to the throne. The security of the appointment gave Galen the opportunity to write even more prolifically than before. Little is known of Galen's final years. He probably never returned to Pergamum.

Anatomical studies. Galen based his descriptive anatomy on the dissection of lower animals, particularly the African monkey, often called the Barbary ape. Because this animal is a primate and shares certain characteristics with man, Galen made inferences concerning human anatomy. There is no doubt that he was an accurate observer, particularly of the muscles and bones. He distinguished seven pairs of cranial nerves, described the valves of the heart, and observed the structural differences between veins and arteries. Notable also were his vivisection experiments, such as tying off the recurrent laryngeal nerve to show that the brain controls the voice, performing a series of transections of the spinal cord to study muscle control, and tying off the ureters to demonstrate kidney and bladder functions. One of his most important demonstrations was that the arteries carry blood, not air as had been taught for 400 years.

Although Galen did not discover that the blood circulates, he did achieve a valid and rational interpretation of the observed facts. According to his view, the most important organ in the vascular system was the liver, where blood was formed and the veins originated; blood vessels carried the blood out to the periphery of the body, where, according to him, it was transformed into flesh. He accounted for the large amount of blood in the aorta—the largest blood vessel leaving the heart—by suggesting a passage from the right ventricle to the left ventricle of the heart through minute pores in the wall that separates the two and by suggesting that a small amount of blood seeps through the lungs between the pulmonary artery and pulmonary veins, and so from the right to the left ventricle.

Galen believed that human health required an equilibrium between the four humours—phlegm, black bile, yellow bile, and the blood—and that, furthermore, the pneuma (thought to be a material but very subtle component carried by the blood) was responsible for guiding many body processes. As a continuation of the earlier Hippocratic conception of the unity of the organism, Galenic physiology became a powerful influence in medicine for the next 1,400 years.

Although Galen's work was primarily in medicine, he believed that a good physician must also be a philosopher and wrote an extant essay on that subject. He was fully aware of, and critical of, the impact of Judaism and Christianity on Roman life. In particular, he accused the Jews of what he called unreasoned assertions. And he cited Christians to illustrate his view that even nonphilosophers could by good behaviour approximate the philosophic ideal. Though he believed that nature expressed a divine purpose, he was not a monotheist in the sense of believing in one transcendent deity. Rather, in line with his eclecticism, he drew on diverse sources for his philosophical interpretations. He fully accepted Aristotle's view that "Nature does nothing in vain" and sought to show that all organic structures, such as the muscles and bones of the hand, serve the functions for which they were designed, which he attributed to a creator or a beneficent nature.

Galen's influence. Greek manuscripts were collected and translated by enlightened Arabs during the 9th century. Ḥunayn ibn Isḥāq, an Arab physician and philologist, prepared an annotated list of 129 works of Galen that he translated from Greek or Syriac versions. During the late 11th century, copies of Ḥunayn's

translations and commentaries on them by Arab physicians were translated into Latin. These Latin versions helped to enlighten European scholars as to the achievements of Greek antiquity. When medical humanists of the 15th and 16th centuries saw the need to prepare new Latin versions of Galen directly from the Greek, it was inevitable that physicians should wish to repeat the experiments and observations that Galen had recorded. This renewal of the Galenic tradition during the Renaissance was an important element in the rise of modern science. Many of Galen's writings have been lost, especially those on philosophical and literary subjects; others survive only in Arabic copies, and only a few have been translated into English.

(G.W.Bo.)

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Galen, Clemens August, Graf von (Count of) (b. March 16, 1878, Dinklage, Oldenburg [Germany]—d. March 22, 1946, Münster, W.Ger.), German Roman Catholic bishop of Münster who was noted for his public opposition to Nazism.

Galen was ordained in 1904 at Münster, where, as a priest at St. Lambert's, he published his *Pest des Laizismus und ihre Erscheinungsformen* (1932; "The Plague of Laicism and Its Manifestations"), deploring what he considered to be the godlessness of post-World War I Germany. He was made bishop of Münster in 1933 and became a powerful critic of Adolf Hitler's regime.

Galen's fight against the Nazis, particularly their racism and totalitarianism, began on Easter 1934 and continued unrelentingly. He frequently complained directly to Hitler when he felt the German dictator had violated the concordat he had signed in 1933 with the Vatican. When the Oldenburg Nazis removed all crucifixes from the schools (November 1936), Galen's protest sparked a public demonstration, and the order was cancelled. In July and August 1941, Galen preached against the general lawlessness of the Gestapo, the confiscation of religious property, and the killing of "unproductive" sick and old; as a result, the "mercy killings" were temporarily halted. Documents discovered later showed that the Nazis were close to a decision to hang him but decided to wait until they achieved a victory in World War II. Galen was created a cardinal on Feb. 18, 1946.

Galena, city, seat (1827) of Jo Daviess county, northwestern Illinois, U.S., on the Galena River (originally called Fever River), 4 miles (6 km) from the Mississippi River. Originally a frontier outpost known as Fever River Settlement, or The Point, it became an active mining centre and was laid out in 1826 and renamed Galena for the lead sulfide deposits, which had been worked in the area since the early 1700s. It prospered by virtue of its being a midpoint for Mississippi River traffic between Fort Armstrong (Rock Island) and Fort Snelling (St. Paul, Minn.). By the 1860s lead mining and river commerce declined, as did the town.

As an example of a well-preserved antebellum Midwestern city, Galena has become a tourist centre, much of it designated an Illinois historic site. Historic buildings include the restored home of Ulysses S. Grant. The Galena Historical Society Museum houses lead-mining relics and an American Civil War collection, which includes a Thomas Nast painting of General Robert E. Lee's surrender to Grant. Inc. 1835. Pop. (1984 est.) 3,930.

galena, also called LEAD GLANCE, a gray lead sulfide (PbS), the chief ore mineral of lead. One of the most widely distributed sulfide minerals, it occurs in many different types of deposits, often in metalliferous veins, as at Broken Hill, Australia; Coeur d'Alene, Idaho, U.S.; Clausthal Zellerfeld and Freiberg, Ger.; and Cornwall, Eng. Large deposits also occur as replacements of limestone or dolomite (*e.g.,* at Santa Eulalia, Mex.). Some deposits (*e.g.,* at Darwin, Calif.) are of contact-metamorphic origin. Galena is found in cavities and brecciated (fractured) zones in limestone and chert (*e.g.,* extensive Mississippi Valley deposits, where 90 percent of the U.S. production of lead is mined). The mineral has occasionally been observed as a replacement of organic matter, and sometimes occurs in coal beds. For detailed physical properties, *see* sulfide mineral (table).

Galena forms isometric crystals in which the ionic lattice is like that of sodium chloride. The mineral is easily weathered to secondary lead minerals, the upper part of galena deposits often containing cerussite, anglesite, and pyromorphite. Nodules of anglesite and cerussite with a banded structure and a galena core are common.

In many cases, galena contains silver and so is often mined as a source of silver as well as lead. Other commercially important minerals that frequently occur in close association with galena include antimony, copper, and zinc.

Galerius, in full GAIUS GALERIUS VALERIUS MAXIMIANUS (b. near Serdica, Thrace—d. 311), Roman emperor from 305 to 311, notorious for his persecution of Christians.

Galerius was born of humble parentage and had a distinguished military career. On March 1, 293, Galerius was nominated as caesar by the emperor Diocletian, who governed the Eastern part of the empire. After fighting the hostile tribes along the Danube for several years, Galerius assumed command of defensive operations against the Sāsānians in 297. After being defeated, he then won a decisive victory that increased his influence with Diocletian; evidently it was the staunchly pagan Galerius who persuaded the emperor to initiate the persecution of the Christians.

When Diocletian abdicated on May 1, 305, Galerius became augustus (senior emperor) of the East, ruling the Balkans and Anatolia. Technically he was subordinate to the Western ruler, Constantius Chlorus. But since Galerius had arranged the appointment of two favourites, Maximinus (his nephew) and Flavius Valerius Severus, to be caesars in both East and West, he was in effect the supreme ruler. When Constantius Chlorus died in 306, Galerius insisted that Severus govern the West. Galerius' supremacy was, however, short-lived. Severus was soon overthrown (306) and killed by Maxentius (son of the former emperor Maximian). Galerius invaded Italy but was forced to retreat. In 308 he induced Diocletian and Maximian to meet him at Carnuntum on the Danube and to declare Maxentius a usurper. On November 11, Galerius proclaimed as augustus of the West his friend Licinius, who had effective control only in the region of the Danube.

A ruthless ruler, Galerius imposed the poll tax on the urban population and maintained the persecution of the Christians. In the winter of 310–311, however, he became incapacitated with a painful disease. Fearing, perhaps,

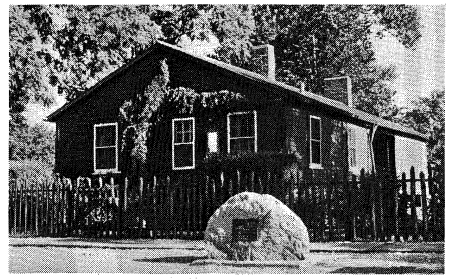
Galerius, marble bust; in the Capitoline Museum, Rome

Anderson—Mansell from Art Resource/EB Inc.

that his illness was the vengeance of the Christian God, he issued on April 30, 311, an edict grudgingly granting toleration. Shortly afterward he died. He was succeeded by his nephew Maximinus Daia.

Galesburg, city, seat (1873) of Knox county, west-central Illinois, U.S. George Washington Gale of Whitesboro, N.Y., a Presbyterian minister for whom the city was named, selected the site for a college community. In 1836 the first settlers arrived, and in 1837 a charter was granted to the Knox Manual Labour College (renamed Knox College in 1857); in 1930 it absorbed Lombard College, founded by Universalists in 1851. The Knox campus was the site of the fifth Lincoln–Douglas debate on the slavery issue in 1858. Galesburg's economy is based mainly on agriculture and manufacturing, with coal mining decreasing in importance.

Galesburg was the birthplace of Carl Sandburg, the poet and biographer of Abraham



Carl Sandburg home, Galesburg, Ill.

By courtesy of the Illinois Department of Business and Economic Development

Lincoln. The small house where he lived as a child has been restored. The city's Carl Sandburg (junior) College was opened in 1967, the year of Sandburg's death. Lake Storey, once a railroad-owned water reservoir, has been transformed into a recreational park. Inc. 1857. Pop. (1987 est.) 31,923.

Galgodon Highlands, also called OGO HIGHLANDS, region of broken mountain terrain, northern Somalia, eastern Africa, lying parallel to the Gulf of Aden south of the "burnt" Guban coastal plain, and extending from the Ethiopian border in the west to Cape Gwardafuy (Caseyr) in the east. Rising abruptly from the Guban, the highlands slope gradually to the Hawd plateau (in the south) and the Nugaaleed (Nogal) Valley (in the southeast). Near Ceerigaabo (Erigavo) the highlands rise to Somalia's highest point, Surud Ad, which has

an elevation of 7,900 feet (2,408 m). Consisting of old volcanic lava, the region is deeply dissected by a series of shallow, dry riverbeds and narrow, steep valleys. Passes, including the Shiikh and Karinduusha, divide the highlands into separate mountain peaks rising to elevations between 6,000 and 7,900 feet (1,830 and 2,410 m). *Boswellia* and *Commiphora* trees, sources of frankincense and myrrh, respectively, occur in the northeastern part; on higher elevations (above 5,000 feet [1,500 m]) there are some remnants of juniper and cedar forests, now protected by the government. Roads have been cut through the highlands at Shiikh to connect Berbera and Burko and at Tabah to link Maydh and Ceerigaabo.

Galiani, Ferdinando (b. Dec. 2, 1728, Chieti, Italy—d. Oct. 30, 1787, Naples), Italian economist whose studies in value theory anticipated much later work.

Galiani served in Paris as secretary to the Neapolitan ambassador (1759–69). Thereafter, he was in government service in Naples, where he helped to formulate and administer economic policy.

Galiani, engraving by Lefevre after a portrait by J. Gillberg

By courtesy of Bildarchiv Preussischer Kulturbesitz BPK, Berlin

Galiani wrote in both French and Italian, and his letters are valuable for their depiction of economic, social, and political life in 18th-century Europe. His correspondents included Denis Diderot, Voltaire, and Anne-Robert-Jacques Turgot. He also carried on a spirited intellectual debate with Abbé André Morellet, the spokesman of the Physiocrats.

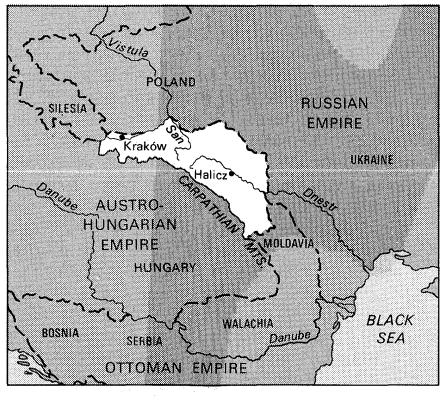
Galiani published two treatises, *Della moneta* (1750; "On Money") and *Dialogues sur le commerce des blés* (1770; "Dialogues on the Grain Trade"), both of which display clarity of methodological presentation, despite his basic eclecticism. In the first work he evolved a theory of value based on utility and scarcity. In the second he stressed the necessity for the regulation of commerce, opposing the Physiocrats, who advocated complete freedom.

Gâlib Dede, also called ŞEYH GÂLIB, pseudonyms of MEHMED ES‘AD (b. 1757, Constantinople—d. Jan. 5, 1799, Constantinople), Turkish poet, one of the last great classical poets of Ottoman literature.

Gâlib Dede was born into a family that was well-connected with the Ottoman government and with the Mawlawīyah, or Mevlevîs, an important order of Muslim dervishes. Continuing in the family tradition by becoming an official in the Divan-ı Hümayun, the Ottoman imperial council, he thus established a career for himself in the Ottoman bureaucracy. Later, after giving up this government position, he became the sheikh (superior) of the Galata monastery, in Constantinople, the renowned centre of the Mawlawīyah order. Remaining in this position for the rest of his life, he continued to write poetry. His work was much appreciated by the reigning Ottoman sultan, Selim III (himself a poet, musician, and Mawlawī dervish), and by other members of the court, who showed him great favour and respect. Gâlib Dede is primarily known for his masterpiece, *Hüsn ü Aşk* ("Beauty and Love"). This allegorical romance describes the courtship of a youth (Hüsn, or "Beauty") and a girl (Aşk, or "Love"). After many tribulations, the couple are finally brought together, allegorizing the fundamental unity of love and beauty. In addition to this famous work, Gâlib Dede is known for his *Divan* (collection of poems). These poems illustrate his preoccupation with mystical religious themes and are characterized by highly symbolic language and complex conceits and wordplay. Thus his work is often inaccessible to the average reader.

Galicia, Polish GALICJA, German GALIZIEN, Russian GALYTSIYA, historic region of eastern Europe that was a part of Poland before Austria annexed it in 1772; in the 20th century it was restored to Poland but was later divided between Poland and the Soviet Union.

During the Middle Ages, eastern Galicia, situated between Hungary, Poland, and the western principalities of Kiev and Volhynia, was coveted by its neighbours for its fertile soil and its important commercial connections. Incorporated into Kievan Rus by Vladimir I (Grand Prince Vladimir) in 981, eastern Galicia (also called Red Ruthenia, or Red Rus), being the country around Halicz (Galich, or Galych) on the upper Dnestr, east of the Zbruch confluent and west of the headwaters of the San River, became an independent principality in 1087; during the next century it developed into a rich and powerful principality. In 1199 Prince Roman of Volhynia, invited by the Galician boyars (noblemen), ascended the throne in Halicz and united under his power both Volhynia (or Lodomeria) and Galicia in 1200. Under his rule and that of his son Daniel (reigned 1238–64), the united principality defeated both Polish and Hungarian attempts at conquest and asserted itself as a major state in eastern Europe. The principality was weakened, however, by internal struggles between the princes and boyars, who often held the real power in the principality, and, though Daniel was crowned king of Galicia by a papal legate in 1253, he was also compelled to recognize the suzerainty of the Mongol khan, who had conquered the former Kievan territory in 1237–41.



Galicia in the mid-19th century

Galicia, however, did not become an integral part of the Mongol empire as did other lands of Rus, and in 1323, when Roman's dynasty died out, a Polish prince, Bolesław Jerzy of Mazovia, was elected by the boyars to rule Galicia. After his death (1340), the Polish king Casimir III the Great annexed Galicia to his lands (1349). Under Polish rule Galicia was settled by Polish gentry, who became the dominant social class, and Galician boyars soon were compelled to accept the Polish language as well as Polish legal and social institutions and Roman Catholicism.

When Poland was first partitioned in 1772, eastern Galicia, together with the territory to the west, between the San and the Vistula, was attached to Austria; and in 1795 further lands, both west and east of the Vistula, passed also to Austria. From 1786 to 1849 Austria administered the territory of Bukovina as part of Galicia. After the adjustments of 1815 (Congress of Vienna), Austria's Polish possessions were called the Kingdom of Galicia and Lodomeria; and the 1815 Republic of Cracow was added to them in 1846. In 1848–49 Austria abolished serfdom in Galicia and after 1867 allowed the region a large degree of administrative autonomy. During the late 19th century, however, the Ukrainian population, which constituted the majority of the inhabitants of eastern Galicia, objected to the increasing domination of the Polish population and developed a strong Ukrainian nationalist movement.

All Galicia became a part of Poland after World War I and postwar controversy. When World War II began, the Soviet Union united eastern Galicia to the Ukrainian Soviet Socialist Republic. Following the war, eastern Galicia remained a part of the U.S.S.R., while western, Polish-settled Galicia was attached to Poland.

Galicia, *comunidad autónoma* ("autonomous community") and historic region of Spain encompassing the northwestern Spanish *provincias* of Lugo, La Coruña, Pontevedra, and Orense. The *comunidad autónoma* was established by the statute of autonomy in 1981. It is roughly coextensive with the former kingdom of Galicia and borders the Atlantic Ocean on the west and north.

Galicia's name is derived from the Celtic Gallaeci, who lived there when the region was conquered by the Roman legions in about 137 BC. In Roman and Visigothic times Galicia stretched south to the Duero River and eastward to beyond the city of León and formed part of the archdiocese of Bracara Augusta (Braga). From about 410 it was an independent kingdom under the Suebi, who were finally destroyed by the Visigoths in 585. Galicia lost much of its political autonomy after the unification of Castile and Aragon in 1479 and fell under the administration of the royal Junta del Reino de Galicia in 1495.

The cultural revival of Galician as a literary language in the mid-19th century pointed to a growing regional consciousness. The plebiscite of 1936 registered overwhelming support for Galician autonomy but was nullified by the strongly centralized government established by General Francisco Franco.

The modern autonomous community was created in 1981 with a Junta de Galicia (a council headed by a president) and a unicameral assembly. The terrain of Galicia is hilly and relatively uniform in elevation, with more than half its area lying between elevations of 1,300 and 2,000 feet (200 to 600 m) and less than one-fifth at elevations lower than 1,300 feet. Mountains ring the interior, isolating the region from the Spanish *provincias* of Asturias, León, and Zamora to the east and from Portugal to the south. The interior is dominated by strongly dissected mountains, which gradually give way to the coastal plains of the Atlantic and Vizcayan (Bay of Biscay) littorals. Numerous rivers and their affluents drain seaward through Galicia, permitting the region to export hydroelectric power to the rest of Spain. Annual precipitation is moderately high, exceeding 40 inches (1,000 mm) in most places, but it is of only limited benefit, because the badly eroded soil retains little moisture.

Villages are ordinarily small and isolated, the parish being the common denominator among the widely dispersed villages of a locality. The terrain favours animal husbandry over cultivation, and the former is the premier agricultural activity; nonetheless, the farm

population is large and fairly evenly dispersed, resulting in the subdivision of the countryside into small landholdings, or *minifundios.* Families generally own and cultivate the *minifundios,* and the inability of those farms to support a growing population has resulted in a higher than average emigration from Galicia since the 18th century. Overseas emigration was particularly high between 1920 and 1935, while emigration since World War II has been to the industrialized countries of Europe but also to the Spanish *provincias* of Madrid, Vizcaya, and Barcelona. Emigration has been especially high among men, resulting in serious demographic and economic imbalances, among them an aging population and declining economic productivity.

Primary production (agriculture, forestry, and fishing) dominates the region's economy. Subsistence farming prevails among the *minifundios,* with potatoes and corn (maize) among the leading crops and pigs among the leading livestock. Underemployment plagues the agricultural sector, and large numbers of migrant labourers periodically leave Galicia in search of seasonal work elsewhere in Spain. The mountains of the region produce considerable quantities of timber. The port of Vigo is one of Spain's leading fishing ports.

Galicia's industrial sector is not well-developed, and much of it centres on the processing of primary commodities. Fish processing is of particular importance, and sawmills are widespread. The installation of a petroleum refinery (Petroliber) in La Coruña has stimulated industrial development in that province, while El Ferrol del Caudillo and Vigo have major shipbuilding works. Galicia's economy remains underdeveloped, however, accounting for a disproportionately small percentage of Spain's gross domestic product.

Galicia's culture and distinctive dialect have developed in relative isolation, showing greater affinity for Portuguese culture than for that of Spain until the final separation of the two countries in 1668. The literary use of Galician reached its apogee toward the 13th century, when its metre, drawing on that of Provençal, showed greater refinement and versatility than the then relatively underdeveloped Castilian metre. The cultural and political predominance of Castile has since submerged the literary uses of Galician, and most of the region's writers of the 20th century have written in Castilian. The preeminent Galician scholar of the 20th century has been Ramón Menéndez Pidal (1869–1968), whose works centred on Spanish philology and culture. Pop. (1986 est.) 2,870,858.

Galician dialect, Portuguese dialect spoken in northwestern Spain, often incorrectly considered a dialect of Spanish. *See* Portuguese language.

Galician Offensive (World War I): *see* June Offensive.

Galilean satellite, any of the four large satellites of Jupiter discovered by Galileo in 1610 and named by the German astronomer Simon Marius soon afterward. In order of distance from Jupiter, the satellites are Io, Europa, Ganymede, and Callisto. The amount of ice relative to rock in these bodies increases systematically with distance from Jupiter and is thought to reflect a primordial high-luminosity phase of the planet at the time of their formation. The orbits of the inner three satellites are in a resonant state, such that conjunctions of Io and Europa and conjunctions of Europa and Ganymede always occur on opposite sides of Jupiter.

Galilean telescope, instrument for viewing distant objects, named after the great Italian scientist Galileo Galilei (1564–1642), who first constructed one in 1609. With it, he discovered Jupiter's four largest satellites, spots on the Sun, phases of Venus, and hills and valleys on the Moon. It consists of a convergent lens as objective (*i.e.,* the lens that forms the image); and its eyepiece (or ocular), placed in front of the focus, is a divergent lens. An upright image is produced. This simple refracting telescope is still used in modern opera glasses, which are low-powered binoculars.

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Galilean transformations, also called NEWTONIAN TRANSFORMATIONS, set of equations in classical physics that relate the space and time coordinates of two systems moving at a constant velocity relative to each other. Adequate to describe only low-speed phenomena, Galilean transformations formally express the ideas that space and time are absolute; that length, time, and mass are independent of the relative motion of the observer; and that the speed of light depends upon the relative motion of the observer. *Compare* Lorentz transformations.

Galilee, Hebrew HA-GALIL, northernmost region of ancient Palestine, corresponding to modern northern Israel. Its biblical boundaries are indistinct; conflicting readings leave clear only that it was part of the territory of the northern tribe of Naphtali.

The frontiers of this hilly area were set down by the Roman-Jewish historian Josephus (1st century AD). They were: ʿAkko (Acre) and Mount Carmel on the west; Samaria and Bet She'an (Scythopolis) on the south; Transjordan on the east; and a line running through ancient Baca (probably modern Bezet) on the north, that line generally corresponding to the modern Israeli-Lebanese boundary. Some geographers extend Galilee's border northward to the Nahr al-Līṭānī (Leontes River).

Galilee is divided into two parts: Upper and Lower. Upper Galilee (chief city: Ẕefat) has higher peaks separated by narrow gorges and defiles. Lower Galilee (chief city: Nazareth) is a region of lower hills.

When the Israelites took possession of Palestine, the Canaanites were strongly entrenched in Galilee. The Book of Judges (1:30–33) suggests that even after Joshua's conquest, Jews and Canaanites lived together there. During the reigns of David and Solomon (10th century BC), Galilee was part of their expanded kingdom; subsequently, it came under the northern kingdom of Israel.

In 734 BC much of Galilee's Jewish population was exiled after the victory of the Assyrian king Tiglath-pileser III over the Israelite kingdom. Later, the region became known as Jesus' boyhood home and, thereafter, the site of most of his public ministry. Most of the miracles recounted in the New Testament were performed in Galilee. After the destruction of the Second Temple (AD 70) by the Romans, the centre of Jewish scholarship in Palestine moved to Galilee.

Galilee became impoverished after the Arab conquest (636). In the Middle Ages Ẕefat was the principal centre of Kabbala, an esoteric Jewish mysticism.

The region's revival in modern times is a result of Zionist colonizations. Beginning with the village of Rosh Pinna (Hebrew: "cornerstone") in 1882, a string of settlements was set up; these proved to be key bargaining points in the inclusion of all Galilee in the British mandate (1920).

The United Nations partition plan (November 1947) envisioned the division of Galilee between Israel and the never-created Arab state in Palestine, but it all went to Israel after the 1948–49 Arab–Israeli war.

A major change in Palestine's physical geography was effected in Galilee in the 1950s when swampy Lake Ḥula, north of the Sea of Galilee, was drained; the Ḥula Valley was converted into fertile farmland and the upper course of the Jordan River straightened.

galilee, type of porch (*q.v.*) that was developed during the Gothic period.

Galilee, Sea of, also called LAKE TIBERIAS, Arabic BUḤAYRAT ṬABARĪYĀ, Hebrew YAM KINNERET, lake in Israel through which the Jordan River flows. From 1948 to 1967 it was bordered immediately to the northeast by the cease-fire line with Syria. It is famous for its biblical associations. Located 686 feet (209 m) below sea level, it has a surface area of 64 square miles (166 square km). The sea's maximum depth, which occurs in the northeast, is 157 feet (48 m). Measuring 13 miles (21 km) from north to south and 7 miles (11 km) from east to west, it is pear-shaped. Its Old Testament name was Sea of Kinneret (Kinerot), but, after the exile of the Jews to Babylon in the 6th century BC, it was called the Lake of Gennesaret.

Because of a pleasant climate, level topography, fertile soil, and relatively abundant water, the rivers flowing into the lake and the adjacent plains have throughout history been the source of livelihood for various peoples. At El-ʿUbeidīya, 2 miles (3 km) south of the lake, lacustrine formations dating from about 400,000 to 500,000 years ago have revealed prehistoric tools and two human fragments, which are among the oldest in the Middle East. Canaanite (ancient Palestinian) structures have been uncovered that date back to between 1000 and 2000 BC. In the 1st century AD the region was rich and populated; the Jewish historian Flavius Josephus wrote of nine cities on the shores of the lake in ancient times, but of these only Tiberias has survived. Tiberias, on the western shore, was one of the four Jewish holy cities, and Kefar Naḥum (Capernaum), near the northwestern shore, has preserved one of the most beautiful synagogues of the Galilee region, dating from the 2nd and 3rd centuries AD. A sanctuary for the Druze (an independent sect founded in the 11th century that followed a creed containing elements of Islām, Judaism, and Christianity) is located near Kefar Ḥittim near the western shore. The Sea of Galilee is especially well known to Christians because it was the scene of many episodes in the life of Christ. The region was also the site of the first Jewish kibbutz, Deganya, established in 1909.

The Sea of Galilee is located in the great depression of the Jordan. The Plain of Gennesaret extends in a circular arc from the north to the northwest, and the Plain of Bet Ẕayda (Buteiha) in Syria extends to the northeast. To the west and the southwest, the hills of Lower Galilee fall abruptly to the lake's edge. In the mid-eastern sections, the cliffs of the Plateau of Golan overlook the lake; the plateau reappears again in the southeast, becoming larger as it approaches the valley of the Yarmuk River, a tributary that has its confluence with the Jordan a few miles to the south of the lake. Also to the south, the Plain of al-Ghawr begins, but the Sea of Galilee is separated from it by a narrow ridge through which the Jordan River flows. The greatest part of the region is covered by basalts that have been formed since the Miocene Epoch began about 26,000,000 years ago and that are part of the vast area of Mount Durūz, located in Syria. Since the Miocene Epoch began, lacustrine limestones and marls (calcareous clays) have been deposited. The rift valley, part of the eastern Africa Rift System, which forms the Jordan Trench, passes to the east of the lake; smaller and less important faults occur to the west. The depression was hollowed out at the end of the Pliocene

epoch (5.3 to 1.6 million years ago) and was partially filled in again by lacustrine and fluvial sediments. During the humid periods of the Quaternary period (1.6 million years ago to the present) the Dead Sea extended up to this point. During the mid-Pleistocene epoch (about 1,250,000 years ago) structural movements of the Earth's crust occurred, while flows of molten basalt reached the lower end of the depression through the Valley of Yarmuk. In the course of the last pluvial period, which occurred about 20,000 years ago, a great lake, called the Lake of Lisan, covered the region. Since then, the waters have receded.

Because of its sheltered location, low altitude, and the influence of the lake itself, the winters are mild, with temperatures averaging 57° F (14° C) in January. The absence of freezing temperatures has facilitated the cultivation of bananas, dates, citrus fruit, and vegetables. The summers are hot, with temperatures averaging 88° F (31° C), and the precipitation—almost 15 inches (380 mm) at Deganya—falls, in the course of a winter of less than 50 days, in the form of brief but violent showers.

The Sea of Galilee is fed primarily by the Jordan River. Other streams and wadis (seasonal watercourses) flow into the lake from the hills of Galilee. In the rivers associated with the lake and at the bottom of the lake itself are many mineral deposits. Because of these deposits and because of the strong evaporation, the waters of the lake are relatively salty.

The lake's fish life has an affinity with that of the eastern African lakes. Fish species to be found include damselfish, scaleless blennies, catfish, mouthbreeders, and barbels. Apart from its permanent fish population, the lake is also visited by migratory fish.

For the past few centuries the Plains of Gennesaret, to the northwest, and the area around Deganya, to the south, have been systematically developed through irrigation and intensive agricultural techniques. Fishing has also been developed, notably from Tiberias and Gennesaret and at En Gev, on the eastern shore. About 1,000 tons of fish are netted annually from motorboats and trawlers; sardines are mainly caught in winter, though, together with larger fish, they are also caught at other seasons. Thermal springs have enabled modern health resorts to be created, and the baths at Tiberias are among Israel's most important winter resort attractions. Similar baths are to be found at Tabigha, or 'En Sheva' (the seven springs of Bathsheba) on the northwest shore.

In the 1960s the Sea of Galilee became the starting point of the National Water Carrier, a large canal that conveys water from the Jordan River to the coastal region as well as south to the Negev Desert. The level of the lake has been raised slightly by a dam constructed downstream; the water, flowing into the lower reaches of the Jordan River, is used as a source of hydroelectric power. Some of the water, however, is pumped by pipe to the northwest to a height almost 800 feet (240 m) above the lake's level, from where it is siphoned across the gorges of Naḥal 'Ammud and Zalmon to irrigate the country's western sector.

The small market towns on the shores of the lake rely for transport of goods and passengers to a great extent on a regular motorboat service that is maintained between them.

Galilei, Vincenzo (b. *c.* 1520, Santa Maria in Monte, near Florence [Italy]—buried July 2, 1591, Florence), father of the astronomer Galileo and a leader of the Florentine Camerata, a group of musical and literary amateurs who sought to revive the monodic (single melody) singing style of ancient Greece.

Vincenzo studied with the famous Venetian organist, theorist, and composer Gioseffo Zarlino (1517–90) and became a noted lutist and composer. Several books of his madrigals and instrumental music were published in his lifetime, and he is said to have been the first to write solo songs (now lost) in imitation of Greek music as it was then understood.

Galilei engaged in heated attacks on his former teacher Zarlino, particularly on his system of tuning, and published several diatribes against him. Among these is the *Dialogo della musica antica, et della moderna* (1581; "Dialogue about Ancient and Modern Music"), which contains examples of Greek hymns (among the few known fragments of ancient Greek music). In the same work he attacked the practice of composition in which four or five voices sing different melodic lines simultaneously with different rhythms, thus obscuring the text and ignoring the natural rhythm of the words; this practice was typical of the Italian madrigal style that Galilei came to despise and that went out of fashion in the 17th century.

Galileo, in full GALILEO GALILEI (b. Feb. 15, 1564, Pisa [Italy]—d. Jan. 8, 1642, Arcetri, near Florence), Italian mathematician, astronomer, and physicist, considered a founder of the experimental method.

A brief treatment of Galileo follows. For full treatment, *see* MACROPAEDIA: Galileo.

Galileo—the son of Vincenzo Galilei, a musician—was educated at a monastery near Florence before studying medicine at the University of Pisa and mathematics with a private tutor. After completing a treatise on the centre of gravity in solids, he became lecturer in mathematics at the university at the age of 25. Later he went to the University of Padua as a professor of mathematics. The story of his dropping weights from the leaning tower of Pisa has no basis in fact.

Galileo's conflict with the church arose over his support of the Copernican theory—that the planets revolve around the Sun. A substantial part of his work is related to mechanics, and he was the first to apply mathematics to its analysis. He suggested the use of pendulums for clocks and proposed the law of uniform acceleration for falling bodies. Galileo developed the astronomical telescope, with which he discovered craters on the Moon, sunspots, phases of Venus, and the satellites of Jupiter. He showed that the Milky Way is composed of stars.

Galileo was under house arrest for the final eight years of his life for having "held and taught" Copernican doctrine. His major works were *Dialogue Concerning the Two Chief World Systems—Ptolemaic and Copernican* (1632) and *Dialogue Concerning Two New Sciences* (1638).

Galileo, unmanned spacecraft launched by the United States on Oct. 18, 1989, to explore the planet Jupiter. On its spiral trajectory taking it once past Venus (February 1990) and twice past Earth (December 1990, December 1992), Galileo was scheduled to transmit pictures and data about Venus, the Earth's Moon, and the asteroid Gaspra (October 1991). Upon reaching Jupiter (December 1995), the Galileo orbiter according to plan is to release a 337-kilogram (744-pound) probe that is intended to descend into Jupiter's atmosphere, near the planet's equator, in order to gather data on the Jovian atmosphere—its temperature, pressure, and density, its chemical composition, and its cloud layers. The probe is expected to survive about 75 minutes before being destroyed by intense atmospheric heat and pressure. The Galileo orbiter will transmit other pictures and data about Jupiter and its 16 satellites. The Jovian system is considered in some respects to be a miniature model of the early solar system and could provide scientists with a better understanding of planetary formation and evolution.

Galinthias, Latin GALANTHIS, in Greek mythology, a friend, or servant, of Alcmene, who bore Zeus's son Heracles (Hercules). While Alcmene was in labour, Zeus's wife, Hera, goddess of childbirth, was clasping her hands, thus by sympathetic magic preventing delivery. To foil this, Galinthias rushed in to Hera and falsely announced that Alcmene had given birth to a son, so causing Hera to relax. Thus the charm was broken, and Alcmene then gave birth to Heracles. As punishment, Galinthias was turned into a weasel or (according to Ovid) a lizard. Hecate, however, took pity on her and made her her attendant, and Heracles later made a sanctuary for her.

Galitzin, Boris Borisovich, Prince (seismologist): *see* Golitsyn, Boris Borisovich, Knyaz.

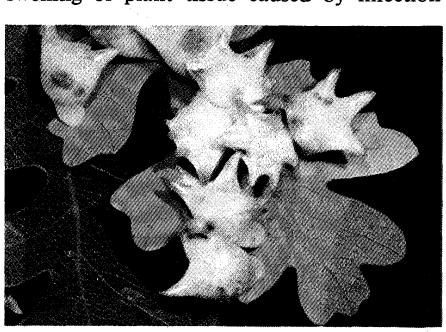
Galiwinku, formerly ELCHO ISLAND, island in the Arafura Sea, 2 miles (3 km) across Cadell Strait from Napier Peninsula, a part of Northern Territory, Australia, and of the Arnhem Land Aboriginal Reserve. It is low-lying, 30 miles (48 km) long by 7 miles (11 km) wide, and is separated from the Wessel Islands (east) by Brown Strait. The community of Galiwinku, on the southwestern coast, which began as a Methodist mission (established 1947), is administered by an Aboriginal town council. It is the largest Arnhem Land Aboriginal community, with a population at times as large as 1,400. Rice and other tropical crops are grown.

Gall (b. *c.* 1840, near Moreau River [modern South Dakota], U.S.—d. 1894, near Oak Creek, S.D.), Hunkpapa Sioux war chief, one of the most important military leaders at the Battle of the Little Big Horn (June 25, 1876).

Orphaned at an early age, Gall was adopted as a younger brother by the Sioux chief Sitting Bull. In many clashes with settlers and the U.S. Army, Gall distinguished himself as an excellent tactician and strategist. At the Battle of the Little Big Horn, Gall is credited with having turned back an initial Indian rout and then luring Lieutenant Colonel George A. Custer and his men into an indefensible position, annihilating his force. After this victory, Gall and Sitting Bull faced continual skirmishes and battles with the military, and in May 1877 he followed Sitting Bull into Canada. The Canadian government would not give them a reservation, the herds of buffalo were gone, and Gall and his people faced starvation. He eventually abandoned his mentor, Sitting Bull, and surrendered to the U.S. Army (*c.* 1880). Once on the Sioux reservation in South Dakota, Gall urged his people to become more acculturated with the whites. His breach with Sitting Bull (who eventually lived on the reservation) became complete when Gall was persuaded to sign the treaty of 1889 that broke up the so-called Great Sioux Reservation and ceded much territory to white settlers.

gall (digestion): *see* bile.

gall, an abnormal, localized outgrowth or swelling of plant tissue caused by infection



Galls of cynipid wasp *Antron douglasii* on oak leaves
Jack Wilburn

from bacteria, fungi, viruses, and nematodes or irritation by insects and mites. *See* black knot; cedar-apple rust; clubroot; crown gall.

Gall, SAINT (b. *c.* 550, Ireland—d. *c.* 645, Switzerland; feast day October 16), Irish monk who helped spread Irish influence while introducing Christianity to western Europe.

Educated at the monastery of Bangor, in County Down, Gall became a disciple of St. Columban and joined him on a mission to France. When Columban proceeded to Italy, Gall remained with the semipagan Alemanni, a Germanic people living in Gaul and northern Switzerland. In 612 he founded a hermitage on the site of modern Sankt Gallen, Switz. The Abbey of St. Gall was founded about 720 on the site of Gall's hermitage. The earliest biographical account of Gall, of which only a fragment survives, dates from the 8th century.

Gall, Franz Joseph (b. March 9, 1758, Tiefenbronn, Baden [Germany]—d. Aug. 22, 1828, Paris, Fr.), German anatomist and physiologist, a pioneer in ascribing cerebral functions to various areas of the brain (localization). He originated phrenology, the practice

Franz Joseph Gall, engraving by Friedrich Wilhelm Bollinger after a portrait by Karl Heinrich Rahl, *c.* 1812
Archiv fur Kunst und Geschichte, Berlin

of divining individual intellect and personality from an examination of skull shape.

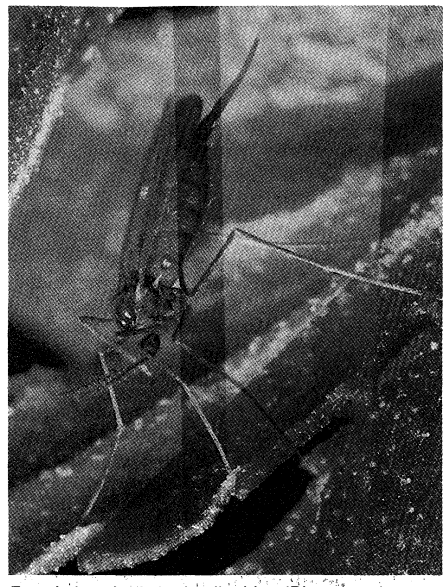
Convinced that mental functions are localized in specific regions of the brain and that human behaviour is dependent upon these functions, Gall assumed that the surface of the skull faithfully reflects the relative development of the various regions of the brain. His popular lectures in Vienna on "cranioscopy" (called phrenology by his followers) offended religious leaders, were condemned in 1802 by the Austrian government as contrary to religion, and were banned. Three years later he was forced to leave the country.

His concept of localized functions in the brain was proved correct when the French surgeon Paul Broca demonstrated the existence of a speech centre in the brain (1861). It was also shown, however, that, since skull thickness varies, the surface of the skull does not reflect the topography of the brain, invalidating the basic premise of phrenology. Gall was the first to identify the gray matter of the brain with active tissue (neurons) and the white matter with conducting tissue (ganglia).

gall fly, any of several different insects that cause tissue swelling (galls) in plants. Included are gall midges and certain fruit flies (order Diptera), gall wasps (order Hymenoptera), and some aphids (order Homoptera).

The galls are usually characteristic for the species that causes them. The goldenrod gall fly is one of the most common.

gall midge, any minute, delicate fly of the insect family Cecidomyiidae (sometimes called Itonididae), order Diptera. Gall midges are characterized by beaded, somewhat hairy antennae and few veins in the short-haired wings. The brightly coloured larvae live in leaves and



Female baccharis bud gall midge (*Rhopalomyia californica*)
William E. Ferguson

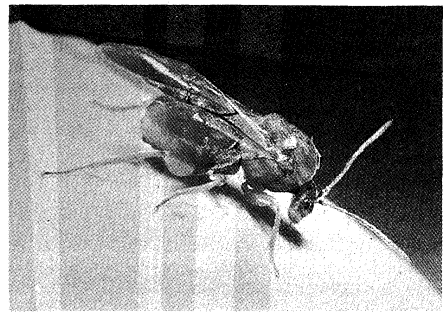
flowers, usually causing the formation of tissue swellings (galls). A few live in galls produced by other dipterans. Pupation takes place in the gall or in the soil; the winter is passed in an immature stage.

The Hessian fly (*q.v.*) is the most serious pest within the family. In Europe and North America the chrysanthemum midge (*Diarthronomyia hypogaea*) makes small galls in the leaves. The rose midge (*Dasyneura rhodophaga*) infests the young buds and shoots of roses and is a serious pest in greenhouses but rarely outside. Some other serious pests are the wheat midge, sorghum midge, rice midge, clover midge, and pear midge. Tobacco fumigation and dust on soil are used to control these insects.

A few beneficial species of gall midges prey on aphids, mites, scale insects, and bark beetle larvae. An interesting species of the genus *Miastor* exhibits an unusual method of reproduction called paedogenesis: large larvae produce smaller daughter larvae that remain inside the mother larva, feeding on it and eventually consuming it. The daughter larvae then escape and may reproduce in a similar manner for several generations before pupation takes place.

gall wasp, any member of the insect subfamily Cynipinae (family Cynipidae, order Hymenoptera), notable for its ability to stimulate the growth of galls (tissue swellings) on plants. Some gall wasp species are gall inquilines; *i.e.,* they do not cause the formation of galls but inhabit those made by other insects. The overgrowth of tissue, or gall, presumably is caused by a substance secreted by the immature insect living within it.

Most of the approximately 600 species of gall wasps that occur in North America are about



Gall wasp
William E. Ferguson

6 to 8 mm (about 0.25 to 0.30 inch) long and black. The shiny abdomen is oval, and the thorax has a sculptured appearance.

A given species of gall wasp will cause a characteristic type of gall to form on a certain part of a particular species of plant; many of the wasps attack oak trees or rose plants.

Male gall wasps are rare. Reproduction is usually by parthenogenesis; *i.e.,* larvae develop from unfertilized eggs. The egg passes through the long ovipositor of the female and into the plant tissue. After the egg hatches into a larva, the plant tissues around it begin to grow faster than normal. The gall grows with the larva, which feeds on the plant tissue and pupates into an adult within the gall.

The so-called oak apple, a round, spongy, fruitlike object about 2.5 to 5 cm (1 to 2 inches) in diameter, is caused by the larvae of the gall wasp *Biorhiza pallida.* About 30 such larvae may develop in a single "apple," or gall. The marble gall, a green or brown growth about 2.5 cm in diameter, is caused by *Andricus kollari.* The bedeguar gall (also called moss gall, or robin's pincushion) is commonly seen on rose bushes and is caused by the gall wasp *Diplolepis rosae.* One gall may contain about 50 or more larvae.

Most gall wasps are not economically important. The galls of some species, however, have been used as a source of tannic acid or in the manufacture of inks or dyes.

Galla (people): *see* Oromo.

Galland, Adolf (b. March 19, 1912, Westerholt, near Recklinghausen, Ger.), German fighter ace and officer who commanded the fighter forces of the Luftwaffe (German Air Force) during World War II.

The son of an estate bailiff of French descent, Galland became a skillful glider pilot before age 20 and joined the civilian airline Lufthansa in 1932. He served with Germany's Condor Legion in the Spanish Civil War in 1937–38, flying several hundred missions. Galland held a staff post when Germany invaded Poland in 1939, but he went on to serve in a fighter group during the campaign against France in 1940 and led a fighter squadron during the Battle of Britain, by the end of which he had destroyed about 100 enemy planes. In November 1941 he was promoted to the post of commander of the Luftwaffe's Fighter Arm, and a year later he was promoted to major general, becoming at age 30 the youngest general in the German armed forces.

In 1943–44 Galland commanded Germany's fighter squadrons in their unavailing defense against Anglo-American bombing raids. Despite his able and resourceful leadership, he was blamed by Adolf Hitler and Hermann Goering for the gradual collapse of the German air defenses in 1944, and he was relieved of his command in January 1945. Galland had supported the development of the jet-powered fighter called the Messerschmitt ME-262, and he was allowed by Hitler to return to active duty as the commander of an elite squadron of these jet fighters. He was shot down in April 1945 and was captured and taken to England. After the war he served as a technical adviser to the Argentine air force for six years, after which he returned to West Germany and worked as an industrial consultant in Düsseldorf.

Galland, Antoine (b. 1646, Rollot, near Montdidier, Fr.—d. 1715, Paris), French Orientalist and scholar, best known for his adaptation of the Middle Eastern tales *Mille et une nuits* (1704–17; *The Thousand and One Nights*).

The seventh child of a poor family, Galland was taught Hebrew, Latin, and Greek by canons and attended the College of Noyon

and the Collège de France in Paris. He accompanied the French ambassador to Constantinople during 1670–75, learned Arabic, Persian, and Turkish, and wrote a journal of his travels.

Galland, engraving by Morel after a portrait by Hyacinthe Rigaud

J.P. Ziolo

In 1679 he was appointed antiquary to Louis XIV, for whom he collected ancient coins and manuscripts. In addition to his work on dictionaries and academic writings, he translated the Qur'ān and in 1694 wrote *Les Paroles remarquables, les bons mots et les maximes des Orientaux* (*The Remarkable Sayings, Apothegms, and Maxims of the Eastern Nations,* 1695), a compendium of Eastern wisdom, and *Les Contes et fables indiennes de Bidpai et de Lokmam* (1724; "Indian Fables and Tales of Bidpai and Lokmam"). His major work, the *Mille et une nuits,* was a popular version freely translated from Syrian manuscripts.

Gallant Fox (foaled 1927), U.S. racehorse (Thoroughbred) who in 1930 won the U.S. Triple Crown: the Kentucky Derby, the Preakness Stakes, and the Belmont Stakes. A bay colt sired by Sir Gallahad III (bred in France) out of Marguerite, he raced for only two seasons (1929–30), winning 11 of 17 starts. His winnings of $308,275 as a three-year-old was a single season record for 17 years, and his career winnings of $328,165 was a world record subsequently broken. Retired to stud, he sired Omaha (winner of the Triple Crown in 1935) and numerous other successful racers.

Gallarate, town, Varese province, Lombardia (Lombardy) region, northern Italy, northwest of Milan. Of medieval origin, it has the 11th- and 12th-century church of S. Pietro and a 19th-century cathedral. It is known for its textile industry; nearly one-tenth of all Italian looms are to be found in and around the town. The international airport of Lombardy at Malpensa is 3 mi (5 km) west. Pop. (1981 prelim.) mun., 46,915.

Gallas, Matthias, GRAF (count) VON CAMPO (b. Sept. 16, 1584, Trento, Italy—d. April 25, 1647, Vienna), imperial general whose ineffectiveness severely damaged the Habsburg cause in the latter stages of the Thirty Years' War.

Gallas, detail from an engraving

By courtesy of the Heeresgeschichtliches Museum, Vienna

Albrecht von Wallenstein, impressed by Gallas' military exploits in battles of the middle and late 1620s, entrusted him with important commands (1631–33) against Gustavus II Adolphus of Sweden and Bernhard of Saxe-Weimar; but Gallas, together with Ottavio Piccolomini, was instrumental in the overthrow of Wallenstein, after whose murder (1634) he obtained the supreme command of the army. Although Gallas was victor in the first of the battles of Nördlingen in 1634, thereafter carelessness and drunkenness marred his conduct of the war, and he became known as the "destroyer of armies," especially after his disastrous campaigns of 1637, 1638, and 1644, each of which resulted in the complete annihilation of his troops. Eventually he was forced to resign his command.

Gallatin, town, seat of Daviess County, northwestern Missouri, U.S. It was laid out in 1837 and named for Albert Gallatin, U.S. secretary of the treasury. The arrival of Mormons in the area led to friction with the established settlers who feared the newcomers. In April 1838 the town was sacked by Mormon settlers, and several buildings were burned. Aside from farming, Gallatin has only one major industry, a cap and glove manufacturer; soybeans and corn (maize) are the major crops of the area. Pop. (1980) 2,063.

Gallatin, city, seat of Sumner County, north central Tennessee, U.S., near the Cumberland River, 25 mi (40 km) northeast of Nashville. Founded in 1802 and incorporated in 1815, the city was named for Albert Gallatin (1761–1849), secretary of the treasury under two U.S. presidents, John Adams and Thomas Jefferson. In the Civil War a Federal garrison there was captured (August 1862) by the Confederate general John H. Morgan. Agriculture (crops, dairying, livestock, and tobacco) forms the chief economic base of the city. The Tennessee Valley Authority's Gallatin Steam Plant, 6 mi (10 km) southeast, is one of the largest employers in the area. Light manufactures include clothing, furniture, footwear, and locks and keys. Volunteer State Community College opened in 1971.

Nearby Old Hickory Lake, impounded by a dam, provides opportunity for recreation. Cragfont, a stone mansion 5 mi east, which was begun in 1798 by the Revolutionary War general James Winchester, is a state historic site. Pop. (1980) 17,191.

Gallatin, (Abraham Alfonse) Albert (b. Jan. 29, 1761, Geneva—d. Aug. 12, 1849, Astoria, N.Y., U.S.), fourth U.S. secretary of the treasury (1801–14); he insisted upon a continuity of sound governmental fiscal policies when the Republican (Jeffersonian) Party assumed national political power, and he was instrumental in negotiating an end to the War of 1812.

Gallatin plunged into business and public life after emigrating to the New World at 19. Settling in Pennsylvania, he became a mainstay of the Anti-Federalists in that area and in 1795 was elected to the House of Representatives. There he inaugurated the House Committee on Finance, which later grew into the powerful Ways and Means Committee. In 1797–98 he helped to reduce Federalist-sponsored expenditures aimed at promoting hostilities with France. He was bitterly denounced by Federalists in Congress, and when the Alien and Sedition Acts were passed in 1798, Jefferson believed they were partly intended to drive Gallatin from office.

As secretary of the treasury Gallatin stressed simplicity in government and termination of the public debt. Despite heavy naval expenditures and the $15,000,000 Louisiana Purchase (1803), he managed to reduce the public debt by $23,000,000 within eight years.

Gallatin, portrait by Rembrandt Peale, 1805; in Independence National Historical Park, Philadelphia

By courtesy of the Independence National Historical Park Collection, Philadelphia

The declaration of war with Great Britain in 1812 shattered all of Gallatin's most cherished schemes, for he felt war to be fatal to the nation's prosperity and progress. He therefore put the nation's finances in the best order he could and set himself to attain an early peace. Grasping at Russia's proffered mediation of the war, he sailed for Europe in May 1813. Refusing to deal through Russia, Great Britain expressed its willingness to proceed with direct negotiations, and commissioners from the two countries finally met at Ghent in August 1814. In the tedious discussions that followed, Gallatin played the leading role, preserving peace among his colleagues and establishing an enviable reputation as a diplomat. Peace was signed at the Treaty of Ghent (December 24).

While still in Europe, Gallatin was appointed minister to France (served 1816–23), after which he returned to the U.S. only to be embroiled in a bitter intraparty political struggle. Though nominated for the vice presidency in 1824, he withdrew in October to avoid weakening the ticket because of his foreign birth. After serving briefly as minister to Great Britain (1826–27), he retired from public life and became president of the National (later the Gallatin) Bank in New York City (1831–39). A student of the Indian tribes in North America, he founded the American Ethnological Society of New York (1842) and has sometimes been called "father of American ethnology." A classic biography is Henry Adams' *Life of A. Gallatin* (1879).

Gallatin River, river rising in the Gallatin Range in the northwestern corner of Yellowstone National Park, Wyoming, U.S., and flowing 120 mi (193 km) north to Three Forks, in southwestern Montana. There it joins with its tributary, the East Gallatin (which rises near Mt. Blackmore), and the Madison and Jefferson rivers to form the Missouri River. Named for Albert Gallatin, an early 19th-century statesman, it forms a deep canyon about 70 mi long between the Madison and Gallatin ranges. The river is used for irrigation.

Gallaudet, Thomas Hopkins (b. Dec. 10, 1787, Philadelphia—d. Sept. 10, 1851, Hartford, Conn., U.S.), educational philanthropist and founder of the first U.S. school for the deaf.

After graduation from Yale in 1805, Gallaudet studied theology at Andover. His interests soon turned to the education of the deaf, and he visited Europe, studying in England and France, where he learned the sign method of communication from the abbé Sicard. On his return to the United States in 1816, he established the American Asylum for Deaf-mutes at Hartford, Conn., in support of which Congress made a land grant. For more than 50 years this school was the primary training centre for instructors of the deaf.

After retiring from the school in 1830, Gallaudet was appointed to the first professorship in the United States for the philosophy of education at New York University (1832–33). In his *Plan of a Seminary for the Education of Instructers of Youth* (1825), he proposed special schools for the professional training of teachers. He also wrote textbooks for children and the deaf.

gallbladder, a muscular membranous sac occurring in many vertebrates; its function is to store and concentrate bile, a fluid that is received from the liver and is important in digestion. Situated in humans on the underside of the liver, the gallbladder is pear-shaped and expandable, with a capacity of about 1.7 fluid ounces (50 ml). The inner surface of the gallbladder wall is lined with mucous membrane tissue similar to that of the small intestine. Cells of the mucous membrane perform the function of absorption; each cell's surface has hundreds of microscopic projections called microvilli, which increase the area of fluid absorption. The absorption of water and inorganic salts from the bile by the mucous-membrane cells leaves the stored bile about 5 times—and sometimes as much as 18 times—more concentrated than when it was produced in the liver.

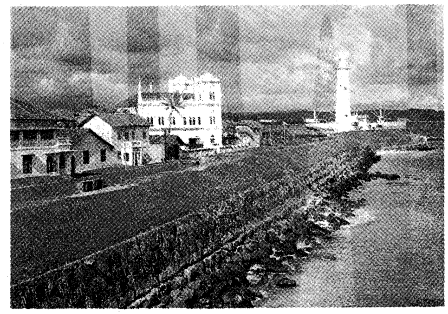
Contraction of the muscle wall in the gallbladder is stimulated by the vagus nerve of the parasympathetic system and by the hormone cholecystokinin, which is produced in the upper portions of the intestine. The gallbladder's contraction results in the discharge of bile through the bile duct into the duodenum of the small intestine. The human bile duct is composed of three branches (hepatic duct, cystic duct, and common duct), which are arranged into the shape of the letter Y. The lower segment is the common bile duct; it terminates in the duodenal wall of the small intestine. A constriction at the end of the common duct, called the sphincter of Oddi (for Ruggero Oddi, a 19th-century Italian physician), regulates the flow of bile into the duodenum. The upper right branch is the hepatic duct, which leads to the liver, where bile is produced. The upper left branch, the cystic duct, passes to the gallbladder, where bile is stored.

Bile flows from the two lobes of the liver into the hepatic and common ducts. If food is present in the small intestine, the bile will continue directly into the duodenum. If the small intestine is empty, the sphincter of Oddi is closed, and bile flowing down the common duct accumulates and is forced back up the tube until it reaches the open cystic duct. It flows into the cystic duct and gallbladder, where it is stored and concentrated until needed. When food enters the duodenum, the common duct's sphincter opens, the gallbladder contracts, and bile enters the duodenum to aid in the digestion of fats.

In animals without a gallbladder, such as horses, rats, and pigeons, bile comes directly from the liver. Some animals have a gallbladder that does not concentrate fluids well; these animals usually have a continuous flow of bile into the intestine.

The gallbladder is commonly subject to many disorders, particularly the formation of solid deposits called gallstones. Despite its activity, it can be surgically removed without serious effect. *See also* bile.

Galle, formerly POINT DE GALLE, port and city, Sri Lanka (Ceylon), situated on a large harbour on the island's southern coast. Galle dates from the 13th century, possibly much earlier, but it became the island's chief port during the period of Portuguese rule (1507–*c.* 1640). Under Dutch rule it was the island capital until 1656, when Colombo replaced it. The rise of Colombo's port in the second half of the 19th century led to Galle's decline, but congestion at Colombo has caused some shipping to be diverted to Galle. The city, 65 miles (105 km) southeast of Colombo, has good road and rail connections; a cement factory is in operation there. A fort and other buildings remain from the early colonial period. Pop. (1983 est.) 88,000.



Ramparts of an old Dutch fort, Galle, Sri Lanka
Harrison Forman

Gallé, Émile (b. May 8, 1846, Nancy, Fr.—d. Sept. 23, 1904, Nancy), celebrated French designer and pioneer in technical innovations in glass. He was a leading initiator of the Art Nouveau style and of the modern renaissance of French art glass.

The son of a successful faience and furniture producer, Gallé studied philosophy, botany, and drawing, later learning glassmaking at Meisenthal, Fr. After the Franco-German War (1870–71), he went to work in his father's factory at Nancy. He first made clear glass, lightly tinted and decorated with enamel and engraving, but he soon developed the use of deeply coloured, almost opaque glasses in heavy masses, often layered in several thicknesses and carved or etched to form plant motifs. His glass was a great success at the Paris Exhibition of 1878, and he became known as a spirited designer working in contemporary revival styles.

Vase with relief decoration by Émile Gallé, *c.* 1895; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London

Gallé's strikingly original work made a great impression when it was exhibited at the Paris Exposition of 1889. Over the next decade his glass, reflecting the prevailing interest in Japanese art, became internationally known and imitated. It contributed largely to the free, asymmetric naturalism and symbolistic overtones of Art Nouveau. He employed wheel cutting, acid etching, casing (*i.e.,* layers of various glass), and special effects such as metallic foils and air bubbles, calling his experiments *marqueterie de verre* ("marquetry of glass"). At Nancy he led the revival of craftsmanship and the subsequent dissemination of crafted glass by way of mass production. At the height of its productivity, during the late 19th century, his workshop employed nearly 300 associates. He attracted numerous artisans, including the Art Nouveau glassmaker Eugène Rousseau. After Gallé's death his glass enterprise continued production until 1913.

With Gallé as its creative force, a form of naturalism, predominantly floristic, developed that was later identified with The School at Nancy, Provincial Alliance of Art Industries, established in 1901. His study of botany was the source for his natural designs, which represented leaves, ethereal flowers, vines, and fruits. His furniture designs, based on the Rococo period, continued the French tradition of emphasizing constructive points organically (*e.g.,* corners of armoires finished in the shape of stalks or tree branches) and employing inlay and carving that were essentially floral in style. Perhaps his most characteristic concept was his *meubles parlants* ("talking furniture"), which incorporated in its decoration inlaid quotations from leading contemporary Symbolist authors such as Maurice Maeterlinck and Paul Verlaine. Both his glass and furniture were signed, sometimes most imaginatively. He collaborated with many colleagues, most notably the Art Nouveau furniture designer Louis Majorelle.

L. de Fourcaud's *Émile Gallé* (1903) preceded Gallé's own book *Écrits pour l'art 1884–89* ("Writings on Art 1884–89"), which was posthumously published in 1908.

Galle, Johann Gottfried (b. June 9, 1812, near Gräfenhainichen, Prussian Saxony—d. July 10, 1910, Potsdam, Ger.), German astronomer who on Sept. 23, 1846, was the first to observe the planet Neptune.

Galle joined the staff of the Berlin Observatory, where he served as assistant director under J.F. Encke from 1835 until 1851. He studied the rings of Saturn and suggested a method, later successful, of measuring the scale of the solar system by observing the parallax of asteroids. He looked for Neptune at the request of the French astronomer U.-J.-J. Le Verrier, who had computed the planet's probable position before it was seen. From 1851 until 1897 Galle was director of the Breslau Observatory.

Gallegos (Freire), Rómulo (b. Aug. 2, 1884, Caracas—d. April 4, 1969, Caracas), novelist and president of Venezuela in 1948, best known for his forceful novels that dramatize the overpowering natural aspects of the Venezuelan llanos (prairies), the local folklore, and such social events as alligator hunts.

Gallegos
By courtesy of the Organization of American States

Gallegos won an international reputation as one of the leading novelists of South America with *Doña Bárbara* (1929; Eng. trans., 1931), the story of the ruthless woman boss of a hacienda who is more than a match for the criminals, desperadoes, and opportunists who exploit the raw country. Other major

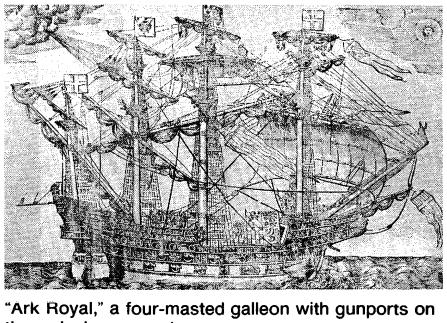
novels are: *Cantaclaro* (1934; "Chanticleer"), dealing with a ballad singer of the llanos, and *Canaima* (1935), a story of the tropical forest, named after the evil spirit that pervades the jungle.

Other important works were *Pobre negro* (1937; "Poor Black"), *El forastero* (1942; "The Stranger"), *Sobre la misma tierra* (1943; "Over the Same Ground"), *La rebelión y otros cuentos* (1947; "The Rebellion and Other Stories"), and *La brizna de paja en el viento* (1952; "A Straw in the Wind"). He also wrote several screenplays.

In 1936 Gallegos began a political career that led to his inauguration to the presidency of Venezuela in February 1948. His government was overthrown by a military coup in November 1948, and he was sent into exile, but he returned in 1958 and was voted life membership in the Senate.

Gallehus Horns, pair of gold, horn-shaped artifacts from 5th-century Scandinavia that constituted the most notable examples of goldwork of that period. They were unearthed at Gallehus, Jutland, Den., in 1639 and 1734 and were stolen and melted down in 1802. Replicas made from drawings are now in the Danish National Museum, Copenhagen. The larger horn, which measured more than 2.5 ft (0.75 m) long, bore the runic inscription, "I Hlewegast [or Laegaest], Holt's son, made the horn." The engraved pictures and symbols (which include animals, hunters, and a three-headed figure), arranged in bands running around the sections of the horns, probably had religious significance.

galleon, full-rigged sailing ship, primarily for war, developed in the 15th and 16th centuries. The name derived from "galley," which had come to be synonymous with "war vessel" and whose characteristic beaked prow the new ship retained. A high, square forecastle rose behind the bow, the three or four masts carried



"Ark Royal," a four-masted galleon with gunports on three decks; engraving

By courtesy of the trustees of the British Museum

both square and fore-and-aft sails, and one or two tiers of guns were carried broadside. The largest galleons were built by the Spanish and the Portuguese for overseas trade; the famed "Manila galleons" of Spain made an annual trip between Acapulco, Mex., and the Philippines, carrying silver west and raw silk east, for more than 250 years.

Galleria d'Arte Moderna (Florence gallery): *see* Arte Moderna, Galleria d'.

Gallerie dell'Accademia (Florence): *see* Accademia, Gallerie dell'.

Galleria Internazionale d'Arte Moderna di Ca'Pésaro (Italian: Pesaro International Gallery of Modern Art), in Venice, fine Baroque palace designed by B. Longhena in the 17th century and housing the Gallery of Modern Art and the Oriental Museum. A number of the rooms present splendid views of the Grand Canal. The collection of paintings and sculptures was mostly purchased at exhibitions of the Venice Biennale. There are works by important contemporary Italian artists including Medardo Rosso and Arturo Martini, as well as paintings and sculptures by celebrated modern artists such as Kandinsky, Klee, Matisse, Corot, and Chagall. Rodin's "The Thinker" and the "Burghers of Calais" are represented by casts.

The museum of Oriental Art is devoted primarily to Japanese and Chinese art. The bulk of the works formed the collection of Prince Henry of Bourbon-Parma, Count of Bardi. A noteworthy Cambodian figure of Buddha dates from the 12th century.

Galleria Nazionale d'Arte Moderna (Italian: National Gallery of Modern Art), in Rome, important collection devoted to Italian artists, and forming a full survey of 19th- and 20th-century Italian art. The museum was begun in 1883 and moved to its present site in 1911. The collection is enormous, with early examples from the Neoclassical period, including some fine portraits, through the contemporary periods. An entire room is devoted to the Tuscan group of painters known as the Macchiaioli, including such well-known examples as Giovanni Fattori's "Portrait of His First Wife" and Silvestro Lega's "The Visit."

A section devoted to Italian artists in Paris include Giovanni Boldini's portrait of Giuseppe Verdi. European works of non-Italian painters are included in the L. Sprovieri collection, which has works by Hogarth, Blake, Goya, Delacroix, Ingres, Manet, Gauguin, Degas, Van Gogh, and many others and also examples of 19th-century Japanese prints. Important 20th-century works include paintings by Monet and Utrillo. Sections are also devoted to works by the Divisionists (Pointillists) and Futurists.

Gallerie dell'Accademia di Venezia (Venice): *see* Accademia di Venezia, Gallerie dell'.

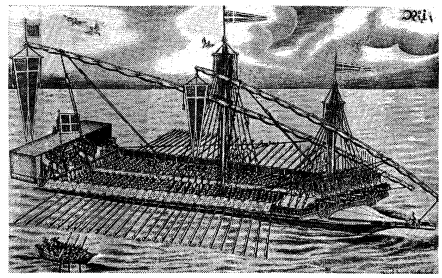
gallery, in architecture, any covered passage, open at one side, such as a portico or a colonnade. More specifically, in late medieval and Renaissance Italian architecture, it is a narrow balcony or platform running the length of a wall. In Romanesque architecture, especially in Italy and Germany, an arcaded wall-passage on the outside of a structure is known as a dwarf gallery.

Facing into a structure, a gallery may either be set into the thickness of a wall at ground level or be elevated and supported on columns or corbels. It would function as a communicating passage. Within an interior space a gallery may be a platform projecting from a wall, as in the example of a musicians' gallery, or may be a second-story opening onto a large interior area, such as the gallery in a church intended to provide additional seating. In legislative houses such a gallery might be intended for spectators or the press. In theatres the gallery is the highest balcony and generally contains the least expensive seats.

Galleries appear as long, narrow rooms in substantial Renaissance houses and palaces, where they were used as promenades and to exhibit art. In Elizabethan and Jacobean houses these were called long galleries. The modern term art gallery is derived from this usage.

gallery grave, long chamber grave, a variant of the collective tomb burials that spread into western and northwestern Europe from the Aegean area during the final stage of the northern Stone Age (*c.* 2000 BC). In the Severn–Cotswold area of Britain, the graves have pairs of side chambers. Segmented graves with concave forecourts are found in Ulster and southwestern Scotland. In the Paris Basin, the gallery graves have small round entrances and are lined with large stone slabs. The tombs are often associated with deities, whose representations are depicted on the rock walls.

galley, large seagoing vessel propelled primarily by oars. The Egyptians, Cretans, and other ancient peoples used sail-equipped galleys for both war and commerce; the Phoenicians were apparently the first to introduce the bireme (about 700 BC), with two banks of oars staggered on either side of the vessel, the upper



Galley of the largest size, with five men on each oar, early 17th century

By courtesy of the trustees of the British Museum

bank situated above the lower so as to permit the oars of the upper bank to clear the oars below. The addition of an outrigger permitted the employment of a third bank of oars, the rowers of which sat above and outside the other two; such a ship, called a trireme, was probably first built around 500 BC by the Greeks. References to even more banks—*e.g.*, the quinquireme—are believed to indicate a ship of very large size but with no more than two or three banks of oars.

By late Roman times, war galleys had become sharply differentiated from merchantmen by their longer, narrower hulls and prow rams. The wider, deeper hulled merchantmen relied increasingly on the sail and ultimately all-sail vessels came into use. Galleys, however, were not entirely replaced for commerce even in late medieval times. More expensive (because of the larger crews) but more manoeuvrable, the galley remained the principal ship for peace and war into the High Middle Ages. The Vikings' longships were small galleys with up to ten oars on a side and a square sail, capable of carrying 50 or 60 men. Byzantium, Venice, Genoa, and other medieval sea powers built much more elaborate galleys; by the 13th century Italian galleys were trading in Flanders and England and on the northwest coast of Africa. In 1291 two Genoese galleys were lost seeking a sea route to the Indies via the West African coast.

Though the advent of the lateen (fore-and-aft) sail and the stern rudder rendered the galley obsolete for commerce, it retained its military importance into the 16th century. It played the leading role at the Battle of Lepanto in 1571.

The galley's last historic role was as a convict ship, to which felons were sentenced in France and elsewhere into the 18th century. Earlier, prisoners of war had sometimes been used to man galleys, even though free citizens, who could be relied on in battle, were understandably preferred.

galli, singular GALLUS, priests, often temple attendants or wandering mendicants, of the Asiatic deity, the Great Mother of the Gods, known as Cybele, or Agdistis, in Greek and Latin literature. The *galli* were eunuchs attired in female garb, with long hair fragrant with ointment. Together with priestesses, they celebrated the Great Mother's rites with wild music and dancing until their frenzied excitement found its culmination in self-scourging, self-laceration, or exhaustion. Self-emasculation by candidates for the priesthood sometimes accompanied this delirium of worship.

The name *galli* may be Phrygian, from the two streams called Gallus, both tributaries of the Sangarius (now Sakarya) River, the waters of which were said to inspire religious frenzy.

Galli DA BIBIENA FAMILY: *see* Bibiena family.

Galli-Curci, Amelita (b. Nov. 18, 1882, Milan—d. Nov. 26, 1963, La Jolla, Calif., U.S.), one of the outstanding operatic sopranos of her time, famed for the beauty of her florid coloratura singing.

Galli-Curci studied piano and composition at Milan, but as a singer she was self-taught. After her debut as Gilda in Verdi's *Rigoletto* at Trani, in southern Italy, she appeared in Rome in 1909 in Bizet's *Don Procopio*. Tours with opera companies in Egypt, South America, Spain, and Russia established local reputations for her. She was almost unknown in the United States in 1916 when she appeared in Chicago as Gilda. She appeared in New York City in 1918 as Meyerbeer's Dinorah, a role that became one of her most celebrated. From 1921 until 1930 she sang with the Metropolitan Opera Company. Foreign concert tours followed, and in 1936 she made her final stage appearance in Puccini's *La Bohème*. Her voice was exceptionally fluent, warm, and smooth; her specialty was florid, high soprano music. Her repertory included 28 operatic roles ranging from Rossini's Rosina (in *The Barber of Seville*) to Strauss's Sophie (in *Der Rosenkavalier*) and Puccini's *Madama Butterfly*.

Galli-Curci, *c.* 1925
The Bettmann Archive

Gallia Belgica (Roman province): *see* Belgica.

Gallia Cisalpina: *see* Cisalpine Gaul.

Gallia Comata (Latin: Hairy Gaul), also called TRES GALLIAE (Three Gauls), in Roman antiquity, the land of Gaul that included the three provinces of (1) Aquitania, bordered by the Bay of Biscay on the west and the Pyrenees on the south; (2) Celtica (or Gallia Lugdunensis), with Lugdunum (Lyon) as its capital, on the eastern border of Gaul; and (3) Belgica (or Gallia Belgica), in the north, where Trier and Reims were the chief towns and many of the people were Germanic in origin. The only garrison was a single cohort at Lugdunum to guard the imperial mint, but the Rhine army could and did move rapidly into the Gallia Comata if trouble occurred.

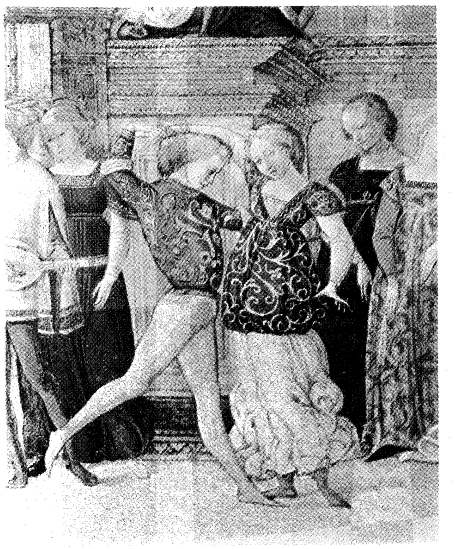
A fourth Roman province, Narbonensis, lay between them and the Mediterranean. It was governed by a proconsul appointed by the Senate, whereas each of the Tres Galliae was ruled by an imperial legate of praetorian standing.

Gallia Lugdunensis (Roman province): *see* Lugdunensis.

Gallia Narbonensis (ancient Gaul): *see* Narbonensis.

Gallia Transalpina: *see* Transalpine Gaul.

galliard (French *gaillard:* "lively"), vigorous 16th-century European court dance. Its four hopping steps and one high leap permitted athletic gentlemen to show off for their partners. Performed as the afterdance of the stately pavane, the galliard originated in 15th-century Italy. It was especially fashionable from *c.* 1530 to 1620 in France, Spain, and England, where it was often called the cinquepace after its five basic steps (French *cinqpas*). Queen Elizabeth I is said to have practiced galliards as her morning exercise.



Galliard, detail from a cassone panel depicting Antiochus and Stratonice, by the Stratonice Master, Sienese, 15th century; in the Henry E. Huntington Library and Art Gallery, San Marino, Calif.
By courtesy of the Henry E. Huntington Library and Art Gallery, San Marino, Calif.

To perform the galliard, couples danced the length of the ballroom either together, men leaping higher than women, or separately. In the wooing pantomime of the early galliard, the men pursued their coyly retreating partners. The step was performed in six counts (two measures of music in moderate $\frac{3}{4}$ time). Musicians usually wrote pavanes and galliards in pairs, the galliard time being a rhythmic adaptation of that of the preceding pavane.

gallic acid, substance occurring in many plants, either in the free state or combined as gallotannin. It is present to the extent of 40–60 percent combined as gallotannic acid in tara (any of various plants of the genus *Caesalpinia*) and in Aleppo and Chinese galls (swellings of plant tissue), from which it is obtained commercially by the action of acids or alkalies. An Aleppo gall has a spherical shape, is hard and brittle, and is about the size of a hickory nut; it is produced on oak twigs by a gall wasp (*Cynips tinctoria*). A Chinese gall is produced by insects on Asian sumac (*Rhus semialata*).

When heated to 200°–250° C, gallic acid splits into carbon dioxide and pyrogallol (pyrogallic acid), the photographic developer. With iron salts it gives a deep blue-black colour, the basis of writing ink. It is used in the manufacture of a few dyes. As bismuth subgallate it has been employed in medicine as a mild skin antiseptic and astringent (*q.v.*; an agent that tends to shrink mucous membranes and raw surfaces and to dry up secretions). Propyl gallate is an important antioxidant for the prevention of rancidity in edible oils and fats. Gallic acid is 3,4,5-trihydroxybenzoic acid and has the formula $(HO)_3C_6H_2 \cdot CO_2H$.

Gallic Wars (58–50 BC), campaigns in which the Roman proconsul Julius Caesar conquered Gaul. Clad in the bloodred cloak he usually wore "as his distinguishing mark of battle," Caesar led his troops to victories throughout the province, his major triumph being the defeat of the Gallic army led by the chieftain Vercingetorix, in 52 BC. Caesar described these campaigns in *De Bello Gallico* ("On the Gallic War").

Gallican chant, music of the ancient Latin Roman Catholic liturgy in the Gaul of the Franks from about the 5th to the 9th century. Scholars assume that a simple and uniform liturgy existed in western Europe until the end of the 5th century and that only in the 6th century did the Gallican church develop its own rite and chant with Oriental influences.

Because of the desire of Rome to have a unified liturgical practice in the West, the Frankish kings Pepin III (d. 768) and Charlemagne (d. 814) suppressed the Gallican rite in favour of the Roman. Although no known manuscripts of Gallican chant have survived, some authentic remnants of it are found in the repertory of Gregorian chant in the liturgy for Good Friday, among them the "Improperia," "Crux fidelis," and "Pange lingua." These chants embedded in the Roman liturgy help to illustrate the theory that the Gregorian chant that has come down to modern times is a synthesis of Roman and Frankish elements. Certain characteristics stand out from surviving examples of Gallican chant. There is a pull in the chants toward cadences on C; motifs are frequently built on the notes C–D–E or C–E–G; and E is often used as a reciting note.

Gallican Confession, Latin CONFESSIO GALLICANA, statement of faith adopted in 1559 in Paris by the first National Synod of the Reformed Church of France. Based on a 35-article draft of a confession prepared by John Calvin, which he sent with representatives from Geneva to the French synod, the draft was revised by his pupil Antoine de la Roche Chandieu. The Gallican Confession consisted of 35 articles divided into four sections concerning God, Christ, the Holy Spirit, and the church. It affirmed that the Bible is the only rule of faith. It also included an exposition on predestination, the doctrine that God elects or chooses who will be saved, and stated Calvin's doctrine of the Eucharist.

Subsequently, a preface was added to the confession, and it was presented to King Francis II of France in 1560. At La Rochelle, Fr., in 1571, during the seventh National Synod of the Reformed Church of France, the confession, amplified to 40 articles, was again ratified and was signed by all the delegates. The Gallican Confession has often been printed in French Bibles, and it remained the authoritative statement of faith for the French Reformed Church into the 19th century.

Gallicanism, a complex of French ecclesiastical and political doctrines and practices advocating restriction of papal power; it characterized the life of the Roman Catholic Church in France at certain periods.

Despite its several varieties, Gallicanism consisted of three basic ideas: independence of the French king in the temporal order; superiority of an ecumenical council over the pope; and union of clergy and king to limit the intervention of the pope within the kingdom. Though the word was coined in the 19th century to identify the position opposing Ultramontanism (*q.v.*), which emphasized papal authority, the doctrine itself had its roots in early French nationalism, especially in the organizing action of Charlemagne in the 8th and 9th centuries, and came to conscious flower in the 14th century.

The struggle between Philip IV the Fair and Pope Boniface VIII (1294–1303) demonstrated in striking fashion the conflict over

the nature of the royal and papal powers and their relationship. The next century and a half saw the development of the conciliar theory, according to which a general council draws its powers directly from Christ, even the pope being subject to its decisions. In this context two important events took place. First, during the attempts to end the Great Schism, when rival popes were established at Avignon and Rome, King Charles VI, following a national synod of bishops in 1398, decided to withdraw obedience from Benedict XIII, the pope of Avignon, without recognizing Boniface IX at Rome because he was no longer functioning for the common good of the people. Second, in 1438, during another national synod, Charles VII issued the Pragmatic Sanction of Bourges, a declaration of 23 articles affirming that the pope was subject to a general council and that his jurisdiction was conditioned by royal will. Though the popes from then on constantly urged the revocation of the pragmatic sanction, they did not succeed until 1516, when it was replaced by a concordat conceding the French king's right to nominate bishops.

By the end of the 16th century two kinds of Gallicanism, political and theological, could be distinguished. Political Gallicanism could be further divided into parliamentary and royal; royal Gallicanism designates the policy of the French kings in matters ecclesiastical, and parliamentary Gallicanism indicates the demands of the courts and legislature in dealing with church affairs.

The most notable champion of parliamentary Gallicanism was the jurist Pierre Pithou, who published his *Les Libertés de l'église gallicane* in 1594. This book, together with several commentaries on it, was condemned by Rome but continued to be influential well into the 19th century.

The best expression of theological Gallicanism was found in the Four Gallican Articles, approved by the assembly of the clergy of France in 1682. This declaration stated: (1) the pope has supreme spiritual but no secular power; (2) the pope is subject to ecumenical councils; (3) the pope must accept as inviolable immemorial customs of the French Church—*e.g.*, the right of secular rulers to appoint bishops or use revenues of vacant bishoprics; (4) papal infallibility in doctrinal matters presupposes confirmation by the total church. Bishop Jacques-Bénigne Bossuet drafted the declaration in Latin and defended it in a conciliatory preamble. Though the articles were condemned at Rome by Alexander VIII in 1690 and were revoked in France by Louis XIV in 1693, they remained the typical expression of Gallicanism.

Not all the French clergy were Gallican; the French Jesuits, in particular, were fervently Ultramontane. The 18th century, with its Rationalist attack on the very foundations of Catholicism, weakened the French concern for Gallicanism, and the Revolution left it enervated. Napoleon, though he favoured the clerical Gallican Party, had no strong interest. The first Vatican Council (1869–70) dealt a final blow by formally declaring the Ultramontane position.

Gallicum Fretum (English Channel): *see* Dover, Strait of.

Gallieni, Joseph-Simon (b. April 24, 1849, Saint-Béat, Fr.—d. May 27, 1916, Versailles), French army officer figure who successfully directed the pacification of the French Sudan and Madagascar and the integration of those African territories into the French colonial empire.

After training at the military academy of Saint-Cyr and serving in the Franco-German War (1870–71), Gallieni was sent to Africa in the mid-1870s. As a captain in 1881 he was captured by the forces of the amīr Ahmadou in the Upper Niger region, but within a year he had extracted exclusive privileges for France in that area.

Gallieni
H. Roger-Viollet

After serving in Martinique, Gallieni was named governor of the French Sudan, where he successfully combatted rebel Sudanese forces. In 1892–96 he served in French Indochina and then was sent to Madagascar. There he suppressed the revolt of monarchist forces and served as governor general until 1905, winning a reputation as a judicious, flexible, and humane colonial master who combined affection for the indigenous people with a sense of duty and innovation.

Gallieni was the logical choice for supreme commander of the French Army in 1911, but advanced age and poor health led him to decline in favour of Gen. Joseph Joffre. Gallieni retired in April 1914 only to be recalled that August, just before the outbreak of World War I, as military commander of Paris. Rather than remain a passive figure, he launched an important counterattack against the German armies as they crossed the Marne in September. He became minister of war in October 1915 and served with distinction until ill health forced his retirement in March 1916.

In 1921 he was posthumously raised to the dignity of marshal.

Gallienus, Publius Licinius Egnatius (b. *c.* 218—d. 268), Roman emperor jointly with his father, Valerian, from 253 until 260, then sole emperor to 268.

Gallienus ruled an empire that was disintegrating under pressures from foreign invaders. The Senate proclaimed him co-emperor because it saw that no one man could run the vast military operations needed to defend the empire. Valerian took charge of the eastern frontiers, while Gallienus fought a series of campaigns against the Goths on the Rhine and defeated the Alemanni at Milan in 258. He next crushed the successive revolts of Ingenuus and Regalianus in Illyricum. In June 260 Valerian was taken prisoner by the Persian king Shāpūr I and died in captivity. At a time when independent rulers were asserting themselves across the empire, Odaenathus, prince of a Roman colony in the East, adhered to Rome, defeated Shāpūr, and quelled the usurping emperor Quietus at Emesa (now Homs, Syria). Gallienus subsequently named Odaenathus governor of all the East. The Persians devastated the East just as the Germanic tribes had recently plundered the Rhine and Danube provinces. Gallienus himself was left in control only of Italy and the Balkans. Toward the end of his reign, the Goths renewed their attacks, and the Emperor's defensive manoeuvres were interrupted by the revolt of a usurper, Aureolus. While besieging the insurgent general in Milan, Gallienus was murdered; his cavalry commander, Claudius, succeeded him as Claudius II.

Gallienus, marble bust; in the Museo Archeologico Nazionale, Naples
Alinari—Art Resource/EB Inc.

Several developments during Gallienus' reign are of particular importance. There was a sharp reduction of civilian control over the military after Gallienus—breaking with a tradition of some seven centuries—transferred the command of the Roman armies from the senators to professional equestrian officers. At the same time, he expanded the role of the cavalry in warfare by creating a mobile cavalry reserve, which was to become the nucleus of the field army of the later empire. Finally, in the relatively peaceful years 262–267, Gallienus sponsored a vigorous intellectual renaissance at Rome. This revival is clearly discernible in the surviving art and the contemporary literature, notably that of Neoplatonist philosophers such as Plotinus.

Galliffet, Gaston-Alexandre-Auguste, marquis de, PRINCE DE MARTIGUES (b. Jan. 23, 1830, Paris—d. July 8, 1909, Paris), French military leader who severely suppressed revolts in the Paris Commune in 1871.

Galliffet, detail from a portrait by I. Pils, 1864; in the Musée de l'Armée, Paris
Giraudon—Art Resource/EB Inc.

Galliffet served with distinction at the Siege of Sevastopol (1854–55) during the Crimean War and in Emperor Napoleon III's wars in Algeria, Italy, and Mexico. As a brigade general during the Franco-German War (1870–71), he was captured at the Battle of Sedan. Assigned the task of suppressing Parisian revolts in 1871, he performed efficiently but with a severity that earned him the animosity of the political left, despite his own republicanism. By 1885 Galliffet was a member of the Conseil Supérieur de la Guerre (Supreme War Council) and had become a political protégé of Léon Gambetta, the moderate republican leader. In June 1899 Premier René Waldeck-Rousseau appointed Galliffet minister of war in order to balance the Cabinet that would support the Dreyfus revision. However, Galliffet was too eccentric and too ill suited for politics, and his role in the 1871 revolt undercut his effectiveness; within a year he was forced to leave his post.

galliform, order of birds (Galliformes) that comprises the gallinaceous (chickenlike) birds; there are about 240 species, including the

well-known chickens, pheasants, partridges, quail, and peafowl (family Phasianidae), turkeys (Meleagridae), guinea fowl (Numididae), and grouse (Tetraonidae). Other, more exotic members of the order are the megapodes (Megapodiidae) of the Australasian region and the South American guans, curassows, and chachalacas (Cracidae). The aberrant South American hoatzin (Opisthocomidae) is sometimes placed in its own order, Opisthocomiformes.

A brief treatment of galliforms follows. For full treatment, *see* MACROPAEDIA: Birds.

Galliforms are heavy bodied with short, rounded wings and strong, four-toed feet, adapted for life on the ground. All gallinaceous birds can fly, but none are long-distance fliers; they burst into quick, short flights to escape from predators. Only the cracids and the hoatzin spend much time in trees, although most of the other species roost off the ground at night. Forest-dwelling galliforms have strong voices.

The galliforms are medium-sized birds, weighing from 1.5 ounces (45 grams) in the painted quail to 24 pounds (11 kilograms) in the North American wild turkey.

The coloration of females is usually drab, but the males frequently sport highly ornamental plumage. Some male pheasants and the peafowl have a small fan of modified feathers on the head, and the fleshy wattles on the face of grouse and pheasants are often bright blue or red. Bright patches of bare skin occur on the faces of many cracids, and the curassows and guans frequently sport brightly hued knobs or bony helmets on the head.

The order is represented in most habitats on all the larger landmasses from the tropics to the subarctic; the ptarmigan (*Lagopus*) even live above the Arctic Circle. Phasianids have an almost worldwide distribution, while the turkeys are restricted to the Western Hemisphere. Grouse are found throughout the temperate and Arctic regions of both hemispheres, and guinea fowl are found only in Africa south of the Sahara.

Galliforms contain two of the birds of greatest economic importance to mankind. These are the chicken (*Gallus domesticus*), domesticated at least 4,000 years ago from the red jungle fowl (*G. gallus*), and the turkey. Chickens have been selectively bred to create varieties which produce upwards of 300 eggs a year; other heavy breeds have been developed for meat production. All turkeys are raised for rapid growth and a high meat yield. The guinea fowl is also raised domestically, but to a lesser extent than chickens or turkeys.

The majority of terrestrial game birds are members of this order. The common or ring-necked pheasant (*Phasianus colchicus*), which was introduced to North America, is well established and has become an important game species. Other species popular for sport are certain quail (especially *Coturnix* and *Colinus*) and partridges (*Perdix* and *Alectoris*).

Galliforms are mostly vegetarian, eating seeds, berries, leaves, and the like, but they also eat quantities of insects, worms, and other invertebrates. Many members of the group use their feet to scratch in the vegetation litter and uncover various food sources. The hoatzin prefers to feed on leaves and fruit, especially those of the arums (Araceae); it will occasionally enter the water to feed on fish and crabs but rarely forages on the ground.

The gallinaceous birds show great variety in reproductive behaviour. Some galliforms are monogamous, while many others are polygamous. Monogamy appears in the megapodes, cracids, hoatzin, ptarmigan, guinea fowl, many quail and partridges, and some pheasants. Other pheasants, peafowl, and many grouse are polygamous. In social displays of grouse, the males congregate yearly on a dancing arena, or lek. Each male uses a small area of the lek, where he struts and calls to attract females, which visit the dancing arena and select a male to copulate with. The most dominant birds occupy the central areas and may get to mate with several females. Males of some pheasant species and the North American ruffed grouse (*Bonasa umbellus*) live alone, displaying to and mating with any receptive female.

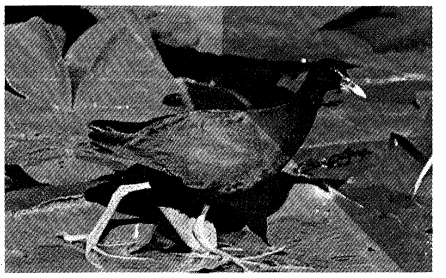
Most gallinaceous birds construct a very limited nest, usually a shallow hole in the ground with a lining of grass or leaves. The only birds which nest in trees are the hoatzin, the cracids, and the horned pheasant (*Tragopan*). The Megapodiidae, however, have a nesting system different not only from the other galliforms but also from all other birds. They are unique in relying on the heat from solar radiation or fermentation of plant matter to carry out the incubation of their eggs. Some, such as Wallace's megapode (*Eulipoa wallacei*), simply bury the egg in the sand at depths up to three feet (one metre) and pay no further attention to it. Fortunately, young megapodes are highly precocious when hatched and can dig their way out and forage alone. Other megapodes, such as the mallee fowl, construct mounds of decaying vegetation in which they lay their eggs. The males of these mound-building species maintain the mound; they open the mounds daily, which it is believed helps aerate the eggs and control the temperature.

Galliforms lay anywhere from two to two dozen eggs. In pheasants, the smaller birds lay from 12 to 20 eggs, but large forms like the great argus may lay only 2. Turkeys and guinea fowl lay between 7 and 20 eggs in a clutch, while cracids and the hoatzin lay only 2 or 3. Most members of the order are indeterminate layers, which explains why they are so useful in commercial egg production. Incubation is usually the task of the female.

Except for the hoatzin, gallinaceous chicks are extremely precocious, following the parent and feeding within hours of hatching. The down-covered chicks are protectively coloured but still undergo high mortality rates due to predation.

Gallinas (people): *see* Vai.

gallinule, any of several species of marsh birds belonging to the rail family, Rallidae, in the order Gruiformes. Gallinules occur in temperate, tropical, and subtropical regions worldwide and are about the size of bantam hens but with a compressed body like the related rails and coots. They are about 30 to 45 centimetres (12 to 18 inches) long, with long, thin toes that enable them to run over floating vegetation and with a prominent frontal shield (a fleshy plate on the forehead). Many species have brightly coloured areas of plumage or skin.



Purple gallinule (*Porphyrula martinica*)
Ruth Cordner from Root Resources—EB Inc.

Gallinules are noisy and inquisitive birds, less furtive in their actions than most rails. Many are migratory. They build bulky nests of rushes on or near the water.

The common gallinule (*Gallinula chloropus*), blackish with a scarlet frontal shield, is called the moorhen or water hen where it occurs in Europe and Africa. Its North American race (*G. chloropus cachinnans*) is sometimes known as the Florida gallinule.

The purple gallinule of America (*Porphyrula martinica*), sometimes called water hen or sultana, is about 30 cm long, bright olive green and purplish blue with a light-blue shield, red and yellow bill, and yellow legs and feet. It is found from South Carolina and Texas to northern Argentina. A related species is the lesser purple gallinule (*P. alleni*), of Africa.

The purple gallinule (*Porphyrio porphyrio*), sometimes called purple swamphen, is about 45 cm long. It occurs around the Mediterranean region and is widely distributed in Africa, southern Asia, and Australia.

Of the many peculiar flightless island forms throughout the world, some, such as the takahe (*q.v.*), are nearly extinct and others have become extinct recently.

Gallio, Junius, original name LUCIUS ANNAEUS NOVATUS (b. *c.* 5 BC, Corduba, Baetica—d. AD 65), Roman official who dismissed the charges brought by the Jews against the apostle Paul (Acts 18:12–17).

The elder brother of the statesman, philosopher, and tragedian Lucius Annaeus Seneca, Novatus assumed the name Gallio after his adoption by the senator Junius Gallio. Upon the accession of the emperor Claudius (ruled 41–54), Gallio probably accompanied his illustrious brother into exile on the island of Corsica—Seneca having fallen victim to the intrigues of Claudius' wife, Messalina. The two brothers evidently returned to Rome in 49, when Claudius' new wife, Agrippina the Younger, selected Seneca to be tutor to the emperor Nero (ruled 54–68). The episode involving the apostle Paul, which occurred when Gallio was serving as proconsul of Achaea (Roman province in Greece) in 51, indicates that Roman provincial officials at that time were remaining aloof from the struggle between the Jews and the new Christian religion. He became consul in 55. After Nero forced Seneca to commit suicide, Gallio also took his own life.

Gallipoli, Turkish GELİBOLU, historically GALLIPOLIS, seaport and chief town of Gelibolu *ilçe* (district) in Çanakkale *il* (province), European Turkey. It lies on a narrow peninsula where the Dardanelles opens into the Sea of Marmara, 126 mi (203 km) west-southwest of Istanbul. An important Byzantine fortress, it was the first Ottoman conquest (*c.* 1356) in Europe and was maintained as a naval base because of its strategic importance for the defense of Istanbul. It was also a key transit station on the trade routes from Rumelia (Ottoman possessions in the Balkans) to Anatolia. In World War I, Gallipoli was the scene of determined Turkish resistance to the Allied forces during the Dardanelles Campaign (*q.v.*), in which most of the town was destroyed. A storehouse of the Roman emperor Justinian (6th century), a 14th-century square castle attributed to the Ottoman sultan Bayezid I, and mounds known as the tombs of Thracian kings still stand.

The new town, developed as a fishing and sardine-canning centre, is connected by road and steamer service with Istanbul and is also linked by road with Edirne. Pop. (1980) town, 14,721; *ilçe*, 37,199.

Gallipoli Peninsula (Turkey): *see* Chersonese, Thracian.

Gallipolis, city, seat (1803) of Gallia County, southern Ohio, U.S., on the Ohio River, near its junction with the Kanawha River, 30 mi (48 km) north-northeast of Huntington, W.Va. The third oldest European settlement in Ohio, it was founded in 1790 by the Scioto Company for Royalists fleeing the French Revolution who had been deceived by agents of the

company into purchasing land certificates that were worthless. The company later, however, financed a settlement at the site, and some French moved there. The name means "city of the Gauls." During the American Civil War its strategic location resulted in economic prosperity; troops were channeled through the city, warehouses were built, and river traffic on the Ohio River increased.

Gallipolis is the shipping centre for a farming and coal-mining region and has light industry. Rio Grande College/Community College (1876) is 12 miles (19 km) northwest. Just south of the city is a large roller dam (1938) that raises the navigable depth of the Ohio River for 50 miles (80 km) and uplifts the Kanawha for 30 miles (50 km). A division of Wayne National Forest lies west and south of Gallipolis. Inc. village, 1842; city, 1865. Pop. (1986 est.) 4,680.

Gallitzin, Demetrius Augustine (b. Dec. 22, 1770, The Hague, Neth.—d. May 6, 1840, Loretto, Pa., U.S.), one of the first Roman Catholic priests to serve as a missionary to European immigrants in the United States during the early 19th century. He was known as the "Apostle of the Alleghenies."

Of noble Russian parentage (his father was Prince Dmitry Alekseyevich Golitsyn, Russian ambassador to the Dutch Republic), Gallitzin converted to Roman Catholicism in 1787. He traveled to the United States and was ordained priest in Baltimore, Md., in 1795. John Carroll, first U.S. bishop, sent him to Cambria county, Pennsylvania, where immigrant Roman Catholics were settling in the Allegheny foothills. Like many of his peers, he was deeply engrossed in land and colony projects to attract Roman Catholic immigrants. At his death, when he was vicar general for western Pennsylvania, about 10,000 Roman Catholics lived in his district, where 40 years earlier there had been only 12.

Gallitzin wrote controversial tracts and pamphlets defending Roman Catholicism against attacks by frontier Protestants; typical of these polemics is *A Defence of Catholic Principles* (1816). A collection of his letters was published in 1940.

BIBLIOGRAPHY. Daniel Sargent, *Mitri* (1945), is a well-documented biography.

gallium (Ga), chemical element, metal of main Group IIIa, or boron group, of the periodic table. It liquefies just above room temperature.

Gallium was discovered (1875) by Paul-Émile Lecoq de Boisbaudran, who observed its principal spectral lines while examining material separated from zinc blende. Soon afterward he isolated the metal and studied its properties, which coincided with those that Dmitry Ivanovich Mendeleyev had predicted a few years earlier for eka-aluminum, the then undiscovered element lying between aluminum and indium in his periodic table.

Though widely distributed at the Earth's surface, gallium does not occur free or concentrated in independent minerals, except for gallite, $CuGaS_2$, rare and economically insignificant. It is extracted as a by-product from zinc blende, iron pyrites, bauxite, and germanite.

Silvery white and soft enough to be cut with a knife, gallium takes on a bluish tinge because of superficial oxidation. Unusual for its low melting point (about 30° C [86° F]), gallium also expands upon solidification and supercools readily, remaining a liquid at temperatures as low as 0° C (32° F). Gallium remains in the liquid phase over a temperature range of about 2,000° C (about 3,600° F) with a very low vapour pressure up to about 1,500° C (about 2,700° F), the longest useful liquid range of any element. The liquid metal clings to or wets glass and similar surfaces. The crystal structure of gallium is orthorhombic. Natural gallium consists of a mixture of two stable isotopes: gallium-69 (60.4 percent) and gallium-71 (39.6 percent).

Somewhat similar to aluminum chemically, gallium slowly oxidizes in moist air until a protective film forms, and it becomes passive in cold nitric acid. Gallium does not react with water at temperatures up to 100° C (212° F) but reacts slowly with hydrochloric and other mineral acids to give the gallium ion, Ga^{3+}. Gallium is amphoteric, reacting with sodium and potassium hydroxide solutions to yield a gallate and hydrogen gas. The halogens attack it vigorously.

In most of its compounds gallium has an oxidation state of +3 and, in a few, +1. There is no evidence for authentic gallium(II) compounds. The "dihalides," for example, contain monovalent and trivalent gallium in a one-to-one ratio. With the main Group V elements—phosphorus, arsenic, and antimony—gallium forms compounds that have semiconductor properties. Gallium antimonide, GaSb, and gallium arsenide, GaAs, are used in electronic devices to perform such functions as voltage rectification and amplification. The arsenide and the phosphide, GaP, are electroluminescent; the arsenide emits infrared light, while the phosphide radiates in the visible spectrum.

Gallium has been considered as a possible heat-exchange medium in nuclear reactors, although it has a high neutron cross section. Radioactive gallium-72 shows some promise in the study of bone cancer; a compound of this isotope is absorbed by the cancerous portion of the bone.

atomic number	31
atomic weight	69.72
melting point	29.78° C
boiling point	2,403° C
specific gravity	5.904 (29.6° C)
valence	3
electronic config.	2-8-18-3 or $(Ar)3d^{10}4s^24p^1$

Galloway, traditional region, southwestern Scotland, composed of the districts of Wigtown, Stewartry, and part of Nithsdale, Dumfries and Galloway region. Until 1975 it was part of the counties of Kirkcudbright (east Galloway) and Wigtown (west Galloway). It is bounded by the districts of Kyle and Carrick and Cumnock and Doon Valley on the north, the Solway Firth on the southeast, and the North Channel, the narrowest point (26 miles [42 km]) between Scotland and Ireland, on the southwest.

The Rinns (or Rhinns), a hammer-shaped 210-foot- (64-metre-) high peninsula in the extreme southwest of Wigtown, surmounted by a 60-foot (18-metre) lighthouse, is the most southerly point in Scotland.

The name Galloway is derived from the Gallgaidhel, or Gallwyddel ("Stranger Gaels"), the original Celtic people of this region, called Novantae by the Romans. The last "king" of Galloway died in 1234, and during the 14th century the Balliols and Comyns were the chief families, succeeded about 1369 by the Douglases (until 1458) and in 1623 by the Stewarts. The 17th-century Scottish Presbyterians known as the Covenanters found much support throughout the region.

Galloway's economy is predominantly pastoral in the lowlands, based on dairy farming of the indigenous black, hornless cattle called Galloway cattle. The moor areas above 500 feet (150 m) elevation have undergone afforestation and now provide hope for the establishment of a forest industry (including a pulp and paper mill). The Galloway Hydro-Electric Scheme (1935) harnessed the waters of the Rivers Dee and Ken for the generation of hydroelectricity. With the former county of Dumfriesshire, it is included in the South West Scotland Development Area.

Galloway, Joseph (b. *c.* 1731, West River, Md. [U.S.]—d. Aug. 29, 1803, Watford, Hertfordshire, Eng.), distinguished American colonial attorney and legislator who remained loyal to Great Britain at the time of the American Revolution (1775–83). His effort in 1774 to settle differences peacefully narrowly missed adoption by the Continental Congress. He was, perhaps, the greatest of the colonial Loyalists.

Entering law practice in Philadelphia in 1747, Galloway early won a reputation by pleading cases before the Supreme Court of Pennsylvania before he was 20. Elected to the provincial assembly in 1756, he occupied the powerful post of speaker from 1766 to 1775. His "A plan of a proposed Union between Great Britain and the Colonies" in 1774 provided for a president general to be appointed by the king and a colonial legislature to have rights and duties similar to the House of Commons. After a day's debate his plan was rejected by the Continental Congress by only one vote and was later expunged from the record.

In the belief that the Revolution was unreasonable and unjust, Galloway left Philadelphia and joined General Sir William Howe's British army. He returned to the city as a civil administrator during the British occupation. He drew up several plans of union after the Declaration of Independence with the hope that they might be used when the rebels had been defeated. With the reentry of the Continentals into Philadelphia in 1778 he fled to England, where he remained until his death.

gallstone, concretion composed of crystalline substances (usually cholesterol, bile pigments, and calcium salts) imbedded in a small amount of protein material formed most often in the gallbladder. The most common type of gallstone consists principally of cholesterol. Its occurrence has been linked to secretion by the liver of bile that is saturated or supersaturated with cholesterol and contains abnormally low levels of bile salts and lecithin, which in normal bile are present in sufficient quantities to keep cholesterol in solution.

Predisposing factors to the development of gallstones (cholelithiasis) are inflammation and stagnation resulting from liver damage, chronic gallbladder disease, or cancer of the biliary tract. Stones located in the gallbladder may produce no clinical symptoms, or they may set up an inflammatory process, producing acute inflammation of the gallbladder (cholecystitis, *q.v.*). When a stone becomes lodged in the bile ducts, obstruction leads to increased pressure above the site of blockage, resulting in the severe pain known as biliary colic.

Gallstones sometimes pass into the intestines spontaneously, but in most instances they must be removed by surgery or dissolved by ultrasonic therapy. The gallbladder itself is sometimes removed during surgery to prevent further stone production. In some cases, cholelithiasis can be treated medically by feeding the patient bile salts to dissolve gallstones and reduce the concentration of cholesterol in the bile.

Gallup, city, seat (1901) of McKinley county, northwestern New Mexico, U.S., on the Puerco River, near the Arizona state line. Settled in 1880 as a Westward Overland Stagecoach stop, it became a construction headquarters for the Atlantic and Pacific Railroad and was named for David L. Gallup, railroad paymaster. It flourished with the discovery of coal and in 1895 became a railroad divisional terminal. Situated between the Navajo (north) and Zuni (south) Indian reservations (with many pre-Columbian ruins), it is the area headquarters of the Bureau of Indian Affairs. A shipping point for cattle, wool, hides, and forest products, it has light industries with emphasis on Indian arts and crafts. Tourism is important, and the Inter-Tribal Indian Ceremonial is held

annually in August. A branch of the University of New Mexico is in the city. Inc. 1891. Pop. (1980) 18,161.

Gallup, George (Horace) (b. Nov. 18, 1901, Jefferson, Iowa, U.S.—d. July 26, 1984, Tschingel, Switz.), U.S. public-opinion statistician whose Gallup Poll became almost a generic title for public opinion sample surveys. Popular faith in public-opinion polls was greatest after 1936, when Gallup, Elmo Roper, and Archibald Crossley, acting independently but using similar methods of sampling, forecast Franklin D. Roosevelt's victory over Alfred M. Landon in the U.S. presidential election.

Gallup taught journalism at Drake University, Des Moines, Iowa, and Northwestern University, Evanston, Ill., until 1932, when an advertising firm in New York City hired him to conduct public-opinion surveys on behalf of its clients. He founded the American Institute of Public Opinion in 1935, the British Institute of Public Opinion in 1936, and the Audience Research Institute, Inc., in 1939. Although, along with other pollsters, Gallup incorrectly predicted Pres. Harry S. Truman's defeat in the U.S. presidential election of 1948, the percentage of error was small; subsequent predictions were more correct or more cautious.

Gallup wrote several books, including *The Pulse of Democracy* (1940) and *The Sophisticated Poll Watcher's Guide* (rev. ed., 1976). He also founded the Quill and Scroll, an international honour society for high school journalists.

gallus (ancient priest): *see* galli.

Gallus, Gaius Cornelius (b. *c.* 70 BC, Forum Julii, Gaul—d. 26 BC, Egypt), Roman soldier and poet, famous for four books of poems to his mistress "Lycoris" (the actress Volumnia, stage name Cytheris), which, in ancient opinion, made him the first of the four greatest Roman elegiac poets.

Gallus was a friend of Augustus and Virgil and, having distinguished himself in the war against Mark Antony, was made governor of Egypt. There, however, his imprudent conduct led to his disgrace and suicide. Quintilian ranked him with Tibullus, Propertius, and Ovid as one of the great Roman elegists. Virgil celebrated him, and Parthenius dedicated to Gallus his book on unhappy love affairs.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Gallus, Gaius Vibius Trebonianus (d. 253, near Interamna, Latium), Roman emperor from 251 to 253.

Gallus came from an ancient family of Perusia (modern Perugia, Italy), whose ancestry could be traced to the pre-Roman Etruscan aristocracy. He served the emperor Decius with loyalty and distinction as legate of Moesia and was proclaimed emperor after the defeat and death (June 251) of Decius at the hands of the Goths. Gallus then concluded a treaty with the enemy. He adopted Decius' son Hostilian as his co-ruler and at the same time made his own son, Volusianus, a secondary and later co-emperor. Hostilian died of plague shortly after receiving his title. The Goths renewed their attacks early in 253, and the armies of Moesia proclaimed their commander, Aemilian, emperor. Gallus summoned Valerian, commander of the armies of the Upper Rhine, to his aid but was killed by his own troops before Valerian arrived.

Gallus, Jacobus: *see* Handl, Jacob.

Gallus, Quintus Roscius: *see* Roscius.

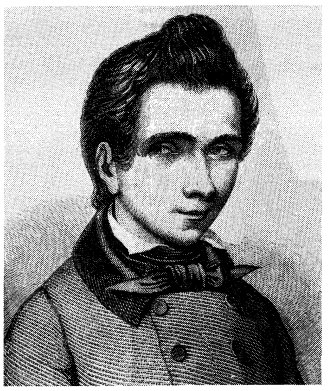
Gallus Caesar, byname of FLAVIUS CLAUDIUS CONSTANTIUS (b. 325/326, Etruria—d. 354, near Pola), ruler of the eastern provinces of the Roman Empire, with the title of caesar, from 351 to 354.

Sources dating from this period describe Gallus' reign at Antioch (modern Antakya, Tur.) as tyrannical. His father, Julius Constantius, was the half brother of Constantine the Great, and Gallus was the elder half brother of the emperor Julian the Apostate and cousin of the emperor Constantius II. Like Julian, with whom he grew up, he was given a strict Christian education. Constantius II proclaimed him caesar at Sirmium (modern Sremska Mitrovica, Yugos.) on March 15, 351, and also arranged Gallus' marriage to his (Constantius') sister, Constantia. But Gallus' strict, isolated upbringing had made him stern and tactless. He instituted a widespread system of espionage among his subjects and executed a number of people—not all unjustly—on suspicion of treason. Meanwhile, he was suppressing revolts in Palestine and in Isauria, Galatia (in south-central Anatolia), and holding the Persians at bay. His subordinates sent unfavourable and sometimes misleading reports about him to Constantius, prompting the Emperor to recall Gallus to Constantinople, to strip him of his powers, and finally to have him executed.

Galois, Évariste (b. Oct. 25, 1811, Bourg-la-Reine, near Paris—d. May 31, 1832, Paris), French mathematician famous for his contributions to the part of higher algebra known as group theory. His theory solved many long-standing unanswered questions, including the impossibility of trisecting the angle and squaring the circle.

Galois was the son of Nicolas-Gabriel Galois, an important citizen in the Paris suburb of Bourg-la-Reine. In 1815, during the Hundred Days regime that followed Napoleon's escape from Elba, his father was elected mayor. Galois's mother, Adelaïde-Marie Demante, was of a distinguished family of jurists. She educated Galois at home until 1823, when he entered the Collège Royal de Louis-le-Grand. There his education languished at the hands of mediocre and uninspiring teachers. But his mathematical ability suddenly appeared when he was able to master quickly the works of Adrien-Marie Legendre on geometry and Joseph-Louis Lagrange on algebra.

Under the guidance of Louis Richard, one of his teachers at Louis-le-Grand, Galois's further study of algebra soon led him to take up a major challenge. Mathematicians for a long time had used explicit formulas, involving only rational operations and extractions of roots, for the solution of equations up to degree four. (For example, $3x^2 + 5 = 17$ is an equation of the second degree, since it contains the exponent 2; solving an equation of this type is called a solution by radicals, because it involves extracting the square root of an expression composed of one or more terms whose coefficients appear in the equation.) The solution of quadratic, or second degree, equations goes back to ancient times. Formulas for the cubic and quartic were published in 1545 by Gerolamo Cardano, Italian mathematician and physician, after their discovery a few years earlier by the mathematicians Niccolo Tartaglia and Ludovico Ferrari. The equation of the fifth degree then defeated mathematicians until Paolo Ruffini in 1796 attempted to prove the impossibility of solving the general quintic equation by radicals. Ruffini's effort was not wholly successful, but the Norwegian mathematician Niels Abel in 1824 gave an essentially correct proof.



Galois, detail of an engraving, 1848, after a drawing by Alfred Galois

By courtesy of the Bibliotheque Nationale, Paris

Galois was unaware of Abel's work in the first stages of his investigation, although he did learn of it later. This was perhaps fortunate because Galois actually had launched himself on a much more ambitious study; while yet a student, at about age 16, he sought, by what is now called the "Galois theory," a deeper understanding of the essential conditions that an equation must satisfy in order for it to be solvable by radicals. His method was to analyze the "admissible" permutations (a change in an ordered arrangement) of the roots of the equation. That is, in today's terminology, he formed the "group" of automorphisms (a particular kind of transformation) of the "field," obtained by adjoining the roots of the equation. His key discovery, brilliant and highly imaginative, was that solvability by radicals is possible if and only if the group of automorphisms is solvable, which means essentially that the group can be broken down into prime-order constituents (prime numbers are positive numbers greater than 1 divisible only by themselves and 1) that always have an easily understood structure. The term solvable is used because of this connection with solvability by radicals. Thus Galois perceived that solving equations of the quintic and beyond required a wholly different kind of treatment than that required for the quadratic, cubic, and quartic.

While still at Louis-le-Grand he published several minor papers. Soon disappointments and tragedy filled his life with bitterness. Three memoirs that he submitted to the Academy of Sciences were lost or rejected by the academicians, who as mathematicians were authorized to act as editors. The first was lost in 1829 by Augustin-Louis Cauchy. In each of two attempts (1827 and 1829) to enter the École Polytechnique, the leading school of French mathematics, he had a disastrous encounter with an oral examiner and failed. Then his father, after bitter clashes with conservative elements in his hometown, committed suicide in 1829. The same year, realizing that his career possibilities as a professional mathematician had ended, Galois enrolled as a teacher candidate in the less prestigious École Normale Supérieure and turned to political activism. But he continued his research.

A second memoir, on algebraic functions, which he submitted in 1830 to the Academy of Sciences, was lost by Jean-Baptiste-Joseph Fourier. The revolution of 1830 sent the last Bourbon monarch, Charles X, into exile. But republicans were deeply disappointed when yet another king, Louis-Philippe, ascended the throne—even though he was a citizen king who wore the tricolour of the Revolution. When Galois wrote a vigorous article expressing these views, he was promptly expelled from the École Normale Supérieure. Subsequently he was arrested twice for republican activities; he was acquitted the first time but spent six months in prison on the second charge. His third memoir in 1831 was returned by Siméon-Denis Poisson with a note that it was virtually incomprehensible and should be expanded and clarified.

The circumstances that led to Galois's death in a duel in Paris have never been fully explained. It has been variously suggested that it resulted from a quarrel over a woman, that he was challenged by royalists who detested his republican views, or that an agent provocateur of the police was involved. Alexandre Dumas, in his autobiography *Mes Mémoirs* (1863–65), implicated Pécheux d'Herbinville as the man who shot Galois. In any case, anticipating his death in the coming duel, Galois in feverish haste wrote a scientific last testament addressed to his friend and former schoolmate Auguste Chevalier. In his distracted notes, there are hints that Galois had begun to develop the theory of algebraic functions, the full development of which was achieved 40 years later by the German mathematician Bernhard Riemann.

Galois's manuscripts, with annotations by Joseph Liouville, were published in 1846 in the *Journal de Mathématiques Pures et Appliquées.* In 1870 the French mathematician Camille Jordan published the full-length treatment of Galois's theory, *Traité des Substitutions.* These works rendered his discoveries fully accessible and his place secure in the history of mathematics. On June 13, 1909, a plaque was placed on Galois's modest birthplace at Bourg-la-Reine, and the mathematician Jules Tannery made an eloquent speech of dedication, which was published the same year in the *Bulletin des Sciences Mathématiques.* (I.K.)

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galop, lively social dance allegedly of German origin, popular in 19th-century England and France. The man put his right hand around his partner's waist and with his left hand held her right; the couple danced the galop's simple step side by side—slide, close, slide—around the ballroom to music in $\frac{2}{4}$ time. The galop's spirited rhythm occurs in the finale of Ponchielli's *Dance of the Hours* and in many ballets, where the basic step is elaborated for theatrical effect.

"The Last Galop," engraving by W.S. Palimer, Sr., after a drawing by Frederick Barnard

The Bettmann Archive

Galswintha, French GALSWINTHE (b. *c.* 540, Spain—d. 568, Neustria), daughter of Athanagild, Visigothic king of Spain; sister of Brunhild, queen of Austrasia; and wife of Chilperic I, the Merovingian king of Neustria. Galswintha and Chilperic were married at Rouen in 567, but soon afterward she was murdered at the instigation of Chilperic's mistress Fredegund, who then married him. Galswintha's death aroused the enmity of her sister Brunhild, wife of King Sigebert I of Austrasia, against Chilperic and precipitated 40 years of warfare between the Frankish kingdoms of Austrasia and Neustria.

Galsworthy, John (b. Aug. 14, 1867, Kingston Hill, Surrey, Eng.—d. Jan. 31, 1933, Grove Lodge, Hampstead), English novelist and playwright, winner of the Nobel Prize for Literature in 1932.

Galsworthy's family, of Devonshire farming stock traceable to the 16th century, had made a comfortable fortune in property in the 19th century. His father was a solicitor. Educated at Harrow and New College, Oxford, Galsworthy was called to the bar in 1890. With a view to specializing in marine law, he took a voyage around the world, during which he encountered Joseph Conrad, then mate of a merchant ship. They became lifelong friends. Galsworthy found law uncongenial and took to writing. For his first works, *From the Four Winds* (1897), a collection of short stories, and the novel *Jocelyn* (1898), both published at his own expense, he used the pseudonym John Sinjohn. *The Island Pharisees* (1904) was the first book to appear under his own name. *The Man of Property* (1906) began the novel sequence to be known as *The Forsyte Saga,* the long chronicle novel by which Galsworthy is chiefly remembered; others in the same series are "Indian Summer of a Forsyte" (1918, in *Five Tales*), *In Chancery* (1920), *Awakening* (1920), and *To Let* (1921). The story of the Forsyte family after World War I was continued in *The White Monkey* (1924), *The Silver Spoon* (1926), and *Swan Song* (1928), collected in *A Modern Comedy* (1929). Galsworthy's other novels include *The Country House* (1907), *The Patrician* (1911), and *The Freelands* (1915).

Galsworthy, oil painting by Rudolf Sauter, 1923; in the University of Birmingham Library, England

By courtesy of Rudolf Sauter

Galsworthy was also a successful dramatist, his plays, written in a naturalistic style, usually examining some controversial ethical or social problem. They include *The Silver Box* (1906), which, like many of his other works, has a legal theme and depicts a bitter contrast of the law's treatment of the rich and the poor; *Strife* (1909), a study of industrial relations; *Justice* (1910), a realistic portrayal of prison life that roused so much feeling that it led to reform; and *Loyalties* (1922), the best of his later plays. He also wrote verse.

In 1905 Galsworthy married Ada Pearson, the divorced wife of his first cousin, A.J. Galsworthy. Galsworthy had, in secret, been closely associated with his future wife for about ten years before their marriage. Irene in *The Forsyte Saga* is to some extent a portrait of Ada Galsworthy, although her first husband was wholly unlike Soames Forsyte.

A television serial of *The Forsyte Saga* by the British Broadcasting Corporation achieved immense popularity in Great Britain in 1967 and later in many other nations, especially the United States, reviving interest in an author whose reputation had plummeted after his death.

Galt, Sir Alexander Tilloch (b. Sept. 6, 1817, London—d. Sept. 19, 1893, Montreal), Canadian statesman and influential early advocate of federation.

Galt emigrated from England to Sherbrooke, Lower Canada (later Canada East, now in Quebec), in 1835 and worked for the British American Land Company, serving as high commissioner from 1844 to 1855. In this role he built up an understanding with the eastern townships and the English-speaking minority of Canada East. He gave active support to the promotion of the St. Lawrence and Atlantic and the Grand Trunk railways. He entered politics in 1849 as an independent member for Sherbrooke County in the legislature of the united province of Canada. Reflecting the opinion of his English-speaking constituents, he did not support the bill compensating citizens for losses incurred by French-Canadians during their 1837 rebellion. He favoured annexation by the United States in order to achieve Anglo-Saxon ascendancy over the French Roman Catholic majority in Canada East and, more overtly, to promote economic growth. He resigned from the legislature in 1850 but was reelected for Sherbrooke town in 1853; he maintained that seat and remained leader of the English-speaking minority until 1872.

In 1858 Galt declined a ministry in the brief George Brown–Sir Antoine Aimé Dorion administration, but that same year he became minister of finance in the Sir John Macdonald–Sir George Étienne Cartier government on condition that federation of British North American provinces be government policy. As finance minister (1858–62, 1864–67) Galt adopted a policy of protection for the Cana-

dian manufacturers. He supported the Macdonald–Brown–Cartier coalition, which advocated federation (1864), and worked on the necessary negotiations at the Charlottetown,

Sir Alexander Galt, 1890

By courtesy of Notman Archives, McCord Museum, Montreal

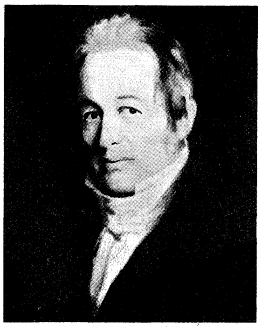
P.E.I.; Quebec; and Westminster conferences; he was knighted for his services in 1869.

Following the creation of the Dominion of Canada (1867), Galt was first finance minister of the Dominion government, but he resigned after a disagreement with Macdonald. He declined further Cabinet office but gave intermittent support to the government until retiring from Parliament in 1872. He then began to advocate Canadian independence as an ultimate goal. He served as first Canadian high commissioner in London from 1880 to 1883, after which he retired from public life.

Galt, John (b. May 2, 1779, Irvine, Ayrshire, Scot.—d. April 11, 1839, Greenock, Renfrewshire), prolific Scottish novelist admired for his depiction of country life.

Galt settled in London in 1804. Commissioned by a merchant firm to establish trade agreements, he travelled to the Mediterranean area, where he met the poet Byron, with whom he travelled to Malta and later to Athens. (In 1830 he published *Life of Lord Byron.*) Other commercial ventures took him to France and The Netherlands (1814) and to Canada (1826). He opened up a road between Lakes Huron and Erie through the forest country and founded the city of Guelph in Upper Canada (now Ontario) in 1827. His position with the Canada Land Company was undermined by enemies, and he returned home practically a ruined man. All his life he had been a voluminous writer, and he now devoted himself entirely to literature.

His masterpieces are *The Ayrshire Legatees* (1820), *The Annals of the Parish* (1821), *Sir Andrew Wylie* (1822), *The Provost* (1822), *The Entail* (1823), and *Lawrie Todd* (1830),



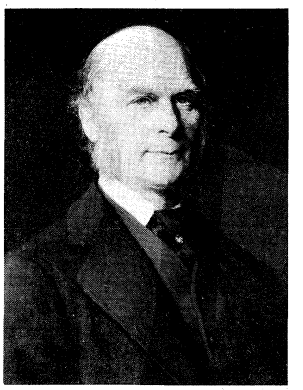
John Galt, oil painting by Charles Gray; in the Scottish National Portrait Gallery, Edinburgh

By courtesy of the Scottish National Portrait Gallery, Edinburgh

novels of Scottish rural life that foreshadowed the Kailyard (kitchen garden) school (*q.v.*) of fiction of the late 19th century. The *Ayrshire Legatees* tells, in the form of letters to their friends in Scotland, the adventures of the Rev. Pringle and his family in London. *The Annals of the Parish,* told by the Rev. Micah Balwhidder, Galt's finest character, is a humorous and truthful picture of the old-fashioned Scottish pastor and the life of a country parish. And in the novel *Lawrie Todd* the hard life of a Canadian settler is depicted with imaginative power.

Galton, Sir Francis (b. Feb. 16, 1822, near Sparkbrook, Birmingham, Warwickshire, Eng.—d. Jan. 17, 1911, Grayshott House, Haslemere, Surrey), English explorer, anthropologist, and eugenicist, known for his pioneering studies of human intelligence. He was knighted in 1909.

Early life. Galton's family life was happy, and he gratefully acknowledged that he owed much to his father and mother. But he had little use for the conventional classical and religious teaching he received in school and church. Indeed, he later confessed in a letter to Charles Darwin that the traditional biblical arguments had made him "wretched."



Galton, detail of an oil painting by G. Graef, 1882; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

His parents had planned that he should study medicine, and a tour of medical institutions on the Continent in his teens—an unusual experience for a student of his age—was followed by training in hospitals in Birmingham and London. But at this time, in Galton's words, "a passion for travel seized me as if I had been a migratory bird." A visit to the University of Giessen, Germany, to attend lectures on chemistry was broken off in favour of travel in southeastern Europe. From Vienna he made his way through Constanza, Constantinople, Smyrna, and Athens, and he brought back from the caves of Adelsberg, in present-day Yugoslavia, specimens of a blind amphibian named *Proteus*—the first to reach England. On his return Galton went to Trinity College, Cambridge, where, as a result of overwork, he broke down in his third year. But he recovered quickly on changing his mode of life, as he did from similar attacks later.

Travels and exploration. After leaving Cambridge without taking a degree, Galton continued his medical studies in London. But before they were completed, his father died, leaving him "a sufficient fortune to make me independent of the medical profession." Galton was then free to indulge his craving for travel. Leisurely expeditions in 1845–46 up the Nile with friends and into the Holy Land alone were preliminaries to a carefully organized penetration into unexplored parts of southwestern Africa. After consulting the Royal Geographical Society, Galton decided to investigate a possible opening from the south and west to Lake Ngami, which lies north of the Kalahari desert some 550 miles east of Walvis Bay. The expedition, which included two journeys, one northward, the other eastward, from the same base, proved to be difficult and not without danger. Though the explorers did not reach Lake Ngami, they gained valuable information. As a result, at the age of only 31, Galton was in 1853 elected a fellow of the Royal Geographical Society and, three years later, of the Royal Society. In 1853, too, Galton married. There were no children of the marriage. Galton wrote 9 books and some 200 papers. They deal with many diverse subjects, including the use of fingerprints for personal identification, the correlational calculus (a branch of applied statistics)—in both of which Galton was a pioneer—twins, blood transfusions, criminality, the art of travel in undeveloped countries, and meteorology. Most of Galton's publications disclose his predilection for quantifying; an early paper, for example, dealt with a statistical test of the efficacy of prayer. Moreover, over a period of 34 years, he concerned himself with improving standards of measurement.

Advocacy of eugenics. Although he made contributions to many fields of knowledge, eugenics remained Galton's fundamental interest, and he devoted the latter part of his life chiefly to propagating the idea of improving the physical and mental makeup of the human species by selective parenthood. Galton, a cousin of Charles Darwin, was among the first to recognize the implications for mankind of Darwin's theory of evolution. He saw that it invalidated much of contemporary theology and that it also opened possibilities for planned human betterment. Galton coined the word eugenics to denote scientific endeavours to increase the proportion of persons with better than average genetic endowment through selective mating of marriage partners. In his *Hereditary Genius* (1869), in which he used the word genius to denote "an ability that was exceptionally high and at the same time inborn," his main argument was that mental and physical features are equally inherited—a proposition that was not accepted at the time. It is surprising that when Darwin first read this book, he wrote to the author: "You have made a convert of an opponent in one sense for I have always maintained that, excepting fools, men did not differ much in intellect, only in zeal and hard work." This book doubtless helped Darwin to extend his evolution theory to man. Galton, unmentioned in *Origin of Species* (1859), is several times quoted in Darwin's *Descent of Man* (1871). Galton's conviction that mental traits are no less inherited than are physical characteristics was strong enough to shape his personal religious philosophy. "We cannot doubt," he wrote, "the existence of a great power ready to hand and capable of being directed with vast benefit as soon as we have learned to understand and apply it."

Galton's *Inquiries into Human Faculty* (1883) consists of some 40 articles varying in length from 2 to 30 pages, which are mostly based on scientific papers written between 1869 and 1883. The book can in a sense be regarded as a summary of the author's views on the faculties of man. On all his topics, Galton has something original and interesting to say, and he says it with clarity, brevity, distinction, and modesty. Under the terms of his will, a eugenics chair was established at the University of London.

Reputation. In the 20th century Galton's name has been mainly associated with eugenics. Insofar as eugenics takes primary account of *inborn* differences between human beings, it has come under the suspicion of those who hold that cultural (social and educational) factors heavily outweigh inborn, or biological, factors in their contribution to human differences. Eugenics is accordingly often treated as an expression of class prejudice, and Galton as a reactionary. Yet to some extent this view misrepresents his thought, for his aim was not

the creation of an aristocratic elite but of a population consisting entirely of superior men and women. His ideas, like those of Darwin, were limited by a lack of an adequate theory of inheritance; the rediscovery of the work of Mendel came too late to affect Galton's contribution in any significant way.

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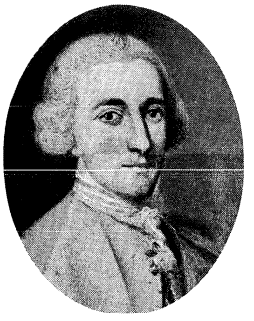
Galty Mountains, also spelled GALTEE MOUNTAINS, mountain range, extending across the border between southwestern County Tipperary and southeastern County Limerick, southern Ireland. The range has the east–west trend characteristic of the extreme south of the country. The highest peaks are formed of sandstone, the highest point being Galtymore (3,018 feet [920 m]). The mountains bear strong evidence of glaciation, notably in the form of corries (ice-scooped basins) with lakes and block moraines (mounds of glacial debris impeding drainage).

Galuppi, Baldassare, byname IL BURANELLO (b. Oct. 18, 1706, island of Burano, near Venice [Italy]—d. Jan. 3, 1784, Venice), Italian composer whose comic operas won him the title "father of the opera buffa." His nickname derives from his birthplace, Burano.

Galuppi was taught by his father, a barber and violinist, and studied under A. Lotti in



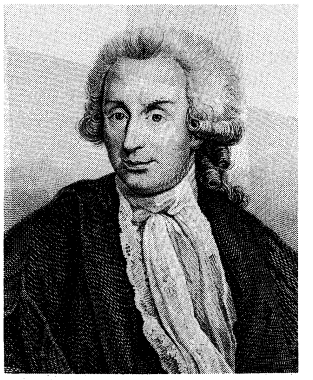
Galuppi, oil painting by an unknown artist
The Andre Meyer Collection—J.P. Ziolo

Venice. After producing two operas in collaboration with G.B. Pescetti (1728–29), he began composing operas for Venetian theatres. In 1741 he visited London and arranged a *pasticcio,* titled *Alexander in Persia.* Several of his own operas were produced in England, including *Enrico* (1743), and the contemporary music historian Charles Burney wrote of his considerable influence on English composers. In 1748 he became assistant concertmaster at San Marco Basilica in Venice and in 1762 concertmaster there. From 1766 to 1768 he was chapelmaster to Catherine II in Russia, where he composed *Ifigenia in Tauride* ("Iphigeneia in Tauris"), an opera seria. In 1768 he returned to Venice and resumed his duties at San Marco.

Of Galuppi's comic operas, *Il filosofo di campagna* (1754; "The Country Philosopher") was the most popular. He was one of the earliest composers of opera to use the ensemble finale, in which all the characters appear in a musical ensemble that carries the action forward to the end of the act. Besides operas, Galuppi wrote religious and instrumental works.

Galut (Judaism): *see* Diaspora.

Galvani, Luigi (b. Sept. 9, 1737, Bologna, Papal States [Italy]—d. Dec. 4, 1798, Bologna, Cisalpine Republic), Italian physician and physicist who investigated the nature and effects of what he conceived to be electricity in animal tissue. His discoveries led to the invention of the voltaic pile, a kind of battery that makes possible a constant source of current electricity.



Galvani, detail of an engraving by A. Marchi after a drawing by F. Spagnoli
By courtesy of the Museum National d'Histoire Naturelle, Paris

Early years. Galvani followed his father's preference for medicine by attending the University of Bologna, graduating in 1759. On obtaining the doctor of medicine degree, with a thesis (1762) *De ossibus* on the formation and development of bones, he was appointed lecturer in anatomy at the University of Bologna and professor of obstetrics at the separate Institute of Arts and Sciences. In 1762, also, he married Lucia, the only daughter of Professor Galeazzi of the Bologna Academy of Science, of which Galvani became president in 1772. Beginning with his doctoral thesis, his early research was in comparative anatomy—such as the structure of renal tubules, nasal mucosa, and the middle ear—with a tendency toward physiology, a direction appropriate to the later work for which he is noted. Galvani's developing interest was indicated by his lectures on the anatomy of the frog in 1773 and in electrophysiology in the late 1770s, when, following the acquisition of an electrostatic machine (a large device for making sparks) and a Leyden jar (a device used to store static electricity), he began to experiment with muscular stimulation by electrical means. His notebooks indicate that, from the early 1780s, animal electricity remained his major field of investigation. Numerous ingenious observations and experiments have been credited to him; in 1786, for example, he obtained muscular contraction in a frog by touching its nerves with a pair of scissors during an electrical storm. Again, a visitor to his laboratory caused the legs of a skinned frog to kick when a scalpel touched a lumbar nerve of the animal while an electrical machine was activated. Galvani assured himself by further experiments that the twitching was, in fact, related to the electrical action. He also elicited twitching without the aid of the electrostatic machine by pressing a copper hook into a frog's spinal cord and hanging the hook on an iron railing. Although twitching could occur during a lightning storm or with the aid of an electrostatic machine, it also occurred with only a metallic contact between leg muscles and nerves leading to them. A metallic arc connecting the two tissues could therefore be a substitute for the electrostatic machine.

Electrical nature of nerve impulse. Galvani delayed the announcement of his findings until 1791, when he published his essay *De Viribus Electricitatis in Motu Musculari Commentarius* (*Commentary on the Effect of Electricity on Muscular Motion*). He concluded that animal tissue contained a heretofore neglected innate, vital force, which he termed "animal electricity," which activated nerve and muscle when spanned by metal probes. He believed that this new force was a form of electricity in addition to the "natural" form that is produced by lightning or by the electric eel and torpedo ray and to the "artificial" form that is produced by friction (*i.e.,* static electricity). He considered the brain to be the most important organ for the secretion of this "electric fluid" and the nerves to be conductors of the fluid to the nerve and muscle, the tissues of which act as did the outer and inner surfaces of the Leyden jar. The flow of this electric fluid provided a stimulus for the irritable muscle fibres, according to his explanation.

Galvani's scientific colleagues generally accepted his views, but Alessandro Volta, the outstanding professor of physics at the University of Pavia, was not convinced by the analogy between the muscle and the Leyden jar. Deciding that the frog's legs served only as an indicating electroscope, he held that the contact of dissimilar metals was the true source of stimulation; he referred to the electricity so generated as "metallic electricity" and decided that the muscle, by contracting when touched by metal, resembled the action of an electroscope. Furthermore, Volta said that, if two dissimilar metals in contact both touched a muscle, agitation would also occur and increase with the dissimilarity of the metals. Thus Volta rejected the idea of an "animal electric fluid," replying that the frog's legs responded to differences in metal temper, composition, and bulk. Galvani refuted this by obtaining muscular action with two pieces of the same material. But the ensuing controversy was without personal animosity; Galvani's gentle nature and Volta's high principles precluded any harshness between them. Volta, who coined the term galvanism, said of Galvani's work that "it contains one of the most beautiful and most surprising discoveries." Nevertheless, partisan groups rallied to both sides.

In retrospect, Galvani and Volta are both seen to have been partly right and partly wrong. Galvani was correct in attributing muscular contractions to an electrical stimulus but wrong in identifying it as an "animal electricity." Volta correctly denied the existence of an "animal electricity" but was wrong in implying that every electrophysiological effect requires two different metals as sources of current. Galvani, shrinking from the controversy over his discovery, continued his work as teacher, obstetrician, and surgeon, treating both wealthy and needy without regard to fee. In 1794 he offered a defense of his position in an anonymous book, *Dell'uso e dell'attività dell'arco conduttore nella contrazione dei muscoli* ("On the Use and Activity of the Conductive Arch in the Contraction of Muscles"), the supplement of which described muscular contraction without the need of any metal. He caused a muscle to contract by touching the exposed muscle of one frog with a nerve of another and thus established for the first time that bioelectric forces exist within living tissue.

Last years. On June 30, 1790, Galvani's devoted wife and companion died, childless, at the age of 47. In the last years of his life, Galvani refused to swear allegiance to the new Cisalpine Republic established by Napoleon. Thereupon he was dropped from the faculty rolls, and his salary was terminated. Rejecting help and much saddened, he moved into the old Galvani home in which his brother was living. Soon, however, the politicians recanted, and the professorship was again offered to Galvani without the requirement of an oath. But the affront had cut short his days: Galvani died in the house of his birth at age 61, at a time when the world was on the threshold of the great electrical revolution.

Galvani provided the major stimulus for Volta to discover a source of constant current electricity; this was the voltaic pile, or a battery, with its principles of operation combined from chemistry and physics. This discovery led to the subsequent age of electric power. Moreover, Galvani opened the way to new re-

search in the physiology of muscle and nerve and to the entire subject of electrophysiology. (B.Di.)

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galvanic skin response: *see* psychogalvanic reflex.

galvanizing, protection of iron or steel against exposure to the atmosphere and consequent rusting by application of a zinc coating. Properly applied, galvanizing may protect from atmospheric corrosion for 15 to 30 years or more. As discontinuities or porosity develop in the coating, galvanic or electrolytic action ensues; the iron or steel, however, is protected by sacrificial corrosion, a phenomenon in which, as long as the zinc and the iron are in contact, atmospheric oxidation spares the iron and affects the zinc.

Zinc may be applied by two general methods: hot dipping and electrolytic deposition.

In hot-dip processes, cleaned iron or steel, usually in sheet form, is passed through a flux such as a zinc–ammonium chloride and guided through a bath of molten zinc. In wire galvanizing, the wire is drawn through successive pickling, annealing, and washing operations. It is dried before passing into the galvanizing pan and is drawn out through wipers of charcoal, coke, sand, or asbestos.

In one hot-dip process, intermetallic compounds of iron and zinc are formed on the surface of the steel or iron being treated by heating it in the presence of finely divided zinc below the melting point of the zinc. In another, molten zinc is applied in a fine spray to the surface of the cleaned iron or steel; the zinc adheres tightly to the surface.

In electrolytic deposition, or electroplating, a pure coating of completely controlled thickness of zinc may be applied without heat. More care is required, and for articles that must be made watertight, the electrolytic processes do not have the soldering effect of the hot processes. The zinc coating, however, has greater adherence than that formed in the hot-dip process. *See also* sherardizing.

galvanometer, instrument for measuring a small electrical current or a function of the current by deflection of a moving coil. The deflection is a mechanical rotation derived from forces resulting from the current.

The most common type is the D'Arsonval galvanometer, in which the indicating system consists of a light coil of wire suspended from a metallic ribbon between the poles of a permanent magnet. The magnetic field produced by a current passing through the coil reacts with the magnetic field of the permanent magnet, producing a torque, or twisting force. The coil, to which an indicating needle or mirror is attached, rotates under the action of the torque; the angle through which it rotates to balance the torsion of the suspension provides a measure of the current flowing in the coil. The angle is measured by the movement of the needle or by the deflection of a beam of light reflected from the mirror.

The ballistic galvanometer is designed to deflect its indicating needle (or mirror) in a way that is proportional to the total charge passing through its moving coil or to a voltage pulse of short duration. Any conventional galvanometer may also be employed as a ballistic type, but the latter has smaller torque and higher inertia in the coil.

galvanoplasty (technology): *see* electroforming.

Galveston, city, seat (1838) of Galveston County, southeastern Texas, U.S., 51 mi (82 km) southeast of Houston. It is a major deepwater port on the Gulf Intracoastal Waterway, at the northeast end of Galveston Island, which extends along the Texas coast for about 30 mi, separating Galveston Bay and West Bay from the Gulf of Mexico. The French explorer La Salle visited the island in 1686 and named it St. Louis for his sovereign, but it remained unoccupied except by Karankawa Indians. In 1777 troops of Bernardo de Gálvez, Spanish governor of Louisiana (later viceroy of Mexico), temporarily occupied the island and named it Gálvez (whence Galveston). The pirate Jean Laffite made the place his headquarters (1817–21). Settlement of the island then began, and in 1834 Michel B. Menard organized the Galveston City Company and laid out a townsite. During the Texas revolt against Mexico (1835–36), the four ships that comprised the Texas Navy ("Invincible," "Brutus," "Liberty," and "Independence") were based at Galveston, which briefly, prior to the successful outcome of the Battle of San Jacinto (April 21, 1836), served as the capital of the republic after the temporary president, David Burnet, arrived there with his cabinet. During the Civil War Galveston was an important Confederate supply port; it was captured by a Federal fleet in October 1862 but was retaken by Confederates a few months later. Two factors dislodged it from its leading commercial position: the rise of competitive Texas ports, notably Houston, and a destructive hurricane on Sept. 8, 1900, in which more than 5,000 lives were lost and much of the city was destroyed. After this disaster, a protective seawall 17 ft (5 m) high and 10 mi long was built, paralleled by a wide boulevard overlooked by hotels. The wall broke the force of a powerful hurricane in September 1961 and reduced flood damage.

Shipping, oil refining, food processing, and resort business are major economic assets. Chief exports are cotton, grain, and sulfur; imports include sugar, tea, and bananas. Galveston offers ship repairing, including nuclear-service facilities. The island is connected to the mainland by causeways, and a superhighway gives rapid access to Texas City, Houston, and other communities. Access from the northeast is by ferry from Bolivar Peninsula across Galveston Harbor. The city is the site of the University of Texas Medical Branch (1891), Moody College of Marine Sciences and Maritime Resources (1971; affiliated with Texas A&M University), and Galveston College (1966). Inc. 1839. Pop. (1980) city, 61,902; metropolitan area (SMSA), 195,940.

Galveston Bay, inlet of the Gulf of Mexico, on the southeastern shore of Texas, U.S. Protected from the Gulf by the Bolivar Peninsula and Galveston Island, the bay is 35 mi (56 km) long and up to 19 mi wide; it receives the Trinity and San Jacinto rivers. The Houston Ship Channel provides deepwater access both to the Gulf (between Bolivar Peninsula and Pelican and Galveston islands) and to Houston (via the San Jacinto River). The bay supplies oyster shells for use in cement making, and, most importantly, it offers safe anchorage for ships serving the heavily populated and industrialized Houston–Galveston area. The Gulf Intracoastal Waterway passes through its southeastern portion, and the shipping of petroleum and chemical products is prominent. Fishery resources in the bay have declined because of pollution, but Galveston still maintains a large fishing and shrimp fleet, which operates in Gulf waters. The bay was named in July 1785 by José de Evía, a Spanish pilot, who surveyed the Gulf Coast by order of Bernardo de Gálvez, governor of Louisiana (and later viceroy of Mexico).

Gálvez, José, MARQUÉS (marquess) DE LA SONORA (b. 1720, Vélez-Málaga, Spain—d. 1787, Aranjuez), Spanish colonial administrator particularly noted for his work as inspector general (*visitador general*) in New Spain (Mexico), 1765–71. Among his important accomplishments were the reorganization of the tax system, the formation of a government tobacco monopoly, the reorganization of the defenses of the northern frontier of the Viceroyalty, and the occupation of Upper California. On completion of his inspection, he recommended further administrative and fiscal reforms, the most important of which, the intendancy system, was introduced in 1786. Subsequently, he was named minister of the Indies (1775) and was granted the title of marqués de la Sonora (1785).

Gálvez, Manuel (b. July 18, 1882, Paraná, Arg.—d. Nov. 14, 1962, Buenos Aires), novelist and biographer, whose documentation of a wide range of social ills in Argentina in the first half of the 20th century earned him an important position in modern Spanish-American literature.

Gálvez studied law at the National University of Buenos Aires, graduating in 1904 and making that city his permanent residence. He was an inspector of secondary education from 1906 to 1931. He founded (1903) and directed the literary magazine *Ideas* and visited Europe on several occasions.

Gálvez is best remembered for his realistic novels of Argentinian life, which deal with conflict in urban society. In *La maestra normal* (1914; "The Schoolmistress"), his first and generally considered his best novel, he captures the pettiness and monotony of life in a small Argentinian city before the quickening pace of modernity shattered old provincial ways. In his later years, Gálvez turned to historical novels and novelized biographies of Argentinian figures, which, despite their popular success, were less enthusiastically received by the critics than his earlier realistic fiction.

Galvin, George (entertainer): *see* Leno, Dan.

Galway, Irish GAILLIMH, county in the province of Connaught (Connacht), western Ireland. With an area of 2,293 sq mi (5,939 sq km), it is bounded on the north by Mayo and Roscommon and Tipperary, on the east by Roscommon and Offaly, on the south by Clare and Tipperary, and on the west by the Atlantic Ocean. The eastern two-thirds of Galway is part of the Irish central lowland. In the west is Connemara (*q.v.*), mainly a lowland, with peat bogs, many lakes, heathlands, and uplands such as the Twelve Bens and the Maumturk Mountains, with many summits higher than 2,000 ft (600 m). The descendants of the followers of the Norman Richard de Burgh, who assumed rule of Connaught in the 1230s, became known as the tribes of Galway. The county was given its shire boundaries in the reign of Elizabeth I. After 1652 the land settlement of Oliver Cromwell established a new class of landed proprietors.

Galway has the largest Gaelic-speaking element of any Irish county; the Irish college at Spiddal has facilities for those wishing to learn Gaelic. About one-third of the county's people live in towns and villages. Apart from the town of Galway, the towns are small. There are a county council and a county manager; Galway town is a borough.

The living conditions in Connemara are among the hardest in Ireland. Most of the people live on small farms in a coastal belt about one mile wide. In the east, areas of cultivable soil are used for crops or for the rich pastures that often develop in this area of high rainfall. Sheep are kept in large numbers. Rough woodlands, patches of rocky heath, and peat

bogs create gaps in the pattern of agricultural settlement. Only a few short streams flow over much of the lowland, but there are numerous shallow depressions called turloughs that provide good pastures in dry periods. Galway produces a black marble and a green-streaked Connemara marble of great beauty. Other industries include boot making in Ballinasloe, cotton spinning in Loughrea, and sugar refining in Tuam. Pop. (1981) 172,018.

Galway, Irish GAILLIMH, seaport and county town (seat) of County Galway, Ireland, on the northern shore of Galway Bay.

After the building of its walls by Anglo-Norman settlers (*c.* 1270), it developed as a commercial centre and had considerable trade with Spain. The charter of incorporation given by Richard II (reigned 1377–99) was extended in 1545 to give the port jurisdiction over the Aran Islands; it permitted export of all goods except linens and woollens. The town and land within a 2-mi (3-km) radius were established as a county by charter in the reign of James I (1603–25). The town was captured by Parliamentary forces during the English Civil War and again during the campaigns of William III. There are remains of a Franciscan friary (founded 1296), and the town is the seat of a Roman Catholic diocese. St. Nicholas' Church dates from 1320. University College, founded in 1849 as Queen's College, received a new charter in 1908 as a college of the National University of Ireland. Claddagh, the Irish part of the town in Norman times, is now a suburb.

The chief exports are wool, agricultural produce, marble, china, and various metals. The main industries are flour milling, ironworking, and the manufacture of hats, furniture, refrigeration units, computers, electric motors, medical instruments, and sports equipment. A shipping service connects Galway with the Aran Islands, 20 mi (32 km) southwest. Pop. (1981) 37,835.

Galway, Henri de Massue, MARQUIS DE RUVIGNY ET RAINEVAL, also called (1692–97) VISCOUNT GALWAY, BARON PORTARLINGTON (b. April 9, 1648, Paris—d. Sept. 3, 1720, Hampshire, Eng.), French soldier who became a trusted servant of the British king William III.

Viscount Galway, detail of a portrait by I. Simon after a painting by Philip De Graves (17th century)
By courtesy of the National Gallery of Ireland, Dublin

Massue began his career as aide-de-camp to Marshal Turenne (1672–75), then went on diplomatic mission to England (1678). After the revocation of the Edict of Nantes (1685), Massue, a prominent Huguenot, along with his father and brother, settled in England in 1688. In 1690 he forfeited his French estates by entering the English army as major general of horse; he fought with distinction in the Irish campaign and was created Viscount Galway in 1692.

One of the few men absolutely trusted by William III, he was nevertheless resented among English politicians because of his foreign birth. In 1694 he was appointed to command the allied armies in Savoy, and in 1697 he received an earldom and was sent as lord justice to Ireland. Feeling unsuited to politics, he happily retired in 1701, but in 1704 he was called out of retirement to command the allied forces in Portugal during the War of the Spanish Succession. After a decisive defeat at Almansa (April 1707), he again retired, only to be recalled again to act as lord justice of Ireland (1715–16).

Gama, (José) Basílio da (b. 1740, São José do Rio das Mortes, Braz.—d. July 31, 1795, Lisbon), neoclassical poet and author of the Brazilian epic poem *O Uraguai* (1769), an account of the Portuguese-Spanish expedition against the Jesuit-controlled reservation Indians of the Uruguay River basin.

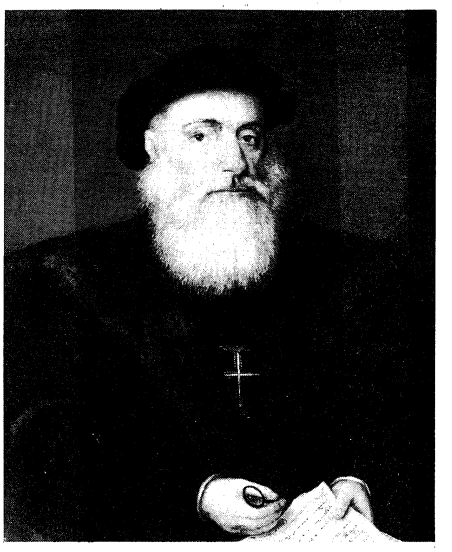
Gama completed his novitiate with the Jesuits in 1759. In that same year the order was expelled from Brazil and all other Portuguese possessions, and he eventually left Brazil for Rome. On his return to Brazil in 1767 he was sent by the Inquisition to Lisbon where, as a Jesuit, he faced deportation to Angola. He won his pardon from the chief minister of the realm, the marquês de Pombal, by composing a poem for Pombal's daughter's wedding; he subsequently became Pombal's protégé. The anti-Jesuit theme of the published version of *O Uraguai,* the original version of which had been openly pro-Jesuit, was no doubt Gama's supreme gesture to establish himself in the good graces of his new patrons.

In spite of its questionable historicity, the poem became the most important Brazilian work of the colonial period. Gama shows himself to be a sensitive and original poet in breaking away from the strict epic model established by Luis de Camões, Portugal's great 16th-century poet, and creating a Brazilian epic in blank verse. He substitutes descriptions of indigenous animism and fetishism for the standard classical mythology of the epic genre and elaborates vivid and moving scenes of Indian life and the Brazilian natural environment. His poem opened the way for the romantic nationalism that was to flower in 19th-century Brazilian literature.

Gama, Vasco da, 1ᵉʳ CONDE (1st count) DA VIDIGUEIRA (b. *c.* 1460, Sines, Port.—d. Dec. 24, 1524, Cochin, India), Portuguese navigator whose voyages to India (1497–99, 1502–03, 1524) opened up the sea route from western Europe to the East by way of the Cape of Good Hope and thus ushered in a new era in world history. He also helped make Portugal a world power.

Life. The third son of Estêvão da Gama, a nobleman who was commander of the fortress of Sines on the coast of Alentejo province in southwestern Portugal, Vasco was born in about 1460. Little is known of his early life; he may have studied at the inland town of Évora—somewhere he learned mathematics and navigation. In 1492 King John II of Portugal sent him to the port of Setúbal, south of Lisbon, and to the Algarve, Portugal's southernmost province, to seize French ships in retaliation for French peacetime depredations against Portuguese shipping—a task that Vasco rapidly and effectively performed.

In accordance with the policy of Prince Henry the Navigator, King John was planning to send a Portuguese fleet to India to open the sea route to Asia and to outflank the Muslims, who had hitherto enjoyed a monopoly of trade with India and other eastern states. Estêvão da Gama was chosen to lead the expedition, but after his death Vasco took his place. Accounts of his appointment differ; whether he was chosen by King John and this choice confirmed by King Manuel, who ascended the throne in 1495, or whether it was King Manuel who



"Knight of the Order of Christ," identified as Vasco da Gama, detail, Portuguese school, first half of the 16th century; in the Museu Nacional de Arte Antiga, Lisbon
By courtesy of the Museu Nacional de Arte Antiga, Lisbon

first chose him, remains unclear. According to one version, the appointment was first offered to his eldest brother Paulo, who declined because of ill health.

The first voyage. Da Gama sailed from Lisbon on July 8, 1497, with a fleet of four vessels—two medium-sized three-masted sailing ships, each of about 120 tons, named the "São Gabriel" and the "São Rafael"; a 50-ton caravel, named the "Berrio"; and a 200-ton storeship. They were accompanied to the Cape Verde Islands by another ship commanded by Bartolomeu Dias, the Portuguese navigator who had discovered the Cape of Good Hope a few years earlier and who was en route to the West African castle of São Jorge da Mina on the Gold Coast (now Ghana). With da Gama's fleet went three interpreters—two Arabic speakers and one who spoke several Bantu dialects. The fleet also carried *padrões* (stone pillars) to set up as marks of discovery and overlordship.

Passing the Canary Islands on July 15, the fleet reached the São Tiago in the Cape Verde Islands on the 26th, remaining there until August 3. Then, to avoid the currents of the Gulf of Guinea, da Gama took a circular course through the South Atlantic to the Cape of Good Hope, reaching Santa Helena Bay (in modern South Africa) on November 7. The expedition departed on November 16, but unfavourable winds delayed their rounding of the Cape of Good Hope until November 22. Three days later da Gama anchored in Mossel Bay, erected a *padrão* on an island, and ordered the storeship to be broken up. Sailing again on December 8, the fleet reached the coast of Natal on Christmas Day. On Jan. 11, 1498, it anchored for five days near the mouth of a small river between Natal and Mozambique, which they called the Rio do Cobre (Copper River). On January 25, in what is now Mozambique, they reached the Quelimane River, which they called the Rio dos Bons Sinais (the River of Good Omens), and erected another *padrão.* By this time many of the crews were sick with scurvy; the expedition rested a month while the ships were repaired.

On March 2 the fleet reached the island of Mozambique, the inhabitants of which believed the Portuguese to be Muslims like themselves. Da Gama learned that they traded with Arab merchants and that four Arab vessels laden with gold, jewels, silver, and spices were then in port; he was also told that Prester John, the long-sought Christian ruler, lived in the interior but held many coastal

cities. The Sultan of Mozambique supplied da Gama with two pilots, one of whom deserted when he discovered that the Portuguese were Christians.

The expedition reached Mombasa (now in Kenya) on April 7 and dropped anchor at Malindi (also now in Kenya) on April 14, where a pilot who knew the route to Calicut, on the southwest coast of India, was taken aboard. After a 23-day run across the Indian Ocean, the Ghāts Mountains of India were sighted, and Calicut was reached on May 20. There da Gama erected a *padrão* to prove he had reached India. Welcomed by the Zamorin, the Hindu ruler, of Calicut (then the most important trading centre of southern India), he failed, however, to conclude a treaty—partly because of the hostility of Muslim merchants and partly because the trumpery presents and cheap trade goods that he had brought, while suited to the West African trade, were hardly in demand in India.

After tension between da Gama's expedition and the Zamorin of Calicut increased, da Gama left at the end of August, taking with him five or six Hindus so that King Manuel might learn about their customs. He visited Anjidiv Island (near Goa) before sailing for Malindi, which he reached on Jan. 8, 1499. Unfavourable winds caused the expedition to take nearly three months crossing the Arabian Sea, and many of the crew died of scurvy. At Malindi, because of greatly reduced numbers, da Gama ordered the "São Rafael" to be burned; there he also erected a *padrão.* Mozambique, where he set up his last *padrão,* was reached on February 1. On March 20 the "São Gabriel" and "Berrio" rounded the Cape together but a month later were parted by a storm; the "Berrio" reached the Tagus River in Portugal on July 10. Da Gama, in the "São Gabriel," continued to Terceira Island in the Azores, whence he is said to have dispatched his flagship to Lisbon. He himself reached Lisbon on September 9 and made his triumphal entry nine days later, spending the interval mourning his brother Paulo, who had died on Terceira. Manuel I granted Vasco the title of *dom* (equivalent to the English "sir"), an annual pension of 1,000 cruzados, and estates.

The second voyage. To further da Gama's achievement, Manuel I dispatched the Portuguese navigator Pedro Álvares Cabral to Calicut with a fleet of 13 ships. Later, the Hindus, incited by the Muslims, rose in arms and massacred the Portuguese whom Cabral had left behind. To avenge this deed a new fleet was fitted out in Lisbon to be sent against Calicut and to establish Portuguese hegemony in the Indian Ocean. At first the command was to be given to Cabral, but it was later transferred to da Gama, who in January 1502 was given the rank of admiral. Da Gama himself commanded 10 ships, which were in turn supported by two flotillas of five ships each, each flotilla being under the command of one of his relations. Sailing in February 1502, the fleet called at the Cape Verdes, reaching the port of Sofala in East Africa on June 14. After calling briefly at Mozambique, the Portuguese expedition sailed to Kilwa, in what is now Tanzania. The ruler of Kilwa, the amīr Ibrāhīm, had been unfriendly to Cabral; da Gama threatened to burn Kilwa if the Amīr did not submit to the Portuguese and swear loyalty to King Manuel, which he then did.

Coasting southern Arabia, da Gama then called at Goa (later the focus of Portuguese power in India) before proceeding to Cannanore, a port in southwestern India to the north of Calicut, where he lay in wait for Arab shipping. After several days an Arab ship arrived with merchandise and between 200 and 400 passengers, including women and children. After seizing the cargo, da Gama shut up the passengers aboard the captured ship and set it afire, killing all on board, the cruelest act of his career.

After da Gama formed an alliance with the ruler of Cannanore, an enemy of the Zamorin, the fleet sailed to Calicut. The Zamorin offered friendship, but da Gama rejected the offer and presented an ultimatum that the Muslims be banished from the port. To show that he meant what he threatened, da Gama bombarded the port and seized and massacred 38 Hindu fishermen who had sailed out to his ships to sell their wares; their bodies were then thrown overboard, to be washed ashore. The Portuguese then sailed south to the port of Cochin, with whose ruler (an enemy of the Zamorin) they formed an alliance. After an invitation to da Gama from the Zamorin had proved to be an attempt to entrap him, the Portuguese had a brief fight with Arab ships off Calicut but put them to full flight. On Feb. 20, 1503, the fleet left Cannanore for Mozambique on the first stage of their return voyage, reaching the Tagus on October 11.

The third voyage. Obscurity surrounds the reception of da Gama on his return by King Manuel. Da Gama seemingly felt himself inadequately recompensed for his pains. Controversy broke out between the Admiral and the Order (*i.e.,* religious association) of São Tiago over the ownership of the town of Sines, which the Admiral had been promised but which the order refused to yield. Da Gama had married a lady of good family, Caterina de Ataíde—perhaps in 1500 after his return from his first voyage—and he then appears to have retired to the town of Évora. He was later granted additional privileges and revenues, and his wife bore him six sons. Until 1505 he continued to advise the King on Indian matters, and he was created count of Vidigueira in 1519. Not until after King Manuel died was he again sent overseas; King John III nominated him in 1524 as Portuguese viceroy in India.

Arriving in Goa in September, da Gama immediately set himself to correct the many administrative abuses that had crept in under his predecessors. Whether from overwork or other causes, he soon fell ill and died in Cochin in December. In 1538 his body was taken back to Portugal. (E.M.J.C.)

BIBLIOGRAPHY. There is no autobiography of Vasco da Gama. Portuguese chroniclers wrote at length about his voyage of 1497–99, and some of them must have had access to secret documents since destroyed. The only one translated into English is that of Gaspear Correa (*c.* 1490–1565) from his *Lendas da India;* see *The Three Voyages of Vasco da Gama, and His Viceroyalty,* ed. by Lord Stanley of Alderley (1869, reprinted 1963). The only firsthand account of the first voyage has also been printed in English in E.G. Ravenstein (ed.), *A Journal [by an Unknown Writer] of the First Voyage of Vasco da Gama, 1497–1499* (1898, reprinted 1963). A later and more definitive edition has been printed in Portuguese in Abel Fontoura da Costa (ed.), *Roteiro da Primeira Viagem de Vasco da Gama, 1497–1499 por Alvaro Velho,* 3rd ed. (1969). An outstanding synthesis of the background of Vasco da Gama's achievements is found in John H. Parry, *The Age of Reconnaissance: Discovery, Exploration and Settlement, 1450–1650,* 2nd ed. (1966). For brief accounts together with English translations of extracts from early documents, see John H. Parry (ed.), *The European Reconnaissance: Selected Documents* (1968). The unique manuscript copy of the three *Roteiros* (sailing directions) of Vasco da Gama's Arab pilot, Aḥmad ibn Mādjid, has not been fully translated and printed in English, but see A.G.R. Tibbetts, *Arab Navigation in the Indian Ocean Before the Coming of the Portuguese* (1971). For the definitive Portuguese translation of the Arab text, see T.A. Chumovsky (ed.), *Três Roteiros desconhecidos de Aḥmad ibn Mādjid* (1960).

Gamagōri, city, Aichi Prefecture (*ken*), Honshu, Japan, facing Mikawa-wan (Mikawa Bay). The city has been well known for the manufacture of cotton textiles since the Tokugawa era (1603–1867). Mandarin orange orchards grace the mountain slopes behind Gamagōri, which also serves as a seaside resort. There are hot-spring spas nearby. The city is connected by bridge to offshore Take-shima (Take Island), which has a Shintō shrine dedicated to the goddess of beauty. Pop. (1980) 85,294.

Gamaliel I, also called RABBAN GAMALIEL (rabban, meaning "teacher") (fl. early 1st century AD), a tanna, one of a select group of Palestinian masters of the Jewish Oral Law, and a teacher twice mentioned in the New Testament.

According to tradition—but not historic fact—Gamaliel succeeded his father, Simon, and his grandfather, the renowned sage Hillel (to whose school of thought he belonged), as nasi (president) of the Sanhedrin, the supreme Jewish court. It is certain, though, that Gamaliel held a leading position in the Sanhedrin and that he enjoyed the highest repute as teacher of the Law; he was the first to be given the title rabban. Like his grandfather, Gamaliel also was given the title *ha-Zaqen* (the Elder).

The New Testament (Acts 5:34–39) relates that Gamaliel intervened on behalf of the Apostles of Jesus when they had been seized and brought to the Sanhedrin, and another passage (Acts 22:3) tells how St. Paul, in a speech to the Jews, tried to influence them by stating that he had been a student of Gamaliel ("I am a Jew, . . . brought up . . . at the feet of Gamaliel").

Gamaliel established a number of lenient ordinances, in particular, laws affecting women and non-Jews. Of his teaching, only one saying is preserved in the Talmud; it enjoins the duties of study and scrupulous observance of religious ordinances. Gamaliel's renown is summed up in the words recorded in the Talmud: "When Rabban Gamaliel the Elder died, regard for the Torah [Jewish Law] ceased, and purity and piety died."

Gamaliel II, also called GAMALIEL OF JABNEH (fl. late 1st/early 2nd century AD), nasi (president) of the Sanhedrin, at that time the supreme Jewish legislative body, in Jabneh, whose greatest achievement was the unification of the important Jewish laws and rituals in a time of external oppression by Rome and internecine quarrels.

In the ancient biblical city of Jabneh, many Jews had taken refuge from the Roman siege of Jerusalem in AD 70. Gamaliel succeeded Johanan ben Zakkai as leader of a school of Judaism whose members inherited the authority of the Sanhedrin of Jerusalem. He strengthened the Jewish faith, which had been seriously weakened by the loss of the Temple and Sanhedrin in Jerusalem and by the Jewish loss of political autonomy.

Gamaliel ended the division of Jewish spiritual leaders—some of whom belonged to the school of Hillel and others to that of Shammai—by ruling that Hillel's more lenient interpretations of Jewish Law were authoritative. He devoted special attention to the regulation of prayer ritual, which had become all-important since the cessation of sacrificial worship. He gave the principal prayer, the *'amida,* consisting of 18 (subsequently 19) benedictions, its final revision and declared that it was every Israelite's duty to recite it three times daily. By asserting his authority to standardize the Jewish calendar and thus fix the dates of festivals, Gamaliel further unified all Jews. He was recognized as patriarch (leader of the people) by Rome, and his reforms raised the power and prestige of the patriarchate.

During his administration, Gamaliel frequently became dictatorial toward dissenters; at one point, he excommunicated his own brother-in-law. Because of his harsh methods, he was deposed, but he was later restored to power. When he died, he was buried, according to his own wish, garbed in simple linen,

to discourage the expensive burials that had impoverished many Jewish families.

Gamaliel III (fl. first half of the 3rd century AD), eldest son of Judah ha-Nasi, and the renowned editor of the Mishna (the basic compilation of Jewish oral law).

A direct descendant of the sage Hillel, Gamaliel became patriarch of the Jewish community in Palestine in approximately AD 220 and, consequently, head of the Sanhedrin, the Jewish legislative body of that time. Beyond the fact that Gamaliel helped complete the Mishna, almost nothing else is known about him. Three of his sayings were incorporated in *Avot* ("Fathers"), a treatise of the Mishna, and there are a few scattered references to him in other postbiblical sources.

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Gambaga Scarp, line of cliffs along the Volta River basin, northeastern Ghana, western Africa. The scarp forms the elevated northern boundary of the Volta River basin and the eastern section of the granite plateaus of Wa and Mamprusi. To the south is another narrow plateau, followed by a gradual descent to the surrounding land. The Gambaga's steep erosional scarps reveal a composition of nearly horizontal sandstones. Because of the elevation (1,000–1,500 feet [300–460 m]), the climate is relatively cool and moist, allowing cultivation of grains and yams and stock raising. The only sizable town on the plateau is Gambaga, originally a cotton-collecting centre and now a popular hill station. The only major road off the scarp runs from Gambaga to Walewale and from there to Kumasi.

Gambetta, Léon (b. April 2, 1838, Cahors, Fr.—d. Dec. 31, 1882, Ville-d'Avray, near Paris), French republican statesman who helped direct the defense of France during the Franco-German War of 1870–71. In helping to found the Third Republic, he made three essential contributions: first, by his speeches and articles, he converted many Frenchmen to the ideals of moderate democratic republicanism. Second, by his political influence and personal social contacts, he gathered support for an elective democratic political party, the Republican Union. Finally, by backing Adolphe Thiers, who was elected provisional head of government by the National Assembly of 1871, against royalists and Bonapartists, he helped transform the new regime into a parliamentary republic. Gambetta was briefly premier of France from Nov. 14, 1881, to Jan. 16, 1882.

Gambetta, photograph by Étienne Carjat; in the Bibliothèque Nationale, Paris

By courtesy of the Bibliotheque Nationale, Paris

Life. Gambetta's mother was from Gascony; his father was an Italian who had emigrated to Cahors and had opened a grocery store there. A successful pupil at the local high school, ambitious and naturally eloquent, young Gambetta refused to stay in a provincial town with no other prospect than to work in his father's store. Against his father's will, he went to Paris to study law.

Gambetta professed very strongly republican opinions, and his exuberant and generous nature soon made him highly popular among the Paris students. In 1859 he was called to the bar, but he was unsuccessful as a lawyer until 1868, when a political case known as the Affaire Baudin made him suddenly famous. Jean-Baptiste Baudin, a deputy (legislator) killed resisting Napoleon III's coup d'état of 1851, had become a republican martyr, and eight journalists were being prosecuted for attempting to have a monument erected in his memory. As counsel of one of the accused, Gambetta delivered an extremely forceful speech in which he indicted the imperial regime, its origin, and its policy.

Press reports of his speech made his political fortune, and almost overnight Gambetta became an acknowledged leader of the Republican Party. In 1869 he was elected to the Legislative Assembly. He opposed the steps that led to the outbreak of the Franco-German War in July 1870, but, once it had begun, he urged the quickest possible victory over the Germans. After the disastrous defeat of the French at Sedan, in which Napoleon III was captured on Sept. 1, 1870, Gambetta played a principal role in proclaiming the republic and forming a provisional government of national defense. He became minister of the interior in this government.

The most pressing problem of the provisional government was the defense of Paris, which was besieged by the Germans. Most members of the government stayed in the city, but Gambetta, as their delegate, left Paris in a balloon on Oct. 17, 1870, floating over the German lines. Establishing himself at Tours, he began to arouse unoccupied France for the defense of the entire country. He became war minister as well, assuming virtually unlimited powers.

Of the two main French armies, one had been captured at Sedan, and the other was besieged at Metz and soon forced to surrender. Gambetta, as always enthusiastic and indefatigable, succeeded in raising new armies, which were trained and supplied with arms. These achieved some local successes but were more often defeated.

When Tours was threatened by the Germans, Gambetta left for Bordeaux in southwestern France. Though he wished to continue fighting, the country was tired of war, and the provisional government signed an armistice on Jan. 18, 1871.

The armistice convention provided for the election of a National Assembly, which met at Bordeaux in March 1871 to ratify the peace terms. Gambetta was elected a deputy for Strasbourg, in Alsace, but, after the ratification of the peace, which yielded most of Alsace and Lorraine to Germany, he lost his seat and retired for a short time to Spain.

In by-elections in July 1871, he was elected to the National Assembly by the *département* of the Seine. The assembly was to determine whether France would remain a republic or restore the monarchy. The majority of the deputies were monarchists. There were, however, two candidates to the throne, the heads, respectively, of the elder and the younger branch of the Bourbons, and they were unable to reach agreement on which should become king. With supreme skill, Gambetta managed to push ratification of the republic through the weary assembly. The republican constitution of 1875 formed the basis of the French Third Republic until the latter's demise in 1940.

Parliamentary intrigue prevented Gambetta from being elected president of the republic, but he became president of the Chamber of Deputies, a position in which he exercised great power. He attempted to promote a tolerant republic, an "Athenian republic," as he described it. In spite of his corpulence, disheveled beard, and badly groomed appearance, his natural warmth, generosity, and liberalism made him highly popular.

Jules Grévy, the president, disliked Gambetta and for a long time refused to ask him to form a government. After Gambetta at last was appointed premier in November 1881, he pursued, in foreign affairs, a policy of establishing a closer relationship with Great Britain and, in domestic affairs, an ambitious program of domestic reform. He was overthrown in January 1882 before achieving either goal.

In 1872 he began a liaison with Léonie Léon, a pretty, well-educated woman, and, after his resignation, he settled with her outside Paris, with the intention of marrying her. While handling a revolver, he shot himself in the arm, and, as his health was very poor, the wound healed slowly. During his convalescence, he was stricken with appendicitis, but the doctors did not operate. He died on Dec. 31, 1882, at the age of 44.

Assessment. Gambetta was honoured with a national funeral. His reputation has remained largely undiminished; there is hardly a town in France without a street bearing his name. Yet his fame rests on what he achieved in his long years of opposition and during the Franco-German War rather than during the two terms—totaling three years—in which he exercised power. He was a fervent advocate both of fully modern democracy—universal suffrage, freedom of the press, right of meeting, trial by jury for political offenses, separation of church and state—and of national unity. For the sake of the latter, he occasionally struck bargains with his political opponents, thus gaining an undeserved reputation as an opportunist. Undoubtedly, he was largely responsible for the consolidation of parliamentary democracy in France, but his compromises resulted in a fragile party system that served to weaken democratic government. (J.C. de C.)

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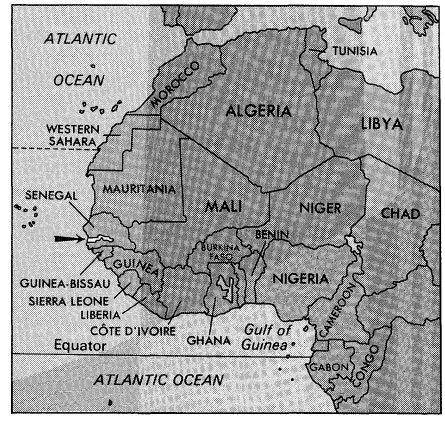
Gambia, The, officially REPUBLIC OF THE GAMBIA, republic of western Africa, covering an area of 4,127 square miles (10,689 square km). The capital is Banjul. Stretching inland 295 miles (475 km) eastward from the Atlantic Ocean, The Gambia is a narrow enclave (15 to 30 miles [24 to 48 km] wide)



The Gambia

along the Gambia River and on land is almost completely surrounded by Senegal. The population in 1990 was estimated at 860,000.

A brief treatment of The Gambia follows. For full treatment, *see* MACROPAEDIA: Western Africa.

For current history and for statistics on society and economy, *see* BRITANNICA WORLD DATA ANNUAL.

The land. The Gambia River, which rises in Guinea and is navigable throughout The Gambia, dominates the country's landscape as it flows westward across a low plateau with elevations between 80 and 250 feet (25 and 75 m) above sea level. In the east, narrow valleys are separated by broad, low hills. In the west, lower and smaller sand hills alternate with depressions that often form sand-filled plains. The soils of the middle and upper river basin are more fertile than are those of the lower river.

The climate is subtropical, with a marked hot and wet season (June to October) and a cooler dry season (November to April). Annual rainfall varies from 30 to 55 inches (760 to 1,400 mm) and comes only in summer. Annual temperatures range from 60° to 110° F (16° to 43° C), with daily temperatures exceeding 90° F (32° C) from April to June. The vegetation cover of The Gambia is savanna on the uplands, various kinds of inland swamp in low-lying areas, and mangrove swamp along the brackish lower Gambia River. The narrow strips of riverine forest shelter birds, but the large fauna—leopard, chimpanzee, west African manatee, western giant eland, and two species of crocodile—are found either in or beside the river itself or in the occasional dry savanna woodlands.

Only about one-sixth of the country is considered arable. It is generally poor in resources, but there are some reserves of zircon and kaolin.

The people. The country is populated by diverse ethnic groups. About two-fifths of the population is Malinke (Mandingo), followed by Fulani (about one-fifth), Wolof (about one-seventh), Diola (Jola), and Soninke (Serahuli). Islām claims the majority of adherents. The population's birth and death rates are high even for western Africa, and the infant mortality rate is the highest in western Africa. The life expectancy of about 43 years is below average for the region. The government has expressed great concern over the high rate of population growth and has taken steps to develop a nationwide family-planning program. Farm labourers from Senegal, Guinea, and Mali seasonally increase The Gambia's population.

Economy. The Gambia has a developing market economy that is largely based on the production and export of peanuts (groundnuts). The gross national product (GNP) actually decreased somewhat during the 1980s. The GNP per capita is among the lowest in Africa.

Agriculture accounts for more than one-fourth of the GNP and employs more than three-fourths of the work force, largely in subsistence-level farming. Food crops include rice, cassava, yams, sorghum, and millet, and although some rice imports are still required, The Gambia is nearly self-sufficient in the production of grains. Peanuts occupy almost all suitable land, and fluctuations in their production due to drought or pest infestations and in world peanut prices have tremendous impact on the country's economy.

Commercial fishing for both domestic and export markets has expanded. Further development of river fishing hinges on the construction of port and related facilities. Kaolin and zirconium are mined in the country in small quantities.

The industrial sector accounts for less than 5 percent of the GNP and employs an even smaller percentage of the work force. Manufacturing is largely limited to food processing. Electricity is generated entirely from imported fuels.

The Gambia River serves as a major artery of transportation, and all-weather road mileage has increased. Tourism remains an important source of revenue. The country's imports substantially outweigh its exports, and large-scale foreign aid is necessary to offset deficits in the balance of payments.

Government and social conditions. The Gambia is an independent republic. The country's 1970 constitution vests legislative power in the House of Representatives with 50 members—36 elected by popular vote every five years, 5 elected by tribal chiefs, 8 nominated by the president, and a nominated attorney general. The president is elected by universal adult suffrage to a five-year term; he acts as head of state and appoints the vice president and the Cabinet. The country's highest judicial body is the Supreme Court, whose members are appointed by the president on the advice of the independent Judicial Service Commission. Electoral politics in The Gambia is dominated by the Progressive People's Party, a moderately socialist group.

The Gambia does not have a system of social-welfare benefits. Health conditions in The Gambia are extremely poor. A significant number of people suffer from such diseases as dysentery, malaria, schistosomiasis, and tuberculosis. Because of the country's severe shortage of trained medical personnel, many of the sick receive little or no medical care.

Education remains underdeveloped. Schooling is not compulsory, and only about one-third of all primary-school-age children are enrolled; 75 percent of the population is illiterate.

The news media are government-owned but enjoy considerable freedom to express political views.

Cultural life. The various tribal groups are the focus of cultural life in The Gambia. They engage in such activities as wood carving, batik cloth printing and weaving, and gold and silver jewelry making. The Ministry of Education, Sports, and Culture has encouraged the tribes to revive traditional dances.

History. The Wolof, Malinke, and Fulani (Fula, Fulbe) peoples, beginning in about the 13th century AD, settled in different parts of what is now The Gambia and established at first villages and then kingdoms in the region. European exploration of the area began when the Portuguese sighted the Gambia River in 1455. In 1588 the Portuguese sold trading rights on the river to British merchants, but no permanent settlements were established. In 1663 the British acquired a river island from a local chief and built Fort James there. In 1681 the French established an enclave at Albreda on the north bank opposite Fort James, and in 1779 they captured and destroyed that fort. Four years later the Treaty of Versailles reserved the Gambia River for Great Britain and recognized French claims to the enclave of Albreda. After the British abolished slavery in 1807, they founded the fort of Bathurst at the mouth of the Gambia River to block the continuing slave trade. In 1857 the French transferred sovereignty over Albreda to Britain, and in 1889 The Gambia's boundaries were agreed upon by Great Britain and France. The British declared a protectorate over the area in 1894. Independence was proclaimed in 1965, and The Gambia became a republic within the Commonwealth of Nations in 1970, with Sir Dawda Kairaba Jawara the country's first president. A 1981 coup attempt failed, and in the next year Jawara was reelected. Following the coup attempt, The Gambia and Senegal agreed to form a limited confederation called Senegambia, in which they would integrate their military and security forces, form an economic and monetary union, coordinate foreign policies and communications, and establish confederal institutions. Despite the merger, each country would remain independent.

Gambia River, river in western Africa, 700 miles (1,120 km) long, rising in the Republic of Guinea and flowing westward through The Gambia into the Atlantic Ocean. Its major tributaries are the Sandougou and the Sofianiama. The Gambia is one of the finest waterways in Africa and the only western African river that is easily accessible to oceangoing shipping. It constitutes a unifying factor for the independent state of The Gambia, which consists of a narrow strip of land along both banks of the river. The political separation between The Gambia and Senegal (formally ended in 1982 by the confederation of the two countries) has, however, long hindered the development of the resources of the river and its basin. A first step had been taken four years earlier, however, with the establishment of the Gambia River Development Organization, initially composed of the same two countries (joined in 1980 by Guinea).

From its source in the highlands of the Fouta Djallon, the Gambia follows a winding course to its mouth, which is a ria, or drowned estuary. The dividing and reuniting of river channels—a phenomenon known as braiding—has created several islands along the river's middle course, of which the two largest are Elephant Island and MacCarthy Island. The river is joined by numerous creeks called *bolons,* the largest of these being Bintang Bolon, which flows into it from the south. The width of the river's valley varies considerably along its course. The river valley is cut into a plateau of sandstone dating from the Tertiary period (66.4 million to 1.6 million years ago).

Dense mangrove swamps fringe the lower river for 60 miles (97 km) inland, after which freshwater swamps and salt flats on low-lying stretches alternate with dense clumps of small trees and shrubs that line the cliffs. On the higher slopes of the riverbank, swamps and shrubs give place to parkland and tall grass. The wild oil palm grows along the valley bottom.

The vegetation of the river and of its creeks provides a favourable habitat for insects, animals, and birds. The swamps encourage mosquitoes and tsetse flies to breed. The river abounds in fish and river creatures, including the hippopotamus and the crocodile. Among the 400 known bird species that have been recorded are the kingfisher, the cuckoo, the swallow, the heron, the sunbird, the hawk, and the grass warbler.

The swampy region closest to the river, with its dense masses of mangrove trees often growing more than 100 feet (30 m) high, abounds in wildlife but has been of little use for either agriculture or human settlement. The grass-covered river flats (known locally as *banto faros*) of the lower river are rendered useless for cultivation by the salt water that periodically inundates them, and settlements on them are few. The flats of the middle and upper river are of some agricultural value, however. Much of the grassland is regularly cleared, and the light soils are easily cultivable. The annual flooding of the fertile alluvial loams of the middle flats makes them especially suitable for intensive rice cultivation. On the light sandy and well-drained soils of the higher slopes, peanuts (groundnuts) grow particularly well. Cultivation and settlement have therefore taken place in the middle flats and on the higher slopes, with many villages being located on the borderline between the flats and the plateau, thus avoiding both the flooding of the lower slopes and the increasing aridity of the higher terrain.

The Gambia is one of the most navigable of

African rivers; its chief value, therefore, has been its transportation function. As the main artery of the state of The Gambia, it is the principal means of transporting passengers, freight, and mail in the territory. North–south river crossings are provided by ferries such as those plying between Barra and Banjul, Banni and Kerewan, Farafenni and Yelitenda, and Kau-ur and Jessadi.

Gambier Islands, French ÎLES GAMBIER, also called MANGAREVA ISLANDS, southeastern-most extension of the Tuamotu Archipelago of French Polynesia in the central South Pacific, nearly 1,000 mi (1,600 km) east-southeast of Tahiti. The principal inhabited group comprises the volcanic islets Mangareva (Magareva), Taravai, Akamaru, and Aukena. Mangareva, 5 mi (8 km) long and encircled by a barrier reef, rises to about 1,444 ft (440 m) in the peaks Duff and Mokoto; Rikitea, the chief village, with St. Michael's Cathedral (1834–71), is on its eastern side.

Capt. James Wilson of the missionary ship "Duff" sighted (1797) and named the Mangareva cluster after Adm. James Gambier. Annexed by the French in 1881, the group now forms a part of the Tuamotu–Gambier *circonscription* (administrative division) of French Polynesia. Resources are limited. People support themselves with subsistence agriculture, coconuts, and a little fishing. Pop. (1977) 556.

Gambino, Carlo (b. Sept. 1, 1902, Palermo—d. Oct. 15, 1976, Massapequa, N.Y., U.S.), head of one of the Five Families of organized crime in New York City from 1957 to 1976, with major interests in Brooklyn, and reputedly the "boss of bosses" of the U.S. national crime syndicate.

Born in Sicily, Gambino came to the United States in 1921 as a ship stowaway, settling in Brooklyn and becoming a gang member under, successively, Joe "the Boss" Masseria, Salvatore Maranzano, Philip and Vincent Mangano, and finally (in 1951) Albert Anastasia. When Anastasia was murdered in 1957 (allegedly by Gambino and another gunman and with Vito Genovese's approval), Gambino inherited leadership of the family, whose operations included gambling, loansharking, hijacking, narcotics trafficking, and, notably, labour racketeering, with extensive controls over waterfront unions.

In 50 years of crime he served only 22 months in prison (1937–38). Although he was indicted in 1970 for hijacking and although the U.S. Supreme Court in 1970 also upheld an order for his deportation (because of illegal entry into the country), severe heart attacks deferred trial or deportation. More heart seizures led to his death by natural causes six years later.

Consult the INDEX *first*

Gamblian Pluvial Stage, major division of Pleistocene rocks and time in Africa (the Pleistocene Epoch began about 1,600,000 years ago and ended about 10,000 years ago). The Gamblian Pluvial, a moist period that began about 30,000 years ago and lasted about 20,000 years, followed the Kanjeran Pluvial Stage and preceded the Makalian Wet Phase, from each of which it was separated by a period of drier conditions. The Gamblian has been equated in time with the major portion of the Würm Glacial Stage of Europe. Three phases of the Gamblian have been recognized in depositional features along prominent lakeshores. Dates for the various phases of the stage are well established on the basis of radiometric techniques. During the Gamblian, eastern Africa was the scene of prominent Earth movements.

gambling, the betting or staking of something of value, with consciousness of risk and hope of gain, on the outcome of a game, a contest, or an uncertain event the result of which may be determined by chance or accident or have an unexpected result by reason of the bettor's miscalculation.

Gambling games may vary in complexity from betting on the outcome of the toss of a coin, in which the winner claims the coin the side of which he correctly guesses, to betting on cards dealt in a game such as Poker, in which strategy also applies. The outcomes of gambling games may be determined by chance alone, as in the purely random activity of a tossed pair of dice or of the ivory ball on a Roulette wheel, or by physical skill, training, or prowess in athletic contests, or, again, by a combination of strategy and chance. The rules by which gambling games are played sometimes serve to confuse the relationship between the components of the game, which depend on skill and chance, so that some players may be able to manipulate the game to serve their own interests. Thus, knowledge of the game is useful to the Poker player or the horse-race gambler but is of very little use to the purchaser of a lottery ticket or to a slot-machine player.

A gambler may participate in the game itself while betting on its outcome (card games, Craps), or he may be prevented from any active participation in an event in which he has a stake (professional athletics, lotteries). Some games are dull or nearly meaningless without the accompanying betting activity and are rarely played unless wagering occurs (coin tossing, Poker, dice games, lotteries). In other games, betting is not intrinsically part of the game, and the association is merely conventional and not necessary to the performance of the game itself (horse racing, football pools). Commercial establishments such as casinos and racetracks may organize gambling when a portion of the money wagered by patrons can be easily acquired by participation as a favoured party in the game, by rental of space, or by withdrawing a portion of the betting pool. Some activities of very large scale (horse racing, lotteries) usually require commercial and professional organizations to present and maintain them efficiently.

Prevalence of principal forms. Betting on the result of a horse race is apparently the principal form of gambling in the English-speaking countries and in France. It also exists in Argentina, Colombia, Mexico, Puerto Rico, Venezuela, Indonesia, Japan, the Philippines, Denmark, Germany, Ireland, Italy, Norway, Sweden, Poland, and the Soviet Union. Wherever horse racing is popular, it has usually become a major business, with its own newspapers and other periodicals; extensive statistical services; self-styled experts who sell advice on how to bet; networks of telephone and telegraph wires that furnish information to betting centres; bookmakers and their employees; and workers incidental to the care and breeding of horses. The same is true, to a smaller extent, of dog racing.

Casinos or gambling houses—places where gamblers can risk their money against a common gambler, called the bank or the house—have existed at least since the 17th century. In the 20th century they are commonplace and have assumed almost a uniform character throughout the world. In Europe and South America they are permitted at many or most holiday resorts but rarely in cities. In the United States they are legal only in Nevada and New Jersey and, by special license, in Puerto Rico, but they operate illegally, through corruption of political authorities, in all other states. Among the games played regularly at casinos, Roulette, which is one of the principal gambling games in France and Monaco, is played throughout the world. Crap shooting is the principal game at most American casinos. Chuck-a-luck, once a standard dice game at North and Central American casinos, has, since the 1940s, largely faded out of the picture. Slot machines are a mainstay of casinos in the United States and also are found in thousands of private clubs, restaurants, and other establishments; they are common in other countries, including Australia, where they are known as Poker machines, and in Great Britain, where they are called fruit machines. Among the card games played at casinos, Baccarat, in its popular form Chemin de fer, has remained a principal gambling game in Great Britain and in the continental casinos most often patronized by the English at Deauville, Biarritz, and the Riviera resorts. Faro, at one time the principal gambling game in the United States, has, since the ascendancy of Craps, become almost obsolete. Poker is offered at many establishments, but Blackjack has been the principal card game in U.S. casinos. The French card game Trente et Quarante (or Rouge et Noire) is played at Monte Carlo and other continental casinos.

State-licensed or state-operated lotteries are widely distributed about most of the world. Soccer-pool companies can be found in Great Britain, Sweden, Australia, and a few African nations.

Chances, probabilities, and odds. Events or outcomes that are equally probable have an equal chance of occurring in each instance. In games of pure chance, each instance is a completely independent one; that is, each play has the same probability as each of the others of producing a given outcome. Probability statements apply in practice to a long series of events but not to individual ones. The "law of large numbers" is an expression of the fact that the ratios predicted by probability statements are increasingly accurate as the number of events increases; but the absolute number of outcomes of a particular type departs from expectation with increasing frequency as the number of repetitions increases. It is the ratios that are accurately predictable, not the individual events or precise totals.

The probability of a favourable outcome among all possibilities can be expressed: probability (p) equals the total number of favourable outcomes (f) divided by the total number of possibilities (t), or $p = f/t$. But this holds only in situations governed by chance alone. In a game of tossing two dice, for example, the total number of possible outcomes is 36 (each of six sides of one die combined with each of six sides of the other), and the number of "ways to make," say, a seven are six (made by throwing 1 and 6, 2 and 5, 3 and 4, 4 and 3, 5 and 2, or 6 and 1); therefore, the probability of throwing a seven is 6/36, or 1/6 (or approximately .167).

In most gambling games it is customary to express the idea of probability in terms of "odds against winning." This is simply the ratio of the unfavourable possibilities to the favourable ones. If the probability of throwing a seven is 1/6, then in every six throws, "on the average," one throw would be favourable and five would not; the odds against throwing a seven are therefore 5 to 1. The probability of getting "heads" in a toss of a coin is one-half; the odds are 1 to 1, called "even." Care must be used in interpreting the phrase "on the average." Again it applies most accurately to a large number of cases and is not useful in individual instances. A common gamblers' fallacy called "the doctrine of the maturity of the chances" (or "Monte Carlo fallacy") falsely assumes that each play in a game of chance is not independent of the others and that a series of outcomes of one sort should be balanced in the short run by the other possibilities. A number of "systems" have been invented by gamblers based largely on this fallacy; casino operators are happy to encourage the use of

such systems and to exploit any gambler's neglect of the strict rules of probability and independent plays.

In some games an advantage may go to the dealer, banker (the individual who collects and redistributes the stakes), or some other participant. Therefore, not all players have equal chances to win or equal payoffs. This inequality may be corrected by rotating the players among the positions in the game. Commercial gambling operators, however, usually make their profits by regularly occupying advantaged positions; or they may charge money for the opportunity to play or subtract a proportion of money from the bank on each play. In the dice game of Craps the casino returns to winners from 3/5 of 1 percent to 27 percent less than the correct odds, depending on the type of bet made. The house percentage in Roulette in U.S. casinos is $5^{5}/_{19}$ percent to $7^{17}/_{19}$ percent, and in European casinos it is $1^{13}/_{37}$ percent to $2^{26}/_{37}$ percent. The house must always win in the long run. Some casinos also add rules that enhance their profits, especially rules that limit the amounts that may be staked under certain circumstances.

Many gambling games include elements of physical skill or strategy as well as of chance. The game of Poker, like most other card games, is a mixture of chance and strategy. Betting on horse racing or athletic contests involves the assessment of a contestant's physical capacity and the use of other evaluative skills. In order to assure that chance is allowed to play a major role in determining the outcomes of such games, weights, handicaps, or other correctives may be introduced in certain cases to give the contestants approximately equal opportunities to win, and adjustments may be made in the payoffs so that the probabilities of success and the magnitudes of the payoffs are put in inverse proportion to each other. Pari-mutuel pools in horse-race betting, for example, reflect the chances of various horses to win as anticipated by the players. The individual payoffs are large for those bettors whose winning horses are backed by relatively few bettors and small if the winners are backed by a relatively large proportion of the bettors; the more popular the choice, the lower the individual payoff. The same holds true for betting with bookmakers on athletic contests (illegal in most of the United States but legal in England). Bookmakers ordinarily accept bets on the outcome of what is regarded as an uneven match by requiring the side more likely to win to score more than a simple majority of points. In a game of United States or Canadian football, for example, the more highly regarded team would have to win by, say, more than 10 points to yield an even payoff to its backers.

Unhappily, these procedures for maintaining the influence of chance can be interfered with; cheating is possible and reasonably easy in most gambling games. Much of the stigma attached to gambling has resulted from the dishonesty of its promoters, and a large proportion of modern gambling legislation is written to control cheating. More laws have been oriented, however, to efforts by governments to derive tax revenues from gambling than to control cheating. (Taxes can be levied against the incomes of the promoters or players or of the turnover [bank, pool] itself.)

gamboge, also spelled CAMBOGE, hard, brittle gum resin that is obtained from various Southeast Asian trees of the genus *Garcinia* and is used as a colour vehicle and in medicine. Gamboge is orange to brown in colour and when powdered turns bright yellow. Artists use it as a pigment and as a colouring matter for varnishes. In medicine and veterinary medicine it is a drastic cathartic. On the skin it has a severe irritant effect. Gamboge was probably brought into Europe from the East at the close of the 16th century.

Gamboge is obtained principally from *G. hanburyi,* a dioecious tree with leathery, laurel-like leaves, small yellow flowers, and usually square-shaped, four-seeded fruit; it is indigenous to Kampuchea and parts of Thailand and southern Vietnam. The tree's juice in its hardened form constitutes gamboge. The juice is contained in ducts in the middle layer of the bark and is procured by making incisions in the bark and then collecting the juice as it exudes.

Gamburtsev Mountains, Russian GORY GAMBURTSEVA, subglacial range in the central part of eastern Antarctica, extending 750–800 miles (1,200–1,300 km). The mountains attain their greatest height at 11,120 feet (3,390 m). Completely buried under more than 1,970 feet (600 m) of the Antarctic ice cap, they were discovered in 1958 by a Soviet expedition and mapped by seismic reflections.

game, a universal form of recreation generally including any activity engaged in for diversion or amusement and often establishing a situation that involves a contest or rivalry. Card games are the games most commonly played by adults. Children's games include a wide variety of amusements and pastimes primarily for children. *See also* card game; children's game; sports and games.

game, in gastronomy, the flesh of any wild animal or bird. Game is usually classified according to three categories: (1) small birds, such as the thrush and quail; (2) game proper, a category that can be subdivided into winged game, such as the goose, duck, woodcock, grouse or partridge, and pheasant; and ground game, such as the squirrel, hare, and rabbit; (3) big game, predominantly venison, including roebuck, deer, elk, moose, and caribou but also including other large animals such as bear and wild boar.

In general, game is drawn and allowed to cool after being killed and then hung for several days. Whether or not game birds should be drawn is a debated issue. A common practice is not to draw birds with slender, tapering beaks, such as the thrush or corncrake.

The meat of young game is generally easily digested. Small birds, usually eaten within a short time after the kill, are considered to be as digestible as poultry. Ground game, which is classed among red meats, is usually readily digestible, but some such meat, like that from hare, may be rich in elements that make it more resistant to digestion than domestic meat acquired from a butcher. Meat from older game, or from an animal exhausted in the chase, is less desirable, but it can be improved by marinating it for several hours, usually in a mixture of wine, vinegar, and spices.

While most game is cooked in simple country fashion, this class of foods has given rise to numerous renowned, sometimes very elaborate gourmet dishes. Young boar, or wild pig, that has been roasted, grilled, braised, or smoked is considered a delicacy, as is pheasant. Bear steak was a popular dish among North American trappers; as served today in wilderness lodges and urban restaurants, it is usually prepared like beef, except that it is marinated for a few days prior to cooking. A favourite dish in Russia is braised bear, served with sour cream.

Hare and rabbit are among the most widely eaten game. Young hare is usually roasted, and older hare is made into pâtés and pies, potted, jugged, and casseroled. Rabbit can be stuffed with bread and herbs before baking, potted with layers of bacon or ham, and stewed with vegetables.

game show: *see* quiz show.

game theory, branch of mathematics used to analyze competitive situations whose outcomes depend not only on one's own choices, and perhaps chance, but also on the choices made by other parties, or "players." Since the outcome of a game is dependent on what all players do, each player tries to anticipate the probable choices of other players in order to determine his own best choice. How these interdependent strategic calculations may reasonably be made is the subject of the theory.

A brief treatment of game theory follows. For full treatment, *see* MACROPAEDIA: Game Theory.

Modern game theory was created practically at one stroke by the publication in 1944 of *Theory of Games and Economic Behavior* by the mathematician John von Neumann and the economist Oskar Morgenstern. This book stimulated rapid, worldwide development of the mathematical theory and its applications to economics, politics, military science, operations research, business, law, sports, biology, and other fields. It has had a major influence, widening and refining common discourse on strategic thinking.

The theory has several major divisions, the following being the most important:

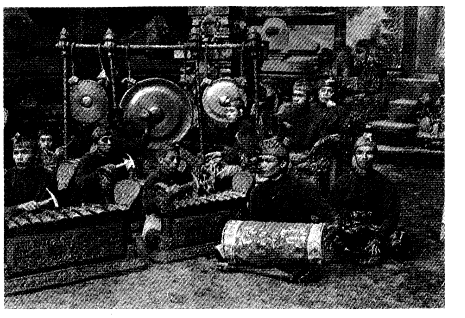
Two-person versus n-person. The 2-person theory deals with the optimal strategic choices of two players, whereas the *n*-person theory ($n > 2$) mostly concerns what coalitions, or subsets of players, will form and be stable and what constitute reasonable payments to their members.

Zero-sum versus nonzero-sum. The payoffs to all players add up to zero (or some other constant) at each outcome in zero-sum games but not in nonzero-sum games, wherein the sums are variable; zero-sum games are games of total conflict, in which what one player gains the others lose, whereas nonzero-sum games permit the players to gain or lose simultaneously.

Cooperative versus noncooperative. Cooperative games are those in which players can make binding and enforceable agreements, whereas noncooperative games may or may not allow for communication among the players but always assume that any agreement reached leads to equilibrium—that is, it is rational for a player not to violate it if other players do not.

Common to all areas of game theory is the assumption that players are rational in the sense that they prefer better over worse outcomes; it is also assumed that they have goals and can rank-order the outcomes or, more stringently, attach utilities, or values, to them. Complications arise from the fact that, except in degenerate one-person games, which are sometimes called "games against nature" and are the subject of decision theory, there is generally no straightforward best choice for a player because of the inherent interdependency of the various choices in a game.

gamelan, also spelled GAMELANG, or GAMELIN, the indigenous orchestra of Java and Bali, consisting largely of several varieties of gongs and various sets of tuned instruments that are struck with mallets. The gongs



Indonesian gamelan

By courtesy of the Indonesian Tourist Board

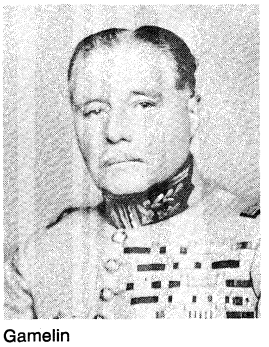
are either suspended vertically or, as with the knobbed-centre, kettle-shaped bonang, placed flat. Percussive melodic instruments include sets of tuned bonangs, xylophones (the *gambang kayu*), and metallophones (these are instruments with a series of tuned metal plates, either suspended over a resonance trough or on resonance tubes). A sustained melody is played either by the bamboo flute (the *suling*) or by a bowed string instrument (rebab) or is sung—the last especially when, as often occurs, the gamelan is used to accompany theatrical performances, or wayangs. The voice is then part of the orchestral texture. Dominating these two groups of instruments is the drum (the *kendang*), which unites them and acts as leader.

No two gamelans are precisely alike tonally, for each instrument is tuned only to the gamelan for which it is intended rather than to an external standard of pitch. A gamelan typically consists of two sets of instruments, one tuned to the scale of *slendro* (in which the octave is divided into five tones roughly equidistant) and the other to *pelog* (a scale consisting of seven notes of varying intervals of which five are given principal stress). The modes (*patet*) of gamelan music are determined by the relative placement on either scale of the basic note (*dong*) and its fifth above and fifth below. (A fifth is an interval more or less the size of that formed by five adjacent white keys on a piano.)

The highly developed polyphony (multipart music) or heterophony (music in which one part varies a melody played simultaneously in another part) of the gamelan has a rhythmic origin. A nuclear theme extends over a number of "bars" (almost invariably in $\frac{4}{4}$ time), against which other instruments play a largely independent countermelody. Another group plays rhythmic paraphrases of this theme, and a fourth group fills out the texture with delicate rhythmic patterns. Highly important are the punctuating, or colotomic, instruments that divide the musical sentence, marking, as it were, the commas, semicolons, and periods. This last-named function is done with the big gong. Over this shimmering, variegated pattern of hammered sound floats the uninterrupted melodic line of the voice, the flute, or the rebab.

Gamelin, Maurice(-Gustave) (b. Sept. 20, 1872, Paris, Fr.—d. April 18, 1958, Paris), French army commander in chief at the beginning of World War II who proved unable to stop the German assault on France (May 1940) that led to the French collapse in June of that year.

Gamelin graduated from the Saint-Cyr military academy in 1893 and ended World War I as a brigadier general in command of a division. He rose steadily after the war, becoming army chief of staff in 1931 and president of the Supreme War Council and army inspector in 1935. He was appointed chief of staff of the national defense in 1938.



Gamelin
By courtesy of the Bibliotheque Nationale, Paris

Gamelin was a strong supporter of the defensive strategy based on the Maginot Line, and, as commander of Allied forces in the West when World War II broke out, he took no offensive action even though at that time most of the German forces were engaged in Poland. In the "phony war" that followed, he proved similarly prudent and unaggressive. He was taken by surprise by the German offensive through the Ardennes that cut the Allied front in two in May 1940. He was dismissed on May 19 and replaced by General Maxime Weygand. Gamelin was later placed on trial at Riom by the Vichy government and, from 1943, was interned in Germany until the end of the war. His memoirs, *Servir,* 3 vol. (*Serving*), appeared in 1946–47.

Gamelyn, The Tale of, anonymous English metrical romance of about 1350, some 900 lines long, written in the East Midland dialect of Middle English, in rhymed couplets. Based on English folklore, it tells of Gamelyn, son of Sir John de Boundys, who is deprived of his inheritance by his brother and becomes an outlaw in the forest. Eventually he is able to regain his estates, and the sheriff who had helped his brother is hanged.

The Tale of Gamelyn is of special interest for its connections with the English ballads of the outlaw Robin Hood. It was a source of Thomas Lodge's prose romance *Rosalynde* (1590), on which William Shakespeare based his *As You Like It.* It was almost certainly intended by Geoffrey Chaucer to form the basis of his (unfinished) "Cook's Tale" in *The Canterbury Tales.*

gamete, sex, or reproductive, cell containing only one set of dissimilar chromosomes, or half of the genetic material necessary to form a complete organism (*i.e.,* haploid). During fertilization, male and female gametes fuse, producing a diploid (*i.e.,* containing paired chromosomes) zygote. Gametes may be identical in form (isogamy), as in the black mold (*Rhizopus*), or there may be more than one morphological type (heterogamy), as with many green algae of the genus *Chlamydomonas.* Gametes of animals, some algae and fungi, and all higher plants exhibit an advanced form of heterogamy called oogamy. In oogamy, one of the gametes is small and motile (the sperm), and the other is large and nonmotile (the egg). *See also* egg; sperm.

gametophyte, in certain plants, sexual phase (or an individual representing the phase) in the alternation of generations—a phenomenon in which two distinct phases occur in the life history of the plant, each phase producing the other. The alternate, nonsexual phase is the sporophyte.

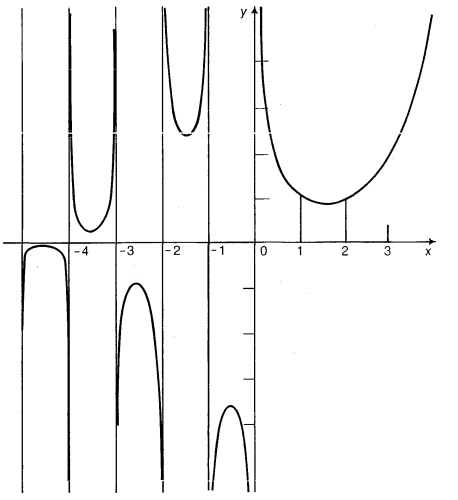
In the gametophyte phase, male and female organs (gametangia) develop and produce eggs and sperm (gametes), which unite in fertilization (syngamy). The fertilized egg (zygote) develops into the sporophyte phase, which produces numerous unicellular spores. These, in turn, develop directly into new gametes. Almost the entire life cycle of many algae and fungi is gametophyte; in others it is almost all sporophyte. *See also* sporophyte.

gamma decay, type of radioactivity in which some unstable atomic nuclei dissipate excess energy by a spontaneous electromagnetic process. In the most common form of gamma decay, known as gamma emission, gamma rays (photons, or packets of electromagnetic energy, of extremely short wavelength) are radiated. Gamma decay also includes two other electromagnetic processes, internal conversion and internal pair production. In internal conversion, excess energy in a nucleus is directly transferred to one of its own orbiting electrons, thereby ejecting the electron from the atom. In internal pair production, excess energy is directly converted within the electromagnetic field of a nucleus into an electron and a positron (positively charged electron) that are emitted together. Internal conversion always accompanies the predominant process of gamma emission to some extent. Some nuclei of a sample decay by gamma emission, others by internal conversion. Internal pair production requires that the excess energy of the unstable nucleus be at least equivalent to the combined masses of an electron and a positron (that is, in excess of 1,020,000 electron volts).

The unstable nuclei that undergo gamma decay are the products either of other types of radioactivity (alpha and beta decay) or of some other nuclear process, such as neutron capture in a nuclear reactor. These product nuclei have more than their normal energy, which they lose in discrete amounts as gamma-ray photons until they reach their lowest energy level, or ground state.

Typical half-lives for gamma emission are immeasurably short (from about 10^{-9} to 10^{-14} second). When the half-lives for gamma emission are measurable, the nucleus in the higher energy state before radiating a photon and the one in the lower energy state are called nuclear isomers. *See also* isomer.

gamma function, generalization of the factorial function to nonintegral values. (The factorial is written as !, with $n!$ defined as the product $1 \times 2 \times 3 \times \ldots \times n$). If a graph is drawn (*see* graph) of the function $y = x!$ when $x = 0, 1, 2, 3, \ldots$ etc., the points can be joined by a curve, and the gamma function gives a precise way of defining and calculating these intermediate points on the curve. The gamma function $\Gamma(z)$ can be defined as the value that is approached by the quotient $n!n^z/z(z+1)(z+2)\ldots(z+n)$ as n gets larger and larger, and is equivalent to its definition as a type of infinite sum given by an integral. For $z = 1$, this integral equals 1, and an operation with integrals known as integration by parts gives the recursion relation $\Gamma(z+1) = z\Gamma(z)$. Using these two facts together, $\Gamma(2) = 1\Gamma(1) = 1$, $\Gamma(3) = 2\Gamma(2) = 2$, etc., can be calculated, giving the result that $\Gamma(n) = (n-1)!$ when n is an integer.



Gamma function

The gamma function is useful more for its relationship to other functions than as a solution by itself of some problem. It arises in simplifying the evaluation of some infinite or improper integrals and in the solution of differential and difference equations arising in probability theory, statistics, mathematical physics, and engineering mathematics.

gamma globulin, subgroup of the blood proteins called globulins. In humans and many of the other mammals, antibodies, when they are formed, occur in the gamma globulins. Persons who lack gamma globulin or who have

an inadequate supply of it—conditions called, respectively, agammaglobulinemia and hypogammaglobulinemia—have frequently recurring infections because of their inability to develop adequate immunity to infectious diseases. *See also* antibody.

gamma ray, penetrating electromagnetic radiation of the same nature as an X-ray, though usually of somewhat shorter wavelength, emitted spontaneously by some radioactive substances. Named (1903) by Ernest Rutherford when evidence showed it differed from beta rays (electrons ejected by radioactive nuclei), gamma radiation originates in atomic nuclei during radioactive decay, sometimes in the decay of certain subatomic particles (as pions and sigma particles), and in particle–antiparticle annihilation. Absorption of gamma rays by nuclei can cause particles (as neutrons, alpha particles) to be ejected (photodisintegration) or can even split the nucleus (photofission). A high-energy gamma photon passing near a nucleus sometimes produces a pair of electrons, one negative (negatron), the other positive (positron). Gamma-ray photons lose energy by being scattered from free electrons (Compton effect) or are completely absorbed by ejecting electrons from atoms (photoelectric effect).

gammarid, any member of the family Gammaridae, the largest of 80 or so families that make up the crustacean order Amphipoda. The name is sometimes also used to refer to amphipods of the genus *Gammarus*. The body of the Gammaridae is of basic amphipod shape: it is flattened from side to side, with seven pairs of thoracic walking legs (the first two pairs often enlarged) and six pairs of abdominal limbs, of which the front three pairs are used for swimming and the back three for gliding locomotion on solid surfaces. Gammarids grow about 5 to 30 millimetres (0.2 to 1.2 inches) long. Nearly 1,200 species and 200 genera are known. They occur exclusively in the Northern Hemisphere, primarily in freshwater bodies, though a few are found in brackish and coastal waters. Gammarids may be locally abundant among aquatic plant growth, feeding largely on fragmented organic matter. Eggs and young develop in a ventral brood pouch.

Gammexane, trade name for an insecticide composed of the most toxic of the isomeric forms of benzene hexachloride (*q.v.*).

Gamow, George, original Russian GEORGY ANTONOVICH GAMOV (b. March 4, 1904, Odessa, Russia—d. Aug. 19, 1968, Boulder, Colo., U.S.), Russian-born U.S. nuclear physicist and cosmologist who was one of the foremost advocates of the big-bang theory, according to which the universe was formed in a colossal explosion billions of years ago. In addition, his work on deoxyribonucleic acid (DNA) made a basic contribution to modern genetic theory.

Gamow attended Leningrad University, where he studied briefly with A.A. Friedmann, a mathematician and cosmologist who suggested that the universe should be expanding. At that time Gamow did not pursue Friedmann's suggestion, preferring instead to delve into quantum theory. After graduating in 1928, he travelled to Göttingen, where he developed his quantum theory of radioactivity, the first successful explanation of the behaviour of radioactive elements, some of which decay in seconds while others decay over thousands of years.

His achievement earned him a fellowship at the Copenhagen Institute of Theoretical Physics (1928–29), where he continued his investigations in theoretical nuclear physics. There he proposed his "liquid drop" model of atomic nuclei, which served as the basis for the modern theories of nuclear fission and fusion. He also collaborated with F. Houtermans and R. Atkinson in developing a theory of the rates of thermonuclear reactions inside stars.

In 1934, after emigrating from the Soviet Union, Gamow was appointed professor of physics at George Washington University in Washington, D.C. There he collaborated with Edward Teller in developing a theory of beta decay, a nuclear decay process in which an electron is emitted (1936).

Soon after, Gamow resumed his study of the relations between small-scale nuclear processes and cosmology. He used his knowledge of nuclear reactions to interpret stellar evolution, collaborating with Teller on a theory of the internal structures of red giant stars (1942). From his work on stellar evolution, Gamow postulated that the Sun's energy results from thermonuclear processes.

Gamow and Teller were both proponents of the expanding-universe theory that had been advanced by Friedmann, Edwin Hubble, and Georges LeMaître. Gamow, however, modified these theories and named his version the "big bang." He and Ralph Alpher published this theory in a paper called "The Origin of Chemical Elements" (1948). This paper, attempting to explain the distribution of chemical elements throughout the universe, posits a primeval thermonuclear explosion, the big bang that began the universe. According to the theory, after the big bang atomic nuclei were built up by the successive capture of neutrons by the initially formed pairs and triplets. This theory is sometimes called the Alpher–Bethe–Gamow theory, Gamow having added Hans Bethe's name to the paper so that this theory of cosmogenesis would be associated with three men whose names approximate the first three letters of the Greek alphabet.

In 1954 Gamow's scientific interests grew to encompass biochemistry. He proposed the concept of a genetic code and maintained that the code was determined by the order of recurring triplets of nucleotides, the basic components of DNA. His proposal was vindicated during the rapid development of genetic theory that followed.

Gamow held the position of professor of physics at the University of Colorado, Boulder, from 1956 until his death. He is perhaps best known for his popular writings, designed to introduce to the nonspecialist such difficult subjects as relativity and cosmology. His first such work, *Mr. Tomkins in Wonderland* (1936), gave rise to the multivolume "Mr. Tomkins" series (1939–67); among his other writings are *One, Two, Three... Infinity* (1947), *The Creation of the Universe* (1952; rev. ed., 1961), *A Planet Called Earth* (1963), and *A Star Called the Sun* (1964). For his achievement as a popularizer of science, Gamow won the 1956 Kalinga Prize from UNESCO. He received other honours as well, including a fellowship in Churchill College, Cambridge (1965), and membership in the Royal Danish Academy of Sciences (1950) and the U.S. National Academy of Sciences (1953).

Gamu Goffa (Ethiopia): *see* Gemu Gafa.

gamut, in music, the full range of pitches in a musical system; also the compass of a particular instrument or voice. The word originated with the medieval monk Guido of Arezzo (died 1050) to identify his system of solmization, *i.e.*, of using syllables to denote musical tones in a scale. Thus, to render in syllables the six tones of the hexatonic scale that prevailed, Guido started with the lowest tone recognized in medieval music theory, the second G below middle C, or gamma. For this note he selected the syllable ut from the hymn "Ut queant laxis" and for the ascending tones used the syllables re, mi, fa, sol, and la. Since Guido and his successors conceived musical theory in terms of overlapping hexachords rather than the diatonic scale, the syllable ut could represent any of the three pitches capable of sustaining the overlapping hexachords that made up the system; these were C, F, and G. While ut might vary, there was only one gamma-ut.

Gradually, the word's meaning was extended to include the whole range from gamma-ut to the high E and contracted to gamut. After diatonic scales displaced the system of overlapping hexachords, gamut came to designate any maximal scale within reach of a given instrument or voice, hence the literary phrase "ranging over the whole gamut of human emotions." *See also* hexachord; solmization.

Gan (people): *see* Ga.

Gan Jiang (China): *see* Kan River.

Gana, Alberto Blest: *see* Blest Gana, Alberto.

Ganane, Webi (Ethiopia and Somalia): *see* Jubba River.

Gananoque, town, southeastern Ontario, Canada, on the St. Lawrence River, at the mouth of the Gananoque River. The town was founded by Charles McDonald, who built a mill there in 1812 and later laid out the townsite. Its name is said to mean "rocks rising out of the water." The town is located 18 miles (29 km) east of Kingston and near St. Lawrence Islands National Park, Gananoque has become a popular resort and gateway to the Thousand Islands. It is also a manufacturing town with metalworks (copper and steel), dairies, and an automotive-parts plant. Pop. (1981) 4,863.

Gaṇapati (Hindu god): *see* Gaṇeśa.

Gāṇapatya, member of an esoteric Hindu sect devoted to the worship of the elephant-headed Gaṇeśa (also called Gaṇapati) as the supreme deity. The sect was at its height in about the 10th century and helped to establish Gaṇeśa as an important minor deity to be propitiated at the beginning of all important undertakings and religious ceremonies. The sect erected temples dedicated to Gaṇeśa, the largest of which is the Ucchi-pillaiyar Kovil, a rock-cut temple near Tiruchchirāppalli in Tamil Nadu state.

Gaṇapati was worshipped both by meditating upon his image and by offering him fruit and flowers without meditation. Sect members wore a red circle on their foreheads and branded themselves on the shoulders with the mark of an elephant's face and tusk.

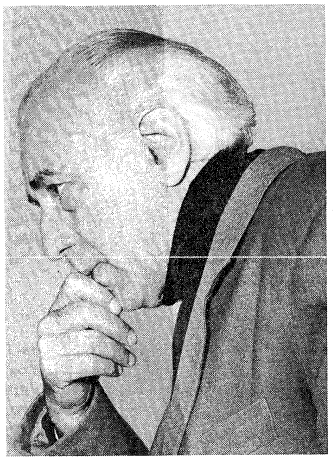
Ganassa, Zan, pseudonym of ALBERTO NASELLI, Naselli also spelled NASELI (b. 1540?—d. 1584?), one of the most important and influential actors and company managers of the early Italian commedia dell'arte.

Ganassa, who took his name from that of a character he invented, was perhaps the first to take a commedia company beyond the borders of Italy. Evidence exists of his appearances at Mantua (1568) and Ferrara (1570), and a performance by him and his company in Paris in 1571 was perhaps the first of an Italian troupe in that capital. The company appeared in France several times during the next three years, most notably in 1572, when they were invited by Charles IX to entertain at the wedding of his sister, Margaret of Valois, to Henry of Navarre.

By 1574 Ganassa and his troupe were performing in Madrid, beginning a decade's work in Spain and making one of the first appearances by a commedia troupe in that country. The company eventually acted in at least four theatres in Madrid, as well as in theatres at Seville, Valladolid, Guadalajara, Toledo, and elsewhere. The influences of Ganassa and his company upon the nascent Spanish professional theatre were many: the business

organization of the commedia troupe was adopted by the Spanish; the *corrales* (theatres) being constructed at this time were altered to accommodate the practice of the Italians; and the new secular drama, especially the plays of Lope de Vega, frequently reflected the characters and situations that were the stock of the foreigners.

Gance, Abel (b. Oct. 25, 1889, Paris, Fr.—d. Nov. 10, 1981, Paris), important director in the post-World War I revival of the French cinema who is best known for extravagant historical spectacles.



Gance, 1954
H. Roger-Viollet

Working in the cinema from 1909, Gance became identified with the Impressionist school, a group of filmmakers who worked to gain respect for the film as an art form. He was first recognized for *Mater dolorosa* (1917; "Sorrowful Mother," remade in 1932) and *La Dixième Symphonie* (1918; "Tenth Symphony"). Influenced by the epic style of the pioneer American director D.W. Griffith, he soon earned a reputation for grand-scale dramas such as *J'accuse!* (1918; "I Accuse!", remade in 1937), a 14-reel antiwar statement, and *La Roue* (1922; "The Wheel"), a film about railway workers and the mechanization of modern life that was consciously composed to a definite rhythmic pattern.

Napoléon vu par Abel Gance (1927; "Napoleon as Seen by Abel Gance," re-edited and revised in 1934, 1971, and 1979), his best-known film, was a monumental four-year undertaking in which he used experimental techniques such as superimposition, hand-coloured film, and rapid cutting to emphasize cinematic movement; it included sweeping battle sequences filmed with three separate cameras. When the film was exhibited in the theatres, three projectors showed separate views of certain vital scenes on each of three connecting screens. This Polyvision technique was a precursor of Cinerama, the wide-screen process using synchronized projectors popularized during the 1950s. Gance also pioneered in the use of stereophonic sound. Another of Gance's ambitious films was *Un Grand Amour de Beethoven* (1936; *The Life and Loves of Beethoven*). His later films, mainly period adventures, included *La Tour de Nesle* (1954; "The Tower of Nesle"), *Austerlitz* (1960; *The Battle of Austerlitz*), and *Cyrano et d'Artagnan* (1963).

Gand (Belgium): *see* Ghent.

Ganda, also called BAGANDA, or WAGANDA, people inhabiting the area to the west and north of Lake Victoria and speaking a Bantu language—called Ganda or Luganda—of the Benue-Congo group. The Ganda are the most numerous people in Uganda and their territory the most productive and fertile. Once the core of the Uganda Protectorate, they have a higher standard of living and are more literate and modernized than any other people in Uganda.

The traditional Ganda are settled hoe cultivators, with plantains their staple food. They also grow cotton and coffee for export. They keep sheep, goats, chickens, and cattle.

Descent, inheritance, and succession are patrilineal. About 50 exogamous clans are recognized, each having principal and secondary totem animals that may not be killed or eaten.

Traditional Ganda religion recognized ancestors, past kings, nature spirits, and a pantheon of gods who were approached through spirit mediums. Most modern Ganda, however, are Christian. Traditional Ganda villages were compact, centred on the chief's house.

By the early 19th century the Ganda had developed a well-organized, efficient administrative hierarchy and a sophisticated political system centred on the institution and person of the *kabaka* (king). The *kabaka* was also the high priest and supreme judge of the land. Ruling through a system of governors and district chiefs, the *kabaka* maintained absolute control over his ever-expanding kingdom. The Ganda state was organized for war, the Nyoro being its hereditary enemies. On becoming the first in the region to accept British influence, the Ganda gained even greater power and a special status in the politics of the Uganda Protectorate, a status they retained after the departure of the British. In 1966, however, under the Ugandan administration of Milton Obote, the centuries-old kingship was abolished; the last *kabaka,* Mutesa II, died in exile in England in 1969. *See also* Buganda.

Gandak River, also called NĀRĀYANI RIVER, river in Nepal and northern India. It is formed by the union of the Kāli and Trisūli rivers, which rise in the Great Himalaya Range in Nepal; from this junction to the Indian border the river is called the Nārāyani. It flows southwest into India and then turns southeast along the Uttar Pradesh–Bihār state border and across the Gangetic Plain. It enters the Ganges River opposite Patna after a winding course of 475 miles (765 km). A dam on the India–Nepal border serves the Tribeni Canal. The Burhi (Old) Gandak flows parallel to and east of the Gandak River in an old channel. It joins the Ganges northeast of Monghyr.

Gander, town, northeastern Newfoundland, Canada, just north of Gander Lake, 206 miles (332 km) northwest of St. John's. It has one of the largest international airports in North America. The site was selected as an air base in 1935 by the British Air Ministry, and transatlantic flights began in 1939. During World War II it was a vital base for air ferries to Britain and Atlantic patrol aircraft. In 1945 the base became a civil airport controlled by the Newfoundland government, and in 1949, when Newfoundland became a province, the airport was acquired by the Canadian government. The modern town, built on a new site a few miles from the field, was incorporated in 1954. Gander's name derives from the river (and the abundant wild geese in the area) that feeds the lake. Pop. (1986) 10,207.

Gandersheim (Germany): *see* Bad Gandersheim.

Gandhāra, historic region in what is now northwestern Pakistan, a meeting place of Indian and Mediterranean influences in ancient times. It was subject to Achaemenidian Iran in the 6th and 5th centuries BC and was conquered by Alexander the Great in the 4th century BC. It was thereafter ruled successively by the Mauryas, Indo-Greeks, Śakas, and Parthians.

Taxila and Peshāwar, its chief cities, were important cultural centres. From the 1st century BC to the 6th–7th century AD, Gandhāra was the home of a distinctive Buddhist art style (*see* Gandhāra art).

Gandhāra art, style of Buddhist visual art that developed in what is now northwestern Pakistan and eastern Afghanistan between the 1st century BC and the 7th century AD. The style, of Greco-Roman origin, seems to have flourished largely during the Kushān dynasty and was contemporaneous with an important but dissimilar school of Kushān art at Mathura (Uttar Pradesh, India).

The Gandhāra region had long been a crossroads of cultural influences. During the reign of the Indian emperor Aśoka (early 3rd century BC), it was the scene of intensive Buddhist missionary activity; and, in the 1st century AD, rulers of the Kushān empire, which included Gandhāra, maintained contacts with Rome. In its interpretation of Buddhist legends the Gandhāra school incorporated many motifs and techniques from classical Roman art, including vine scrolls, cherubs bearing garlands, tritons, and centaurs. The basic iconography, however, remained Indian.

The materials used for Gandhāra sculpture were green phyllite and gray-blue mica schist, which, in general, belong to an earlier phase, and stucco, which was used increasingly after the 3rd century AD. The sculptures were originally painted and gilded.

Gandhāra's role in the evolution of the Buddha image has been a point of considerable disagreement among scholars. It now

The Buddha preaching, relief from Gandhāra, schist, c. 2nd century AD; in the Prince of Wales Museum of Western India, Bombay
P. Chandra

seems clear that the schools of Gandhāra and Mathurā each independently evolved its own characteristic depiction of the Buddha in about the 1st century AD. The Gandhāra school drew upon the anthropomorphic traditions of Roman religion and represented the Buddha with a youthful Apollo-like face, dressed in garments resembling those seen on Roman imperial statues. The Gandhāra depiction of the seated Buddha was less successful. The schools of Gandhāra and Mathurā undoubtedly influenced each other, and the general trend was away from a naturalistic conception and toward a more idealized, abstract image.

The composition of the Gandhāra reliefs, meant to adorn stupas and other sacred buildings, is similar in its simplicity and frontal representation to that of reliefs from Sānchi and Mathura, but the Gandhāran craftsmen made a lasting contribution to Buddhist art in their composition of the events of the Buddha's life into set scenes. The stupa at Gandhāra is distinctive for its more elaborate ornamentation; the railing is absent, and narrative and dec-

orative reliefs are transferred directly to the body of the monument. *See also* Kushān art; Mathurā school.

Gandhi, Indira (Priyadarshini) (b. Nov. 19, 1917, Allahābād, India—d. Oct. 31, 1984, New Delhi), politician who served as prime minister of India for three consecutive terms (1966–77) and a fourth term (1980–84). She was assassinated by Sikh extremists.

She was the only child of Jawaharlal Nehru, a nationalist leader who became the first prime minister of independent India. She attended Visva-Bharati University, West Bengal, and Oxford University, and in 1942 she married Feroze Gandhi (d. 1960), a fellow member of the national Congress Party. She was a member of the working committee of the ruling Congress Party from 1955, and in 1959 she was elected to the largely honorary post of party president. Lal Bahadur Shastri, who succeeded Nehru as prime minister in 1964, named her minister of information and broadcasting in his government.

Indira Gandhi
AP/Wide World Photos

On Shastri's sudden death in January 1966, she became leader of the Congress Party (and thus also prime minister) in a compromise between the right and left wings of the party. Her leadership, however, came under continual challenge from the right wing of the party, led by a former minister of finance, Morarji Desai. In the election of 1967 she failed to win an absolute majority and had to accept Desai as deputy prime minister. In 1971, however, she won a sweeping electoral victory over a coalition of conservative parties. Gandhi strongly supported East Bengal (now Bangladesh) in its secessionist conflict with Pakistan in late 1971, and India's armed forces achieved a swift and decisive victory over Pakistan that led to the creation of Bangladesh.

In March 1972, after India's victory over Pakistan, Gandhi again led her New Congress Party to a landslide victory in national elections. Shortly afterward her defeated Socialist opponent charged that she had violated the election laws. In June 1975 the High Court of Allahābād ruled against her, which meant that she would be deprived of her seat in Parliament and would have to stay out of politics for six years. In response, she declared a state of emergency, imprisoned her opponents, and assumed emergency powers, passing many laws limiting personal freedoms. During this period she implemented several unpopular policies, including large-scale sterilization as a form of birth control. When long-postponed national elections were held in 1977, Gandhi and her party were soundly defeated, whereupon she left office. The Janata Party took over the reins of government.

Early in 1978 Gandhi's supporters split from the Congress Party and formed the Congress (I)—I for Indira—Party. Gandhi was briefly imprisoned (October 1977 and December 1978) on charges of official corruption. Despite these setbacks, she won a new seat in Parliament in November 1978, and her Congress (I) Party began to gather strength. Dissension within the ruling Janata Party led to the fall of its government in August 1979. When new elections for the Lok Sabha (lower house of Parliament) were held in January 1980, Gandhi and her Congress (I) Party were swept back into power in a landslide victory. Her son Sanjay Gandhi, who had become her chief political adviser, also won a seat in the Lok Sabha. All legal cases against Indira, as well as against her son, were withdrawn.

Sanjay Gandhi's death in an airplane crash in June 1980 eliminated Indira's chosen successor to the political leadership of India. After Sanjay's death, Indira groomed her other son, Rajiv, for the leadership of her party. During the early 1980s, Indira Gandhi was faced by threats to the political integrity of India. Several states sought a larger measure of independence from the central government, and Sikh extremists in the Punjab used violence to assert their demands for an autonomous state. In response, Gandhi ordered an army attack in June 1984 on the Golden Temple of Amritsar, the Sikhs' holiest shrine, which led to the deaths of more than 450 Sikhs. Five months later Gandhi was killed in her garden by a fusillade of bullets fired by two of her own Sikh bodyguards in revenge for the attack on the Golden Temple. (One of the assailants died soon after the attack; the other, along with a third coconspirator, was tried and sentenced to death.)

Gandhi adhered to the quasi-socialist economic policies begun by her father. She established closer relations with the Soviet Union, depending on that nation for support in India's longstanding conflict with Pakistan.

Gandhi, Mohandas Karamchand, byname MAHATMA ("Great-Souled") GANDHI (b. Oct. 2, 1869, Porbandar, India—d. Jan. 30, 1948, Delhi), leader of the Indian nationalist movement against British rule, considered to be the father of his country. He is internationally esteemed for his doctrine of nonviolent protest to achieve political and social progress.

A brief treatment of Gandhi follows. For full treatment, *see* MACROPAEDIA: Gandhi.

Reared in a deeply religious home that decreed pacifism and the sanctity of all living things, Gandhi received an indifferent formal education in India and in 1888 began law studies in England. In quest of clerical work he went to South Africa (1893–1914) and was shocked at the racial discrimination there. He became an advocate for his fellow Indians in South Africa and undertook a series of challenges to the government that led to jail. After thorough soul-searching, he entered politics in India in 1919 to protest British sedition laws. He emerged as the head of the Indian National Congress and advocated a policy of nonviolent noncooperation to achieve Indian independence. In 1930 he led a march to the sea to protest the British-imposed tax on salt, and by the following spring the making of salt for personal use was permitted. Imprisoned throughout much of World War II, in August 1947 he negotiated with the British for an autonomous Indian state. In January 1948 he was shot by a Hindu fanatic.

Gandhi was one of the very few people who impressed an idea upon a historical epoch. That idea was nonviolence. Gandhi's creed of nonviolence insisted that people struggling for their rights should never violate their basic obligation to respect life.

Gandhi, Rajiv (b. Aug. 20, 1944, Bombay, India), the leading general secretary of India's Congress (I) Party (from 1981) and prime minister of India (1984–89) after the assassination of his mother, Indira Gandhi.

He and his younger brother Sanjay (1946–80), the sons of Feroze and Indira Gandhi, were educated at the prestigious Doon School in Dehradun. Rajiv then attended Imperial College, London, and completed an engineering course at the University of Cambridge (1965). After returning to India, he took flying lessons, acquired a commercial pilot's license, and in 1968 began piloting for Indian Airlines.

While his brother was alive, Rajiv largely stayed out of politics; but, after Sanjay, a vigorous political figure, suddenly died in an airplane crash on June 23, 1980, Indira Gandhi, then prime minister, drafted him into a political career. In June 1981 he was elected in a by-election to the Lok Sabha (lower house of Parliament) and in the same month became a member of the national executive of the Youth Congress.

Whereas Sanjay had been described as politically "ruthless" and "willful" (he was considered a prime mover in his mother's state of emergency in 1975–77), Rajiv was regarded as a nonabrasive person who consulted other party members and refrained from hasty decisions. When his mother was killed on Oct. 31, 1984, Rajiv was sworn in as prime minister that same day and was elected leader of the Congress (I) Party a few days later. He led the Congress (I) Party to a landslide victory in elections to the Lok Sabha in December 1984, but his leadership proved ineffectual and he resigned his position as prime minister—though he remained party leader—in November 1989.

Gāndhīnagar, town, capital of Gujarāt state, west-central India. It is located on the banks of the Sābarmati River, north of the former capital of Ahmadābād. Built to supplant the former capital, the town was begun in 1966. The first state government offices were transferred there in 1970. An expressway connects Gāndhīnagar with Ahmadābād. Pop. (1981) 62,443.

Gandía, city, Valencia *provincia,* in the *comunidad autónoma* ("autonomous community") of Valencia, eastern Spain. It lies south of Valencia city at the mouth of the Serpis River. Once a Greek settlement, Gandía was occupied by the Moors in the 8th century and recaptured in 1252 by James I of Aragon, who ordered it rebuilt. It later became a duchy of the Borgia (Borja) family, whose 14th-century palace still stands. St. Francis Borgia, 4th Duke de Gandía, third general of the Society of Jesus, and a native of the city, founded the first Jesuit college there in 1546. The Gothic Monastery of San Jerónimo de Cotalba was founded in the 14th century.

A port city, Gandía has a shipping industry, as well as factories for tanning, silk spinning, and crate making. Pop. (1981) 48,494.

Gando (Nigeria): *see* Gwandu.

Gandzha (Azerbaijan S.S.R.): *see* Kirovabad.

Gaṇeśa, also spelled GANESHA, also called GAṆAPAṬI, elephant-headed Hindu god, the son of Śiva and Pārvatī. Gaṇeśa, considered the remover of obstacles, is the first god invoked at the beginning of worship or a new enterprise, and his image is often seen at the entrance of temples or houses. He is a patron of letters and learning, and he is the legendary scribe who wrote down the *Mahābhārata* ("Great Epic of the Bharata Dynasty") from Vyāsa's dictation. He is also called the chief of the *gaṇas* (attendants of Śiva). Gaṇeśa is usually depicted coloured red; he is pot-bellied, has one tusk broken, and has four arms that may hold a noose, a goad, a pot of rice or sweetmeats, and his broken tusk or that may bestow boons or protection. He rides on a rat.

One account of his birth is that Pārvatī formed him from the rubbings of her body so that he might stand guard at the door while she bathed. When Śiva approached, unaware this was his son, he was enraged at being kept away from his wife and sent his attendants against Gaṇeśa, whose head was cut off in the battle. To ease Pārvatī's grief, Śiva promised

to cut off the head of the first living creature that he came across and join it to the body. This was an elephant. Although Gaṇeśa was worshiped by a small medieval sect (the Gāṇapatya) as their chief god, he is a subsidiary figure in modern Hinduism. During the early part of the 20th century, his festivals were

Gaṇeśa dancing, relief from Farrukhābād, Uttar Pradesh, India, 10th century AD; in the State Museum, Lucknow, India

Pramod Chandra

revitalized by the Indian independence leader Balgangadhar Tilak; Gaṇeśa-caturthī, the festival celebrating his birth, falls on the fourth day (*caturthī*) of the lunar month Bhādrapada (August–September) and is observed with particular enthusiasm in the state of Mahārāshtra.

Gang (people): *see* Acholi.

Gang of Four, Chinese (Pinyin) SIRENBANG, Wade–Giles SSU-JEN-PANG, the most powerful members of a radical political elite convicted for implementing the harsh policies directed by Communist Party chairman Mao Zedong during the Cultural Revolution (*q.v.*) of the 1960s and early 1970s. The group included Mao's third wife, Jiang Qing, and Wang Hongwen, Zhang Chunqiao, and Yao Wenyuan. Their backgrounds were similar in that, prior to 1966, all four were low-ranking officials who lacked leverage within the existing power structure. Shared traits included their ability to manipulate the mass media, their good standing with Mao, and their dislike of and subsequent desire to overthrow moderate government officials who clustered around Liu Shaoqi and Deng Xiaoping.

The group came into prominence in 1965, when Wu Han's play *Hai Jui Dismissed from Office* was banned as a direct result of an investigation by Jiang Qing into its political character, which resulted in a published denunciation of the play by Yao Wen-yuan. This case set a precedent for radicalizing the arts and, in effect, signaled the beginning of the Cultural Revolution.

As the Cultural Revolution intensified, the members of the Gang of Four advanced to high positions in the government and the Communist Party. Manipulating the youthful Red Guards, the Gang of Four controlled four areas: intellectual education, basic theories in science and technology, teacher–student relations and school discipline, and party policies regarding intellectuals. After the turmoil of the Cultural Revolution subsided in 1969, the Gang of Four maintained their power through control of the media and propaganda outlets and by their seeming adherence to Mao's policies and wishes. With Mao's death in 1976, however, the Gang of Four lost their remaining power and were imprisoned and later tried in 1980–81 for their activities during the Cultural Revolution. Jiang and Zhang both received suspended death sentences; Wang was sentenced to life imprisonment, and Yao to a 20-year term.

Gaṅgā (India): *see* Ganges River.

Gaṅga DYNASTY, either of two distinct but remotely related Indian dynasties. The Western Gaṅgas ruled in Mysore state (Gaṅgavāḍi) from about AD 250 to about 1004. The Eastern Gaṅgas ruled Kaliṅga from 1028 to 1434–35.

The first ruler of the Western Gaṅga, Koṅgaṇivarman, carved out a kingdom by conquest, but his successors, Mādhava I and Harivarman, expanded their influence by marital and military alliances with the Pallavas, Cālukyas, and Kadambas. By the end of the 8th century a dynastic dispute weakened the Gaṅgas, but Būṭuga II (*c.* 937–960) obtained extensive territories between the Tungabhadra and the Krishna rivers, ruling from Talakād (the capital) to Vātāpi. Repeated Cōḷa invasions cut the contact between Gaṅgavāḍi and the imperial capital, and Talakād fell into the hands of the Cōḷa Viṣṇuvardhana in about 1004. Most of the Western Gaṅgas were Jainas, but some patronized Brahmanical Hinduism. They encouraged scholarly work in Kannada (Kanarese), built some remarkable temples, and encouraged deforestation, irrigation, and cross-peninsular trade.

The Eastern Gaṅgas arose to intermarry with and challenge the Cōḷas and Cālukyas in the period when the Western Gaṅgas had been forced to abandon this role. Early dynasties of the eastern Gaṅgas ruled in Orissa from the 8th century; but Vajrahasta III, who assumed the title of Trikaliṅgādhipat (ruler of the three Kaliṅgas) in 1028, was probably the first to rule all three divisions of Kaliṅga. His son Rājarāja I waged war upon the Cōḷas and the Eastern Cālukyas and strengthened the dynasty by marrying a Cōḷa princess, Rājasundarī. Their son, Anantavarman Cōḍagaṅgadeva, ruled from the mouth of the Ganges in the north to the mouth of the Godāvari in the south; he began building the great Jagannātha temple at Purī at the end of the 11th century. Rājarāja III ascended the throne in 1198 and did nothing to resist the Muslims of Bengal, who invaded Orissa in 1206. Rājarāja's son Anaṅgabhīma III, however, repulsed the Muslims and built the temple of Megheśvara at Bhuvaneśvara. Narasiṃha I, the son of Anaṅgabhīma, invaded southern Bengal in 1243, defeated its Muslim ruler, captured the capital (Gauḍa), and built the Sun Temple at Konārak to commemorate his victory. With the death of Narasiṃha in 1264, the Eastern Gaṅgas began to decline; the sultan of Delhi invaded Orissa in 1324, Muslims raided in 1353, and Vijayanagar defeated the Orissan powers in 1356. Narasiṃha IV, the last known king of the Eastern Gaṅga dynasty, ruled until 1425. The "mad king," Bhānudeva IV, who succeeded him, left no inscriptions; his minister Kapilendra usurped the throne and founded the Sūryavaṃśa dynasty in 1434–35. The Eastern Gaṅgas were great patrons of religion and the arts, and the temples of the Gaṅga period rank among the masterpieces of Hindu architecture.

Gangānagar, formerly SRI GANGĀNAGAR, town, extreme northern Rājasthān state, northwestern India. During the 1970s it grew rapidly as an agricultural distribution centre. The town has textile, sugar, and rice mills. A meteorological station and a number of colleges affiliated with the University of Rājasthān are located there.

The area in which Gangānagar is situated was formerly a part of Bīkaner princely state. The region is a fertile plain that was once desert; its productive potential has increased as a result of the development of the Rājasthān Canal project. The chief crops are sugarcane, wheat, gram, corn (maize), barley, and cotton. Pop. (1981) town, 123,692.

Ganganelli, Giovanni Vincenzo Antonio (pope): *see* Clement XIV.

Ganges River, Hindi GAṄGĀ, great river of the plains of North India, held sacred by people of the Hindu faith.

A brief treatment of the Ganges River follows. For full treatment, *see* MACROPAEDIA: Asia.

The Ganges' five headstreams—the Bhāgirathi, Alaknanda, Mandakini, Dhauli Ganga, and Pindar—all rise in northernmost Uttar Pradesh state in India. On its 1,560-mile (2,510-kilometre) course the Ganges flows in a southeasterly direction across the Gangetic Plain from Uttar Pradesh through the Indian states of Bihār and West Bengal.

Its major tributaries include the Jumna (Yamuna), Rāmganga, and Ghāghara rivers in Uttar Pradesh and the Gandak, Burhi Gandak, and Kosi rivers in Bihār. In central Bangladesh the Ganges is joined from the north by the great Brahmaputra River near Goalundo Ghāt and from the northeast by the Meghna River above Chāndpur. Their combined waters empty into the Bay of Bengal through innumerable channels that form a delta 200 miles (320 km) wide which is shared by India and Bangladesh.

The Gangetic Plain is one of the most fertile and densely populated regions in the world. Because there is little relief across the surface of the plain, the Ganges for most of its course is a wide and sluggish stream. Its total drainage basin covers an area of about 376,800 square miles (975,900 square km), or roughly a quarter of the territory of India, and supports more than 300,000,000 people. The land of the basin is now intensely cultivated. The water supply of the Ganges system is dependent partly on the rains brought by the monsoon winds from July to October, as well as on the flow from melting Himalayan snows in the hot season from April to June.

Use of the river's water for irrigation, either when the Ganges floods or by means of gravity canals, has been common since early times. Irrigation has increased the production of such food and cash crops as wheat, sugarcane, cotton, and oilseeds in Uttar Pradesh and Bihār. River traffic is insignificant above the Middle Ganges Basin around Allahābād, where railways serve the region, but the rural people of West Bengal and Bangladesh continue to rely on the waterway to transport jute, tea, grain, and other agricultural products.

Ganges-Yamuna Doab, segment of the Gangetic Plain in western and southwestern Uttar Pradesh state, northeastern India, with an area of about 23,360 square miles (60,500 square km). It lies between the Ganges and Yamuna rivers, west of the Upper Ganges Plain, is about 500 miles (800 km) in length and 60 miles (100 km) in width, and consists of a wide trough between the Great Himalayas in the north and the Deccan Plateau in the south. It was formed by sediment deposited by rivers flowing southward from the Himalayas.

The doab can be divided into three sections: Upper, Middle, and Lower. The Upper Doab extends from Hardwār town on the north to Alīgarh town on the south. It has a gentle slope and is crisscrossed by a number of streams. Secondary transverse slopes on older floodplains have developed in the Middle Doab. The topography flattens out in the Lower Doab, where the Sind, Betwa, and Ken streams run parallel to each other. Geologically, the whole region forms part of the alluvial Indo-

Ganges trough. Forests, occurring in patches, are composed of acacia and teak. The regional economy is dominated by agriculture based on intensive cultivation and crop rotation; crops include cereals, pulse (legumes), sugarcane, fruits, and vegetables. Livestock raising and dairy farming are also important. The region is highly industrialized and produces refined sugar, printed calico, fans, automobile radiators, insulated wire, textile machinery, textiles, brass and copper utensils, and railroad equipment. Roads and railways link the regional centres, and there are airports at Kānpur and Allahābād. Meerut, Alīgarh, Sahāranpur, and Ghāziābād are other important towns. The doab is one of the most fertile and densely populated regions in India.

ganglion, plural GANGLIA, dense aggregate of nerve-cell bodies present in most animals more advanced than cnidarians. In flatworms (*e.g., Planaria*) there are two lateral neuronal cords that carry impulses to and from a pair of ganglia at the head of the animal. In more advanced groups, such as earthworms and arthropods, there are pairs of ganglia at intervals along the body that largely control the actions of each body segment, as well as a larger, dorsal pair in the head. This latter pair of ganglia, considered the brain in these more advanced invertebrates, acts mostly to inhibit responses rather than to direct them. In vertebrates the term ganglion denotes a cluster of neural bodies outside the central nervous system; a spinal ganglion is such a cluster of nerve bodies positioned along the spinal cord at the root of a spinal nerve. The dorsal root ganglia contain the cell bodies of afferent nerve fibres (those carrying impulses toward the central nervous system); efferent motor neurons are present in the ventral root ganglia.

ganglion blocking agent, any drug that blocks the conduction of an impulse from one nerve cell to another through a ganglion (*e.g.,* group of nerve cell bodies) of the autonomic nervous system.

This blockage causes vascular walls to dilate, resulting in a decrease in blood pressure. Ganglionic blocking agents also decrease blood flow through the kidneys and the volume of gastric and salivary secretions. Partial to total impairment of the voiding contractions of the urinary bladder is one undesirable effect.

These drugs were formerly used in routine treatment of hypertension but have been replaced by more specific agents; they are still used in the emergency treatment of acute hypertensive cardiovascular disease. A secondary use is to reduce hemorrhage during surgery. *See also* neuromuscular blocking agent.

Gangra (Turkey): *see* Çankırı.

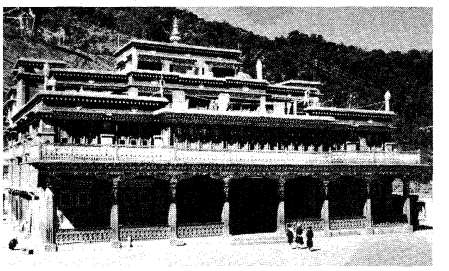
gangrene, localized death of animal soft tissue, caused by prolonged interruption of the blood supply that may result from injury or infection. Diseases in which gangrene is prone to occur include arteriosclerosis, diabetes, Raynaud's disease, thromboangiitis obliterans (Buerger's disease), and typhus. It also may occur after severe burns, freezing, or prolonged bed rest (bed sores).

Gangrene is differentiated as being either dry or moist. Dry gangrene results from a gradual decrease in the blood supply (as from diabetes or arteriosclerosis) in the affected area, often an extremity. The diseased part may at first be discoloured and cold to the touch; later it becomes distinct from nearby healthy tissue, turning dark and dry. If the infection is confined to a small area, the diseased tissue may eventually dry up completely and fall off. Treatment involves improving the blood flow to the affected area.

Moist gangrene develops when the blood supply is suddenly cut off, as by a severe burn or an arterial blood clot. Tissue that has not been destroyed by the trauma begins to leak fluids, which then foster the growth of bacteria. The affected area becomes swollen and discoloured and later becomes foul-smelling. If not treated, the infection can spread beyond the wound and cause death. The administration of antibiotics is the principal treatment, which may be supplemented by the removal of diseased tissue to stop the spread of the infection.

A different and more virulent form, gas gangrene, is caused by infection with bacteria of the genus *Clostridium,* which grow only in the absence of oxygen. It typically develops in deep crushing or penetrating wounds, as in war wounds, that are improperly cleansed; it may also be a sequel to an improperly performed induced abortion. Within three or four days the wound begins to exude brownish, foul-smelling pus. Numerous gas bubbles, produced by a toxin released by the bacteria, form under the skin. The toxin is extremely lethal, and if the affected area is not treated, the infection spreads rapidly, causing death. Treatment involves removing all dead and diseased tissue and administering antibiotics. In some instances a polyvalent antitoxin derived from horses is also given, and occasionally a severely affected limb is placed in a high-pressure oxygen chamber to inhibit the growth of bacteria. *See also* infarction; necrosis.

Gangtok, town, capital of Sikkim state, northeastern India. It lies at an elevation of 5,600 feet (1,700 m). The town (the name of which means "top of the hill") rises over slopes extensively terraced in corn (maize). It was the governmental seat of the kingdom of Sikkim until the monarchy was abolished (1975) and Sikkim was annexed by India (1976).



The Buddhist monastery of Rumtek, near Gangtok, Sikkim, India

N. Merrifield—Shostal Assoc./EB Inc.

The capital serves as a market centre for corn, rice, pulses, and oranges. It was an important point on the India–Tibet trade route via Nathula (Nathu Pass), 13 miles (21 km) northeast, until the border with Tibet was closed in 1962. From Gangtok the North Sikkim Highway (1962) reaches the Tibetan border areas via Lachung and Lachen, and the National Highway runs southwest to India.

Gangtok has a hospital, secondary school, and law court and some modern shops, hotels, and cinemas. The town's landscape is marked by the former royal palace and chapel, two monasteries, the open-air Lall Market, the Namgyal Institute of Tibetology (1958; a centre for research in Mahāyāna Buddhism with a library and a museum), and the Cottage Industries Institute (1957). The noted Buddhist monastery of Rumtek is 5 miles (8 km) southwest, and the royal cremation ground is at nearby Lukshiyama. In Gangtok are government-maintained nurseries for cardamom—an important export—and subtropical fruits, and there is an experimental agricultural station at Tadong, to the south. The population includes Nepalese, Tibetans, Lepchās, and Indians. Pop. (1981) 36,747.

Ganioda'yo, English HANDSOME LAKE (b. *c.* 1735, Ganawaugus, N.Y.—d. Aug. 10, 1815, Onondaga, N.Y., U.S.), Seneca Indian chief who developed a new religion for the Iroquois (*see* Handsome Lake cult). The cult was so successful that in the 20th century several thousand Indians still adhered to it.

After a somewhat dissolute life, Ganioda'yo became seriously ill in 1799 and was near death. On his recovery he declared that he had been visited by three spirits, who revealed to him the will of the Great Spirit. From 1800, as an itinerant preacher of the religion that he called Gai'wiio ("Good Message"), he urged his people to refrain from adultery, drunkenness, laziness, and witchcraft. He explained his beliefs to Thomas Jefferson on the occasion of a visit to that president. His combination of old beliefs with Christian ethics provided the Iroquois with a faith that revitalized their civilization at a time when it was threatened with extinction by the white man's culture.

Ganivet y García, Ángel (b. Dec. 13, 1865, Granada, Spain—d. Nov. 29, 1898, Riga, Latvia, Russian Empire), Spanish essayist and novelist, considered a precursor of the Generation of '98 because of his concern for the spiritual regeneration of his country. Fluent in five languages, he served with the Spanish consular service in Antwerp, Helsinki, and Riga. An anguished and skeptical man facing an uncertain prognosis of a progressive disease, and disillusioned in love, he drowned himself in the Dvina River at age 33.

Ganivet's most important work is the *Idearium español* (1897; *Spain, an Interpretation*), an essay that examines the Spanish temperament and the historical basis of the political situation of his country. In this essay he asserts that Spaniards are basically stoical and that the country has wasted its energies on territorial aggrandizement. He maintains that Spain has suffered from "abulia," a state of paralysis of the will.

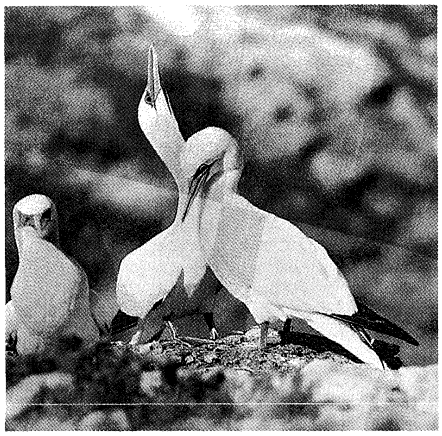
In addition to this work, Ganivet published two novels of a satirical-social nature: *La conquista del reino de Maya* (1897; "The Conquest of the Mayan Kingdom") and *Los trabajos del infatigable creador Pío Cid* (1898; "The Labors of the Indefatigable Creator Pío Cid"). In the former, the author satirizes European civilization and the customs of modern Spanish society. The latter novel addresses the problem of national apathy and calls for a revitalization of Spain. In the brilliant *Cartas finlandesas* (1905; "Letters from Finland"), Ganivet presents a contrast between Spanish and Nordic life and character.

Ganku, original name SAEKI KISHI (b. 1756, Kanazawa, Japan—d. Jan. 19, 1839, Kyōto), Japanese painter of the late Tokugawa period who established the Kishi school of painting.

A retainer of Prince Arisugawa in Kyōto and a holder of high rank, Ganku studied various styles of painting, including those of the Maruyama school, known for its realism, and of the Chinese painter Shen Nan-p'in, who had visited Japan in 1731. Ganku developed a realistic solid style and painted portraits, landscapes, flowers, and birds. He was particularly noted for his pictures of tigers.

gannet, any of three oceanic bird species within the family Sulidae (order Pelecaniformes). Closely related to the boobies and variously classified with them in the genus *Sula* or separated as *Morus* (or *Moris*), the gannets are the best known of the Sulidae. They are found in the northern Atlantic, where they are the largest seabirds, and also in temperate waters around Africa, Australia, and New Zealand. Adult gannets are mainly white with black-tipped wing feathers. They have a large, yellowish or buff-coloured head marked with black around the eyes. They have a tapered beak and a pointed tail. Gannets dive with half-closed wings into the sea in order to catch fish and squid. They waddle on land but are expert fliers, alternating rapid

wing beats with gliding. They spend most of their lives over water. Gannets nest in dense colonies on cliffs, brooding a single bluish, chalky egg for six or seven weeks in a nest of seaweed or mud. The young birds are fed by regurgitation and reach maturity in the third or fourth year.



Northern gannets (*Morus bassanus*)
William and Laura Riley

The largest of the three species is the 100-centimetre (40-inch) northern gannet, *Morus bassanus* (or *Sula bassana*), sometimes called solan goose; it breeds on islands in Canada, Greenland, Iceland, and northeastern Europe, wintering to the Gulf of Mexico, Morocco, and the Mediterranean. The two slightly smaller southern species are the Cape gannet (*M. capensis*), which breeds on islands off South Africa, and the Australian gannet (*M. serrator*), which breeds around Tasmania and New Zealand.

Gannett, Frank Ernest (b. Sept. 15, 1876, Bristol, N.Y., U.S.—d. Dec. 3, 1957, Rochester, N.Y.), American publisher who established a major chain of daily newspapers in small and medium-sized U.S. cities. During his career Gannett bought many newspapers and often merged them, creating one paper from two or more.

Gannett was reared in rural upstate New York, where his father was a farmer who later came to own several hotels. Frank attended Cornell University, where he worked on the school newspaper and was the campus correspondent for the *Ithaca Journal* (which he later owned) and the *Syracuse Herald.* Gannett graduated from Cornell in 1898, and in 1900 the *Ithaca Journal* hired him as city editor. He soon became managing editor and business manager, then moved through a variety of other editorial jobs with various newspapers until 1906. In that year he bought a half-interest in the *Elmira* (N.Y.) *Gazette,* his first publishing venture. In 1907 Gannett merged the *Gazette* with the Elmira *Star,* creating the *Star-Gazette,* eliminating competition, and setting a pattern for future acquisitions. In the next two decades Gannett acquired various newspapers in medium-sized cities in New York state; his strategy was to pursue the profitable advertising and expandable circulations presented by one-newspaper towns and cities, rather than trying to obtain possession of a single large, prestigious big-city newspaper.

Becoming interested in radio, Gannett in 1922 backed Lawrence G. Hickson's purchase of station WHQ in Rochester, N.Y., the first link in a Gannett broadcasting chain. By 1954 he owned 22 newspapers as well as four radio and three television stations. In general, Gannett gave the editors of his papers control over editorial policy, but he would not permit them to accept liquor advertisements. By the late 1970s the Gannett Company, Inc., was the United States' largest newspaper chain in terms of the number of different newspapers published.

Gannett Co., Inc., one of the largest newspaper groups in the United States. It also has interests in broadcasting and outdoor advertising. It is headquartered in Arlington, Va.

The company was started by the newspaperman Frank Ernest Gannett (*q.v.*), who in 1906 began buying small newspapers in New York state. The company was incorporated in 1923, and it grew as Gannett continued to purchase the newspapers of small and medium-sized cities. These newspapers were usually the only ones published in their city and so could be run very profitably. The company's growth was further spurred by the attention it paid to advertising and circulation and by its tight control of costs. By the late 1980s the Gannett Co. owned more than 90 daily newspapers with a total circulation of more than 6,000,000. In 1982 the company began publishing *USA Today,* the United States' first national, general-interest newspaper. In subsequent years the company began buying larger newspapers, including the *Des Moines Register* (1985), the *Detroit Evening News* (1986), and both of the newspapers in Louisville, Ky. The company also owns numerous radio and television stations and the largest billboard-advertising firm in the country.

Gans, Eduard (b. March 22, 1798, Berlin—d. May 5, 1839, Berlin), a major German jurist and, for a time, a potent force in the revival of studies of Jewish culture.

The son of prosperous Jewish parents, Gans studied law in Berlin, Göttingen, and Heidelberg (Ph.D., 1820), where he became a disciple of the philosopher Hegel. In 1819, in collaboration with Leopold Zunz, later a Judaic scholar, and Moses Moser, a merchant and mathematician, Gans founded and became president of the Society for Jewish Culture and Science, which attempted to demonstrate Jewish worth and bring about a rapprochement between Christians and Jews. The society was dissolved in 1824, but not without having initiated some important studies of Jewish culture, such as Zunz's biography of the great Jewish commentator Rashi (1040–1105) and Gans's analysis of the Mosaic law of inheritance.

In 1820 Gans became a lecturer on law in Berlin, but his religious faith ruled out his holding high-level positions. He converted to Christianity in 1825 and the following year was appointed professor of law at the University of Berlin. Gans's major work is *Das Erbrecht in weltgeschichtlicher Entwicklung,* 4 vol. (1824–35; "Historical Development of Inheritance Law"); his decision to write a historical work may have been influenced by the number of historical works in Hegel's corpus. Gans's treatise is valuable not only for its extensive survey of facts but also for its presentation of a general theory on the slow evolution of legal principles.

The Prussian government disapproved of Gans's liberal political views and banned his *Vorlesungen über die Geschichte der letzten fünfzig Jahre* (1833–34; "Lectures on the History of the Last Fifty Years"). His other works include studies of Roman civil law and an analysis of the basis of property. Gans edited the *Philosophie der Geschichte* ("Philosophy of History") in Hegel's *Werke,* to which he also wrote a preface.

Gans, Joe, byname of JOSEPH GAINES (b. Nov. 25, 1874, Baltimore—d. Aug. 10, 1910, Baltimore), American professional boxer known as the Old Master, perhaps the greatest fighter in the history of the lightweight division. Because he was black, he was compelled by boxing promoters to permit less-talented white fighters to last the scheduled number of rounds with him and occasionally to defeat him. He was also forced to fight at unnaturally low weights, and, perhaps as a result, he was so weakened that he contracted tuberculosis and died while a young man.

After 11 years of fighting, Gans won the world lightweight title by knocking out Frank Erne in one round at Fort Erie, Ont., on May 12, 1902. On Sept. 30, 1904, he fought a 20-round draw with the great welterweight champion Joe Walcott, who thereby retained his crown. Gans was already ill when he defended his lightweight championship against Battling Nelson at Goldfield, Nev., on Sept. 3, 1906. Gans, who gave one of his finest performances, won this match when Nelson deliberately fouled him in the 42nd round. In a return bout with Nelson in San Francisco on July 4, 1908, Gans was knocked out in 17 rounds.

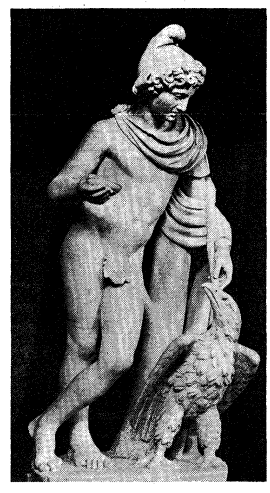
Gans spent several months in Arizona in an unsuccessful attempt to arrest his disease. When he returned to Baltimore to die, his train was greeted at each station by groups of boxing fans, and his impending death was treated as a national calamity by the press.

Gansu (China): *see* Kansu.

Gante, Pedro de, original name PEETER VAN DER MOERE (b. 1486?, Ghent, Flanders [now in Belgium]—d. 1572, Mexico City), Franciscan monk who founded the first school in New Spain (Mexico) and laid the foundations for future Indian education in the Spanish colonies.

In 1523 Gante (Spanish for "Ghent"), then confessor to the emperor Charles V, went to New Spain, where he established a village school for Indian children in Texcoco. Because he believed that education and religion should be natural parts of everyday life, Gante studied the native Indian language and taught reading, catechism, and native arts in both Spanish and the local dialect. Three years later he founded a similar school in Mexico City. There, teaching in both languages, he welcomed children and adults from all economic and social levels. His *Doctrina cristiana en lengua mexicana* ("Christian Doctrine in the Mexican Language") was published in Antwerp in 1528 and in Mexico in 1553.

Ganymede, Greek GANYMĒDĒS, Latin GANYMEDES, or CATAMITUS, in Greek legend, the son of Tros (or Laomedon), king of Troy.



Ganymede and Zeus in the form of an eagle, antique marble statue; in the Vatican Museum
Anderson—Alinari from Art Resource/EB Inc.

Because of his unusual beauty, he was carried off either by the gods or by Zeus, disguised as an eagle, or, according to a Cretan account, by Minos, to serve as cupbearer. In compensation, Zeus gave Ganymede's father a stud

of immortal horses (or a golden vine). From early times it was believed that Ganymede's kidnapper had a homosexual passion for him, hence the term catamite, derived from the popular Latin form of his name. He was later identified with the constellation Aquarius.

Ganymede, also called JUPITER III, largest satellite of Jupiter. It was discovered by Galileo in 1610 and named by the German astronomer Simon Marius not long afterward. Ganymede has a diameter of about 5,262 kilometres (3,262 miles), and it orbits Jupiter at a distance of 1,070,000 km (663,400 mi). The satellite's relatively low density of 1.93 grams per cubic centimetre indicates that its composition is roughly half rock and half ice by mass. Heat from formation by accretion and from decay of radioactive elements may have caused differentiation early in Ganymede's history, forming a core of rock surrounded by a thick layer of ice.

Ganymede was observed at close range in 1979 by the U.S. Voyager 1 and 2 planetary probes. It has two principal types of terrain, one dark and one bright. The dark terrain is present in broad, roughly polygonal regions that are separated by bands of the bright terrain. Both terrains have impact craters. The density of craters is higher in the dark terrain, indicating that it is the older of the two units. Craters of a given diameter are generally much shallower than craters of the same diameter on rocky bodies, suggesting the relaxation of Ganymede's topography by cold viscous flow of the ice-rich crust. Many of the craters have rays consisting of very bright ice deposits. They are similar in form to those associated with certain lunar craters.

Much of the bright terrain is covered by complex patterns of long, narrow topographic grooves. These grooves are typically several hundred metres deep and may be hundreds of kilometres long. They often lie in parallel sets, with adjacent grooves spaced about 5–10 km (3–6 mi) apart. The bright terrain in the grooves was probably formed during a period of tectonic activity in which internally generated stresses disrupted and fractured the crust. The exact time at which this activity occurred is not known, but the density of craters in the bright terrain suggests that it was early in Ganymede's history.

Ganz, Rudolph (b. Feb. 24, 1877, Zürich—d. Aug. 2, 1972, Chicago), pianist, conductor, and composer, who introduced works by contemporary composers such as Bartók, Ravel, and Vincent d'Indy, and who revived little-played older works in the keyboard repertory.

Ganz performed as a cellist at age 10 and as a pianist at 12. After study at the conservatories in Zürich, Lausanne, and Strasbourg, he studied piano in Berlin under the composer and piano virtuoso Ferruccio Busoni. He made his official debut in 1899 with the Berlin Philharmonic. He directed the piano department of Chicago Musical College (now part of Roosevelt University) from 1900 to 1905 and became vice president in 1927, president in 1933, and president emeritus in 1954. He conducted the St. Louis Symphony (1921–27) and the New York Philharmonic Young People's concerts (1938–49). His compositions include a symphony, works for piano and voice, and more than 200 songs.

Ganzhou (China): *see* Kan-chou.

Gao, historically KAWKAW, town and capital of Gao *région,* situated on the Niger River at the southern edge of the Sahara (desert) in eastern Mali, West Africa. Founded by fishermen in the 7th century AD, it is one of the oldest trading centres in West Africa. Gao became the capital of the Songhai Empire in the early 11th century. Under Songhai rule, the town thrived as a major trans-Saharan trading centre for gold, copper, slaves, and salt. The rulers of the Kingdom of Mali annexed Gao in 1325, but the Songhai people regained control of it some 40 years later. The Moroccans ended Songhai rule over Gao permanently in 1591, and the town's importance as a commercial centre declined thereafter. Today Gao serves as a terminus for large steamers emanating from Mopti and Koulikoro. A road crossing the Sahara links the town with Algeria, and other roads connect Gao with the Malian towns of Timbuktu and Mopti.

Gao *région* borders the countries of Algeria on the northeast, Niger on the east, Burkina Faso (formerly Upper Volta) on the south, and Timbuktu *région* on the west. Most of Gao *région*'s population live near the banks of the Niger River, where irrigation permits the growing of wheat, rice, and sorghum. The nomadic Tuareg of the Sahara and the Songhai of the Niger Valley constitute Gao's main inhabitants. Phosphate is mined in the Tilemsi area north of Gao town. Pop. (1976) town, 36,714; (1980 est.) *région,* 409,315.

Gao (Chinese surname): *see under* Kao, except as below.

Gao Gang, Wade–Giles romanization KAO KANG (b. *c.* 1902, Heng-shan, Shensi Province, China—d. *c.* 1955, China), one of the early leaders of the Chinese Communist Party and one of the most important figures in the Communist government established after 1949. His purge in 1954–55 was the biggest scandal in the Chinese Communist movement from the mid-1930s to the 1960s.

Gao joined the Chinese Communist Party in 1926 and spent much of the next 10 years participating in Communist guerrilla operations in his home Shensi Province. In the early 1930s he helped establish a Communist guerrilla base on the Shensi–Kansu provincial border. When the main Red Army under Mao Zedong occupied the area after completing the Long March, Gao became an important Communist official. By the early 1950s he was a full Politburo member, one of Mao Zedong's closest comrades, and the party and government head of the country's single most industrialized area, Manchuria (administratively designated the Northeast Region). Gao exercised virtually autonomous power in Manchuria and as such was the country's most powerful regional leader. He committed suicide shortly before he was publicly condemned by the party for deviating from Communist policies in April 1955. Gao's fall was accompanied by the purge of virtually all the key party leaders in the Northeast Region. The most credible speculation is that Gao and his close associates were purged because they had vehemently asserted their administrative independence of the central government in Peking.

gaon (Hebrew: "excellency"), plural GEONIM, the title accorded to the Jewish spiritual leaders and scholars who headed Talmudic academies that flourished, with lengthy interruptions, from the 7th to the 13th century in Babylonia and Palestine. The chief concern of the *geonim* was to interpret and develop Talmudic Law and to safeguard Jewish legal traditions by adjudicating points of legal controversy. Their replies (*responsa*) were quoted far beyond the limits of their own communities and are of great value in studying the Jewish history and theology of the period. The *geonim* continued a tradition of scholarship begun long before by the *soferim* (teachers and interpreters of biblical law) and kept alive in subsequent centuries by the *tannaim* and *amoraim* (who, respectively, produced the compilation of law called the Mishna and wrote commentaries on the Mishna, called Gemara).

A long-standing rivalry between the Babylonian and Palestinian *geonim* came to a head in the 10th century. Sa'adia ben Joseph, famous Babylonian *gaon* of the academy at Sura, bested his rival, Aaron ben Meir of Jerusalem, in a controversy involving calendar dates of Jewish festivals. Thereafter, the superiority of the Babylonian *geonim* was rarely questioned.

The prestige of the *geonim* gradually declined with the establishment of Talmudic academies elsewhere and the acceptance of local scholars as competent authorities on Jewish Law.

After the gaonic period, the term *gaon* was used simply as a title of honour to describe excellence in Jewish learning. Thus Elijah ben Solomon (1720–97) became known as *gaon* of Vilna or the Gaon.

Gaoual, town and administrative capital of Gaoual region, northwestern Guinea, West Africa, on the Fouta Djallon plateau. It lies at the point where the Koumba and Nomo rivers join to form the Tominé and is at the intersection of trade routes from Boké, Labé, Télimélé, and Koundara. It is the chief market town for cattle, peanuts (groundnuts), rice, millet, and cotton produced in the area and is also the site of a hospital. Gaoual region (area 4,439 sq mi [11,497 sq km]) is mostly a hilly savanna and is mainly inhabited by the Muslim Fulani (Peul), Landuma, and Tyapi peoples. Bauxite and iron-ore deposits have been discovered in the region. Pop. (1977 prelim.) region, 98,000.

Gaoyao (China): *see* Chao-ch'ing.

Gap, town, capital of the Hautes-Alpes *département,* Provence-Alpes-Côte-d'Azur region, southeastern France, south-southeast of Grenoble. Situated at an altitude of 2,406 ft (733 m) in a valley on the right bank of the Luye, a tributary of the Durance, it is a tourist centre surrounded by mountains. Through the town pass the main road from Briançon to the Rhône Valley and the Route Napoléon—the road that Napoleon took in 1815 when he crossed the Alps into France on his return from exile on Elba. Gap was the first place where he was well received. Known as Vapincum to the Romans, the town was founded by the Roman emperor Augustus in about 14 BC. The town remained under episcopal rule until 1512, when it was annexed by France. Gap has an agricultural market and is an industrial centre (food processing, underwear, and wood products). Pop. (1982) 21,798.

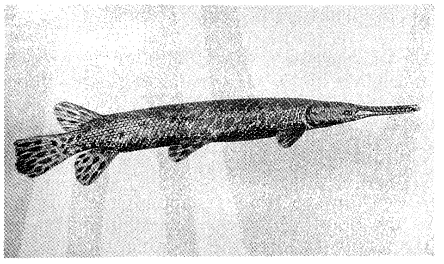
gap, submarine: *see* submarine gap.

gaper clam, also called HORSE CLAM (*Tresus nutalli* and *Tresus capax*), either of two species of bivalve mollusks of the family Mactridae. These clams live in sand and mud flats along the coast of western North America from British Columbia to Baja California. The shells of both species reach about 200 millimetres (8 inches) in length. They are roughly oblong in shape and creamy white in colour. Gaper clams have long, fused siphons that are contained in sheathlike tubes; the siphons are not fully retractable into the shell. The clams burrow up to one metre (three feet) deep into sediment. Gaper clams are edible and are heavily fished at spring tides. They are commonly infected with larval tapeworm cysts, but these are harmless to humans.

Gar (Tibet): *see* Ka-erh.

gar, any of several large North or Middle American fishes of the genus *Lepisosteus,* in the family Lepisosteidae. Gars, which are related to the bowfin in the superorder Holostei, are confined chiefly to fresh water, though some of the eight or so species descend to brackish or even salt water. They frequently bask like logs at the surface in sluggish waters and commonly breathe atmospheric air. Their jaws and face form a sharp-toothed beak, and their bodies are encased in an armour of diamond-shaped, thick, enamelled (ganoid) scales.

During the Eocene epoch (57.8 to 36.6 million years ago), gars lived in Europe as well as in North America. One reason for their survival is thought to be that the relatively large, yolk-filled, greenish eggs are highly toxic



Short-nosed gar

Treat Davidson from The National Audubon Society Collection/Photo Researchers—EB Inc.

to prospective predators. The eggs are laid in shallows in the spring; the hatchlings grow remarkably fast, feeding from the start on minnows, and soon become such voracious predators that measures are often applied to reduce their numbers. The long rows of needlelike teeth are very effective in capturing prey. The beak is very long and forcepslike in the longnose gar, or billfish (*Lepisosteus osseus*), and broad and relatively short in the alligator gar (*L. spatula*) of the southern United States. The alligator gar, reaching a length of about 3 m (10 feet), is one of the largest of all freshwater fishes. Gars are edible but are almost never eaten in the central and northern United States. They are sometimes baked in their own armour. The enameled scales are sometimes fabricated into novelty jewelry.

Especially in Europe, the name gar, or garfish, or gar pike, is applied to the needlefish (*q.v.*) of the family Belonidae. In Australia the term is used for the halfbeak (*q.v.*), a relative of the needlefish.

GAR (U.S.): *see* Grand Army of the Republic.

garabā, also spelled GARBĀ, dance form popular at festival times in Gujarāt, India. It is a simple, joyful dance, based on a circular pattern and characterized by a sweeping action from side to side accompanied by hand clapping.

At the Daśaharā festival (September) after the monsoon rains, girls carrying pitchers go from house to house and dance around the *garabi,* decorated pots containing offerings that are hung in the doorways. Later they celebrate by dancing around the goddess of plenty and prosperity, Mātājī. The *garabā* dances are also performed at the Holī spring festival, when many activities centre on the Krishna legends. Folk dances similar to the *garabā* are performed in other parts of India, especially Tamil Nadu and Rājasthān.

Garajonay National Park, national park located in the centre of Gomera, one of the Canary Islands, Spain. The park, created in 1980, occupies 9,844 acres (3,984 hectares) and encompasses the peak of Garajonay (4,869 feet [1,484 m]) and a small plateau rising 2,600 to 4,600 feet (790 to 1,400 m) above sea level. Laurel dominates the flora, which includes Azore laurel, Canary holly, and Canary willow. Rare laurel pigeons and long-toed pigeons inhabit the area. Atlantic mists support a lush vegetation that abounds in ferns; lichens and mosses cover tree trunks.

Garamba National Park, French PARC NATIONAL DES GARAMBA, national park in northeastern Zaire, bordering on The Sudan. The park, which was created in 1938, has an area of 1,900 square miles (4,920 square km) and is a continuation of the Sudanese savanna fed by the Garamba and Dungu rivers. Wildlife includes the rare white rhinoceros, hippopotamuses, and giraffes. In the south there is an elephant station, Gangala-Na-Bodio, one of the few of its kind in the world, where the animals are domesticated for use in forestry.

Garamond, Claude, Garamond also spelled GARAMONT (b. 1499, Paris—d. 1561, Paris), French type designer and publisher.

Garamond was apprenticed about 1510 to Antoine Augerau and by 1520 was working with the typefounder Geoffroy Tory. His first romans and his *grecs du roi* were cut for the firm of Robert Estienne. In 1545 he began to publish books; apparently he was not successful in business, for he died in poverty.

Garamond was one of the first punch cutters to work independently of printers. His roman fonts, cut from 1531 onward, surpassed the best existing romans in grace and clarity and influenced European punch cutters for 150 years. His Greek type set the pattern for Greek printing until the early 19th century. Modern typefaces bearing his name were patterned after other faces mistakenly attributed to Garamond.

Garand rifle, also called M1 RIFLE, semiautomatic, gas-operated .30-calibre rifle adopted by the U.S. Army in 1936. It was developed by John C. Garand, a civilian engineer employed at the Springfield Armory, Springfield, Mass. The Garand was the first semiautomatic military rifle used as a standard combat shoulder weapon. It was the basic U.S. infantry weapon in both World War II and the Korean War. More than 5,000,000 M1s were manufactured.

The Garand weighed 9.5 pounds (4.3 kg) and was fed from an eight-round clip. Its 24-inch (61-centimetre) barrel was rifled with four grooves. Located next to the muzzle on the underside of the barrel was the small gas port that fed some of the propellant gases into a small cylinder that operated the autoloading mechanism.

Garanhuns, city, eastern Pernambuco *estado* ("state"), northeastern Brazil, in the Serra Garanhuns, at 2,841 feet (866 m) above sea level. It was elevated to city status in 1874. Garanhuns is a trade and manufacturing centre serving its coffee- and cotton-producing municipality. It is also a popular resort, known for its cool climate and mineral waters. A railroad and highways link Garanhuns to Recife, the state capital, to the northeast and to other urban centres in Pernambuco and Alagoas states. Pop. (1980 prelim.) 64,854.

Garašanin, Ilija, original name ILIJA SAVIĆ (b. Jan. 28 [Jan. 16, Old Style], 1812, Garaši, Serbia [now in Yugoslavia]—d. June 28 [June 16], 1874, Belgrade), statesman and administrator of Serbia who was twice prime minister (1852, 1861–67).

The son of a prominent merchant, Garašanin became a customs official in 1834 and joined the army in 1837, where he served as colonel and commander. Changing sides in the rivalry between the two dynastic families—the Obrenović and the Karageorgević—he went into exile when Prince Miloš Obrenović abdicated (1839), but then he helped to depose Prince Michael Obrenović to pave the way for the accession of Prince Alexander Karageorgević (1842). Garašanin was rewarded with the posts of home secretary (1843) and prime minister and foreign secretary (1852). In 1844 he wrote a memorandum called the "Draft Plan," in which he called for a general rising of Christians under Turkish rule and the unification of all Serbs in their restored medieval empire. During the Hungarian revolution of 1848, he hoped to liberate the South Slavs of the Austrian Empire, but Alexander decided to remain neutral. Considered unfriendly by the Russians because of his pro-Western views, Garašanin was dismissed in 1853 by Alexander under Russian pressure. He was mainly responsible for the abdication of Prince Alexander (1858) but took no part in politics during the second reign of Miloš Obrenović (1858–60).

When Prince Michael Obrenović succeeded Miloš, Garašanin became prime minister and foreign secretary (1861–67). As during his first term as prime minister, he worked to modernize Serbia through enlightened legislation administered by an efficient bureaucracy. In foreign policy he sought to implement his "Draft Plan." Though he was not in office during the Congress of Paris (1856), he is credited with the collective guarantee of Serbia's autonomy by the Great Powers at Paris. By 1867 he had managed to gain the withdrawal of all Turkish civil officials and garrisons. Meanwhile, he helped to create the first Balkan League by negotiating alliances with Montenegro (1866), Greece (1867), and Romania (1868). With a Greater Serbia in mind, he also secretly entered into arrangements with the Albanians and Serbs in Bosnia.

Garašanin was dismissed in 1867 because of his opposition to Michael's wish to marry his cousin Katarina Konstantinović. When Prince Milan Obrenović came to the throne in 1868, Garašanin retired from politics.

Garavito, Pedro: *see* Peter of Alcántara, Saint.

garbā (dance): *see* garabā.

garbanzo (seed of *Cicer arietinum*): *see* chickpea.

Garbett, Cyril Forster (b. Feb. 6, 1875, Tongham, Surrey, Eng.—d. Dec. 31, 1955, York, Yorkshire), archbishop of York and ecclesiastical writer who promoted a social consciousness among the membership of the Church of England by his reports on the human misery in the areas he administered as bishop, particularly London's Southwark district (1919–32).

Educated at Keble College, Oxford, Garbett was curate (1900–09) and vicar (1909–19) of a then-important Portsmouth parish before becoming bishop of Southwark (1919–32). There he restored discipline, built churches, and drew public attention to the evils of slums. Transferred to Winchester (1932–42), he felt the scope inadequate to his energies and chief interests. In 1942 he became archbishop of York, in which office his common sense, careful preparation of speeches, and gift for expressing in simple language the thoughts of laymen on matters of social, political, and religious interest made him a national figure. His books of this period, *The Claims of the Church of England* (1947), *Church and State in England* (1950), *In an Age of Revolution* (1952), and *The Church of England Today* (1953), provided a balanced account of his church.

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Garbo, Greta, original name GRETA LOVISA GUSTAFSSON (b. Sept. 18, 1905, Stockholm, Swed.—d. April 15, 1990, New York, N.Y., U.S.), one of the most glamorous and popular stars of the motion pictures of the 1920s and '30s and later a legendary recluse.

Garbo was born in Stockholm to poor parents. She went to work at age 14, first as a lather girl in a barbershop, then as a clerk in a department store and as a model. In her first motion picture, *Luffar-Petter* (*Peter the Tramp*; 1922), she played a bathing beauty. From 1922 to 1924 she studied at the Royal Dramatic Theatre, Stockholm. During that period she met Mauritz Stiller, the foremost Swedish director, who gave her an important role in *Gösta Berlings Saga* (1924; "The Story of Gösta Berling"), gave her the stage name

Greta Garbo in *Camille*, 1936
Culver Pictures

Greta Garbo, and trained her in cinema-acting techniques. In 1925, when Stiller went to the United States to work for Metro-Goldwyn-Mayer, he insisted that Garbo be given a contract also. In all, she appeared in 27 films (two in Sweden, one in Germany, and the remainder in Hollywood); the most important were *The Torrent* (1926); *Flesh and the Devil* (1927) and *Love* (1927), both with the popular leading man John Gilbert, whose name was linked with hers in a much-publicized romance; *Wild Orchids* (1929); *Anna Christie* (1930), the talking picture in which her rich, low voice was first heard; *Mata Hari* (1932); *Grand Hotel* (1932); *Queen Christina* (1933); *Anna Karenina* (1935); *Camille* (1936); and *Ninotchka* (1939), in which she displayed a surprising gift for comedy.

Garbo had, in the opinion of her directors and most critics, a perfect instinct for doing the right thing before the camera. Her talent, her great beauty, and her indifference to public opinion made her career unique in the history of the cinema.

At age 36 Garbo withdrew from the entertainment field and retired to a secluded life in New York City. In 1954 she was awarded a special Academy Award for unforgettable performances.

BIBLIOGRAPHY. Biographies include John Bainbridge, *Garbo* (1971); and Alexander Walker, *Garbo: A Portrait* (1980), based on MGM archives.

Garborg, Arne Evensen, Arne also spelled ADNE (b. Jan. 25, 1851, Time, Nor.—d. Jan. 14, 1924, Asker), novelist, poet, playwright, and essayist, one of the first great writers to show the literary possibilities of Nynorsk, which many writers wished to establish in place of the standard Dano-Norwegian literary medium. The demand for social reform was central to Garborg's life and work.

Garborg was the son of a farmer, and his father's suicide, the result of an overstrained religious conscience, made him a permanent enemy of orthodox religion, especially his narrow Pietist heritage. Like Tolstoy, he understood Christianity to mean a social and spiritual revolution. Later he moved ever further to the left and became interested in socialism, anarchism, and free love, though he attacked each when it threatened to become dogmatic.

Educated at a teachers' seminary, he taught school and edited newspapers before studying at King Frederick's University. An unusually versatile and prolific writer, Garborg established himself as one of the great writers of his time with his second novel, *Bondestudentar* (1883; "Peasant Students"), a depiction of the cultural clash between country and city life as embodied in the struggles of a peasant student living in the capital. The naturalistic approach of this novel was developed in *Hjaa ho mor* (1890; "At Mother's"), winner of a German literary prize, and several further works. Garborg's masterpiece is a poetic cycle in Nynorsk, *Haugtussa* (1895; "Woman of the Underground People"), which describes a young girl's belief in the supernatural and was set to music by Edvard Grieg. Other works include translations of the *Odyssey* (1918) and of a section of the *Mahābhārata* (1921), and, for presentation in the Nynorsk theatre that he and his wife had founded, Baron Ludvig Holberg's classical comedy *Jeppe på bjerget* (1921).

Garção, Pedro António Correia (b. April 29, 1724, Lisbon, Port.—d. Nov. 10, 1772, Lisbon), one of Portugal's principal Neoclassical poets.

Garção studied law at Coimbra but apparently took no degree. His marriage in 1751 brought him a rich dowry, and he had a moderately lucrative government post in the India House as an administrator, but later a lawsuit reduced him to poverty. From 1760 to 1762 he edited the *Gazeta de Lisboa*. In 1756 he became a member of Arcádia Lusitana, a literary society founded to rid Portuguese poetry of the archaisms, conceits, and windy rhetoric still persisting from the 17th century. For reasons that are still obscure, Garção was arrested in April 1771 and imprisoned but was never brought to trial. He died on the day of his release.

Taking the ancient Latin poet Horace as his model, Garção adopted a classical simplicity. His sonnets and epistles reveal him as a man of good taste and good sense, devoted to his friends and possessing high ideals of conduct and of art. The *Teatro Novo* (1766; "New Theatre") attacked foreign influences in the theatre, especially Italianate ones, and the *Assembléia ou Partida* ("Meeting or Parting") satirized the social life of Lisbon. In the "Cantata de Dido," included in the latter play, he combined the spirit of classical art with perfection of form to produce one of the most celebrated 18th-century Portuguese poems.

Garcés, Francisco (Tomás) (b. April 12, 1738, Villa Morata del Conde, Aragon [Spain]—d. July 18, 1781, near the junction of the Colorado and Gila rivers [U.S.]), Spanish Franciscan missionary-explorer, who from 1768 to 1775 explored, alone and with Juan Bautista de Anza, commandant of the presidio at Tubac (now in Nogales, Arizona, U.S.), the Gila and Colorado rivers and sought a route from the province of Sonora to California. His attempt with Juan Díaz to found Indian missions ended in their death.

García, name of rulers grouped below by country and indicated by the symbol •.

GALICIA

• **García II** (b. 1042?—d. March 22, 1090, Luna Castle, Aragon [Spain]), king of Galicia from 1065 to 1071. His father, Ferdinand I the Great, divided his lands among his three sons: Alfonso VI received Leon; Sancho II received Castile; and García II, the youngest, received Galicia with a portion of Portugal (1065). Despotic and suspicious, García was deprived of his kingdom by his brother Sancho II and sent into exile to the Moorish court at Seville. When Sancho II was assassinated during a fratricidal struggle with Alfonso VI and their sister Urraca, García returned from Seville. Alfonso VI, then in control, had him arrested and imprisoned in the castle at Luna (1073), never to be released. García became a figure of Castilian poetry and romance, popular in the European Middle Ages.

NAVARRE (PAMPLONA)

• **García (I)** (d. *c.* 860), self-styled king or chief of the Navarrese, centred in Pamplona. He is partly legendary, perhaps originally a count and vassal of Asturias, and is said to have reconquered many towns from the Moors. His son Fortún (or Fortunio) was captured and imprisoned by the Moors in 860, and not until about 880 was he free to proclaim himself king of Pamplona. On Fortún's death (905), Sancho I Garcés reigned as the first indisputable king of Pamplona.

• **García I (or II) Sanchez** (b. 919/921—d. 970), king of Pamplona (Navarre) from 925 to 970, son of Sancho I Garcés and Queen Toda Aznar. He owed his throne to the support of his cousin 'Abd ar-Rahman III, the Umayyad caliph of Cordoba. The end of his reign was taken up with wars against the count of Castile, Fernán González. Sancho I of Leon, deposed by the Castilian, took refuge in Navarre; García took to the field and in 960 managed to capture the famous Castilian, holding him prisoner for many years. García was succeeded by his son, Sancho II Garcés.

• **García II (or III),** byname GARCÍA THE TREMBLER, Spanish GARCÍA EL TRÉMULO (d. 1005), king of Pamplona (Navarre) and of Aragon from about 994 to about 1000, son of Sancho II Garcés. Coming to the aid of besieged Castile, García fought against the Muslim forces of Abū 'Āmir al-Manṣūr. Manṣūr then turned his armies against Navarre (1002), burning the monastery of San Millán de la Cogolla before dying unexpectedly. García died three years later and was succeeded by Sancho III Garcés, the Great.

• **García III (or IV)** (d. Sept. 1, 1054, Atapuerca, Castile [Spain]), king of Pamplona (Navarre) from 1035 to 1054. Following an old custom, Sancho III the Great divided his Spanish lands among his four sons: Ferdinand I received Castile; Gonzalo received Sobrarbe and Ribagorza (modern Huesca); Ramiro I received Aragon; and García III received the ancient patrimony of Pamplona enlarged by portions of Castile. Although García helped his brother Ferdinand I of Castile against the Leonese, Ferdinand made war on him to recover the territories of Castile, and García was killed in the Battle of Atapuerca. He was succeeded by his son Sancho IV.

• **García IV (or V),** byname GARCÍA THE RESTORER, Spanish GARCÍA EL RESTAURADOR (d. Nov. 21, 1150, Lorca, Navarre [Spain]), king of Pamplona (Navarre) from 1134 to 1150, grandson of Sancho IV and son of El Cid's daughter Cristina and Ramiro Sánchez, lord of Monzón.

When Alfonso I of Aragon and Navarre died in 1134 and the Aragonese proclaimed the succession for his brother Ramiro II, the Navarrese rebelled and restored their own ancient line in the person of García Ramirez. García IV broke the union of Aragon and Navarre by declaring himself a vassal of Alfonso VII of Castile, "emperor" of Spain, but a year later he broke with Castile and allied himself with the Portuguese against Castile and Aragon. After Ramiro's abdication (1137), there ensued a period of warfare and intrigue among the kingdoms of Spain, ending in 1149. In spite of these wars García IV collaborated with Alfonso VII against the Muslim Almohads and took part in the conquest of Almeria (1147). On his death, he was succeeded by his son Sancho VI.

García, Anastasio Somoza: *see* Somoza family.

Garcia, Carlos Polestico (b. Nov. 4, 1896, Talibon, Phil.—d. June 14, 1971, Quezon City), fourth president of the Republic of the Philippines. After graduating from law school in 1923, he became, successively, a schoolteacher, representative in the Philippine Congress, governor of his province (Boh-

ol), and then (1941–53) senator. During the Japanese occupation of the Philippines in World War II, Garcia was active in the resistance movement. He was elected vice president on the ticket of the Nacionalista Party in 1953 and was also minister of foreign affairs (1953–57). He became president of the Philippines in March 1957, upon the death of Pres. Ramon Magsaysay, and was elected to a full four-year term the same year. He maintained the strong traditional ties with the United States and sought closer relations with non-Communist Asian countries. In the election of November 1961 he was defeated by Vice Pres. Diosdado Macapagal.

García, Manuel del Popolo (Vicente) (b. Jan. 22, 1775, Seville—d. June 2, 1832, Paris), tenor and composer, one of the finest singers of his time. The age of 17 he made his stage debut at Cádiz, Spain, in an operetta that included songs he had composed. In 1800 the first of his more than 90 operas, *El preso*, was produced in Madrid. García was active as a singer and composer in Paris (1808–11) and Italy (1811–16), where Rossini wrote for him the role of Almaviva in *The Barber of Seville.* Thereafter he worked principally in London and Paris, singing and composing. In 1825 he formed an opera company, which included his son Manuel and his celebrated daughters Maria Malibran and Pauline Viardot-García, and took it to New York City and Mexico. His singing was praised for its vivacity and intelligence, and he was skilled at the art of embellishment. His son, Manuel García, incorporated García's principles and methods in his *Traité complet de l'art du chant* (1847; "Complete Treatise on the Art of Singing").

García, Manuel (Patricio Rodríguez) (b. March 17, 1805, Madrid—d. July 1, 1906, London), the most renowned European teacher of singing in the 19th century.

The son of the celebrated tenor Manuel del Popolo Vicente García, he began a singing career in 1825 in New York City as Figaro in his father's company's production of Rossini's *The Barber of Seville.* In 1825 in Paris he left the stage to concentrate on the teaching of singing. His pupils included Jenny Lind and Mathilde Marchesi.

He did extensive research into the voice and was the inventor of the laryngoscope. His *Mémoires sur la voix humaine* (1840) became a fundamental study of the voice. His *Traité complet de l'art du chant* (1847; "Complete Treatise on the Art of Singing") is a classic. His influence continued into the 20th century. García taught singing at the Paris Conservatoire in 1847 and from 1848 to 1895 taught at the Royal Academy of Music in London.

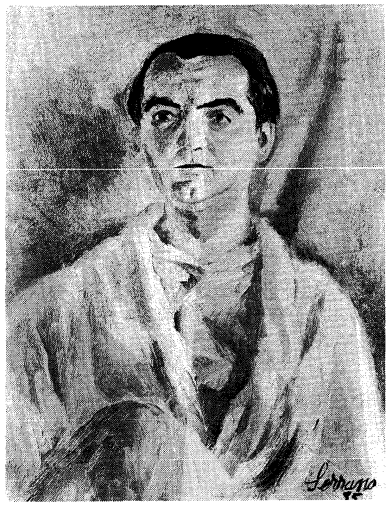
García de la Huerta, Vicente (Antonio) (b. March 9, 1734, Zafra, Spain—d. March 12, 1787, Madrid), playwright, poet, and critic whose Neoclassical tragedy *Raquel* (1778) was once considered the most distinguished tragic drama of 18th-century Spain.

García held a position in the Royal (later National) Library and was a political prisoner in Oran, where *Raquel* was performed. Although he was learned and translated Sophocles and Voltaire, his critical ability was not very sound. His 16-volume *Teatro español* (1785–86; "Spanish Theatre"), a collection of Spanish drama from the Golden Age (*c.* 1500–1650), was personal in its outlook, reflecting his particular interest in classical drama; Lope de Vega, Juan Ruiz de Alarcón, and several other important dramatists of the Golden Age were omitted from the work.

García Gutiérrez, Antonio (b. July 5, 1813, Chiclana, Spain—d. Aug. 26, 1884, Madrid), dramatist whose play *El trovador* (1836; "The Troubadour") was the most popular and successful drama of the Romantic period in Spain. It formed the basis for the Italian composer Giuseppe Verdi's opera *Il trovatore* (performed 1853).

After studying medicine briefly, he walked to Madrid, hoping to gain success as a playwright, but, because he was penniless, he enlisted in the army and travelled extensively. His last years were spent in various governmental posts, and he died while director of the Museum of Archaeology.

García Lorca, Federico (b. June 5, 1898, Fuente Vaqueros, Spain—d. Aug. 19/20, 1936, Granada), Spanish poet and dramatist, noted for his poems of death and for his dramatic trilogy: *Bodas de sangre* (1933; *Blood Wedding*), *Yerma* (1934), and *La casa de Bernarda Alba* (1936; *The House of Bernarda Alba*). He was assassinated by the Nationalists shortly after the outbreak of the Spanish Civil War.



Federico García Lorca, oil painting by Serrano, 1935

Archivo Mas

Life. Lorca's father was a farmer, his mother a schoolteacher. Struck by his musical gifts, his mother became his first piano teacher.

When the family moved to the city of Granada, Lorca attended a Jesuit school there. At his father's urging, he then read law at the University of Granada but soon abandoned law to study literature, painting, and music. A precocious composer and excellent performer, he was "the musician" to his friends. To their surprise, in 1918 he published *Impresiones y paisajes* ("Impressions and Landscapes"), a book of prose inspired by a trip he had taken into Castile. The book suggested that Lorca soon might become known as "the writer."

In 1919 he entered the *residencia de estudiantes* (residence of scholars) at the University of Madrid, a large university that had become the cultural centre of the Spanish capital. There he became friends with artists and writers of his own generation, including the painter Salvador Dalí, the filmmaker Luis Buñuel, and the poet Rafael Alberti; there he also met well-known older figures such as the poet Juan Ramón Jiménez.

During his first two years at the *residencia,* Lorca's poetry became known in literary circles throughout the whole of Spain. Yet he had published hardly any of his work. "Verse is made to be recited," he said; "in a book it is dead." And so, at the *residencia* and elsewhere in Madrid, like a medieval troubador, he read his poetry and plays. Thus, throughout his career, his works were often composed and passed on by word of mouth long before they were published.

At the same time that he was composing the experimental poems that would later be published as *Libro de poemas* (1921; "Book of Poems"); *Primeras canciones* (1936; "First Songs"); and *Canciones* (1927; "Songs"), he was also writing his first play, *El maleficio de la mariposa* (*Butterfly's Evil Spell*), which opened in 1920 at the Eslava Theater in Madrid. It closed after the first night.

Lorca found the true bent of his genius when he collaborated with the distinguished composer Manuel de Falla on the folk music festival Fiesta de Cante Jondo at Granada in 1922. In the traditions of folk and gypsy music, Lorca seemed to find a resolution of his musical, poetical, and spiritual impulses. *Poema del cante jondo* (written 1922, published 1931; "Poem of the Cante Jondo") and *Romancero gitano* (written 1924–27, published 1928; *The Gypsy Ballads*) were to be the lyrical expression of this resolution.

In the 18 poems of *Gypsy Ballads* Lorca combined the ancient magic of a traditional literary form—the Spanish ballad (*romance*)—with startling new images. The description, for example, in "The Ballad of the Spanish Civil Guard," of the Guard riding ominously toward a gypsy village:

> Los caballos negros son.
> Las herraduras son negras.
> Sobre las capas relucen
> manchas de tinta y de cera.
> Tienen, por eso no lloran,
> de plomo las calaveras.
> Con el alma de charol
> vienen por la carretera.
>
> Black are the horses.
> The horseshoes are black.
> On the dark capes glisten
> stains of ink and of wax.
> Their skulls are leaden,
> which is why they don't weep.
> With their patent-leather souls
> they come down the street.
>
> (Federico García Lorca, *Selected Poems,* translated by A.L. Lloyd. Copyright 1955 by New Directions Publishing Corporation. Reprinted by permission of New Directions Publishing Corporation.)

While Lorca was writing *Gypsy Ballads,* he was also writing plays. His first dramatic success came in 1927 with the Barcelona production of *Mariana Pineda,* a poetic and romantic verse drama, with scenery by Salvador Dalí. The same year and the same city also saw the first public exhibition of Lorca's drawings.

The publication of *Gypsy Ballads* in 1928 brought Lorca sudden international fame but little happiness. Displeased about the creation of what he called "the myth of my gypsy-hood" and tormented by an emotional crisis that he described as "one of the most painful states I have had in my life," he sought relief and a new source of inspiration in the United States and Cuba in 1929–1930.

The trip inspired *Poeta en Nueva York* (*Poet in New York*), published posthumously in 1940. In this work, Lorca's horror at what he saw as the death in life of a mechanized civilization is conveyed by the jarring combination of brutal, tortured images:

> Con una cuchara
> arrancaba los ojos a los cocodrilos
> y golpeaba el trasero de los monos.
> Con una cuchara.
>
> With a spoon
> he gouged out the crocodile's eyes
> and thumped on the monkey-rumps,
> with a spoon.
>
> ("The King of Harlem," in Federico García Lorca, *Poet in New York,* translated by Ben Belitt. Copyright 1955 by Ben Belitt. Reprinted by permission of New Directions Publishing Corporation.)

By 1931 Lorca was back in Spain, where he began the poems to be published as *Diván del Tamarit* (1936; "Divan of Tamarit") and again wrote for the theatre. Expressing the passionate enthusiasm for marionettes that he

had had since childhood, he wrote two puppet plays: *Los títeres de cachiporra* (*The Billy Club Puppets*) and *Retabillo de Don Cristóbal* (*The Puppet Play of Don Cristóbal*). Even these puppet farces were clouded by melancholy.

The advent of the Republic in Spain made it possible for Lorca to plunge fully into the theatre. The Ministry of National Education subsidized La Barraca, a troupe of students who, from 1932 to 1935, brought masterpieces of the classical theatre to uneducated workers and peasants. Founder, driving spirit, director, and musician for La Barraca, Lorca staged Lope de Vega, Calderón de la Barca, and Cervantes, thereby acquiring immense theatrical experience.

The result was the first of a trilogy of folk dramas, *Bodas de sangre*, staged in 1933. The theme was inspired by a news item: a bride had fled on her wedding day with the man whom she secretly loved, and the rivals had killed each other. In Lorca's play the characters become pawns in a tragedy of fate. They are trapped in a conflict between primitive passions and civilization's unyielding code of honour—a conflict that ends in death.

In 1934 the goring and subsequent death of a bullfighter who had been Lorca's friend inspired "Llanto por Ignacio Sánchez Mejías" (published 1935; "Lament for Ignacio Mejías"). Lorca's greatest poem, the finest elegy in modern Spanish literature and one of the finest in all literature, it beats with the hollow, haunting, dirgelike refrain, repeated over and over again: "A las cinco de la tarde" ("At five in the afternoon"):

A las cinco de la tarde.
Eran las cinco en punto de la tarde.
Un niño trajo la blanca sábana
a las cinco de la tarde.
Una espuerta de cal ya prevenida.
a las cinco de la tarde.
Lo demás era muerte y sólo muerte
a las cinco de la tarde.

At five in the afternoon.
It was exactly five in the afternoon.
A boy brought the white sheet
at five in the afternoon.
A frail of lime ready prepared
at five in the afternoon.
The rest was death, and death alone
at five in the afternoon.

Later in 1934, *Yerma*—the second of Lorca's folk drama trilogy and, along with *Bodas de sangre,* one of the few successful poetic tragedies of the 20th century—was produced. The play—"a tragic poem"—is about the torment of a woman who, despairing over her childless state, kills her sterile husband. On an evening in June 1936, at the home of friends, Lorca read the final play of the trilogy, *La casa de Bernarda Alba.* Almost entirely in prose, the play is about four sisters who, shut up by their tyrannical mother in a house of mourning, burn with hatred and lust.

In July, alarmed by the outbreak of the Civil War, Lorca left Madrid for Granada. But his fate fulfilled the premonition of violent death that haunts his works. During the night in Granada, Lorca was shot to death without trial by the Nationalists.

Assessment. No matter how localized the subject of Lorca's work, the themes that recur in them are universal: love and lust, death, motherhood, a brotherly compassion for the poor and humble, and, above all, cruelty, violence, and death resulting when primordial passions are frustrated by convention. The elemental passion in Lorca's poetry is expressed largely through concrete, voluptuous, sulfurous, vibrating, sometimes surrealistically juxtaposed images and symbols. He is a poet who must be ranked among the greatest of the 20th century. (M.A.)

MAJOR WORKS. *Poetry. Canciones* (1927); *Romancero gitano* (1928; *The Gypsy Ballads,* 1953); *Poema del cante jondo* (1931); *Poeta en Nueva York* (posthumously published 1940; *The Poet in New York,*); "Llanto por Ignacio Sánchez Mejías" (1935; trans. in *Lament for the Death of a Bullfighter, and Other Poems,* 1937).

Plays. Bodas de sangre (1933; *Blood Wedding,* 1939); *Yerma* (1934; Eng. trans. 1941); *La casa de Bernarda Alba* (1936; *The House of Bernarda Alba*). These three plays were all translated in *Three Tragedies of Federico García Lorca* (1947). Also, *Doña Rosita la soltera* (1935; *Doña Rosita, the Spinster,* 1941).

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Marcelle Auclair, *Enfances et mort de Garcia Lorca* (1968), the only complete study of Lorca published to date; Arturo Barea, *Lorca: The Poet and His People* (1944), an analysis of the poet and his work by a Spaniard of Lorca's generation; Robert Lima, *The Theatre of Garcia Lorca* (1963), the plays viewed historically, critically, and biographically, with an extensive bibliography of Lorca's theatre that includes adaptations of texts for operas and ballets; John B. Trend, *Lorca and the Spanish Poetic Tradition* (1956), contains an informative chapter on Lorca by an English hispanist who knew him at the start of his poetic career; Howard T. Young, *The Victorious Expression: A Study of Four Contemporary Spanish Poets* (1964), has an intelligent study of the poet that includes an annotated list of English translations of his work; José A. Balbontín, *Tres poetas de España* (1957; *Three Spanish Poets,* 1961), traces Lorca's development and includes a number of his poems in translation; Manuel Durán (ed.), *Lorca: A Collection of Critical Essays* (1962), articles on both Lorca's poetry and his theatre by a heterogeneous group of scholars, poets, and critics; three works that are interesting but present variously one-sided views of Lorca are: Carl W. Cobb, *Federico García Lorca* (1967); Edwin Honig, *García Lorca,* rev. ed. (1963); and Roy Campbell, *Lorca: An Appreciation of His Poetry* (1952), which also contains translations by Campbell that make Lorca's poetry sound unduly English. Richard L. Predmore, *Lorca's New York Poetry: Social Injustice, Dark Love, Lost Faith,* uses a stylistic approach to the symbolism in the New York poems.

García Márquez, Gabriel (b. March 6, 1928, Aracataca, Colom.), major Latin-American author of novels and short stories, a central figure in the so-called magical realism movement in Latin American literature. He was awarded the Nobel Prize for literature in 1982.

Although born into poverty, García Márquez studied law and journalism at the National University of Colombia in Bogotá and at the University of Cartagena. He began his career as a journalist in 1948, working in Cartagena, Barranquilla, and Bogotá. In the late 1950s, García Márquez was a foreign correspondent for the Bogotá daily *El Espectador* in Rome and Paris, returning to Colombia and then to Caracas as a journalist in 1958. From 1959 to 1961 he worked for the Cuban news agency La Prensa in Colombia, Havana, and New York City, and in the 1960s he worked as a screenwriter, journalist, and publicist in Mexico City. He moved to Barcelona in 1973 and in the later 1970s returned to Mexico. In the early 1980s, periodic restrictions on his travel in his native Colombia and in the United States were attributed to his avowed left-wing political views.

García Márquez began writing short stories in the late 1940s. His first major publication was *La hojarasca* (1955; *Leafstorm and Other Stories,* 1972). In this story first appears the fictional Colombian village of Macondo—the setting of much of his later work—and the combination of realism and fantasy characteristic of his style.

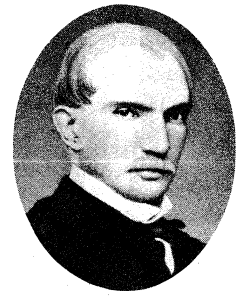
El coronel no tiene quien le escriba (1961), which first appeared in the Colombian magazine *Mito* in 1958, relates the story of an aged war veteran whose service remains unrecognized by the country for which he fought. It was translated together with a collection of short stories, *Los funerales de la Mamá Grande* (1962), under the title *No One Writes to the Colonel and Other Stories* (1968). During this period García Márquez also published *La mala hora* (1962; *In Evil Hour,* 1979), a story of political repression in Macondo.

It was during his first stay in Mexico that García Márquez wrote his best known novel, *Cien años de soledad* (1967; *One Hundred Years of Solitude,* 1970), which recounts the history of Macondo and its founders, the Buendía family. It is also a history of Colombia and, on its highest level, a presentation of the myth and legend of human experience. The dense, convoluted style of this and other works recalls that of the U.S. novelist William Faulkner, an influence acknowledged by García Márquez in his Nobel Prize acceptance speech.

With Mario Vargas Llosa, García Márquez produced a volume of literary criticism, *La novela en America Latina* (1968). An episode in *Cien años* gave rise to the collection of short stories titled *La increíble y triste historia de la candida Eréndira y de su abuela deselmada* (1972; *Innocent Eréndira and Other Stories,* 1978). Another series of stories was published as *Ojos de perro azul* (1972; "Eyes of a Blue Dog"). He later wrote *El otoño del patriarca* (1975; *The Autumn of the Patriarch,* 1976), a satire on Latin-American military dictators; and *Crónica de una muerte anunciada* (1981; *Chronicle of a Death Foretold,* 1983), which examines the events surrounding a murder for honour in a Latin-American town.

García Moreno, Gabriel (b. Dec. 24, 1821, Guayaquil, Ecuador—d. Aug. 6, 1875, Quito), initiator of a church-oriented dictatorship in Ecuador (1861–75). His rule, oppressive but often effective in its reformist aims, eventually cost him his life.

Versed in political theory, he early took an active role in Ecuador's turbulent politics. He



García Moreno
By courtesy of the Library of Congress, Washington, D.C.

became convinced that the remedy for his nation's political and economic plight was the application of moral principles by a powerful leader.

Aided by a general and former president of Ecuador, Juan José Flores, he seized power in 1860. Twice president (1861–65, 1869–75), he centralized the government, reduced corruption, maintained relative peace, strengthened the economy, placed education under the Roman Catholic Church, signed a concordat with the Vatican (1863), and officially dedicated Ecuador to the Sacred Heart. He was assassinated by a group of young liberals.

García Robles, Alfonso (b. March 20, 1911, Zamora, Michoacán, Mex.), Mexican diplomat and advocate of nuclear disarmament,

corecipient with Alva Reimer Myrdal (*q.v.*) of Sweden of the Nobel Prize for Peace for 1982.

García Robles entered Mexico's foreign service in 1939 and was a delegate to the 1945 San Francisco Conference, at which the United Nations was founded. He subsequently worked in the UN Secretariat for several years. As director general of the Department for Europe, Asia, and Africa in the Mexican Ministry of Foreign Affairs during the late 1950s, García Robles played a central role at the Law of the Sea conferences.

While serving as ambassador to Brazil, he first encountered the proposition of excluding nuclear armaments from Latin America, and after the Cuban Missile Crisis of 1962, he persuaded the Mexican government to support such a policy. His efforts led to the Treaty of Tlatelolco (1967), which committed 22 nations to bar nuclear weapons from their territories. A year later he helped draft the Nuclear Non-proliferation Treaty. He was appointed permanent representative to the Disarmament Conference in Geneva in 1977. The following year he served as chairman of the Mexican delegation to the UN General Assembly's special session on disarmament.

Garcilaso de la Vega (b. 1503, Toledo, Spain—d. Oct. 14, 1536, Nice, Duchy of Savoy), the first major poet in the Golden Age of Spanish literature (*c.* 1500–1650).

Garcilaso was born into an aristocratic family that had been prominent in Spanish letters and politics for several centuries. Entering court life at an early age, he distinguished himself as a soldier, serving Emperor Charles V in Rhodes, Tunis, and Pavia. After a brief imprisonment in 1532 for conspiring to marry his brother's son to a prominent lady-in-waiting against the Emperor's wishes, he was released into the service of the viceroy, the Marqués de Villafranca. Serving under the Viceroy in southern France, he was mortally wounded in an assault on a fortified position and died several days later.

After writing poetry in rather conventional Spanish metres for a short period, Garcilaso had become acquainted with the poet Juan Boscán Almogáver, who quickly introduced him to Italianate metres, to the use of which he was further attracted by his close study of such Italian Renaissance poets as Petrarch, Boccaccio, and Sannazzaro. Garcilaso was a consummate craftsman, and he transformed the Italianate metres into Spanish verse of high lyric quality. His most important innovations in this regard were the verse stanzas of the *silva* and *liva* (both using combinations of 7- and 11-syllable lines), which allowed him a new concern with the analytical expression of thought and emotion. Garcilaso's major theme is the melancholy laments and misfortunes of romantic love as conventionally portrayed in pastoral poetry. He continually rewrote and polished his poetry, lifting his work high above that of his contemporaries and profoundly influencing the development of Spanish verse.

Garcilaso's small body of work—38 sonnets, 5 canciones, 3 eclogues, 2 elegies, 1 epistle, and 8 coplas (songs)—was published with that of Boscán, by the latter's widow, in 1543. These works were soon accepted as classics and largely determined the course of lyric poetry throughout Spain's Golden Age.

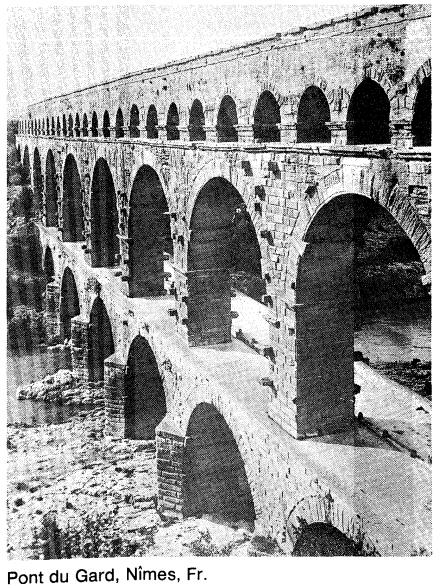
Garcinia, genus in the family Clusiaceae, with about 200 species of tropical trees found in Asia and Australia. The best known of these species is a tropical fruit, the mangosteen (*q.v.*; *G. mangostana*). Imbe (*G. livingstonei*) has stiff leaves and small, thick-skinned, orange fruits with a juicy, acid, fragrant pulp. Rata (*G. tinctorea*) produces a peach-sized, yellow fruit with a pointed end and acid-flavoured, buttery yellow flesh. *G. spicata* is planted as an ornamental in tropical salt-spray oceanfront areas. Orange dyes are extracted from the bark of *G. xanthochymus* and *G. cowa.*

Gard, *département,* Languedoc-Roussillon region, southern France, bounded on the east by the Rhône River and on the south by 10 mi (16 km) of Mediterranean coastline. Created from an eastern part of the historic province of Languedoc, it has an area of 2,260 sq mi (5,853 sq km). Gard is divided into three distinct regions: (1) the northwest, on the eastern border of the Massif Central, in which the humid, wooded Cévennes heights reach 5,141 ft (1,567 m) at Montagne de l'Aigoual; (2) the southeast, in which cereals, olives, and vines grow in the dry, hilly Garrigues region; and (3) the south, in which the summers are hot and dry and the best arable land is found, including the plain of Nîmes and some of the marshlands of the Rhône Delta. The Gard, or Gardon, River, a tributary of the Rhône, forms gorges through the Garrigues. The Hérault River flows through northwestern Gard, and the Ardèche River borders it on the northeast. The Gard is bridged near Remoulins by a Roman aqueduct that brought water to Nîmes, the departmental capital, from springs near Uzès, a picturesque medieval town.

Roman civilization brought economic prosperity and a wealth of monuments to the region before it was conquered by the Visigoths in the 5th century AD and ravaged by the Saracens in the 8th century. Louis IX acquired land from local monks in the 13th century and built the fortified harbour town of Aigues-Mortes (*q.v.*), from which he set out on two crusades. Other points of interest include Villeneuve-lès-Avignon, on the Rhône opposite Avignon, and Beaucaire, on the Rhône opposite Tarascon.

The *département* produces good wines (Côtes-du-Rhône, Tavel), and some of its ewe milk goes to Roquefort cheese factories in neighbouring Aveyron *département.* Industries (steel, aluminum, textiles, and electrical equipment) have been established mainly in the Nîmes area and around Alès, a former mining centre on the Gard, which is also a tourist centre. The oldest of France's atomic energy stations is in Marcoule. The *département* has three *arrondissements*—Nîmes, Alès, and Le Vignan—and is in the educational division of Montpellier. Pop. (1984 est.) 540,200.

Gard, Pont du (French: "Bridge of the Gard"), giant bridge-aqueduct, a notable ancient Roman engineering work constructed in about 19 BC to carry water to the city of Nîmes over the Gard River in southern France. Augustus' son-in-law and aide, Marcus Vipsanius Agrippa, is credited with its conception. Three tiers of arches rise to a height of 155 feet (47 metres). The first tier is composed of 6 arches, from 51 to 80 ft wide, the largest spanning the river; the second tier is composed of 11 arches of the same dimensions; the third, carrying the conduit, is composed of 35 smaller (15-ft) arches. Like many of the best Roman constructions, it was built without mortar. The structure was severely damaged in the 5th century but was restored in 1743. A highway bridge has since been added to the structure alongside its base.



Pont du Gard, Nîmes, Fr.
Ewing Galloway

Garda, Lake, Italian LAGO DI GARDA, also called BENACO, the largest (area 143 sq mi [370 sq km]) of the Italian lakes, bordering Lombardy (southwest and west), Veneto (east and southeast), and Trentino-Alto Adige (north). It is surpassed in area in the Alpine region only by Lakes Geneva and Constance. Lying at an altitude of 213 ft (65 m), the lake is 34 mi (54 km) long and 2–11 mi wide, with a shoreline of 77½ mi and a maximum depth of 1,135 ft. Separated from the Adige River Valley by the narrow ridge of Monte Baldo, the lake is fed by the Sarca River at its northern end, while the Mincio flows out toward the Po River at the southern end. Narrow at the northern end, between towering cliffs, the lake widens gradually southward into a nearly circular basin, with rich vegetation on the southern and western shores. The predominant winds (which may swell into violent storms) are the *sover* from the north in the morning and the *ora* from the south in the afternoon.

The lake was called Lacus Benacus by the classical writers Virgil, Horace, and Catullus; its name was changed when the city of Garda, elevated to a county in the early 9th century by the emperor Charlemagne, acquired dominion over the lake. The northern end belonged to Austria until 1919. The lake is encircled by the magnificent Gardesana scenic route (89 mi), opened in 1931. Well sheltered by the Alps to the north, it has a temperate Mediterranean climate, which makes it a popular resort area. Citrus fruits, olives, vines, laurels, oleanders, cypresses, and palms are grown on the southern and western shores, and there is fishing for eels, carp, and trout. Small steamers ply between the principal lakeside towns of Riva, Gargnano, Desenzano del Garda, and Peschiera del Garda.

Gardel, Carlos (b. Dec. 10, either 1887, Uruguay, or 1890, Toulouse, Fr.—d. June 24, 1935, Medillín, Colom.), Argentine singer and stage and film actor, celebrated throughout Latin America for his espousal of tango music.

By different accounts he was the illegitimate son of a Frenchwoman or a native of Uruguay, but he was certainly in Buenos Aires by the age of three. His first formal acting roles were at the Nacional Corrientes theatre, which also listed Don José Razzano, with whom Gardel formed a duo for many years. They played in a succession of theatre companies, touring Argentina and other Latin-American countries and Spain. Gardel's extraordinary popularity as an interpreter of the melancholy ballads of the tango was confirmed in the 1920s and '30s in nightclubs and motion pictures. One of his first pictures, *Luces de Buenos Aires* (1931), was filmed in Paris; but later ones were made by Paramount Pictures for the Spanish-speaking market. They include *Espérame* (1933), *La Casa es seria* (1933), *Melodia de Arrabal* (1933), *Cuesta abajo* (1934), *El Tango en Broadway* (1934), *Tango-Bar* (1935), *El Día que me quieras* (1935), and *Cazadores de estrellas* (1935).

Gardel died in a plane crash while on tour. In Buenos Aires his funeral and funeral procession in a horse-drawn carriage were wit-

nessed by tens of thousands of Argentines. Like Rudolf Valentino's, his tomb became an object of popular pilgrimage.

Garden, Mary (b. Feb. 20, 1874, Aberdeen, Scot.—d. Jan. 3, 1967, Aberdeen), soprano famous for her vivid operatic portrayals. She was noted for her acting as well as her singing, and was an important figure in American opera.

Garden studied voice as a child in Chicago and was later sent to Paris to study under the noted teacher Mathilde Marchesi. Her spur-of-the-moment debut as a last-minute replacement in Gustave Charpentier's *Louise* (Paris, 1900) established her reputation. She made her American debut in New York City in 1907 as Massenet's Thaïs.

Garden began a long association with Chicago opera in 1910 and was influential in retaining French opera in the repertory there. She was director of the Chicago Opera Association in 1921–22, a financially disastrous season. She retired from the stage in 1930 but remained active in musical circles until the mid-1950s.

Debussy chose her to create the part of Mélisande in his *Pelléas et Mélisande* (1902), and this ethereal role became permanently identified with her. Massenet rewrote the tenor lead in *Le Jongleur de Notre Dame* (*The Juggler of Notre Dame*) for her; this portrayal probably inspired the role of Octavian in Richard

Mary Garden as Mélisande
The Bettmann Archive

Strauss's *Der Rosenkavalier*. Strauss's *Salome* was one of her most celebrated roles, and her performance of the "dance of the seven veils" caused a scandal in Chicago. With Louis Biancolli she wrote an autobiography, *Mary Garden's Story* (1951).

Garden carpet, floor covering designed as a Persian garden seen from directly above. The design consists of a central watercourse, with tributary canals of various sizes, interrupted by islands or by tanks containing waterfowl and fishes, lined by avenues of stylized small trees and shrubs that surround flower plots, and often shaded by great plane trees.

The earliest, best examples of Garden carpets, dating from the late 16th or early 17th century, are in museums at Jaipur in India and at Glasgow. They were apparently made at Kerman and share characteristics of weave and colour with Vase carpets. A later, simplified group of Garden carpets shows the bold, varied coloration of Kurdistan, together with small Kurdish details. In the early 19th century the design in certain Kurdish pieces degenerated into a mere checkerboard of flower beds. The most celebrated Persian Garden carpet, the Spring of Khosrow Carpet, made for the palace of a 6th-century Sāsānian king, is little more than a legend, for the carpet itself has not survived, and descriptions of it

Persian Garden carpet, 18th century; in the Metropolitan Museum of Art, New York City
By courtesy of the Metropolitan Museum of Art, New York City, gift of J.F. Ballard, 1922; photograph, Otto E. Nelson—EB Inc.

by Arab writers do not disclose its technique. Certain Turkmen or Shirvan rugs have also been described as Garden rugs. In a broad sense, every Near Eastern floral carpet or rug actually represents, in its own fashion, a garden—especially if it is filled with prancing animals.

Garden City, city, seat (1883) of Finney County, southwestern Kansas, U.S., lying on the Arkansas River. Founded in 1878, it acquired its name through the suggestion of a visitor who admired a local flower garden. The city is the centre of an irrigated agricultural area of the Arkansas River Valley known for its alfalfa, wheat, grain sorghums, sugar beets, and livestock. The city's chief industries include meat-packing, food processing, machine shops, and the manufacture of brick and tile. Natural gas and oil are produced in the vicinity. Garden City Community College was established in 1919. Finnup Park includes the state's largest zoo and other recreational facilities; a state game refuge nearby protects a large buffalo herd. Inc. city, 1883. Pop. (1982 est.) 20,082.

Garden City, residential village in Hempstead town (township), Nassau County, New York, U.S., on western Long Island. One of the nation's first planned communities, it was the aspiration of Alexander T. Stewart, who bought a 7,000-ac (2,800-ha) tract of land there in 1869. His heirs founded the Garden City Company, which developed and guided the community until its incorporation as a village in 1919. Distinguished for its handsome residential areas and garden atmosphere, it is the site of the English Gothic Cathedral of the Incarnation (seat of the Episcopal diocese of Long Island) and of the George Mercer Jr. Memorial School of Theology. Adelphi University (founded 1896 in Brooklyn) was relocated there in 1929. The village has established a reputation as a publishing and printing centre. Nearby Roosevelt Field, now a shopping centre, was the starting point for Charles A. Lindbergh's historic transatlantic flight in 1927. Nassau Community College (founded 1959) is in Garden City. Pop. (1980) 22,927.

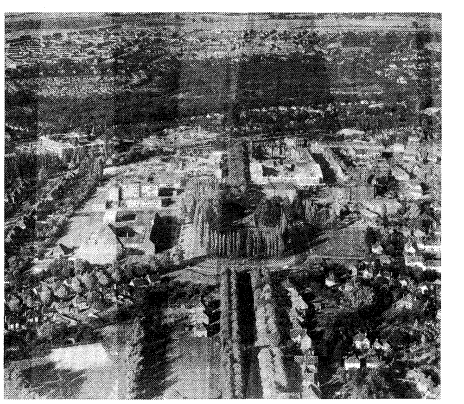
garden city, the ideal of a planned residential community, as devised by the English town planner Ebenezer Howard (*q.v.*) and promoted by him in *Tomorrow: A Peaceful Path to Social Reform* (1898). Howard's plan for garden cities was a response to the need for improvement in the quality of urban life, which had become marred by overcrowding and congestion due to uncontrolled growth since the Industrial Revolution.

Howard's solution to the related problems of rural depopulation and the runaway growth of great towns and cities was the creation of a series of small, planned cities that would combine the amenities of urban life with the ready access to nature typical of rural environments. The main features of Howard's scheme were: (1) the purchase of a large area of agricultural land within a ring fence; (2) the planning of a compact town surrounded by a wide rural belt; (3) the accommodation of residents, industry, and agriculture within the town; (4) the limitation of the extent of the town and prevention of encroachment upon the rural belt; and (5) the natural rise in land values to be used for the town's own general welfare.

Howard's ideal garden city would be located on a 6,000-acre tract of land currently used for agriculture purposes only. It would be privately owned by a small group of individuals; this company, in retaining ownership, would retain control of land use. Revenue, to pay off the mortgage and to fund city services, would be raised solely by rents. Private industry would be encouraged to rent and to use space in the town. Only a fraction of the tract's land would be built upon by the town's 30,000 inhabitants; the rest would be used for agricultural and recreational purposes.

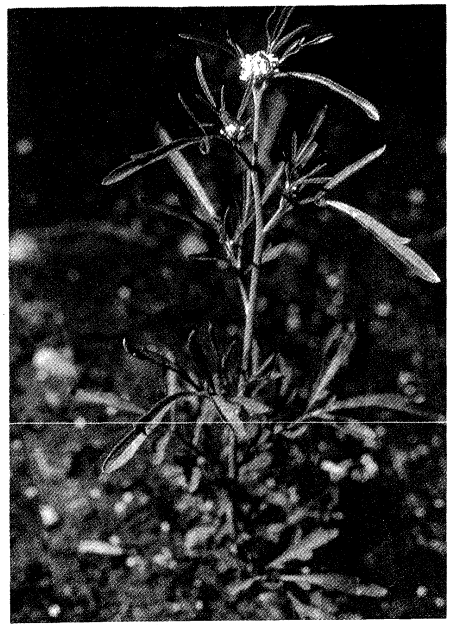
At the centre of the city would lay a garden ringed with the civic and cultural complex including the city hall, a concert hall, museum, theatre, library, and hospital. Six broad main avenues would radiate from this centre. Concentric to this urban core would be a park, a combination shopping centre and conservatory, a residential area, and then, at the outer edge, industry. Traffic would move along avenues extending along the radii and concentric boulevards.

Howard stressed that the actual placement and planning of such a town would be governed by its site. In 1903 he had the pleasure of seeing his plan realized. A garden city called Letchworth was developed about 30 miles north of London in Hertfordshire, Eng. It succeeded according to the guidelines that he had laid down, and in 1920 a second, Welwyn Garden City, was established nearby. Howard's concept of interrelating country and city in a planned city of predetermined size has enjoyed wide popularity in the planning of subsequent new towns. His emphasis on greenbelt areas and controlled population densities has become an integral part of suburban and city planning as well.



Aerial view of Letchworth, Hertfordshire, the first garden city in England, founded in 1903.
Aerofilms Limited

garden cress, also called UPLAND CRESS (*Lepidium sativum*), North African annual herb, of the mustard family (Brassicaceae), often cultivated as a salad plant for the peppery basal leaves of the young plants. Some varieties have golden leaves. Garden cress bears



Garden cress (*Lepidium sativum*)
Roger & Joy Spurr—Bruce Coleman Inc.

white, occasionally reddish, flowers. The flattened seedpod is deeply notched, has a narrow wing, and contains one seed.

Garden Island, Australian island in the Indian Ocean, just off the southwest coast of Western Australia, 30 mi (48 km) southwest of Perth. With Green and Penguin islands, it shelters Cockburn Sound (east) and the approaches to the ports of Fremantle, Kwinana, and Rockingham. Measuring 6 mi by 1 mi, it has an area of 2,338 ac (946 ha) and is generally sandy and thickly wooded, rising to 211 ft (65 m) in hills along its western shore. It was sighted in 1801 by the French navigator Capt. J. Hamelin, who called it Île de Bauche. In 1829 a British colony expedition, prevented from landing on the mainland by rough seas, landed on the island instead and there proclaimed the colony. In that same year, Lieut. Gov. Capt. James Stirling planted seeds for a garden, whence the island's name. This settlement was short-lived, and the island was abandoned for Fremantle. Later in the century, a large bay on its southeast coast was utilized for careening (beaching ships for repairs). During World War II the island was a secret military training base, and in 1978 a naval support facility, HMAS "Stirling," was commissioned. There has been extensive resort development, with ferry services from Perth and Rockingham. A causeway (1972) joins the island with the mainland.

Garden of ———: *see under* substantive word (*e.g.*, Eden, Garden of).

garden pepper (*Capsicum*): *see* pepper.

garden spider, also called CROSS SPIDER (*Araneus diadematus*) member of the family Araneidae (suborder Labidognatha), characterized by white marks arranged in the form of a cross on the abdomen. A fairly common species, the garden spider occurs throughout the Northern Hemisphere and is often found in grassy areas and gardens, where it builds an orb-shaped web on low shrubs. The adult spider lives in a retreat, usually a curled up leaf connected to the web by a 'signal' thread, which vibrates when prey lands in the web. In general, garden spiders mature in the summer. Eggs laid in the autumn hatch the following spring, and the newly emerged spiderlings spin an irregular mass of silk in which they cluster in a ball for several days. When disturbed they rush out in all directions but soon recluster if left alone. They overwinter as juveniles and mature the following summer. *See also* orb weaver.

garden tapestry: *see* verdure tapestry.

Gardenia, genus of ornamental shrubs and trees of the madder family (Rubiaceae), containing about 200 species native to tropical and subtropical Africa and Asia. Gardenias

Cape jasmine (*Gardenia jasminoides*)
A to Z Botanical Collection—EB Inc.

have white or yellow tubular flowers, evergreen leaves, and large, berrylike fruits containing a sticky, orange pulp.

Cape jasmine (*G. jasminoides*), native to China, is the fragrant species sold by florists.

gardening, the laying out and care of a plot of ground devoted partially or wholly to the growing of plants such as herbs, fruits, flowers, or vegetables. Gardening can be considered both as an art, concerned with arranging plants harmoniously in their surroundings, and as a science, encompassing the principles and techniques of plant cultivation.

A brief treatment of gardening follows. For full treatment, *see* MACROPAEDIA: Gardening and Horticulture.

Planting and tending a garden next to a dwelling place is practiced not only for the spot of beauty, repose, and seclusion it creates, or for the food it provides, but also for the feelings of relaxation, anticipation, and contentment gained from the work involved. Many garden plants are grown in conditions widely different from their natural environments and have been selectively bred for generations. Gardening therefore requires protecting them from naturally growing weeds and cultivating them according to methods derived both from science and from practical experience under local conditions.

Small home gardens became prevalent in the 19th century. Individual plants and flowers attracted increasing interest, and growers started to specialize, introduce exotic species, and compete in exhibitions. Private gardens have become smaller and less formal than those of earlier times. They may occupy extensive areas surrounding the house or may be as small as a window box or some pots on a windowsill. Labour-saving tools and new discoveries in plant physiology and pest control have encouraged the spread of horticulture both as a profession and as a relaxation and hobby.

Designs for a garden area often incorporate a boundary (for example, a fence, wall, or hedge), paths, seats, and some focal point, such as a pool or piece of sculpture. The more or less permanent elements of a garden may include lawn, shrubs, vines, and trees. The lawn usually consists of grass, kept shorn close to the ground. Nongrass lawns may be planted with some variety of low-growing creeping plant. Shrubs and bushes growing up to about 20 feet (6 metres) require little labour, and some flowering varieties bloom for extended periods. Vines can soften the sharp lines of buildings and fences, provide shade over arbours, or cover slopes and terraces. Trees, furnishing protection and interest, have a range of sizes, shapes, and colours broad enough to suit any garden scheme. Transitory elements in a garden include the herbaceous plants—annuals, biennials, and perennials—which die down each year, and the bulbous plants, which survive seasons unfavourable for growth and from which a new stem arises annually.

The style of a garden depends on how it is laid out, where it is situated, and what plants are grown. A well-designed flower garden displays blends and contrasts of colours and forms. Shrubs and trees are placed first and the spaces for herbaceous plants and bulbs arranged around them. The design may include areas of blooms for both the summer and the spring. Woodland gardens have a less formal style. Trees are thinned but left in irregular groups; paths are winding; plants are those that grow naturally in the woods.

Rock gardens are planned to look like a natural part of a rocky slope. The rocks, mainly of sandstone or limestone, are arranged to provide various exposures for sun-tolerant and shade-tolerant plants. A water garden may have a formal pool and fountains, or it may consist of an irregular-shaped pool containing water lilies and other vegetation surrounded by boggy soil for moisture-tolerant plants. Vegetable and herb gardens require sunny locations, and vegetable crops are most successful when they are rotated every three years or so. Rooftop gardens, window boxes, and indoor plants are increasingly popular in urban areas and can thrive well with the right choice of plants.

Soil is the basic factor in plant cultivation. It consists largely of mineral particles derived from the breakdown of rocks and other substances and also contains organic matter. Plant roots penetrate spaces between the particles where air, water, and microorganisms circulate. Ideal garden soil is a clay and sand mixture, rich in organic materials and of the proper degree of acidity or alkalinity for the plants to be grown.

The three chief elements that plants need for growth (other than light and water) are nitrogen, potassium, and phosphorus. Animal manures or composts of decayed plant matter can supply most growth requirements to the soil. Thorough watering is essential, furnishing the plants with needed moisture and making minerals available in solution. Many plants can withstand temperatures below freezing, but less hardy plants may have to be protected from cold weather by wrapping them or covering them with a mulch of leaves, soil, or ashes. Glass frames provide greater protection, and heated greenhouses permit plants to grow throughout the winter.

Trees and shrubs sometimes require pruning—cutting off branches or shoots—to restrict the plant to a desired size and shape. Shrubs may flower more abundantly after pruning, and pruned fruit trees often yield larger and better fruit. New plants can be propagated either from seeds or from a part of the parent plant. Seeds of vegetables and annual plants are usually sown in the spring. Trees and bushes can be produced by a variety of propagation methods from parent shoots or buds.

Two essential gardening tasks are the control of weeds and the protection of plants from

pests and diseases. Chemical and biological weed killers can be effective, but hoeing and hand weeding are often necessary. Garden pests include some insects and mites as well as a number of mammals; diseases may be caused by fungi, bacteria, or viruses. Keeping a clean, well-ventilated garden and rotating crops can help to prevent some of these problems. Chemical control is widely used, though with some long-term environmental risks.

Gardens in the world's temperate zones are generally more varied and successful than those of the tropics. Tropical gardens are able to maintain fewer herbaceous plants, and their dominant features tend to be flowering trees, shrubs, and climbers. In cooler climates the winter resting season enables many different plants and trees to thrive year after year.

Gardēz, capital of Paktīā *velāyat* (province) in eastern Afghanistan, located on a high plain at an altitude of 7,550 ft (2,300 m), near the Rūd-e (river) Jolgeh-ye Janūbī. Gardēz is a trade centre for lumber produced in the area and is connected by roads with Kābul, the nation's capital, 60 mi (100 km) north, and Ghaznī. Old trade routes lead from the town to northwestern Pakistan. Pop. (1982 est.) 10,040.

Gardie, Jacob Pontusson, Greve De la: *see* De la Gardie, Jacob Pontusson, Greve.

Gardie, Magnus Gabriel, Greve De la: *see* De la Gardie, Magnus Gabriel, Greve.

Gardiner, city, Kennebec County, southwestern Maine, U.S., on the Kennebec River (head of navigation), just south of Augusta and bounding Farmingdale, West Gardiner, and Richmond. Founded in 1754 by Sylvester Gardiner as Gardinerstown Plantation, it was set off from Pittston in 1760. Incorporated as a town in 1803, it had by 1850, when it became a city, acquired shoe factories, paper mills, and woodworking shops. One of the first workable steam automobiles in America was built there in 1858. It was the boyhood home of the poet Edwin Arlington Robinson (1869–1935) and is considered to be the "Tilbury Town" of his poems. Laura E. Richards (1850–1943) lived in Gardiner, where she wrote many of her novels including *Captain January* (1890). Pop. (1980) 6,485.

Gardiner, James Garfield (b. Nov. 30, 1883, Farquhar, Ont., Can.—d. Jan. 12, 1962, Balcarres, Sask.), Canadian statesman who twice served as premier of Saskatchewan (1926–29 and 1934–35).

After working on a farm in Manitoba from 1901, Gardiner in 1904 moved to Saskatchewan, where he became a schoolteacher and principal. He became a Liberal member of the Saskatchewan Legislative Assembly in 1914 and sat until 1935. After being appointed to the provincial Cabinet in 1922, he succeeded C.A. Dunning as premier in 1926. His party lost the 1929 election but returned in 1934, with Gardiner again as premier.

He resigned as premier the following year to become federal minister of agriculture and was elected to the dominion House of Commons for Melville. Gardiner was minister of agriculture during W.L. Mackenzie King's and Louis Saint Laurent's ministries. He dealt with federal agricultural assistance during the Great Depression of the 1930s and with problems relating to World War II (1939–45). In 1947 he was appointed to the Imperial Privy Council and made an unsuccessful attempt to replace King as Liberal leader. Reelected to the House in 1957, Gardiner resigned his portfolio when the Liberal ministry resigned.

Gardiner, Samuel Rawson (b. March 4, 1829, Ropley, near Alresford, Hampshire, Eng.—d. Feb. 23, 1902, Sevenoaks, Kent), English historian, whose career was dedicated to the study of the English Civil Wars.

He was educated at Winchester and Christ Church, Oxford, and for some years was a member of the Irvingite Church. From 1871 to 1885 he taught at King's College, London, becoming professor of modern history there in 1876. He was elected fellow of All Souls College, Oxford, in 1884 and of Merton College in 1892 but declined the regius professorship in 1894.

His researches among manuscript collections at Simancas, Venice, Rome, Brussels, and Paris, as well as in England, gave unrivalled authority to the monumental undertaking that took shape between 1863 and 1900. Its principal stages were the *History of England From the Accession of James I to the Outbreak of the Civil War, 1603–1642,* 10 vol. (1883–84); *History of the Great Civil War, 1642–1649,* 3 vol. (1886), 4 vol. (1893); and *History of the Commonwealth and Protectorate, 1649–1660,* 4 vol. (1903). In analyzing the cause of the Civil War, he showed keen perception of individual motives as well as broad understanding of the material factors underlying political conduct. He was ready to credit England with a sense of nationhood wider and deeper than any provided for by the mere forms of government, and this gave drama to his otherwise unadorned chronicle. Inconsistencies and misinterpretations may be found, but the authority of his *History of England* continues to command respect little short of that usually reserved for original sources.

Among the most noteworthy of his separate works are *Prince Charles and the Spanish Marriage,* 2 vol. (1869); *Outline of English History* (1st ed., 1881; later ed., 1919); *Student's History of England,* 2 vol. (1st ed., 1890–91; later ed., 3 vol., 1920); *What Gunpowder Plot Was* (1897); and *Oliver Cromwell* (1901). His edition of *Constitutional Documents of the Puritan Revolution 1628–1660* (1889) continues to be widely used. He also edited collections of papers for the Camden Society and from 1891 was editor of the *English Historical Review.*

Gardiner, Stephen (b. *c.* 1482, Bury St. Edmunds, Suffolk, Eng.—d. Nov. 12, 1555, London), English bishop and statesman, a leading exponent of conservatism in the first generation of the English Reformation. Although he supported the antipapal policies of King Henry VIII (ruled 1509–47), Gardiner rejected Protestant doctrine and ultimately backed the severe Roman Catholicism of Queen Mary I (ruled 1553–58).

The son of a clothmaker, he obtained his doctorate in civil and canon law from the University of Cambridge in 1520–21. Throughout a busy public life he maintained ties to Cambridge, serving as master of Trinity 1525–49 and 1553–55. Gardiner became, in 1525, secretary to Henry VIII's chief minister, Cardinal Wolsey, and in 1528–29 he was sent on missions to Pope Clement VII to negotiate for the annulment of Henry's marriage to Catherine of Aragon—the issue that was to cause Henry to break with Rome and declare himself head of the English Church. As a reward for his services Gardiner was made Henry's principal secretary in 1529 and bishop of Winchester, the wealthiest see in England, in September 1531.

Gardiner, however, failed to earn the King's trust; in 1532 Henry bypassed him to appoint as his archbishop of Canterbury the obscure Thomas Cranmer, who was to become a renowned Protestant reformer. Two years later Henry's chief adviser, Thomas Cromwell, eased Gardiner out of his secretaryship. Thus the Bishop became the inveterate enemy of both Cromwell and Cranmer. Gardiner recovered some favour at court by publishing his *Episcopi de vera obedientia oratio* (1535; "Bishop's Speech on True Obedience"), a treatise attacking the papacy and upholding royal supremacy over the Church of England. In 1539, however, he led the conservative reaction that, through the Act of Six Articles, required all Englishmen to abide by the main tenets of Roman Catholic doctrine. Gardiner and his sometime colleague Thomas Howard, 3rd duke of Norfolk, had a hand in bringing about Cromwell's downfall in June 1540, and he then succeeded Cromwell as chancellor of Cambridge. Thereafter Henry kept Gardiner on his royal council in order to counter the Protestant sympathies of some of his other advisers, but he would not allow the Bishop to bring Cranmer to trial on charges of heresy. Gardiner was also frustrated in his campaign to destroy Queen Catherine Parr, and Henry did not name him to the council of regency for his son Edward.

During the rapid advance toward Protestantism that took place upon the accession of Edward VI, Gardiner was sent to prison for refusing to enforce Cranmer's Reformist injunctions. Although released in January 1548, he was imprisoned in the Tower of London in June and remained there until Edward's death (on July 6, 1553), being deprived of his bishopric late in 1550.

After the Catholic Mary I ascended the throne, Gardiner was restored to his see in August 1553 and appointed lord chancellor. Although he had become, in effect, chief minister of the realm, he was in a difficult position because he felt out of step in a court increasingly oriented toward Rome and—after Mary wed the Holy Roman emperor Charles V's son Philip (King Philip II of Spain, 1556–98)—by Spain. Gardiner approved the severe persecution of Protestants that began early in 1554, but to his credit he tried unsuccessfully to save Cranmer and others from the stake. He died two years before the persecutions ended. Gardiner had earned distinction for his legal and administrative talents; he was a powerful churchman but not a great spiritual leader. See J.A. Muller, *Stephen Gardiner and the Tudor Reaction* (1926).

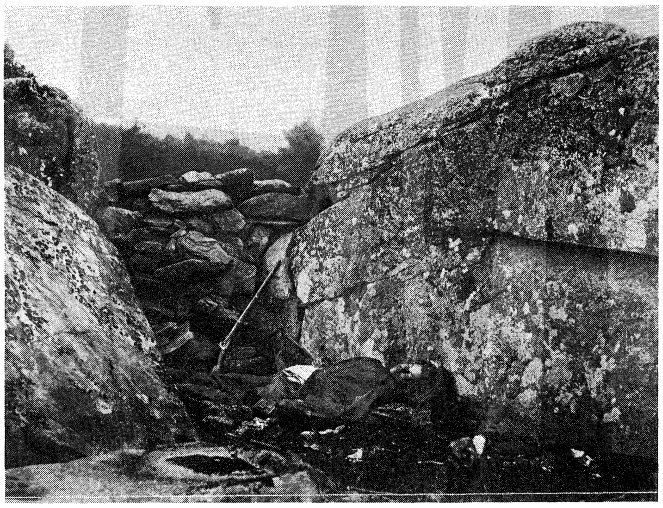
Gardner, Alexander (b. Oct. 17, 1821, Paisley, Renfrew, Scot.—d. 1882, Washington, D.C.), photographer of the American Civil War and of the American West during the latter part of the 19th century.

Gardner probably came to the United States in 1856, when he was hired by the photographer Mathew B. Brady as a portrait photographer. Two years later, Gardner opened a portrait studio for Brady in Washington, which was so successful that it helped to support Brady's more extravagant New York studio.

When the American Civil War erupted in 1861, Gardner assisted Brady in his effort to make a complete photographic record of the conflict. Brady, however, refused to give Gardner public credit for his work. Gardner, therefore, left Brady in 1863, opened a portrait gallery in Washington, and continued to photograph the hostilities on his own. His photographs "President Lincoln on the Battlefield of Antietam" (1862) and "Home of a Rebel Sharpshooter, Gettysburg" (1863) and his portraits of Abraham Lincoln are among the best known photographs of the war period. *Gardner's Photographic Sketch Book of the Civil War,* a two-volume collection of 100 original prints, was published in 1866. When Brady petitioned Congress to buy his photographs of the war, Gardner presented a rival petition, claiming that it was he, not Brady, who had originated the idea of providing the nation with a photographic history of the conflict. Congress eventually bought both collections.

In 1867 Gardner became the official photographer for the Union Pacific Railroad. Pri-

marily active in Kansas, he photographed the building of the railroad and the new settlements that grew up near it. He also compiled



"Home of a Rebel Sharpshooter, Gettysburg," by Alexander Gardner, 1863
George Eastman House Collection

valuable photographic documentation of the Indians of the Great Plains. Returning to Washington, he gradually lost interest in photography and devoted the rest of his life to philanthropy.

Gardner, Erle Stanley (b. July 17, 1889, Malden, Mass., U.S.—d. March 11, 1970, Temecula, Calif.), U.S. author and lawyer who wrote nearly 100 detective and mystery novels that sold more than 1,000,000 copies each, making him easily the best-selling American writer of his time. His best known works centre on the lawyer-detective Perry Mason.

The son of a mining engineer, Gardner travelled extensively with his family throughout childhood. He dropped out of Valparaiso University, Valparaiso, Ind., after a brief time and settled in California, where he worked as a typist in a law firm. After three years he was admitted to the California bar (1911) and began defending poor Chinese and Mexicans as well as other clients. His interest in the friendless and unjustly accused was lifelong and led to his founding of The Court of Last Resort in the 1940s, an organization dedicated to helping men imprisoned unjustly.

While practicing trial law in Ventura, Calif., he began writing for the pulp magazines popular at that time, creating accurate courtroom scenes and brilliant legal manoeuvres resembling his own legal tactics. By 1932 he was writing more than 200,000 words a month while still working two days a week in his law practice. With the successful publication of the first Perry Mason detective stories, *The Case of the Velvet Claws* (1933) and *The Case of the Sulky Girl* (1933), however, he gave up the law. Eighty Perry Mason novels followed.

Erle Stanley Gardner
Brown Brothers

Gardner later supervised the adaptation of the Perry Mason stories for radio, television, and motion pictures.

A second series of books, built around Doug Selby, a virtuous crusading district attorney, all had titles beginning "The D.A. . . .": *The D.A. Calls It Murder* (1937) and *The D.A. Goes to Trial* (1940). A third series, written under the pseudonym A.A. Fair, dealt with the adventures of the fat, middle-aged, greedy private detective Bertha Cool and the knowledgeable legalist Donald Lam.

Gardner, Percy (b. Nov. 24, 1846, London—d. July 17, 1937, Oxford), English archaeologist who was noted for his contributions to the study of Greek numismatics.

Gardner was a prolific writer and lecturer on numismatics, Greek art, and religious subjects, as well as a gifted teacher. He was educated at Christ's College, Cambridge, and while a member of the department of coins and medals at the British Museum, London, he contributed several volumes to the museum's *Catalogue of Greek Coins*. In 1880 he became a professor of archaeology at Cambridge and the first editor of the *Journal of Hellenic Studies*, which he co-founded. In 1887 he transferred to Oxford, where he taught for 38 years.

Among his best known works are *The Types of Greek Coins* (1883), important for demonstrating the ways in which coinage reflects the history of Greek cities and the development of Greek art, *Samos and Samian Coins* (1882), and *New Chapters in Greek Art* (1926). His *Principles of Greek Art* (1913), an elaboration of *Grammar of Greek Art* (1905), became a standard introduction.

His younger brother Ernest Arthur Gardner (1862–1939), educated at Caius College, Cambridge, was director of the British School of Archaeology at Athens from 1887 to 1895 and later became professor of archaeology at University College, London, and dean of the university. He also published a number of works on Greek art and history, including *Handbook of Greek Sculpture* (1896–97; new ed., 1905), *Ancient Athens* (1902), and *Greece and the Aegean* (1933).

Gardner Museum, in full ISABELLA STEWART GARDNER MUSEUM, home and art collection, located in Fenway Court, Boston. The building, designed in the style of a 15th-century Venetian palace and built between 1899 and 1903, houses a collection that includes Oriental art and Classical, medieval, and Renaissance sculpture and decorative arts, as well as masterpieces of European painting from the Middle Ages to the late 19th century. Many of the art objects in the collection were acquired for Isabella Stewart Gardner by the famed connoisseur Bernard Berenson. The arrangement of the rooms has remained unchanged, and there have been no additions to the collection since Mrs. Gardner's death in 1924, in accordance with the terms of her will.

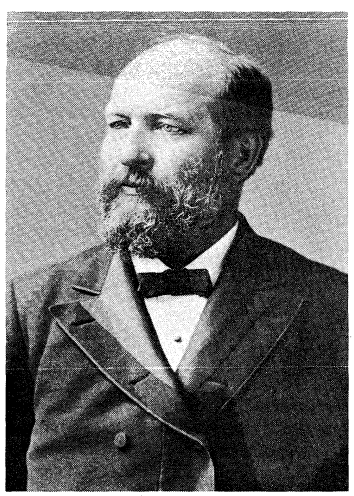
garefowl (bird): *see* great auk.

Garfield, James A(bram) (b. Nov. 19, 1831, near Orange, Ohio, U.S.—d. Sept. 19, 1881, Elberon, N.J.), 20th president of the United States (March 4–Sept. 19, 1881). When he was shot and rendered unconscious soon after taking office, serious constitutional questions arose concerning who should properly perform the functions of the presidency.

Garfield's father died in 1833, leaving the family in poverty. His mother continued to run the family's small farm and to see that her children went to the neighbourhood school. Garfield attended Western Reserve Eclectic Institute at Hiram, Ohio, and was graduated from Williams College (1856). He then returned to the academy in Ohio as a teacher and later as principal.

An advocate of free-soil principles, he soon became a supporter of the newly organized Republican Party, and in 1859 he was elected to the Ohio legislature. During the Civil War he helped recruit the 42nd Ohio Volunteer Infantry and became its colonel. He fought at Shiloh (April 1862), served as chief of staff in the Army of the Cumberland, saw action at Chickamauga (September 1863), and emerged as a major general of volunteers.

In 1862 he was elected to the U.S. House of Representatives, where he served until 1880. Chairman of the House Committee on Appropriations, he became an expert on fiscal matters, advocated a high protective tariff, and, as a Radical Republican, sought a firm policy of Reconstruction for the South. In 1880 the Ohio legislature elected him to the U.S. Senate.



James Garfield, 1880
By courtesy of the Library of Congress, Washington, D.C.

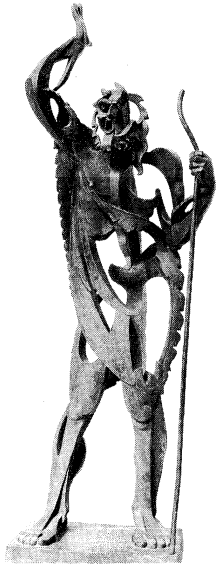
At the Republican presidential convention the same year in Chicago, the delegates were sharply divided between supporters of James G. Blaine and Ulysses S. Grant. Garfield, present as the chairman of the Ohio delegation, led a coalition of anti-Grant delegates who succeeded in rescinding the unit rule, by which a majority of delegates from a state could cast the state's entire vote. This rule change doomed Grant's candidacy; he led all other candidates for 35 ballots, but failed to command a majority, and on the 36th ballot the nomination went to Garfield. In November, with a popular plurality of less than 50,000 votes, Garfield was elected.

On July 2, 1881, after only four months in office, Garfield was shot at the railroad station in Washington, D.C., by Charles J. Guiteau,

a disappointed office seeker. For 80 days the President lay ill and performed only one official act—the signing of an extradition paper. It was generally agreed that, in such cases, the vice president was empowered by the Constitution to assume the powers and duties of the office of president. But should he serve merely as acting president until Garfield recovered, or would he receive the office itself and thus displace his predecessor? Because of an ambiguity in the Constitution, opinion was divided, and since Congress was not in session, the problem could not be debated there. On Sept. 2, 1881, the matter came before a Cabinet meeting where it was finally agreed that no action would be taken without first consulting Garfield. But in the opinion of the doctors this was impossible, and no further action was taken before the death of the President on September 19. Biographies are Theodore Clark Smith, *Life and Letters of James Abram Garfield*, 2 vol. (1925), Robert Granville Caldwell, *James A. Garfield: Party Chieftain* (1931), and Allan Peskin, *Garfield* (1978).

garfish, European species of needlefish (*q.v.*).

Gargallo (y Catalán), Pablo (b. 1881, Maillà, Spain—d. Dec. 28, 1934, Reus), 20th-century Spanish sculptor, among the first to work in iron; he introduced Pablo Picasso to metal sculpture. Although he used the Cubist concepts that he learned from Picasso to focus attention on the human figure, he never tended toward abstraction.



"The Prophet," bronze statue by Pablo Gargallo, 1930; in the Musée National d'Art Moderne, Paris

By courtesy of the Musee National d'Art Moderne, Paris; Cliche Musees Nationaux

After studying drawing and sculpture in Barcelona, Gargallo won a scholarship to continue his studies in Paris but was forced to return shortly thereafter to support his widowed mother and her family. Returning to Paris in 1911, he met Amedeo Modigliani, Juan Gris, Apollinaire, and other French artists and saw Picasso's Cubist paintings. He returned to Barcelona in 1914 and in 1917 began to teach at the Escuela Superior de Artes Oficios, only to return once more to Paris, in 1924. After his death he was honoured with four major posthumous exhibitions, in 1935 at Madrid and in Paris, in 1947 in Paris, and in 1955 at the Venice Biennale.

Gargallo achieved recognition in the 1920s for his figure sculptures, constructed of thin leaves of metal. Works such as "The Prophet" (1930; Musée National d'Art Moderne, Paris) and "Picador" (1928; Museum of Modern Art, New York City) are examples of his emphasis on the human figure and his use of Cubist techniques to achieve realism rather than abstraction.

Gargano, Italian PROMONTORIO DEL GARGANO, also called MONTE GARGANO, mountainous promontory jutting into the Adriatic Sea from the east coast of Italy, in Foggia province, Puglia (Apulia) region. Called the "spur" of the Italian "boot" (peninsula), it is 40 mi (65 km) long and 25 mi at its widest, with an area of 778 sq mi (2,015 sq km). The peninsula is composed entirely of limestone, surrounded by terraces of various geological periods, and rises to 3,465 ft (1,056 m) at Monte Calvo. The north coast has splendid citrus and olive groves and vineyards along the shore; the southern slopes, facing the Foggia plain, are known for their heavy red wines. The oak forests, famous in ancient times, have largely been cut, and only naked bedrock remains over much of the interior of the Gargano; most famous of the few surviving forest preserves is the Bosco Umbra (mainly beech).

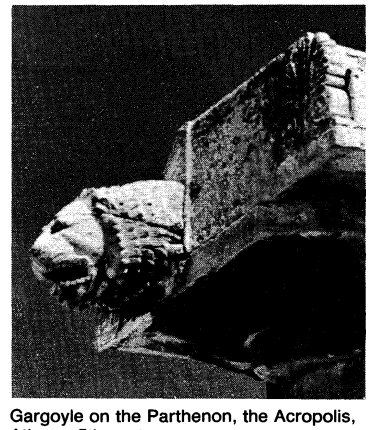
Vieste, on the eastern tip, and Manfredonia (*q.v.*), on the south coast, are the main seaside settlements. Monte Sant'Angelo (*q.v.*), an ancient pilgrimage centre, and San Giovanni Rotondo, near which bauxite is mined, are the largest towns of the interior.

Gargantua and Pantagruel (1532–64), the comic and satiric story of the adventures of the giant Gargantua, his son Pantagruel, and companions, a masterpiece by the French Humanist François Rabelais (*q.v.*). Books II, *Pantagruel* (1532), and I, *Gargantua* (1534), were followed by Books III (1546), IV (1552), and V (of uncertain authenticity, 1564). The travels and adventures of this ribald crew are the vehicle for devastating ridicule of the follies and superstitions of the times; the work brought Rabelais into trouble with authority for alleged obscenity and irreligion.

Gargas, cave in southern France containing important examples of Late Paleolithic mural art, paintings and engravings dating from the Aurignacian Period, the oldest phase of European Stone Age art. The cave and its decoration were discovered in 1887. Numerous "macaroni," or finger tracings, appear on the clay walls and ceiling of the cave; some of these are simply tangled lines, representing the most ancient attempts at art, and some are primitive but lively outlines of animal forms. From a somewhat later stage are a number of engraved animal pictures cut with a sharp tool into the rock of the cave: wild horses, ibex, stags, oxen, bison, and mammoths rendered in a vigorous naturalism that is typical of Aurignacian art and probably functioning as magical images relating to hunting and animal fertility. The distinctive feature of the decoration at Gargas, however, is the large number of silhouettes of human hands painted on the walls of the cave. These are "negative imprints" of real hands, achieved by blowing paint around and between the fingers while the hand is held next to the wall surface. Hand silhouettes of this type are the oldest form of painting known, the earliest examples dating from *c.* 30,000 BC. They occur throughout the cave art of France and Spain, both as "negative" and as "positive" prints made by hands dipped in paint and pressed on the wall, but they are most numerous at Gargas, where more than 150 have been found. At Gargas, red and black pigments were used, the red being earlier, and the prints are often arranged in horizontal rows, revealing, even at this early stage, a feeling for artistic composition and rhythmic repetition of motif. A curious feature of these silhouettes is that many are representations of mutilated hands with one or more finger joints missing, most frequently the last two joints of the last four fingers. Often the same mutilated hand is stencilled repeatedly over an area. This mutilation may have been the result of voluntary sacrificial amputation or, more likely, considering the pattern and severity, of disease associated with malnutrition and exposure to cold.

The significance of these handprints is unknown. The motif is widespread in Stone Age art, appearing not only in Ice Age Europe but also in the art of primitive hunter cultures in Africa, Australia, and America. It may have served primitive man as a sort of personal signature, defining his relationship with his tribe or with supernatural powers or perhaps sealing some promise made to his companions or to the gods. The imprinted hand may also have been a symbol of possession.

gargoyle, in architecture, waterspout designed to drain water from the parapet gutter. Originally the term referred only to the carved lions of classic cornices or to terra-cotta spouts, such as those found frequently in Pompeii. The word later became restricted primarily to the grotesque, carved spouts of the Middle Ages. It is frequently, although incorrectly, applied to other grotesque beasts, such as the



Gargoyle on the Parthenon, the Acropolis, Athens, 5th century BC

Alison Frantz

chimères (chimeras) that decorate the parapets of Notre-Dame at Paris. The gargoyle of the developed Gothic period is usually a grotesque bird or beast sitting on its haunches on the back of a cornice molding and projected forward for several feet in order to throw the water far from the building.

gargoylism (hereditary disorder): *see* Hurler's syndrome.

Garhwāl, district, Uttar Pradesh state, northern India, with its administrative headquarters at Pauri. The district, 2,100 sq mi (5,440 sq km) in area, lies almost wholly within the forested Siwālik Range and varies in altitude between 1,000 ft (300 m) in the south and 10,000 ft in the north. There is a narrow strip of piedmont along the mountains' southern margin. The Ganges River is formed by the confluence of the Bhāgīrathi and the Alaknandā rivers on the district's northern boundary. Crops grown include wheat, rice, and barley. The towns of Badrīnāth and Kedārnāth are Hindu pilgrimage centres. Garhwāl district has a poor road system and no major railways. Pop. (1981) 637,877.

Garian (Libya): *see* Gharyān.

Garibaldi, Giuseppe (b. July 4, 1807, Nice, French Empire—d. June 2, 1882, Caprera, Italy), Italian patriot and soldier of the Risorgimento, a republican who, by his conquest of Sicily and Naples with his guerrilla "Redshirts," contributed to the achievement of Italian unity under the royal House of Savoy.

Early life. Garibaldi's family was one of fishermen and coastal traders, and for more than 10 years he himself was a sailor. In 1832 he acquired a master's certificate as a merchant captain. By 1833–34, when he served in the navy of the Kingdom of Piedmont–Sardinia, he had come under the influence of Giuseppe Mazzini, the great prophet of Italian nationalism, and the French Socialist thinker, the Comte de Saint-Simon. Garibaldi, in 1834, took part in a mutiny intended to provoke a republican revolution in Piedmont, but the plot failed; he himself escaped to France and in his absence was condemned to death by a Genoese court.

Garibaldi, 1866
Deutsche Fotothek, Dresden

Exile in South America. From 1836 to 1848 Garibaldi lived in South America as an exile, and these years of turmoil and revolution in that continent strongly influenced his career. He volunteered to serve the Rio Grande do Sul republic as a naval captain in the unsuccessful attempt by that small state to break free from the Brazilian Empire. Actually, he did little more than prey on Brazilian shipping. In the course of often harrowing adventures on land and sea, he managed to elope with Anna Maria Ribeiro da Silva (Anita), a married woman, who remained his companion in arms until her death. After a succession of victories by the Brazilians in 1839–40, he finally decided to leave the service of Rio Grande. Driving a herd of cattle, he made the long trek to Montevideo with Anita and their son. There he tried his hand as commercial traveller and teacher but could not accustom himself to civilian life. In 1842 he was put in charge of the Uruguayan Navy in another liberation war—this time against Juan Manuel de Rosas, the dictator of Argentina. The following year, again in the service of Uruguay, he took command of a newly formed Italian Legion at Montevideo; these men formed the first of the "Redshirts," with whom his name became associated. After he won a small but heroic engagement at the Battle of Sant'Antonio in 1846, his fame reached even to Europe, and in Italy a sword of honour, paid for by subscriptions, was donated to him. For a short time in 1847 he was in charge of the defense of Montevideo. On this occasion he first came to the attention of Alexandre Dumas *père,* who later did much to foster his reputation. He also greatly impressed other foreign observers as an honest and able man. His South American experiences gave him invaluable training in the techniques of guerrilla warfare that he was later to use with great effect against French and Austrian armies, which had not been taught how to counter them. These first exploits in the cause of freedom cast him in the mold of a professional rebel, an indomitable individualist who all his life continued to wear the gaucho costume of the pampas and to act as if life were a perpetual battle for liberty.

War of liberation. In April 1848 Garibaldi led 60 members of his Italian Legion back to Italy to fight for the Risorgimento, or resurrection, of Italy in the war of independence against the Austrians. He first offered to fight for Pope Pius IX, and—when his offer was refused—for Charles Albert, the king of Piedmont–Sardinia. The King, too, rebuffed him, for Garibaldi's conviction as a rebel in 1834 was still remembered; moreover, the regular army despised this self-taught guerrilla leader. Garibaldi went, therefore, to the aid of the city of Milan, where Mazzini had already arrived and had given the war of liberation a more republican and radical turn. Charles Albert, after his defeat at the hands of the Austrians at Custoza, agreed to an armistice, but Garibaldi continued in the name of Milan what had become his private war, and emerged creditably from two engagements with the Austrians at Luino and Morazzone. But at the end of August, heavily outnumbered, he had to retreat across the frontier to Switzerland.

For a time Garibaldi settled down at Nice with Anita (whom he had married in 1842) and their three children, but his resolve to help free Italy from foreign rule was now stronger than ever. He was confirmed in his purpose by his belief—which he and only a handful of others shared with Mazzini—that the many Italian states, though often engaged in internecine warfare, could nonetheless be unified into a single state. When Pius IX, threatened by liberal forces within the Papal States, fled from Rome toward the end of 1848, Garibaldi led a group of volunteers to that city. There, in February 1849, he was elected a deputy in the Roman Assembly, and it was he who proposed that Rome should become an independent republic. In April a French army arrived to restore papal government, and Garibaldi was the chief inspiration of a spirited defense that repulsed a French attack on the Janiculum Hill. In May he defeated a Neapolitan army outside Rome at Velletri, and in June he was the leading figure in the defense of Rome against a French siege. There was no chance at all of holding the city, but the gallantry of the resistance became one of the most inspiring stories of the Risorgimento. Refusing to accept defeat, in July 1849 Garibaldi led a few thousand men out of Rome and through central Italy, manoeuvring to avoid French and Austrian armies, until he reached neutral territory in the republic of San Marino.

Retreat. There he found himself surrounded and decided to disband his men. Soon afterward, he himself was pursued by the Austrians as he tried to escape. Although Anita died during this escape, Garibaldi successfully crossed the Apennines to the Tuscan coast. The retreat through central Italy, coming after the defense of Rome, made Garibaldi a well-known figure wherever newspapers were read. From then on he was the "hero of two worlds." Some people criticized his military skill in this campaign, but his qualities as a leader had proved to be extraordinary, and his courage and determination not to surrender were a lesson in patriotism to his fellow countrymen.

The Piedmontese monarchy, however, was too frightened to let this rebel return to his mother and his children, and soon he was in exile a second time, first at Tangier, then on Staten Island, then in Peru, where he returned to his original trade as a ship's captain. Only in 1854 was he allowed to return to Italy; Conte di Cavour, the prime minister of Piedmont, believed that by this act he could pry Garibaldi away from the republican Mazzini. In the following year Garibaldi bought part of the island of Caprera off the Sardinian coast, which remained his home for the rest of his life. In 1856 he tried to lead an expedition to release political prisoners held by the Bourbon kings of Naples, but it came to nothing. In 1858 he received an invitation from the Conte di Cavour to help prepare for another war against Austria. His task was to lead an army of volunteers collected from other provinces of Italy, and for this purpose he was given the rank of major general in the Piedmontese Army. When war broke out in April 1859, he led his Cacciatori delle Alpi (Alpine Huntsmen) in the capture of Varese and Como and reached the frontier of the south Tirol. This war ended with the acquisition of Lombardy by Piedmont.

In September 1859, after peace had returned to northern Italy, Garibaldi transferred his attention to central Italy, where a revolutionary government had established itself at Florence. There, on several occasions, he had private meetings with King Victor Emmanuel II of Piedmont–Sardinia, when it was agreed that he should prepare to invade the Papal States; the King would support his venture if it succeeded or disown him if it failed. At the last moment, however, the King realized that this was too dangerous and asked him to give up the idea. Garibaldi agreed, though reluctantly. He was ready at any moment to revive this kind of unwritten agreement with Victor Emmanuel, but it became increasingly clear that their aims were not entirely identical. Though both men were patriots, Garibaldi was already working for the unification of Italy; the King was more prudent and was concerned rather with expanding Piedmont as far as seemed feasible. Garibaldi was especially furious when, early in 1860, Cavour and Victor Emmanuel gave his hometown of Nice back to France (it had become Piedmontese in 1814), and he made one of his rare appearances in Parliament to protest this violation of the national principle. In January 1860 he married Giuseppina, the daughter of the Marchese Raimondi, but abandoned her, within hours of the marriage, when he discovered she almost certainly was five months pregnant by one of his own officers. Twenty years later, he was able to obtain the decree of nullity that enabled him to legitimize his children by Francesca Armosino.

Conquest of Sicily and Naples. In May 1860 Garibaldi set out on the greatest venture of his life, which was to result in the conquest of Sicily and Naples. This time he had no government backing, but Cavour and Victor Emmanuel did not dare to stop him, for he had become a popular hero. They stood ready to assist, but only if he proved successful, and he accepted this unwritten arrangement, confident that he could thus force Cavour to support a new move toward the unification of the Italian peninsula. Sailing from near Genoa on May 6 with about 1,000 men, he reached Marsala in Sicily on the 11th and in the name of Victor Emmanuel proclaimed himself dictator. A popular revolution in Sicily gave him considerable help, for his personal charm was irresistible, and many of the peasants thought him a god come to deliver them from slavery and feudalism. The decisive moment for his forces was a small engagement at Calatafimi, when he gave convincing proof that he could defeat the regular soldiers of the king of Naples' army. Immediately there was a great popular movement in his support; and this helped him, at the end of May, to capture Palermo.

The seizure of Palermo was one of Garibaldi's most remarkable military successes, and it convinced Cavour that this volunteer army should now be strongly, if still secretly, supported by Piedmont. Moving across the island, Garibaldi won the Battle of Milazzo in July, helped by reinforcements from northern

Italy. On August 18–19 he crossed over the Strait of Messina and landed on the mainland in Calabria. As always, his strategy was to deny the enemy a moment's pause. After a lightning campaign, he moved up through Calabria and on Sept. 7, 1860, entered Naples, Italy's largest city, where he proclaimed himself "Dictator of the Two Sicilies" (the name of the territories of the king of Naples, comprising most of southern Italy and Sicily). He then fought another battle on the Volturno River north of Naples. This was the biggest battle of his career, Garibaldi commanding about 30,000 men. After his victory he held plebiscites in Sicily and Naples, which allowed him to hand over the whole of southern Italy to King Victor Emmanuel. When the two met, he was the first person to hail Victor Emmanuel as king of a united Italy. The King made a triumphal entry into Naples on November 7, and Garibaldi sat beside him in the royal carriage. But immediately afterward the former dictator returned to Caprera, refusing all the rewards thrust on him. He had asked for only one thing—to be allowed to continue governing Naples as the King's viceroy until conditions returned to normal; but this was refused him, for in the eyes of the conservatives he was still a dangerous radical—an anticlerical who moreover professed to hold advanced ideas on social reform. He was also a man who was known to want to reconquer Rome from the pope and make it into Italy's capital. This was too dangerous a scheme for Victor Emmanuel, for there was a French garrison defending the papal temporal power in Rome. There was also another, more insidious danger: Garibaldi was more popular than the King himself. Furthermore, the regular army of Piedmont was deeply jealous of his successes and determined that he should not be permitted to score fresh ones. Finally, it was feared that Mazzini and the republicans might recapture Garibaldi's allegiance and make him desert the monarchical cause.

Kingdom of Italy. In 1861 a new kingdom of Italy came into existence, but from the start it found Garibaldi virtually in opposition. Many people regarded him as an embarrassment. He opposed Cavour in Parliament and he accused the government of shabby treatment of the volunteer soldiers who had conquered half the country and given it to the King. Also, he condemned the inefficient administration of the provinces that he had conquered and for which he felt especially responsible. In many ways he showed that he considered himself almost an independent power in his own right, both in his dealings with his own government and with foreign powers. So much admired was he outside the country that Pres. Abraham Lincoln in July 1861 offered him a command in the American Civil War; the offer was declined, partly because Lincoln would not make a sweeping enough condemnation of slavery, but also because he would not give Garibaldi supreme command of the Federal troops. Another sign of Garibaldi's reputation was the rapturous reception that he later received in England in April 1864. Perhaps never before in history had there been such a large spontaneous gathering as the one that cheered him through the streets of London.

Last campaigns. Early in 1862 Victor Emmanuel again persuaded Garibaldi to lead a revolutionary expedition, this time to attack Austria in the Balkans. He was allowed to recruit another volunteer army, and munitions were collected for him in Sicily; but he then decided to use this army to attack the Papal States. The Italian government did not want to jeopardize its relations with the French, who garrisoned the Papal States, and at this point ordered its own forces to stop Garibaldi. At the ensuing Battle of Aspromonte he was badly wounded and taken prisoner. He was freed, however, and now the King's complicity with him could no longer be denied. His wound left him lame, but this did not prevent the government from using him more openly when war broke out with Austria in 1866. He was given an almost independent command in the Tirol, and once again he emerged from the war with a good deal more credit than any of the regular soldiers. This war led to the acquisition of Venice. In 1867 Garibaldi led another private expedition of his own into the Papal States. This, too, was secretly subsidized by the government, though, of course, the King pretended otherwise; but political mismanagement of the whole incident forced the French to intervene, and French troops defeated Garibaldi's volunteers at Mentana. Once more he was arrested by the Italian government in order to cover up its complicity, but he was soon released and taken back to Caprera. Garibaldi led one final campaign in 1870–71, when he went to assist the French Republic against Prussia. Again he distinguished himself, though on a small scale, and he was subsequently elected a member of the French National Assembly at Bordeaux.

During the last decade of his life he was crippled by rheumatism and by his many wounds. Though he had become something of a recluse on his island, he kept abreast of affairs through the numerous deputations that called on him, and he habitually made pronouncements on affairs of the day. Toward the end he called himself a Socialist, but both Karl Marx and the anarchist Mikhail Bakunin disowned him. He also became something of a pacifist, for his own experience had taught him that wars were seldom either righteous or effective in achieving their ends. He was a recognized champion of the rights of labour and of women's emancipation. He also showed himself a religious freethinker and ahead of his time in believing in racial equality and the abolition of capital punishment.

Assessment. Garibaldi was responsible for most of the military victories of the Risorgimento, not least because he was one of the great masters of guerrilla warfare. Almost equally important was his contribution as a propagandist to the unification of Italy. Himself a man of the common people, he knew far better than Cavour or Mazzini how to reach the masses with the new message of patriotism. Furthermore, the fact that he used his military and political gifts for liberal or nationalist causes coincided well with current fashion and brought him great acclaim. In addition, he attracted support by being a truly honest man who asked little for himself.

But his forthright innocence coloured his politics. Not interested in power for himself, he believed in dictatorship because of his South American experiences. He distrusted parliaments because he saw them to be ineffective and corrupt. Actually, his own dictatorship of southern Italy in 1860, though much criticized, compares surprisingly well with the subsequent administration by the Kingdom of Italy. There was little of the intellectual about Garibaldi, yet his simpleminded radicalism for the first time created some kind of political awareness in many of his fellow countrymen and brought home to them what nationality signified. Notwithstanding his turn toward Socialism, he remained primarily a nationalist—but the object of his nationalism was always the liberation of peoples and not patriotic aggrandizement. To his embodiment of this aim he owes his eminent place in Italian history.

(De.M.S.)

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Garibaldi, Mount, peak in southern British Columbia, Canada, in the Coast Mountains east of the Cheakamus River. Glacier-capped, it is 8,787 ft (2,678 m) high and is the focus of Garibaldi Provincial Park (area 760 sq mi [1,968 sq km]), established in 1927 and now a popular year-round recreational district. The park includes a nature conservancy (area 69 sq mi) and is 40 mi (64 km) north of Vancouver. Capt. George H. Richards of the survey ship "Plumper" named the peak *c.* 1860 for the Italian patriot.

Garis, Howard R(oger) (b. April 25, 1873, Binghamton, N.Y., U.S.—d. Nov. 6, 1962, Amherst, Mass.), author, creator of the Uncle Wiggily series of children's stories, who began his career as a newspaperman on the *Newark Evening News* in 1896. Shortly after, he began writing a daily bedtime story about Uncle Wiggily—a rabbit hero—and his friends. He averaged a story a day (except Sunday) until he retired in 1947. In all, he turned out more than 15,000 stories and about 500 books.

Garissa, town, headquarters of Garissa district, and capital of North-Eastern Province, east central Kenya, East Africa. The town is a market centre situated on the Tana River, and its industries process food and tobacco products; manufactures include plastic containers and beverages. It is located about 215 mi (350 km) east of Nairobi and is linked by road with Nairobi, Mombasa, and Alanga Arba. Pop. (1979) 14,076.

Garland, city, Dallas County, northern Texas, U.S. Adjacent to Dallas (west), it was founded when two rival railroad communities, Duck Creek and Embree, were consolidated in 1887 by an act of the U.S. Congress and named for Attorney General Augustus H. Garland. Its economy is industrialized and supplemented by the farm crops grown on the nearby Blacklands Belt. A wide variety of manufactures includes electronic equipment, chemicals, and scientific instruments. A branch of Abilene Christian University is there. Pop. (1980) 138,-857.

garland, a band, or chain, of flowers, foliage, and leaves; it may be joined at the ends to form a circle (wreath), worn on the head (chaplet), or draped in loops (festoon or swag). Garlands have been a part of religious ritual and tradition from ancient times: the Egyptians placed garlands of flowers on their mummies as a sign of celebration in entering the afterlife; the Greeks decorated their homes, civic buildings, and temples with garlands and placed them crosswise on banquet tables; in ancient Rome, garlands of rose petals were worn, and carved wooden festoons (a craft revived in the 17th and 18th centuries) decorated homes. These garlands are a recurrent motif in classical and Renaissance paintings and relief sculptures. In the Byzantine culture a spiral garland made with foliage and tiny flowers was popular as were those of narrow bands of alternating fruit or flowers and foliage. During the 15th and 16th centuries garlands of fruits and flowers, especially of roses, were worn in pageants, festivals, and at weddings, a custom echoed in

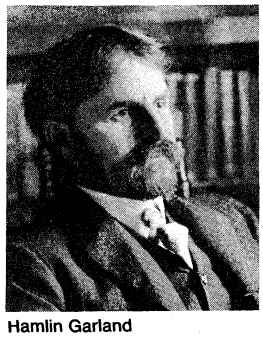
the folk festivals of Europe in which cattle are decked with flowers and dances are performed with chains of flowers linking the participants (garland dance). The religious significance of

Garland of leaves and fruit arranged over a throne, "Madonna della candeletta" by Carlo Crivelli, in the Brera, Milan
SCALA—Art Resource/EB Inc.

garlands was evident in the Middle Ages (*c.* 5th–15th centuries) when they were hung on religious statues. The Hindus in India also attach a spiritual meaning to flowers, wearing and adorning their statues with blessed garlands. *See also* wreath.

Garland, (Hannibal) Hamlin (b. Sept. 14, 1860, West Salem, Wis., U.S.—d. March 4, 1940, Hollywood), U.S. author perhaps best remembered for his autobiographical "Middle Border" series.

As his farming family moved progressively westward, Garland rebelled against the vicissitudes of pioneering and turned to Boston for a career. Self-educated there, he gradually won a place for himself in the literary set of Boston and Cambridge. A follower of William Dean Howells, Garland far exceeded his mentor in the bitterness of his realism as he recorded the frustrations of rural life. Unlike Howells, Garland made his narratives a vehicle



Hamlin Garland
By courtesy of the Library of Congress, Washington, D.C.

for philosophical and social preachments. The short stories of *Main-Travelled Roads* (1891), *Prairie Folk* (1892), and *Wayside Courtships* (1897), and the novel *Rose of Dutcher's Coolly* (1895) raised a storm of protest. Garland's critical theories of "veritism," set out in *Crumbling Idols* (1894), were largely derivative but well in advance of contemporary popular acceptance.

Garland next turned to the "high country" of the American West and to the occult for materials, producing a series of mediocre novels that were serialized in the burgeoning "slick magazines." His Indian stories, however, written during this period (though uncollected until 1923 in *The Book of the American Indian*), remain one of the earliest accurate and sympathetic appraisals of these people. Garland grew increasingly critical of the "excesses" of the Naturalists, and in 1917 in a mellow autobiographical mood wrote *A Son of the Middle Border*, apostrophizing the vanishing frontier. The book won immediate and deserved acclaim. *A Daughter of the Middle Border* (1921), was less successful. *Trail-Makers of the Middle Border* (1926) nostalgically described the epic sweep of migrations that settled the American continent. In his later years Garland compiled from his journals *Roadside Meetings of a Literary Nomad* (1930) and successive reminiscent volumes.

Garland, John, also called JOHANNES DE GARLANDIA (b. *c.* 1180, England—d. *c.* 1252), English grammarian and poet whose writings were important in the development of medieval Latin. Though much of his life was spent in France, his works were influential mainly in England.

Garland went to Paris (1202) to complete his studies and remained as a teacher until 1229, when he went to the University of Toulouse. He fled Toulouse, however, in 1232 or 1233 because of conflicts ensuing from the defeat of the heretical Cathari, or Albigenses.

Among his grammatical works were *Compendium grammatice* ("Outline of Grammar"), *Liber de constructionibus* ("Book on Constructions"), and a Latin vocabulary. Two of his best known poems are *De triumphis ecclesiae* ("On the Triumphs of the Church"), which gives a detailed account of the crusade against the Cathari, and *Epithalamium beatae Mariae Virginis* ("Bridal Song of the Blessed Virgin Mary"). *Scolarium morale* covers topics such as general behaviour, table manners, virtue, and the defense of the pope against charges of simony. It was edited in 1927 by L.J. Paetow, who gives an account of Garland's life and works in the introduction.

Garland, Judy, original name FRANCES GUMM (b. June 10, 1922, Grand Rapids, Minn., U.S.—d. June 22, 1969, London), U.S. vaudeville and motion-picture singer and actress.

The daughter of vaudeville performers, Garland made her stage debut at the age of three. She toured the United States with her sisters (The Gumm Sisters) in a musical act until her screen debut in the short film *Every Sunday* (1936). Achieving critical notice for the musical *Broadway Melody of 1938* (1937), she followed with *Thoroughbreds Don't Cry* (1937), a film that initiated her partnership with the juvenile star Mickey Rooney. They appeared together in *Love Finds Andy Hardy* (1938), *Babes in Arms* (1939), and *Babes on Broadway* (1941). *The Wizard of Oz* (1939), based on the novel by L. Frank Baum, brought Garland international stardom and became a film classic, for which she was honoured with a special Academy Award. Musical hits, such as *For Me and My Gal* (1942), *Meet Me in St. Louis* (1944), and *Easter Parade* (1948) followed.

The last 15 years of Garland's life were troubled by a growing reliance on drugs, repeated suicide attempts, and breakdowns. She made

Judy Garland
Brown Brothers

spectacular comebacks, however, and her personal appearances in London and New York broke box-office records. Many of her fans saw suggestions of her personal misfortunes in her masterly performance in the film *A Star Is Born* (1954), and her dramatic portrayals in *Judgment at Nuremberg* (1961) and *A Child Is Waiting* (1963) were also acclaimed.

Liza Minnelli (1946–), the daughter of Garland and the motion-picture director Vincente Minnelli (married 1945, divorced 1951), also became a singer and actress.

garland flower (plant): *see* ginger lily.

garlic (*Allium sativum*), bulbous perennial plant of the lily family (Liliaceae). A classic ingredient in many national cuisines, garlic has a powerful, onion-like aroma and pungent taste; its wide use in the U.S. originated among European immigrant groups.

In ancient and medieval times garlic was prized for its medicinal properties and carried as a charm against vampires and other evils. Modern scientific research has verified a number of its traditional attributes. The bulb contains allium, an antibiotic; it has antiseptic properties and is an expectorant and intestinal antispasmodic. Garlic's reputed benefits to the circulatory system received significant clinical attention in the late 20th century.

Garlic (*Allium sativum*)
A-Z Botanical Collection—EB Inc.

Native to Asia, garlic also grows wild in Italy and southern France. The membranous skin of the bulb encloses up to 20 edible bulblets called cloves. Flower stalks sometimes arise bearing tiny bulblets and blossoms without seeds. Garlic is propagated by planting cloves or top bulblets. Garlic is grown as an annual crop by methods similar to those used in growing onions. Garlic contains about 0.1 percent essential oil, the principal components of which are diallyl disulfide, diallyl trisulfide, and allyl propyl disulfide.

garment industry: *see* clothing and footwear industry.

Garmisch-Partenkirchen, market town, Bavaria *Land* (state), southern Germany, at the junction of the deep Loisach and Partnach valleys, in the Bavarian Alps at the foot of the Zugspitze (9,721 feet [2,963 m]), the highest mountain in Germany. The town, a union of the two ancient villages of Garmisch and Partenkirchen, was chartered in 1935 and retains much of its rural character. Notable buildings are the medieval Old Church of St. Martin (Alte Kirche), the Baroque parish New Church of St. Martin in Garmisch, and the 18th-century Pilgrimage Church of St. Anton in Partenkirchen. Scene of the 1936 Winter Olympics, the town is a health and winter sports resort, with ski facilities, an Olympic skating rink, rack and cable railways, and summer mountain-climbing facilities. Pop. (1989 est.) 25,908.

Garneau, François-Xavier (b. June 15, 1809, Quebec—d. Feb. 3, 1866, Quebec), first outstanding French-Canadian historian, known as the father of Canadian historiography.

The son of a carriage maker, Garneau left school at the age of 14 and entered the court clerk's office and two years later a notary's firm, becoming himself a notary in 1830. He was in London from 1831 to 1833 as secretary to D.B. Viger, a Canadian political delegate. Back in Quebec he wrote poetry, started two

Garneau, detail from a lithograph
By courtesy of the Public Archives of Canada

short-lived periodicals, dabbled in history, and in 1837 became a bank cashier. Active in local politics, Garneau was appointed translator to the legislative assembly (1843) and was the city clerk of Quebec (1844–64).

Garneau's *Histoire du Canada* (1845–48), predominantly a political and military account of early Quebec, includes tales of pioneering men and women and descriptions of the major civil, political, and religious leaders. An attempt to conserve Quebec's religion, language, and laws, the work met with great success and inspired a reawakening of interest by poets, novelists, and other historians in French-Canadian culture.

Garneau, Hector de Saint-Denys (b. June 13, 1912, Sainte-Catherine de Fossanbault, Que., Can.—d. Oct. 24, 1943, Sainte-Catherine de Fossanbault), poet who was the co-founder of the important French-Canadian literary journal *La Relève* (1934; "The Relief"). His intense and introspective verse, filled with images of death and suicide, set him apart from the prevailing regionalism of Canadian literature and strongly influenced the poets who followed.

Garneau was the great-grandson of François-Xavier Garneau, the first outstanding French-Canadian historian. In his early 20s, he suffered a heart attack and lived thereafter in increasing solitude, writing poetry that reflects the despair he felt over his joyless life. He published only one volume of poetry, *Regards et jeux dans l'espace* (1937; "Glances and Games in Space") in his lifetime. His *Poésies complètes* (1949; "Complete Poetry") and *Journal* (1954), an intimate record of his life between 1935 and 1939, appeared posthumously.

Garner, Alan (b. Oct. 17, 1934, Congleton, Cheshire, Eng.) British writer whose works, noted for their somewhat idiosyncratic style, appeal primarily to young readers.

Garner attended local schools before spending two years in the Royal Artillery and attending Magdalen College, Oxford. His first book, *The Weirdstone of Brisingamen: A Tale of Alderley* (1960), is a conventional albeit J.R.R. Tolkien-like tale for young readers set in Alderley Edge in his native Cheshire. The following two—*The Moon of Gomrath* (1963) and *Elidor* (1965)—shift back and forth in time but remain anchored both in local legend and in contemporary England. His later books vary in complexity, and readers reared before the multi-media, television-computor age sometimes find such novels as *The Owl Service* (1967) and *Red Shift* (1973) difficult. His later works for young readers include *The Stone Book* (1976) and *Alan Garner's Fairy Tales of Gold* (1979) as well as a collection of retold Celtic stories, *The Lad of the Gad* (1980). Garner has also edited a number of anthologies and written radio, television, and stage plays.

Garner, John Nance, byname CACTUS JACK GARNER (b. Nov. 22, 1868, Red River County, Texas, U.S.—d. Nov. 7, 1967, Uvalde, Texas), U.S. Democratic vice president (1933–41) who maintained his conservatism despite his position within the New Deal administration of Pres. Franklin D. Roosevelt.

Admitted to the Texas bar in 1890, Garner served two terms in the state legislature (1898–1902) before being elected to the U.S. House of Representatives, where he remained for 30 years (1903–33). As a congressman, Garner was especially expert at backstage manoeuvring to expedite legislation. He supported the graduated income tax and the federal reserve system and came to be regarded by 1917 as one of the most influential politicians in Congress. After serving successively as Democratic whip and floor leader, he was elected speaker of the House (1931).

At the 1932 Democratic National Convention, Garner was himself a candidate for the presidency, but released his delegates from Texas and California to ensure the nomination of Roosevelt. The choice of Garner for the vice presidency assuaged party conservatives. He in fact never felt comfortable in the New Deal, which he deemed "too liberal." Although reelected in 1936, he broke with the administration in 1937 over efforts to "pack" (enlarge) the Supreme Court. At the end of his second term he retired to his Texas ranch.

Garnerin, André-Jacques (b. Jan. 31, 1769, Paris—d. Aug. 18, 1823, Paris), French aeronaut, the first person to use a parachute regularly and successfully. He perfected the parachute and made jumps from greater altitudes than had been possible before.

As a young man Garnerin studied physics; in 1793 he became an inspector in the French Army, where he encouraged the use of balloons for military purposes, but was captured during hostilities with England and was imprisoned for two years. On his return to France he began to make balloon ascents, giving his first exhibition of parachuting in Paris in 1797, when he jumped from a height of about 3,200 feet (1,000 metres). Garnerin continued his exhibitions in cities throughout northern Europe, making a spectacular jump from 8,000 feet in 1802, in England. His white canvas parachute was umbrella-shaped and approximately 23 feet in diameter. In most of his aeronautical enterprises, he worked with his brother Jean-Baptiste-Olivier (1766–1849).

garnet, any member of a group of common silicate minerals that have similar crystal structures and chemical compositions. Garnets are most commonly found in metamorphic rocks, but also in certain types of igneous rocks, and, usually in minor amounts, in clastic sediments and sedimentary rocks. They may be colourless, black, and many shades of red and green. The garnet is considered to be the birth stone associated with the month of January.

Use of garnets as gems began with the ancient Egyptians, if not earlier. During the latter part of the 19th century, garnet bracelets and brooches were particularly popular. Most familiar during the peak of popularity were varieties of pyrope, cut either with a convex polished surface (*en cabochon*) or with facets. Garnet varieties have become known by misleading names, frequently consisting of a locality with the name of another mineral variety, such as Uralian emerald or Cape ruby.

The hardness of garnets and their sharp fracture make them suitable as abrasives for wood, leather, glass, metals, and plastics. Heating to about 800° C (1,470° F), followed by immediate cooling, improves the toughness and fracture characteristics of iron-bearing garnets.

At Gore Mountain, New York, garnet crystals average 13 centimetres (5 inches) in size, but reach a maximum of a metre or so and are obtained from a complex metamorphic rock that consists principally of hornblende and garnet. Other commercial deposits occur in Benewah County, Idaho. Garnets have been won, sometimes as a by-product of other mining operations, in New Hampshire, Florida, North Carolina, and California. Intermittently, notable quantities have been produced for abrasive use in Canada, Czechoslovakia, India, Madagascar, Spain, and South Africa.

In addition to silicon (Si) and oxygen (O), garnets contain calcium (Ca), magnesium (Mg), iron (Fe), and aluminum (Al). Divalent and trivalent metal atoms occur in the proportions 3 to 2, leading to a general formula $(R^{2+})_3(R^{3+})_2(SiO_4)_3$, in which R^{2+} may be calcium, magnesium, iron, or manganese, and R^{3+} may be aluminum, iron, chromium, or manganese. Garnets may contain other metallic atoms in minor amounts as well as nonmetallic constituents other than silicon. Most natural garnets are mixtures of two or more of the following pure species:

pyrope	$Mg_3Al_2(SiO_4)_3$
almandine	$Fe_3Al_2(SiO_4)_3$
spessartine	$Mn_3Al_2(SiO_4)_3$
uvarovite	$Ca_3Cr_2(SiO_4)_3$
grossular	$Ca_3Al_2(SiO_4)_3$
andradite	$Ca_3Fe_2(SiO_4)_3$

The first three (pyralspite, from *pyr*ope, *al*mandine, and *sp*essartine) form solid solutions with each other, as do the last three (ugrandite, from *u*varovite, *gr*ossular, and *and*radite). Pyralspite and ugrandite do not mix. For detailed physical properties, *see* silicate mineral (table). For gem varieties, *see also* pyrope; almandine; spessartine; uvarovite; grossular; andradite; and hessonite.

Garnet, Henry Highland (b. 1815, New Market, Md., U.S.—d. Feb. 13, 1882, Liberia), leading black Abolitionist and clergyman.

Born a slave, Garnet escaped in 1824 and made his way to New York. There he pursued an education and eventually became a Presbyterian minister. Garnet became associated with the American Anti-Slavery Society, and his career in the late 1830s and early 1840s joined preaching with agitation for emancipation. A nationally known figure, he shocked his listeners at the 1843 national convention of free people of colour when he called upon slaves to murder their masters. The convention refused to endorse Garnet's radicalism, and he gradually turned more to religion as Frederick Douglass assumed the role of premier black Abolitionist.

During the next two decades, Garnet served as pastor in a number of Presbyterian pulpits. While at his post in Washington, D.C., in 1864, he aided the war-related displaced and distressed. Later, he assisted government workers in developing programs to help former slaves.

In 1881 Garnet was appointed minister to Liberia. In his younger, more radical days, he had vigorously opposed plans to solve America's slavery problem by sending blacks back to Africa. Toward the end of his life, however, he favoured U.S. blacks' emigration back to Africa. Within two months of his arrival in the African nation, though, he died.

Garnett, Constance (Clara), *née* BLACK (b. Dec. 19, 1861, Brighton, East Sussex, Eng.—d. Dec. 17, 1946, Edenbridge, Kent), English translator who made the great works of Russian literature available to English and American readers in the first half of the 20th century. The first to render Dostoyevsky and Chekhov into English, she also translated the complete works of Turgenev and Gogol and major works of Tolstoy.

In 1879, when advanced education for women was unusual, she won a scholarship to Newnham College, Cambridge. After her marriage to the critic Edward Garnett and the birth of their son David, the future novelist, in 1892, she began her career as a translator with Ivan Goncharov's *Obyknovennaya istoriya* (1847), which she rendered as *Common Story* (1894). Altogether she produced about 70 volumes of translations from Russian literature.

Garnett, David (b. March 9, 1892, Brighton, East Sussex, Eng.—d. Feb. 17, 1981, Le Verger Charry, Montcuq, Fr.), English novelist, son of Edward and Constance Garnett, who was the most popularly acclaimed writer of this literary family.

A prolific writer, he is best known for his satirical fantasies *Lady into Fox* (1922), the tale of a man whose wife is suddenly transformed into a fox, and *A Man in the Zoo* (1924), concerned with a man who is accepted by the London Zoo to be exhibited as an example of *Homo sapiens*. Later novels, not fantastic, were not so successful. In *The Golden Echo* (1953), *The Flowers of the Forest* (1955), and *The Familiar Faces* (1962) Garnett described his memories of the English literary coterie—including the Bloomsbury group—of which he was a member during the period of World War I and the 1920s. *Great Friends: Portraits of Seventeen Writers* (1980) continued in the same vein. His other novels include *Aspects of Love* (1955), *Two by Two* (1963), and *A Clean Slate* (1971). He edited several collections of correspondence, including *The Letters of T.E. Lawrence* (1938) and *Carrington: Letters and Extracts from Her Diaries* (1978).

Garnett, Edward (William) (b. Feb. 19, 1868, London—d. Feb. 21, 1937, London), influential English critic and publisher's reader who discovered, advised, and tutored many of the great British writers of the early 20th century.

The son of the writer and librarian Richard Garnett, he was more influenced by his family's literary interests than by his slight formal education. Through extensive reading Garnett developed a nearly unerring ability to recognize genuine and original literary talent. Among the authors he discovered or befriended were Joseph Conrad, D.H. Lawrence, John Galsworthy, Ford Madox Ford, W.H. Hudson, and Stephen Crane. Garnett's own fiction, which he produced in quantity, was unsuccessful. He was the husband of the translator Constance Garnett and father of the novelist David Garnett.

Garnett, Henry (b. 1555, Heanor, Derbyshire, Eng.—d. May 3, 1606, London), English Jesuit superior implicated in the Gunpowder Plot, an abortive conspiracy to destroy the Protestant king James I of England and Parliament while in assembly on Nov. 5, 1605, in retaliation for stricter penal laws against Roman Catholics.

Garnett was raised in the Anglican faith but became converted to Roman Catholicism and in 1575 went to Rome, where he joined the Society of Jesus and became a professor of Hebrew at the Roman College. He returned to England as a missionary in 1586, becoming Jesuit superior in England the following year. The extent of his role in the Gunpowder Plot is disputed. He was not an active conspirator but associated with the plotters on a number of occasions. When arrested and tried in 1606, he at first denied all knowledge of the plot but later admitted having learned of it under the seal of confession. He protested his innocence but was executed.

Garnett, engraving by Jan Wierix, early 17th century

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

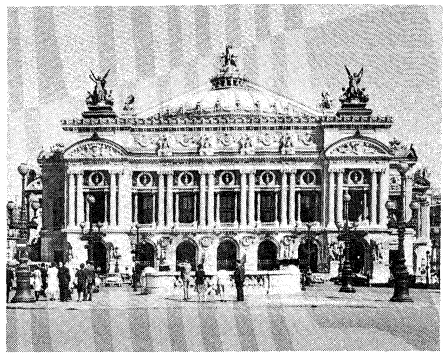
Garnett, Richard (b. Feb. 27, 1835, Lichfield, Staffordshire, Eng.—d. April 13, 1906, London), English writer, librarian, and the head of the Garnett family, which exerted a formative influence on the development of modern British writing. From the age of 15 until his retirement in 1899 he was in the employ of the British Museum.

After initially working as a clerk, Garnett served as keeper of the printed books, the position his philologist father, Richard, had previously held. He later became chief keeper of the museum and received an honorary LL.D. degree from Edinburgh. Largely through his efforts, a general catalog of the British Museum was published in 1905, after 25 years of preparation. In 1862 Garnett published some previously undiscovered poetry of Shelley. Garnett's other published works were biographical and historical, in addition to poetry, translations, and essays. Best known among his fiction is *The Twilight of the Gods, and Other Tales* (1888), a collection of fables in the style of Lucian. In the British Museum, he became a legend to generations of readers and researchers for his extensive scholarship and prodigious memory.

Garnier, Bernard (counter-antipope): *see* Benedict (XIV).

Garnier, (Jean-Louis-) Charles (b. Nov. 6, 1825, Paris—d. Aug. 3, 1898, Paris), French architect of the Beaux-Arts style, famed as the creator of the Paris Opera House. He was admitted to the École des Beaux-Arts in 1842 and was awarded the Grand Prix de Rome in 1848 to study in Italy.

He won the 1860 competition for the new Paris Opera House. One of the most famous buildings of the century, the Opéra (completed 1875) became a symbol of Second Empire taste, and its eclectic neo-Baroque style became characteristic of late 19th-century Beaux-Arts design. Garnier's command of the sweeping



Opera House, Paris, by Charles Garnier, begun 1861

Michel Serraillier—Rapho/Photo Researchers

interiors was equalled by his mastery of balance, punctuation, and termination of mass and surface.

Garnier also influenced the style of resort architecture for the wealthy with his small theatre for the casino of Monte-Carlo (1878), the casino and baths at Vittel, and the villas he built in Bordighera, notably his own (1872–73). Among his other works were the observatory at Nice, an apartment house, and the Hôtel du Cercle de la Librairie in Paris.

For the Paris Exposition of 1889 he conceived the Exposition des Habitations Humaines, which became the subject of his book *L'Habitation humaine* (with A. Ammann, 1892). He also published, in 1871, *Le Théâtre* and, in 1876–81, *Le Nouvel Opéra de Paris*, a monumental description and defense of his work.

Garnier, Francis, French in full MARIE-JOSEPH-FRANÇOIS GARNIER (b. July 25, 1839, Saint-Étienne, Fr.—d. Dec. 21, 1873, outside Hanoi, Vietnam), French naval officer, colonial administrator, and explorer.

Garnier, the son of an army officer, overcame parental opposition to enter the naval school at Brest in 1856. Upon completion of his training he was posted as an ensign aboard a ship forming part of the French expeditionary force sent to China in 1860. He accompanied Adm. Léonard Charner to Saigon in 1861 and took part in the Battle of Chi Hoa that marked the end of effective Vietnamese resistance to the French advance into southern Vietnam (Cochinchina). In 1863 Garnier joined the newly formed colonial administration in Cochinchina, while still retaining his naval rank, and was appointed prefect of Cho Lon, the twin city to Saigon.

An enthusiastic believer in France's imperial destiny, Garnier vigorously advocated the expansion of French power in Vietnam and the commercial benefits he believed would flow from the exploration of the Mekong River. Largely as the result of his advocacy, a French expedition led by Doudart de Lagrée, with Garnier as second in command, left Saigon to explore the Mekong in June 1866. The mission was a failure in commercial terms, and the river was found to be unnavigable by boats of any size. But the explorers, despite great hardships and frequent sickness that finally took Lagrée's life, accomplished a major task in mapping unknown territory, and they were the first Europeans to enter Yunnan province by a southern route. Garnier, who assumed command of the expedition after Lagrée's death three months before its completion in June 1868, was honoured by the award of several medals.

Garnier was in France supervising the publication of an account of the Mekong River expedition when the Franco-German War broke out. He served with distinction during the siege of Paris but was passed over for promotion because of his public criticism of the peace terms imposed on France. Disappointed by this development and resentful of suggestions

that he had denigrated Doudart de Lagrée's role in the exploration of the Mekong, Garnier travelled to China in the hope of combining exploration with commercial success.

He was called to Saigon from Shanghai in August 1873, when the French governor of Cochinchina, Adm. Marie-Jules Dupré (*q.v.*), sought to take advantage of an unauthorized attempt by a French trader, Jean Dupuis (*q.v.*), to open the Red River for commerce with China. Although Garnier's formal orders instructed him to extricate Dupuis from the Hanoi region of northern Vietnam, he appears to have received secret instructions from Dupré to establish a French position in the area. Such a plan was contrary to French government policy, but both Dupré and Garnier seem to have believed that a successful seizure of territory would result in approval from Paris.

Garnier reached Hanoi on Nov. 5, 1873, and forced a confrontation with Vietnamese officials. On November 20 he led an attack against the Hanoi citadel and was able, with his small band of well-equipped troops, to overcome a numerically superior Vietnamese force. This action was followed by Garnier's troops seizing other positions in the Red River Delta. By mid-December, however, the Vietnamese authorities had enlisted the aid of the Chinese Black Flag bandits led by Liu Yung-fu. In attempting to repel the Black Flag forces that attacked the Hanoi citadel on Dec. 21, 1873, Garnier was killed. His actions were disavowed by Governor Dupré, and, despite the opposition of Dupuis and others, a French envoy, Paul-Louis-Félix Philastre (*q.v.*), negotiated a withdrawal from northern Vietnam in early 1874.

Garnier, impetuous and headstrong, held a chauvinist vision of France's role in Asia that appealed to many of his contemporaries. He was at the same time a man of wide accomplishments in history, languages, and general science, in addition to his skills as a navigator and cartographer. The account he prepared of the Mekong River expedition, *Voyage d'exploration en Indo-Chine, 1866–68* (1873; "Voyage of Exploration in Indochina, 1866–68"), is a most valuable record of the political and economic situation of the countries through which the explorers passed in the 1860s.

Garnier, Robert (b. *c.* 1545, La Ferté Bernard, Fr.—d. Sept. 20, 1590, Le Mans), outstanding French tragic dramatist of his time.

While a law student at Toulouse, Garnier won two prizes in the *jeux floraux*, or floral games (an annual poetry contest held by the

Robert Garnier, detail of an engraving
H. Roger-Viollet

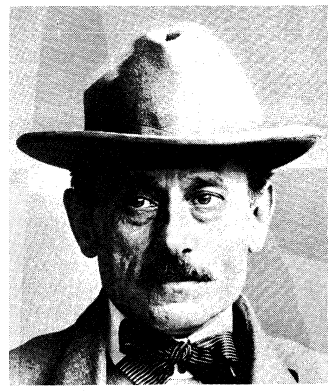
Académié des Jeux Floraux). He published his first collection of lyrical pieces, now lost, *Plaintes Amoureuses de Robert Garnier,* in 1565. After practice at the Parisian bar he became *conseiller du roi* in his native district and later *lieutenant-général criminel.*

In his early plays Garnier was a follower of the Senecan school. His pieces in this style are *Porcie* (1568), *Hippolyte* (1573), and *Cornélie* (1574). His next group of tragedies—*Marc-Antoine* (1578), *La Troade* (1579), *Antigone* (1580)—shows an advance in technique beyond the plays of Étienne Jodelle, Jacques Grévin, and his own early plays, since the rhetoric is accompanied by some action.

In 1582 and 1583 he produced his two masterpieces, *Bradamante* and *Les Juives.* In *Bradamante,* the first important French tragicomedy, which alone of his plays has no chorus, he turned from Senecan models and sought his subject in Ariosto. The romantic story becomes an effective drama in Garnier's hands. Although the lovers, Bradamante and Roger, never meet on the stage, the conflict in the mind of Roger supplies a genuine dramatic interest. *Les Juives* is the story of the barbarous vengeance of Nebuchadnezzar on King Zedekiah and his children. This tragedy, almost entirely elegiac in conception, is given unity by the personality of the prophet.

Garnier was a Catholic and a patriot: he used his tragedies to convey moral and religious arguments to his contemporaries, who were then suffering in the Wars of Religion. His fine verse reflects the influence of his friend Pierre de Ronsard. His plays, which contain many affecting emotional scenes, were performed to the end of the 16th century.

Garnier, Tony (b. Aug. 13, 1869, Lyon—d. Jan. 19, 1948, Roquefort-la Bédoule, Fr.), a forerunner of 20th-century French architects, notable for his *Cité Industrielle,* a farsighted plan for an industrial city. He is also remembered, along with Auguste Perret, for the pio-



Tony Garnier, 1920
AIGLES

neering use of reinforced concrete.

On his Prix de Rome grant Garnier developed plans (beginning in 1898, exhibited in 1904, and published in 1917) for an entire industrial city, embracing new concepts in city planning: long, narrow lots running east–west, buildings separated by wide open spaces, separate levels provided for pedestrians, and houses with roof gardens. The plan called for the extensive use of reinforced concrete.

In 1905 Garnier was appointed architect of Lyon, a position he held until 1919. The most important work in Lyon to emerge from his *Cité Industrielle* was the large stockyards complex of 1908–24. Other works include the stadium (1913–18), the Grange Blanche Hospital with its 22 pavilions (started in 1911, completed in 1927), the War Memorial (1924), and the housing project known as Les États Unis (1920–35; The United States).

Dora Wiebenson, *Tony Garnier: The Cité Industrielle* (1969), is well illustrated.

Garnier-Pagès, Louis-Antoine (b. Feb. 16, 1803, Marseille, Fr.—d. Oct. 31, 1878, Paris), republican political figure prominent in the opposition to France's monarchical regimes from 1830 to 1870.

Garnier-Pagès was an active participant in the antiroyalist uprising of 1830, but he did not formally enter politics until 1842, when he was elected to the Chamber of Deputies from the Eure region. In 1842–48 he sat with the republican left and devoted himself to financial and commercial questions.

In 1848, as the Orleanist regime of King Louis-Philippe began to topple, Garnier-Pagès

Garnier-Pagès, lithograph
H. Roger-Viollet

emerged as a leader of the "banquets campaign," a series of anti-regime political rallies. When Louis-Philippe abdicated, Garnier-Pagès became mayor of Paris and then minister of finance in a new republican government. Faced with a desperate financial situation, he enacted a series of stringent fiscal measures, including a surcharge on direct taxation, which caused great public dissatisfaction and brought about his defeat in a bid for election to the Legislative Assembly (1849). His *Histoire de la révolution de 1848,* 11 vol. ("History of the Revolution of 1848"), appeared in 1864.

During the Second Empire (1852–70) Garnier-Pagès remained in private life until 1864 and then became a member of the Corps Législatif. He opposed the Franco-German War (1870–71) but joined the republican Government of National Defense when Emperor Napoleon III abdicated in 1870. Once again, however, unpopularity cost him a seat in the legislature in 1871, and he retired from public life. He wrote an account of his experiences during the Second Empire, *L'Opposition et l'empire,* 2 vol. (1872; "The Opposition and the Empire").

garnish, an embellishment added to a food to enhance its appearance or taste. Simple garnishes such as chopped herbs, decoratively cut lemons, parsley and watercress sprigs, browned breadcrumbs, sieved hardcooked eggs, and broiled tomatoes are appropriate to a wide variety of foods; their purpose is to provide contrast in colour, texture, and taste, and to give a finished appearance to the dish.

In the classic cuisine of France, garnishes comprised any accompaniment to a principal dish—vegetables and starch dishes fell under this definition. Further, basic dishes could be varied by the selection of one of a codified array of garnishes. Under this system a chicken, for example, could be served *à la archiduc,* with a sauce of paprika and cream; *à la forestière,* with morels and potatoes, *à la bouquetière,* with an array of individually cooked, decoratively cut vegetables, and so on into hundreds of formulations.

garnishment (from Middle French *garnir,* meaning "to warn"), a process by which a creditor can obtain satisfaction of an indebtedness of the debtor by initiating a proceeding to attach property or other assets. A common form of garnishment involves a creditor attaching the wages of an employee owed to him by his employer. The creditor instituting the proceedings is the garnisher, the person indebted is the debtor-employee, and the party holding the property (the employer) is the garnishee. The result of a garnishment of salary

proceeding, if successful, is an order of the court requiring the employer to deduct and pay to the creditor a percentage of the debtor's salary until the debt is satisfied.

The remedies of garnishment and attachment are traceable to Roman law and were a recognized practice of medieval merchants. The availability and scope of the remedy today depends on statutory authorization; statutory provisions differ among the various countries having garnishment statutes.

Gāro Hills, physical region, western Meghālaya state, northeastern India. It comprises the western margin of the Shillong Plateau (*q.v.*) and rises to an elevation of 4,600 feet (1,400 m). Drained by various tributaries of the Brahmaputra River, it has extremely high rainfall and is heavily forested.

The region has an agricultural economy, with rice, cotton, sal, bamboo, and lac as the principal products. Large quantities of coal and limestone and some petroleum have been found. Its clans practice a complex matrilineal social system. The population is mainly Gāro.

Garofalo, Benvenuto do, also called BENVENUTO TISI, or TISIO (b. 1481—d. 1559), Italian painter, who was the most prolific 16th-century painter of the Ferrarese school.

Garofalo's first apprenticeship was with Domenico Panetti. The Cremonese painter Boccaccio Boccaccino and Garofalo's two visits to Rome in the first and second decades of the century influenced his work, as did the work of Dosso Dossi, especially in the treatment of landscape backgrounds. This is clearest in several pictures of the Nativity painted before 1520; it is also apparent in the fine "Sacrifice to Ceres" (1526; National Gallery, London). Northern Italian influences, particularly from Andrea Mantegna's "Camera degli Sposi," dominate Garofalo's ceiling paintings in the Seminario at Ferrara (1519). The influence of Raphael and Michelangelo made itself felt from about 1520 onward, and Garofalo, though he seems never to have left Ferrara at this time, kept pace with the developments of Michelangelesque mannerism in Florence and Rome. This is evident in his painting the "Baptist Taking Leave of His Father" (1542) in S. Salvatore, Bologna.

Garonne River, Spanish RÍO GARONA, most important river of southwestern France, rising in the Spanish central Pyrenees and flowing into the Atlantic by way of the estuary called the Gironde. It is 357 miles (575 km) long, excluding the Gironde Estuary (45 miles in length). Formed by two headstreams in the Maladeta Massif (mountainous mass) in the Aragon region of northeast Spain, which flow from glaciers situated at elevations of more than 10,000 feet (3,000 m), the Garonne flows north for 30 miles (48 km) through Spanish territory, traversing the high mountain Val d'Aran through a gorge before crossing the frontier through the narrow defile of Pont-du-Roi at an elevation of 1,902 feet (580 m). Flowing east around Saint-Gaudens, the river veers northeast across one of the largest alluvial plains of France, receiving a tributary, the Ariège, from the southeast before passing Toulouse and then winding northwestward to Bordeaux. The Garonne receives the Tarn west of Moissac and is then joined by the Lot River below Aiguillon, southeast of Marmande. About 34 miles above Bordeaux it passes through Castets—its highest tidal point. At Bordeaux the river is 1,800 feet broad. Flowing between the wine-growing Entre-deux-Mers peninsula to the east and the Médoc coastal strip to the west, it unites with the Dordogne 16 miles north of Bordeaux to form the vast Gironde Estuary.

The Garonne, which is regulated by 50 locks, is subject to sudden floods. The seasonal flow of the river is irregular, with high springtime levels at its source in the snows of the mountains, and its lowest levels in August and September. The Garonne is not navigable; it is accompanied by an old and little used lateral canal from Toulouse to Castets. The Canal du Midi, equally old, connecting the Garonne with the Mediterranean, starts at Toulouse. The river's basin is some 21,600 square miles (56,000 square km) in area.

Garoua, also spelled GARUA, town, northeastern Cameroon, west central Africa. The town lies along the right bank of the Benue (Bénoué) River, north-northeast of Yaoundé, the national capital. It is situated at the junction of the Maroua–Ngaoundéré road and the Benue waterway and is the chief commercial centre of the region. The town was founded by Modibbo Adama, the Fulani amir who founded the kingdom of Adamawa in the first half of the 19th century. It developed as a river port. River steamers and barges bring petroleum and cement to Garoua and carry its hides, skins, cotton, and peanuts (groundnuts) 1,200 miles (1,900 km) down the Benue to Burutu, Nigeria, during the brief shipping period (August–September). Ground transportation partially replaced river transport for commerce after the construction of the railway to Douala on the Atlantic coast. Nearby cotton plantations supply Garoua's weaving factory; support its ginning, dyeing, and spinning industries; and motivate the textile research company in the town. Other industries include leatherwork, fishing, and tourism encouraged by the nearby Faro, Bénoué, and Bouba Ndjida game reserves. Garoua is served by an airfield, a hospital, a customs station, several banks and insurance companies, and a junior college. Pop. (1985 est.) 96,186.

Garrett, João Baptista da Silva Leitão de Almeida, VISCONDE (viscount) DE ALMEIDA GARRETT (b. Feb. 4, 1799, Porto, Port.—d. Dec. 9, 1854, Lisbon), writer, orator, and statesman who was one of Portugal's finest prose writers, an important playwright, and chief of the country's Romantic poets.

Garrett graduated in law from the University of Coimbra in 1820, having already gained a name for himself as a playwright and a fervent liberal. His liberalism forced him into exile in England in 1823, during which time he introduced his countrymen to the new Romantic movement with two patriotic epic poems: *Camões* (1825) and *Dona Branca* (1826).

Garrett returned to Portugal in 1832 and distinguished himself as a liberal statesman as well as a writer. In 1834 he became consul general in Brussels but returned to Portugal the following year. He entered Parliament in 1837 and soon made his mark as an orator. He was asked by the government to draw up proposals for the formation of a national theatre. He found that he had to create theatre, plays, actors, and audience to revive a native tradition that had been moribund for centuries, and to provide material for the project, he wrote a series of historical prose dramas that have become classics. Among these dramas are *Um Auto de Gil Vicente* (1838) and *O Alfageme de Santarém* (1841). Another work, *Frei Luís de Sousa* (1843), is considered one of the greatest Portuguese plays of the 19th century. An excursion Garrett took to Santarém in July 1843 resulted in a prose masterpiece describing his journey, *Viagens na Minha Terra* (1846; "Voyage to My Land"). His historical romance *O Arco de Sant'Ana,* 2 vol. (1845–50), was probably the first Romantic novel produced in Portugal.

Garrett's patriotism and service were rewarded in 1851 when he was created viscount. He served as minister for foreign affairs for a short time in 1852 and remained active in political life until his death. His other works include the verse collection *Romanceiro,* 3 vol. (1843–51), and *Folhas Caídas* (1853), a collection of short love poems whose formal elegance and sensual, melancholy tone make them the best Portuguese lyric poems of the Romantic period.

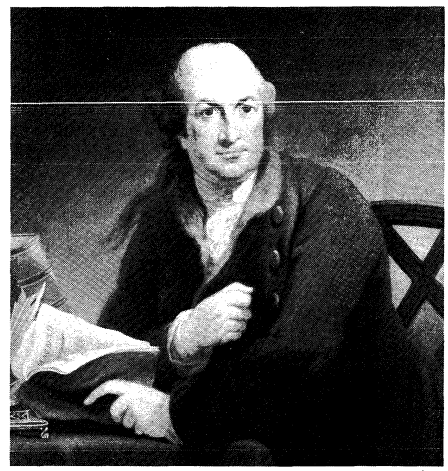
Garrett, Pat, byname of PATRICK FLOYD GARRETT (b. June 5, 1850, Chambers County, Ala., U.S.—d. Feb. 29, 1908, near Las Cruces, N.M.), Western U.S. lawman known as the man who killed Billy the Kid (*q.v.*).

Born in Alabama and reared in Louisiana, Garrett left home at about the age of 17 and headed for Texas and the life of a cowboy and buffalo hunter. In 1879 he married and settled in Lincoln County, N.M., where he became first deputy sheriff and then sheriff. In July 1881 he tracked down and shot the escaped murderer Billy the Kid.

Thereafter, Garrett was a rancher near Roswell, N.M. (1882–96), deputy sheriff and then sheriff of Dona Ana County, N.M. (1896–1902), and collector of customs at El Paso, Texas (1902–06). He then bought a horse ranch, leased it, and became involved in a heated dispute over the lease. Garrett was fatally shot on the road from the ranch to Las Cruces, N.M. The man who had leased the ranch, Wayne Brazel, alleged that Garrett had drawn a gun on him and that the killing was self-defense. A witness agreed, and Brazel went free. A suspicion lingered that Brazel or someone else conspired to execute Garrett, a lawman with many enemies.

Garrick, David (b. Feb. 19, 1717, Hereford, Herefordshire, Eng.—d. Jan. 20, 1779, London), English actor, producer, dramatist, poet, and comanager of the Drury Lane Theatre.

Early years. Garrick was of French and Irish descent, the son of Peter Garrick, a captain in the English Army, and Arabella Clough, the daughter of a vicar choral at Lichfield cathedral who was of Irish extraction. David was born at Hereford, where his father was on recruiting duty. In the family home at Lichfield, the seven children were reared on the highest moral principles in conditions of strict economy. To obtain full pay, after several years on half pay, Captain Garrick joined an infantry regiment at Gibraltar, and David, then 14, as eldest son at home, reported family progress in lively letters that, on the whole, did credit to the Lichfield grammar school. In 1736 Gilbert Walmesley, registrar of the ecclesiastical court of Lichfield, who lived in the bishop's palace and lent his premises for private theatricals organized by his young protégé, advised that "Little Davy" should be sent to the academy opened in that year by Samuel Johnson at Edial, near Lichfield. This venture lasted only a few months, and on



Garrick, detail of an oil painting by Robert Edge Pine, c. 1762; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

March 2, 1737, Johnson and Garrick set out for London; according to Johnson, he had two-pence-halfpenny in his pocket and David three halfpence.

Garrick entered his name as a law student at Lincoln's Inn and prepared to study with a friend of Walmesley's at Rochester, Kent, but his father's death in March 1737 and a legacy of £1,000 from an uncle made possible a change of plan. David had spent some months at Lisbon as apprentice to his uncle, a vintner, and he and his elder brother set up as Garrick & Co., wine merchants—Peter at Lichfield and David in London, in Durham Yard, off the Strand. His business took him into places of entertainment, where he soon had a large acquaintance, including the actor Charles ("Wicked Charlie") Macklin, with whom he conferred on modern theories of acting, and the elegant but unreliable Charles Fleetwood, manager of Drury Lane Theatre, one of the two theatres authorized by the 1737 Licensing Act, the other being Covent Garden. In April 1740, Drury Lane produced Garrick's first comedy, *Lethe, or Esop in the Shades.*

Beginning of career as an actor. Garrick entered the acting profession anonymously, in a mask. In March 1741, upon the illness of the actor billed to take the part, he dashed onto the stage as Harlequin at a small, unlicensed theatre in Goodman's Fields. Soon afterward the proprietor took a company to Ipswich for the summer season, and Garrick appeared there in Thomas Southerne's *Oroonoko* as Aboan, a noble savage, with his face blackened, and later played Captain Duretête, in George Farquhar's *The Inconstant.* He was thereafter well received in several parts, but when he applied at Drury Lane and Covent Garden, neither Fleetwood nor old John Rich, manager of Covent Garden, wanted him. He had to return to Goodman's Fields. His mother had died in 1740, but he still dared not tell his family that he had entered a profession then generally held in low esteem. Not until the night after his astounding first appearance as Richard III in 1741 did he break the news to Peter.

The instant success of a young, unknown actor in a major tragic Shakespearean part remains one of the romances of theatrical history. The Garrick legend was founded in a single night. Audiences, weary of the pompous recitative and stately attitudinizing imposed by French tradition, were ready for the naturalistic new style, and they soon perceived that this bright young man could do anything. He was equally good in *Pamela,* a dramatization of Samuel Richardson's novel; in Thomas Otway's *The Orphan* and *Venice Preserv'd;* in Colley Cibber's *Love Makes a Man: or, The Fop's Fortune;* in *King Lear;* and in a farce he himself wrote, *The Lying Valet.* He wrote to Peter: "Mr. Pit, who is reckon'd ye Greatest Orator in the house of Commons, said I was ye best actor ye English stage had produc'd." Alexander Pope had pronounced: "That young man never had his equal an actor, and he will never have a rival." Thomas Gray wrote to Horace Walpole that a dozen dukes a night attended Goodman's Fields. So much adulation, so easily won, might have demoralized a less stable character, but Garrick, though highly strung and sensitive, had a strong vein of common sense and remarkable staying power.

Fleetwood was now eager to secure him for Drury Lane and offered a salary larger than ever proposed to any performer. Before the season of 1742–43 Garrick went over to Dublin where he played at the theatre in Smock Alley with the captivating Peg Woffington, with whom he was already in love, and whom he hoped to marry. There, his success was tremendous, and he continued to triumph at Drury Lane from 1742–45, playing such diverse roles as Hamlet; the simple-minded Abel Drugger in Ben Jonson's *The Alchemist;* and the voluble Francis Archer in George Farquhar's *The Beaux' Stratagem.* But Fleetwood's patent of the theatre was running out, and he was a ruined man. In 1743 Garrick sued him for £600 arrears of salary and led an actor's strike against him, one side effect of which was a quarrel with Macklin. A reconciliation was arranged in 1747, but Macklin's senile mutterings, noted down by his biographer, became the fountainhead of the anti-Garrick legends of vanity, avarice, meanness, and arrogance.

In the winter of 1745–46 Garrick was in Dublin, sharing with Thomas Sheridan, the playwright and actor-manager, in the direction of the Theatre Royal. During this time negotiations began for Garrick to become part owner and manager of Drury Lane Theatre. In the season of 1746–47 Garrick made his only appearances at Covent Garden. John Rich had also secured James Quin, the outstanding exponent of the old style of acting, and the season became a duel between them.

Reforms of Drury Lane Theatre. In April of 1747 friends in the city helped Garrick to raise £8,000, his share of the purchase money for the lease and furnishings of Drury Lane Theatre and renewal of the patent, in partnership with one James Lacy, a failed actor with a flair for the entertainment trade, who had been stage manager at Covent Garden. Garrick was to perform and to choose plays and players; Lacy, assisted by a weakish, devoted younger Garrick, "Brother George," dealt with the business side. Drury Lane, redecorated, reopened in September 1747 with Macklin as Shylock and a prologue by Johnson that set forth Garrick's principles, as a producer, of devotion to Shakespeare and reform of plays and players and ending with the famous appeal:

> The drama's laws the drama's patrons give,
> For we, who live to please, must please to live.
> . . . 'Tis yours this night to bid the reign commence
> Of rescued nature and reviving sense.

Garrick was unwell, however. He had endured many minor ailments, indicative of overstrain, in the past months, during which he had never acted more poignantly. The infidelities and extravagance of Peg Woffington had convinced him that they had better not marry. He had announced to his brilliant new troupe that they would find his rule stricter than any to which they were accustomed. Among his stars were Macklin, Woffington, and Kitty Clive, the only actress of whom he was said to be afraid, but one who was to become a dear friend.

He had made plans for reforming audiences as well as actors. He was going to try refusing admittance behind the scenes and on the stage and discontinuing the practice of reduced entry fees for those who left early or came late. He planned to bring down the orchestra from the gallery and to enlarge the auditorium. The apron, a forestage in front of the curtain onto which players marched, struck a pose, and took up their stances for lengthy soliloquies, became obsolete with the new, natural style of acting. Garrick hoped to introduce new lighting, but not until 1765 did he get his footlights and sidelights, which were oil lamps with reflectors.

Most important was to be his choice of plays and manner of production. He was going to produce much more Shakespeare, purged of the coarse language and effects of Restoration drama: the name of Garrick should be remembered with that of Shakespeare. He would add a death scene between Romeo and Juliet but restore much of the original text lost in adaptations by the Restoration playwrights, Thomas Otway and Colley Cibber. He would present Nahum Tate's 1681 adaptation of *King Lear,* without the Fool and with a happy ending, and give *The Fairies (A Midsummer Night's Dream)* without the clownish artisans and *Hamlet* without the gravediggers and the tragic fate of Ophelia. *Florizel and Perdita* (adapted from *The Winter's Tale*) and Dryden's version of *The Tempest* would make charming light operas. He would rewrite *The Taming of the Shrew,* adapting the role of Katherina for Kitty Clive. In general, his audiences, accustomed to rewritings of Shakespeare, accepted his "improvements" with docility: they at least had the merit of keeping the plays on the stage by suiting them to the taste of the time. Moreover, Garrick's acting and casting often succeeded in interpreting character in a way closer to Shakespeare and new to the audience.

On June 22, 1749, Garrick married Eva Maria Veigel, a Viennese opera dancer who spoke little English and was a devout Roman Catholic. Under the stage name of La Violette, she had enchanted audiences at the Opera House in the Haymarket in 1746, and, although she had refused to dance for Garrick at Drury Lane in 1748, the following year she consented to retire and thereafter to attempt only one role, that of Mrs. Garrick. The marriage, though childless, was happy, and the Garricks' hospitality became famous.

Successes and setbacks. At Drury Lane, Garrick went from strength to strength. He had already appeared in most of the parts in which he was best liked, and he realized with good humour that, as he was slightly below middle height and had put on weight, he had better give up youthful characters and add to his fame in the more mature roles—Abel Drugger, King Lear, Macbeth, Richard III. His mobile features, dark complexion, and eyes—widely praised for their lustre, expressiveness, and piercing brilliance—were famous on and off stage. In search of "copy," he frequented the law courts and House of Commons and would even visit the scene of a family tragedy. Critics disagreed as to whether he excelled in tragedy or comedy. He himself once told a young aspirant that comedy called for the greater skill.

Though he raised Drury Lane Theatre from penury to astounding financial success and, by his improvements in 1747–48 and 1762 and by the acting of his company, had made it London's most flourishing theatre, he had his setbacks. He burdened his players with some deadly historical and classical tragedies. He could turn disaster to success, however. When his theatre was wrecked by hooligans in November 1755, he faced a hostile house with courage. When in 1769 preternaturally wet weather washed out his cherished Shakespeare Jubilee at Stratford-on-Avon, he refurbished both costumes and script for London, played *The Jubilee* to packed houses, and emerged with a profit. He was accused of avarice—though his inconspicuous charities were many—and was laughed at for his vanity and love of staying at great houses. He was involved in a succession of "paper wars" with touchy and even slanderous disappointed writers and players, such as Charles Churchill, who praised and attacked him, and Samuel Foote, who ridiculed the extravagant Shakespeare Jubilee. Garrick's caricatures of fellow actors in the Duke of Buckingham's *The Rehearsal* in his early days gave wide offense. His rivalry with Rich, at Covent Garden, was sometimes acrimonious; sometimes it led to new success. Rich had prided himself on his Christmas pantomimes; Garrick's, with superb effects and lighting by Philip James de Loutherbourg, a young expert in scenic design of Polish descent, far surpassed them. For his own spectacular "Christmas gambol," *Harlequin's Invasion* (1759), with music by William

Boyce, he wrote the patriotic song, "Heart of Oak."

Though "Heart of Oak" is perhaps the only poem by which he is remembered, his quality as a poet is shown by songs added to plays and by verses to Peg Woffington (the early ones those of a young man deeply in love, the bitter "Epistle to Mrs. Woffington" of 1745 exposing "the naked truth") and to his wife. As a dramatist (he wrote more than 20 plays and "entertainments" and adapted many more), he suffers from having written for a particular company and audience; and his farces and burlesques, though lively, have not held the stage. Only *The Clandestine Marriage* (1766), written with George Colman the Elder, is still successfully revived. His letters, however, have lasting interest. All of his life a prolific letter writer, he wrote as he acted, with ease, spontaneity, and versatility. His letters are a valuable source for the details of his busy life, the tangled theatrical history of his time, and his character and outlook.

Last years. In 1763 the Garricks departed for a continental tour. They enjoyed sightseeing in Italy in aristocratic company, but Mrs. Garrick suffered agonies from what was, apparently, a slipped disk, and Garrick contracted typhoid in Venice and nearly died in Munich. They wintered in Paris, where Garrick enlarged his acquaintance with French literary and theatrical celebrities, Shakespearean enthusiasts, and the philosophes. After returning (spring 1765), he appeared in no new parts, but 10 years passed before he prepared to sell his share of the Drury Lane patent. A series of farewell performances included four Shakespearean parts: Benedick, Hamlet, Richard III, and Lear; Abel Drugger; Sir John Brute from Sir John Vanbrugh's *The Provok'd Wife;* Archer from *The Beaux' Stratagem;* and, for his last performance, Don Felix from Susannah Centlivre's *The Wonder: A Woman Keeps a Secret.*

Garrick's retirement was happy. In London he was a member of Johnson's Literary Club and Brooks's. At Hampton he had his duties as squire, his library and garden, his dogs, and his nieces and nephews. All of his life a sufferer from kidney trouble, he was taken ill while staying with his old friends Lord and Lady Spencer at Althorp Park, Northamptonshire, for the New Year, 1779, and died at his house in Adelphi Terrace shortly thereafter.

Garrick was buried in the Poets' Corner, Westminster Abbey; a monument in Lichfield cathedral bears Johnson's famous "I am disappointed by that stroke of death that has eclipsed the gaiety of nations, and impoverished the public stock of harmless pleasure."

(C.O.)

MAJOR WORKS. *Lethe: or, Esop in the Shades* (1740); *The Lying Valet* (1741); *Miss in Her Teens; or, The Medley of Lovers* (1747); *Lilliput* (1756); *The Male Coquette; or, Seventeen Fifty Seven* (1757); *The Guardian* (1759); *Harlequin's Invasion* (1759); *The Enchanter; or, Love and Magic* (1760); *The Farmer's Return from London* (1762); *The Clandestine Marriage* (1766; with George Colman the Elder); *Neck or Nothing* (1766); *Cymon* (1767); *Linco's Travels* (1767); *A Peep Behind the Curtain, or The New Rehearsal* (1767); *The Jubilee* (1769); *The Irish Widow* (1772); *A Christmas Tale* (1773); *The Meeting of the Company; or, Bayes's Art of Acting* (1774); *Bon Ton; or, High Life Above Stairs* (1775); *The Theatrical Candidates* (1775); *May-Day; or, The Little Gypsy* (1775).

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Consult the INDEX *first*

Garrison, William Lloyd (b. Dec. 10/12, 1805, Newburyport, Mass., U.S.—d. May 24, 1879, New York City), U.S. journalistic crusader who published a newspaper, *The Liberator* (1831–65), and helped lead the successful Abolitionist campaign against slavery in the United States.

Garrison

By courtesy of the Library of Congress, Washington, D.C.

Garrison was the son of an itinerant seaman who subsequently deserted his family. The son grew up in an atmosphere of declining New England Federalism and lively Christian benevolence—twin sources of the Abolitionist movement, which he joined at the age of 25. As editor of the *National Philanthropist* (Boston) in 1828 and the *Journal of the Times* (Bennington, Vt.) in 1828–29, he served his apprenticeship in the moral reform cause. In 1829, with a pioneer Abolitionist, Benjamin Lundy, in Baltimore, he became co-editor of the *Genius of Universal Emancipation;* he also served a short term in jail for libelling a Newburyport merchant who was engaged in the coastal slave trade. Released in June 1830, Garrison returned to Boston and, a year later, established *The Liberator,* which became known as the most uncompromising of American anti-slavery journals. In the first issue of *The Liberator* he stated his views on slavery vehemently: "I do not wish to think, or speak, or write, with moderation .... I am in earnest—I will not equivocate—I will not excuse—I will not retreat a single inch—AND I WILL BE HEARD."

Like most of the Abolitionists he recruited, Garrison was a convert from the American Colonization Society, which advocated the return of free blacks to Africa, to the principle of "immediate emancipation," borrowed from English Abolitionists. "Immediatism," however variously it was interpreted by American reformers, condemned slavery as a national sin, called for emancipation at the earliest possible moment, and proposed schemes for incorporating the freedmen into American society. Through *The Liberator,* which circulated widely both in England and the United States, Garrison soon achieved recognition as the most radical of American anti-slavery advocates. In 1832 he founded the New England Anti-Slavery Society, the first immediatist society in the country, and in 1833 he helped organize the American Anti-Slavery Society, writing its Declaration of Sentiments and serving as its first corresponding secretary. It was primarily as an editorialist, however, excoriating slave owners and their moderate opponents alike, that he became known and feared. "If those who deserve the lash feel it and wince at it," he wrote in explaining his refusal to alter his harsh tone, "I shall be assured that I am striking the right persons in the right place."

In 1837, in the wake of financial panic and the failure of Abolitionist campaigns to gain support in the North, Garrison renounced church and state and embraced doctrines of Christian "perfectionism," which combined Abolition, women's rights, and nonresistance, in the biblical injunction to "come out" from a corrupt society by refusing to obey its laws and support its institutions. From this blend of pacificism and anarchism came the Garrisonian principle of "No Union With Slaveholders," formulated in 1844 as a demand for peaceful Northern secession from a slaveholding South.

By 1840 Garrison's increasingly personal definition of the slavery problem had precipitated a crisis within the American Anti-Slavery Society, a majority of whose members disapproved of both the participation of women and Garrison's no-government theories. Dissension reached a climax in 1840, when the Garrisonians voted a series of resolutions admitting women and thus forced their conservative opponents to secede and form the rival American and Foreign Anti-Slavery Society. Later that year a group of politically minded Abolitionists also deserted Garrison's standard and founded the Liberty Party. Thus, 1840 witnessed the disruption of the national organization and left Garrison in control of a relative handful of followers loyal to his "come-outer" doctrine but deprived of the support of new anti-slavery converts and of the Northern reform community at large.

In the two decades between the schism of 1840 and the Civil War, Garrison's influence waned as his radicalism increased. The decade before the war saw his opposition to slavery and to the federal government reach its peak: *The Liberator* denounced the Compromise of 1850, condemned the Kansas–Nebraska Act, damned the Dred Scott decision, and hailed John Brown's raid as "God's method of dealing retribution upon the head of the tyrant." In 1854 Garrison publicly burned a copy of the Constitution at an Abolitionist rally in Framingham, Mass. Three years later he held an abortive secessionist convention in Worcester, Mass.

The Civil War forced Garrison to choose between his pacifist beliefs and emancipation. Placing freedom for the slave foremost, he supported Abraham Lincoln faithfully and in 1863 welcomed the Emancipation Proclamation as the fulfillment of all his hopes. Emancipation brought to the surface the latent conservatism in his program for the freedmen, whose political rights he was not prepared to guarantee immediately. In 1865 he attempted without success to dissolve the American Anti-Slavery Society and then resigned. In December 1865 he published the last issue of *The Liberator* and announced that "my vocation as an abolitionist is ended." He spent his last 14 years in retirement from public affairs, regularly supporting the Republican Party and

continuing to champion temperance, women's rights, pacifism, and free trade. "It is enough for me," he explained in justifying his refusal to participate in radical equalitarian politics, "that every yoke is broken, and every bondman set free." (J.L.T.)

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Garrod, Dorothy Annie Elizabeth (b. May 5, 1892, London—d. Dec. 18, 1968, Cambridge, Cambridgeshire, Eng.), English archaeologist who directed excavations at Mt. Carmel, Palestine (1929–34), uncovering skeletal remains of primary importance to the study of human evolution.

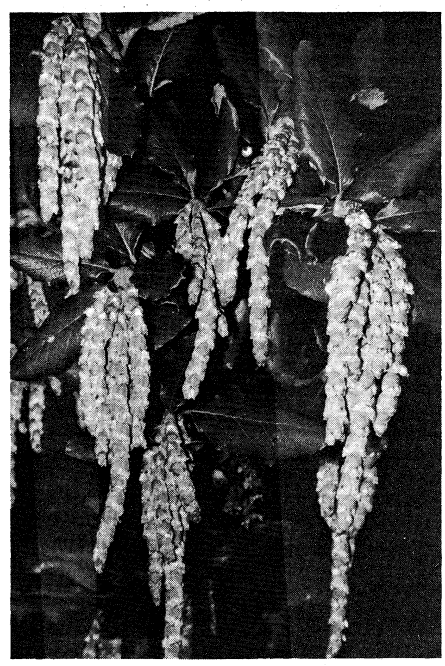
Garrod carried out Paleolithic, or Old Stone Age, research in Gibraltar (1925–26) and in southern Kurdistan (1928). From 1929 to 1934 she led joint British and U.S. efforts at Mt. Carmel that brought to light the first evidence of Paleolithic and Mesolithic, or Middle Stone Age, cultures in Palestine. During 1931–32 some dozen skeletal remains were found in a cave and rock shelter, including, from the cave, a complete female skeleton now known to be about 41,000 years old. The remains from the rock shelter are about 5,000 years younger. Some authorities believe that these remains represent an intermediate stage between Neanderthal man and modern man. Findings were published in *The Stone Age of Mount Carmel,* 2 vol. (1937–39). She turned to Stone Age studies in Bulgaria in 1938. A leading authority on the Paleolithic for many years, Garrod was the first woman to receive a professorship at Cambridge, serving as professor of archaeology from 1939 to 1952. She conducted research in southern Lebanon in 1958.

Garros, Pey de (b. *c.* 1530, Lectoure, near Agen, Fr.—d. 1585, Pau), Provençal poet whose work raised the Gascon dialect to the rank of a literary language in 16th-century France.

A Protestant, Garros studied law, theology, and Hebrew at Toulouse and later became *avocat-général* of Pau. In the preface to his *Poesias gasconas* (1567) he chided his fellow countrymen for preferring French to Gascon and pleaded for a restoration of the native dialect. He published a rhymed Gascon translation of the Psalms of David (1565). His *Églogues* go beyond the imitation of classical models, attempting to capture the true flavour of Gascon peasant life.

garrote, device used in strangling condemned persons. In one form it consists of an iron collar attached to a post. The victim's neck is placed in the collar, and the collar is slowly tightened by a screw until asphyxiation occurs. Another form of garrote is a length of wire with wooden handles at the ends, held by the executioner.

Garrya, genus of about 15 species of shrubs or small trees, constituting the family Garryaceae, native to the western United States and Mexico, with one species occurring in the West Indies. The young branches of these plants are four sided. Male and female flowers



Garrya elliptica
G.E. Nicholson

are on separate plants and grow in catkin-like flower clusters (the only genus in the order Cornales with such a flower cluster). *G. elliptica,* an early flowering species, is occasionally grown as an ornamental.

Garshin, Vsevolod Mikhaylovich (Feb. 14 [Feb. 2, old style], 1855, Bakhmutsky District, Russian Empire—d. April 5 [March 24, O.S.], 1888, St. Petersburg), Russian short-story writer whose works helped to foster the vogue enjoyed by that genre in Russia in the late 19th century.

Garshin was the son of an army officer whose family was wealthy and landed. The major Russo-Turkish war of the 19th century broke out when Garshin was in his early twenties, and, perhaps feeling obligated by his father's profession, he renounced his youthful pacifism to serve.

He wrote of the plight of injured soldiers in his first story, "Chetyre dnya" (1877; "Four Days"), the title of which refers to the length of time the wounded main character remains unattended on the battlefield. The theme of wartime casualty is continued in his "A Very Short Novel," the story of a soldier whose injury precipitates an emotional crisis when he returns home. In perhaps his most famous story, "Krasny tsvetok" (1883; "The Red Flower"), a madman dies after destroying a flower he believes to contain all of the world's evil. Haunted by similar delusions in his own life, Garshin committed suicide by throwing himself down a stairwell.

Garstang, John (b. May 5, 1876, Blackburn, Lancashire, Eng.—d. Sept. 12, 1956, Beirut), English archaeologist who made major contributions to the study of the ancient history and prehistory of Asia Minor and Palestine.

Best known for his excavation of Jericho (1930–36), Garstang entered the field of archaeology by excavating Roman remains in Britain, notably at Ribchester, Lancashire. For about 40 years he successfully combined fieldwork with an academic career. He became a lecturer in Egyptian archaeology at the University of Liverpool (1902), where he served as professor of methods and practice of archaeology from 1907 to 1941.

His work in Egypt, first at Abydos with the famed English archaeologist Flinders Petrie (1900), continued through 1908 and included excavation of a number of sites. During a visit to the excavation of the Hittite capital at Hattusas (now Boğazköy, Tur.), he witnessed the discovery of the Hittite royal archives, and a major aspect of his career thus was launched. While carrying out research in northern Syria and Anatolia, he decided to excavate a mound near Sakcagöz, Tur. Between 1907 and 1911 a wealth of discoveries were made there, from architectural remains and sculpture of the late Hittite period to Neolithic pottery and implements of the 5th and 4th millennia BC. In 1910 he published *The Land of the Hittites.* From 1909 to 1914 he directed much attention to the northern Sudan, excavating ancient Meroe and the nearby temple of the sun, analyzing this work in *Meroë: The City of the Ethiopians* (1911).

Garstang became the first director of the British School of Archaeology in Palestine in 1919, where he developed plans for systematic archaeological surveys. He studied a number of sites, including that of Ascalon (present-day Ashqelon), near Gaza, where he found evidence of habitation dating back to 2000 BC. His excavation of places associated with the passing of the Israelites into Canaan aroused considerable interest and support. In 1926, near the Sea of Galilee, he identified Hazor of the Bible. From 1930 to 1936 he worked at Jericho and made the first soundings to reach very early strata that antedated the use of pottery. Though he related some fallen city walls to Joshua's conquest, later research indicated that they date from three centuries earlier. Nevertheless, his book *The Foundations of Bible History: Joshua, Judges* (1931) remains a valuable source of information.

In 1937 he again turned his attention to the land of the Hittites. Choosing Yümük Tepesi, near Mersin, Tur., as his site, he found many valuable prehistoric remains. He became director of the British Institute of Archaeology in Turkey (1947) and published the results of his last major effort in *Prehistoric Mersin* (1953).

Garter, The Most Noble Order of the, English order of knighthood founded by King Edward III in 1348, considered to be the highest British civil and military honour obtainable. Because the earliest records of the order were destroyed by fire, it is difficult for historians to reconstruct its original purposes, the significance of its emblem, and the origin of the order's motto. One theory is that Edward III wished to revive the Round Table of Arthurian legend, thereby creating a fraternity of knights, and that the garter perhaps symbolized the homage paid by knights to ladies.

According to the most picturesque legend, it was established to commemorate an incident in which Edward was dancing with Joan of Kent, countess of Salisbury (later the wife of the Black Prince, one of the original knights of the order), when one of her blue garters dropped to the floor. As bystanders snickered, Edward gallantly picked up the garter and put it on his own leg, admonishing the courtiers in French with the phrase that remains as the order's motto "*Honi soit qui mal y pense*" ("Shame to him who thinks evil of it," or, more popularly, "Evil to him who evil thinks"). The king inaugurated the order with a great feast and a memorable joust.

As one of the most distinguished and exclusive orders of knighthood, the order's roster has contained many illustrious names. Nonetheless, members have fallen from honour and forfeited their rank. Thirty-six knights of the Garter have been beheaded, with Henry VIII alone accounting for six. During World War II, the crests and swords of the "extra knights" Emperor Hirohito of Japan and King Victor Emmanuel III of Italy were removed

from the order's chapel. The conferment of the honour has even been refused. In 1945, when his party was voted out of office, Winston Churchill refused the order when it was first offered to him, explaining in private, "I can hardly accept the Order of the Garter from the king after the people have given me the Order of the Boot." Churchill relented, however, and was inducted into the order in 1953.

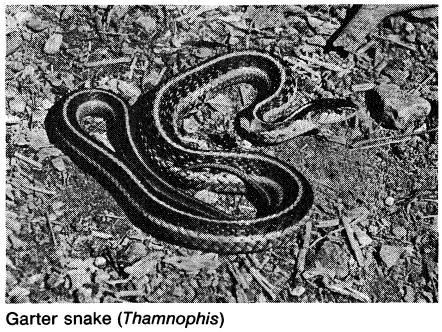
The original medieval membership consisted of the British sovereign and the prince of Wales, each with 12 companions, as if at a tournament. In 1805 the number of knights companions was expanded to 25, the number it maintains today. Membership was expanded in the late 18th and early 19th centuries to include supernumeraries such as members of the royal family (known as "royal knights companions"), lineal descendants of George I and George II, and foreigners (known as "extra knights"). The British sovereign and prince of Wales are always members of the order. Originally, existing knights elected new knights, but now appointment to the order is solely at the discretion of the British monarch. Women have been made ladies of the order, but they are not ranked among the 25 knights companions.

Conferment of the order entails adoption into knighthood and the right to use the title "Sir." Holders of the order can add K.G. (Knight of the Garter) after their names. The order has five officers: prelate (who is always the bishop of Winchester), chancellor, registrar (dean of Windsor since Charles I's reign), Garter king of arms, and gentlemen usher of the Black Rod. The first, third, and fifth offices date from the creation of the order, the fourth office was added by Henry V, and the second office by Edward IV.

As St. George is the patron saint of the order, April 23 (St. George's Day) is its feast day. The chapel of the order is St. George's Chapel, Windsor Castle. Each knight has a stall assigned to him in this chapel; placed in it are his banner, helmet, and stallplate bearing his coat of arms. The banner and helmet are taken down after the death of a knight, but the stallplate remains permanently fixed in the stall of the chapel (the oldest plate of arms is from *c.* 1394). As a result of this arrangement, the stalls of St. George's Chapel provide one of the most excellent examples known of the history of heraldic design.

The insignia comprise the garter with the motto emblazoned on it, the star with St. George's cross, and a collar with a badge representing St. George and the dragon. All insignia must be returned on the death of the holder.

garter snake (*Thamnophis*), any of more than a dozen species belonging to the family Colubridae. They have a striped pattern suggesting a garter: typically, one or three longitudinal yellow or red stripes, between which are checkered blotches. Forms in which the stripes are obscure or lacking are often called grass snakes. Authorities differ as to the number of species, since garter snakes show only slight differences in scalation but considerable geographic differences in coloration. From Canada to Central America they are among the commonest serpents: every vacant lot harbours a few, and the name garden snake is appropriate. Western forms are more water-loving than eastern forms.



Garter snake (*Thamnophis*)
Leonard Lee Rue III

Garter snakes are small—usually under 60 centimetres (24 inches) long—and quite harmless. If disturbed they usually hide the head and writhe the tail while discharging a foul secretion from the anal gland; some will strike. Among the more aggressive forms is the common garter snake (*Thamnophis sirtalis*), North America's most widely distributed reptile. The ribbon snake (*Thamnophis sauritus*), small and slender, is a strongly striped form. Garter snakes live chiefly on insects, earthworms, and amphibians; the ribbon snake is especially fond of frogs. All are rather gregarious before breeding and before hibernating.

garter stitch (knitting): *see* purl stitch.

Gartok (China): *see* Ka-erh.

Garua (Cameroon): *see* Garoua.

Garuḍa, in Hindu mythology, the bird and the *vāhana* (mount) of the god Vishnu. In the Ṛgveda (a collection of Vedic hymns) the sun is compared to a bird in its flight across the sky, and the association of the kitelike Garuḍa with Vishnu is taken by scholars as another indication of Vishnu's early origins as a sun deity. The mythological account of Garuḍa's birth identifies him as the younger brother of Aruṇa, the charioteer of the sun god, Sūrya. His mother was held in slavery by her co-wife and her sons, who were *nāgas* (serpents), to which is attributed the lasting enmity between the eagle-like kite and the serpents. The *nāgas* agreed to release his mother if he could obtain for them a drink of the elixir of immortality, the *amṛta*. Garuḍa performed this feat with a certain amount of difficulty and on his way back from the heavens met Vishnu and agreed to serve him as his vehicle and also as his emblem.

Garuḍa carrying Vishnu and Lakṣmī, bronze image from South India, 18th century; in the Musée Guimet, Paris
Cliche Musees Nationaux, Paris

Garuḍa is described in one text as emerald in colour, with the beak of a kite, roundish eyes, golden wings and four arms, and with breast, knees, and legs like those of the kite. He is also depicted anthropomorphically, with wings and hawk-like features. Two of his hands are folded in adoration (*añjali-mudrā*) and the other two carry an umbrella and the pot of *amṛta*. Sometimes Vishnu rides on his shoulders. Images of Garuḍa are used by devotees of Vishnu to designate their cult affiliations, in which guise they appeared on coins of the Gupta period.

Garuḍa travelled with the spread of Hinduism to Nepal and to Southeast Asia, where he is frequently depicted on the monuments. He is also associated with royalty in several Southeast Asian countries.

Garvey, Marcus (Moziah) (b. Aug. 17, 1887, St. Ann's Bay, Jamaica—d. June 10, 1940, London), charismatic black leader who organized the first important U.S. black nationalist movement (1919–26), based in New York City's Harlem.

Garvey, 1922
UPI/EB Inc.

Largely self-taught, Garvey attended school in Jamaica until he was 14. After travelling in Central America and living in London from 1912 to 1914, he returned to Jamaica, where, with a group of friends, he founded (Aug. 1, 1914) the Universal Negro Improvement and Conservation Association and African Communities League, usually called the Universal Negro Improvement Association (UNIA), which sought, among other things, to build in Africa a black-governed nation.

Failing to attract a following in Jamaica, Garvey went to the United States (1916) and soon established branches of the UNIA in Harlem and the other principal ghettos of the North. By 1919 the rising "Black Moses" claimed a following of about 2,000,000, though the exact number of association members was never clear. From the platform of the Association's Liberty Hall in Harlem, he spoke of a "new Negro," proud of being black. His newspaper, *Negro World,* told of the exploits of heroes of the race and of the splendours of African culture. He taught that blacks would be respected only when they were economically strong, and he preached an independent black economy within the framework of white capitalism. To forward these ends, he established the Negro Factories Corporation and the Black Star Line (1919), as well as a chain of restaurants and grocery stores, laundries, a hotel, and a printing press.

He reached the height of his power in 1920, when he presided at an international convention in Liberty Hall, with delegates present from 25 countries. The affair was climaxed by a parade of 50,000 through the streets of Harlem, led by Garvey in flamboyant array.

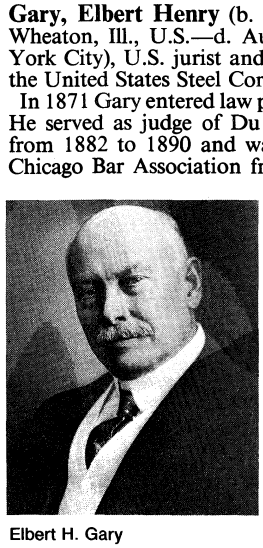
His slipshod business methods, however, and his doctrine of racial purity and separatism (he even approved of the white racist Ku Klux Klan because it sought to separate the races) brought him bitter enemies among estab-

lished black leaders, including labour leader A. Philip Randolph and W.E.B. Du Bois, head of the National Association for the Advancement of Colored People (NAACP). Garvey's influence declined rapidly when he and other UNIA members were indicted for mail fraud in 1922 in connection with the sale of stock for the Black Star Line. He served two years of a five-year prison term, but in 1927 his sentence was commuted by Pres. Calvin Coolidge, and he was deported as an undesirable alien. He was never able to revive the movement abroad, and he died in virtual obscurity. Edmund David Cronon's biography *Black Moses* appeared in 1955.

Gary, city, Lake County, extreme northwest Indiana, U.S., at the southern end of Lake Michigan in the Calumet district east of Chicago. In 1906 the town (named for Elbert H. Gary, chief organizer of the United States Steel Corporation) was laid out as an adjunct of the company's vast new manufacturing complex. The site was chosen because it lay on navigable water midway between the iron ore beds to the north and the coal region to the south. Large areas were drained, a meandering river was rerouted, and sand dunes were removed. Steelworks were then built along the lake shore, with the city to the south. The Gary Land Company, a U.S. Steel subsidiary, laid out its part of the city, constructed the streets and sidewalks, installed the sewage system, and built the waterworks and electric plant. The first blast furnace was fired in December 1908, and steel production began early the following year. Although Gary has some diversified manufacturing, it is essentially a one-industry city and has periodically suffered from declines in steel production and labour disputes. During World War I a sizable number of blacks came to work in Gary and comprised one-sixth of the population in the 1930s. World War II drew many more, and in 1967 Richard G. Hatcher was one of the first blacks to be elected mayor of a major U.S. city. Gary was the scene of a significant early 20th-century development in public education when William A. Wirt established the work–study–play school, popularly known as the platoon school, designed to attract underprivileged children. Construction of a new civic centre in the city's downtown area was begun in 1979. Gary is the seat of Indiana University Northwest (1948). Inc. town, 1906; city, 1909. Pop. (1980) city, 151,953; Gary–Hammond–East Chicago metropolitan area (SMSA), 642,-781.

Gary, Elbert Henry (b. Oct. 8, 1846, near Wheaton, Ill., U.S.—d. Aug. 15, 1927, New York City), U.S. jurist and chief organizer of the United States Steel Corporation.

In 1871 Gary entered law practice in Chicago. He served as judge of Du Page County, Ill., from 1882 to 1890 and was president of the Chicago Bar Association from 1893 to 1894.



Elbert H. Gary
U.S. Steel Photo

A leader and an authority in corporate law and the insurance business, Gary became general counsel and a director in a number of large railroads, banks, and industrial corporations. In 1898 he became the first president of the newly organized Federal Steel Company, which was backed by the financier J.P. Morgan. Federal Steel merged with the U.S. Steel Corporation in 1901. Gary was elected chairman of the board of directors and was the corporation's chief executive officer during 26 years of remarkable development and growth of the steel industry.

As chairman of U.S. Steel, Gary helped improve the workers' conditions by promoting stock ownership and profit sharing by the employees, higher wages, and safe, sanitary working conditions. He was a firm advocate of the open shop, however, and his unwillingness to negotiate that issue led to the steel strike of 1919–20. The strike forced him to give his support to abolishing the 7-day week and the 12-hour day in the steel mills. The town of Gary, Ind., named in his honour, was laid out in 1906 by U.S. Steel.

Gary, Romain, original name ROMAIN KACEW (b. May 8, 1914, Vilnius, Lithuania, Russian Empire—d. Dec. 2, 1980, Paris), French novelist whose first work, *L'Éducation européenne* (1945; *Forest of Anger*, 1944), won him immediate acclaim. Humanistic and optimistic despite its graphic depictions of the horrors of World War II, the novel was later revised and reissued in English as *Nothing Important Ever Dies* (1960).

Gary's novels mix humour with tragedy and faith with cynicism. *Les Couleurs du jour* (1952; *The Colors of the Day*, 1953), set in Nice at carnival, and *La Danse de Gengis Cohn* (1967; *The Dance of Genghis Cohn*, 1968), in which the ghost of a Jewish stand-up comedian takes possession of his Nazi executioner, are comic novels nonetheless informed by serious moral considerations. *Les Racines du ciel* (1956; *The Roots of Heaven*, 1958), winner of the Prix Goncourt, balances a visionary conception of freedom and justice against a pessimistic comprehension of man's cruelty and greed. Other works by Gary include *Le Grand Vestiare* (1948; *The Company of Men*, 1950), a novel set in postwar Paris; *Lady L* (French and English versions, 1959), a social satire; *La Promesse de l'aube* (1960; *Promise at Dawn*, 1962), an autobiography; *Clair de femme* (1977; "The Light of a Woman"); and *Les Cerf-volants* (1980; "The Kite").

During World War II Gary joined Gen. Charles de Gaulle in London. Already trained as an aviator, he served with the Free French Forces in Europe and North Africa, earning the Croix de Guerre and Compagnon de la Libération. For 20 years following the war, he served in French diplomatic service. From 1956 to 1960 he was French consul general in Los Angeles.

Garyān (Libya): *see* Gharyān.

gas, one of the three fundamental states of matter. It has distinctly different properties from the liquid and solid states.

A brief treatment of gas follows. For full treatment, *see* MACROPAEDIA: Matter: Its Properties, States, Varieties, and Behaviour.

A gas has no definite shape and exhibits high fluidity. It tends to expand indefinitely and readily fills any container into which it is introduced. Gases are highly compressible, and under ordinary conditions they have a density approximately 1,000 times less than that of liquids. A small change in temperature or pressure generally produces a substantial change in the volume of a gas. The relationships between the temperature, pressure, and volume of gases have been deduced and expressed in the form of equations known as the gas laws (*see* Boyle's law; Charles's law; Avogadro's law).

Gases were studied as early as antiquity, but an understanding of the gaseous state, as of the other basic states of matter, came only with the development of the kinetic molecular theory in the 19th century. According to this theory, all matter is composed of particles (atoms or molecules or mixtures of both) in constant motion. In a gas, the particles are far enough apart and are moving fast enough to escape each other's influence (*e.g.*, attraction or repulsion due to electrical charges). The freely moving particles constantly collide with one another, but the collisions result in no loss of energy. When a gas is cooled, its particles move more slowly, and those that are slow enough to linger in each other's vicinity tend to coalesce because a force of attraction overcomes their lowered kinetic energy—*i.e.*, energy of motion. Each particle, when it joins the liquid state with others, gives up a measure of heat called the latent heat of liquefaction, but each continues to move at the same speed within the liquid so long as the temperature remains at the condensation point. Warming up a liquid, by contrast, provides constituent particles with heat of evaporation, which enables them to escape each other and form the vapour of the liquid—namely, the gaseous state.

gas, natural: *see* natural gas.

gas, perfect (physics): *see* perfect gas.

gas burner, heating device in which natural gas is used for fuel. Gas may be supplied to the burner prior to combustion at a pressure sufficient to induce a supply of air to mix with it; the mixture passes through several long narrow openings or a nozzle to mix with additional air in the combustion chamber. Metal surfaces supply the means of heat transfer to circulating water or air.

gas chamber, method of executing condemned prisoners by lethal gas. It was first used in the U.S. state of Nevada in 1924 in an effort to provide a more humane form of capital punishment. The prisoner is strapped in a chair in a sealed chamber in which poisonous fumes, such as cyanide, are released. If the prisoner breathes deeply, death is almost instantaneous and painless. By the second half of the 20th century, 11 U.S. states had adopted the gas chamber as the method of execution.

During the Holocaust (*q.v.*) in Nazi Germany during World War II, gas chambers were employed for the purpose of killing Jews and other unwanted minorities. They were established at concentration camps and usually disguised as bathhouses. Men, women, and children were herded naked into the chambers after being told that they were going to take showers. The doors were closed, and poison gas was injected.

gas chromatography, in analytical chemistry, technique for separating chemical substances in which the sample is carried by a moving gas stream through a tube packed with a finely divided solid that may be coated with a film of a liquid. Because of its simplicity, sensitivity, and effectiveness in separating components of mixtures, gas chromatography is one of the most important tools in chemistry. It is widely used for quantitative and qualitative analysis of mixtures, for the purification of compounds, and for the determination of such thermochemical constants as heats of solution and vaporization, vapour pressure, and activity coefficients. Gas chromatography is also used to monitor industrial processes automatically: gas streams are analyzed periodically, and manual or automatic responses are made to counteract undesirable variations. Many routine analyses are performed rapidly in medical and other fields. For example, by the use of only 0.1 cubic centimetre (0.003 ounce) of blood, it is possible to determine

the percentages of dissolved oxygen, nitrogen, carbon dioxide, and carbon monoxide. Gas chromatography is also useful in the analysis of air pollutants, alcohol in blood, essential oils, and food products.

The method consists of, first, introducing the test mixture or sample into a stream of an inert gas, commonly helium or argon, that acts as carrier. Liquid samples are vaporized before injection into the carrier stream. The gas stream is passed through the packed column, through which the components of the sample move at velocities that are influenced by the degree of interaction of each constituent with the stationary nonvolatile phase. The substances having the greater interaction with the stationary phase are retarded to a greater extent and consequently separate from those with smaller interaction. As each component leaves the column with the carrier, it passes through a detector and then either goes to a fraction collector or is discarded.

Gas Hills, district rich in uranium deposits, east-southeast of Riverton, central Wyoming, U.S. Uranium was first discovered there by Neil and Maxine McNeice in 1953 on a knoll, now called Discovery Hill, and since then the area has been the object of intense mineral exploration. The uranium-rich soil is scraped up by huge earth movers to form some of the world's largest open pits and pit well mines. The area's uranium mills crush the ores; uranium salts (leached out by sulfuric acid) are refined and pressed into yellow cakes of crude uranium compound for shipping.

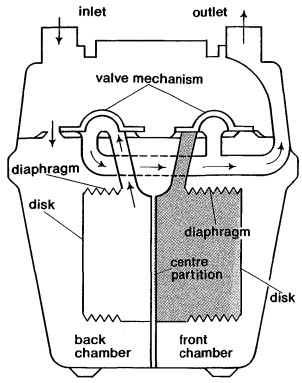
gas mask, breathing device designed to protect the wearer against harmful substances in the air. The typical gas mask consists of a tight-fitting facepiece that contains filters, an exhalation valve, and transparent eyepieces. It is held to the face by straps and can be worn in association with a protective hood. The filter elements in the cheeks of the mask remove contaminants from the air that is drawn through the mask by the wearer's inhaling. The filters, which can be replaced, clean the air but do not add oxygen to it (some masks are connected by a hose to a separate tank of oxygen). The most common filters employ fibre screens (to strain out finely divided solid particles) and chemical compounds such as charcoal (to capture or chemically alter poisonous gases in the air). Charcoal absorbs and holds a fairly large volume of poisonous gases.

Gas masks are widely used by the world's armed forces. Although it is possible to design filtering devices that will neutralize almost any specific toxic substance in the air, it is impossible to combine in one mask protection against all toxic substances. Military gas masks are accordingly constructed with a view to counteracting those chemicals that are thought most likely to be used in wartime. Gas masks are effective only against those chemical-warfare agents that are dispersed as true gases and are injurious when breathed. Agents such as mustard gas that are dispersed in liquid form and attack the body through the skin surface necessitate the use of special protective clothing in addition to gas masks.

gas meter, device for measuring the quantity or rate of flow of a gas. Types of gas meters (by operating principles) include displacement, velocity, head, thermal, acoustic, and tracer.

An example of the displacement principle is the bellows-and-diaphragm gas meter (shown in the diagram). This type is widely used in commercial and domestic gas service to measure the quantity of gas delivered to a user. Bellows gas meters measure the quantity of gas passing through them by filling and emptying, in a regular sequence, one or more internal chambers of known capacity. Counting the times each chamber is filled and emptied gives the volume of gas delivered.

In velocity-type gas meters the gas flow moves impeller blades on a rotor. Rotation of the rotor is geared to a dial mechanism that records gas volume delivered. In the velocity



Bellows-and-diaphragm gas meter
By courtesy of Rockwell Manufacturing Company

vortex meter the rotor is mounted in an offset chamber in a short section of the flow pipe. Only a portion of the total gas flow is fed into this chamber, and total quantity measurements are based on recorded rotor movement. Velocity gas meters also include anemometer-type meters in which rotating cups or vanes either power a small generator or drive a series of recording registers.

Head-type gas meters measure quantity of gas per unit time. The measurement is based on a deliberately produced pressure drop, or head, between two nearby points in a tube in the meter. This pressure differential can be converted to a flow rate. Devices used to produce the pressure head include orifice plates, venturi tubes, flow nozzles, and pitot tubes.

In thermal-type gas meters a heater (such as an electrical heating coil) is placed in the gas stream, and thermometers are installed on its upstream and downstream sides. Gas flow is measured in relation to either the temperature rise of the gas stream or the amount of electrical energy that is necessary to keep the heater at a constant temperature.

Acoustic gas meters measure the rate of gas flow by comparing the frequency shifts of two initially identical signals (one sent upstream, the other downstream) after they are reflected.

A tracer-type gas meter measures flow rate by timing the passage of an injected radioactive material between two fixed detectors.

gas plant, also called DITTANY, BURNING BUSH, or FRAXINELLA (*Dictamnus albus*), or-

Gas plant (*Dictamnus albus*)
A.J. Huxley—EB Inc.

namental, gland-covered perennial herb, of the rue family (Rutaceae), native to Eurasia. The flowers (white or pink) and the leaves give off a strong aromatic vapour which can be ignited, hence the names gas plant and burning bush.

gas reservoir, in geology, naturally occurring storage area, characteristically a folded rock formation such as an anticline, that traps and holds natural gas. The reservoir rock must be permeable and porous to contain the gas, and it has to be capped by impervious rock in order to form an effective seal that prevents the gas from escaping upward or laterally. Typical reservoir rocks are sedimentary in origin and include sands, sandstones, arkoses, and fissured limestones and dolomites. The natural gas migrates into these from the compact and less permeable source rock (*e.g.,* clays and fine-grained limestones) because of the pressure difference between the source rocks, which are compressed by the weight of overlying rocks, and the reservoir rocks, which are at lower pressures. Recovery from the reservoir is effected principally by the natural expansion of the gas.

In the United States and certain other countries, artificial gas reservoirs are being created from depleted oil and gas fields, particularly near salt domes and in sedimentary basins, to store gas during periods of low consumption for later use.

Gascogne, Golfe de: *see* Biscay, Bay of.

Gascoigne, George (b. *c.* 1525, Cardington, Bedfordshire, Eng.—d. Oct. 7, 1577, Bernack, near Stamford, Lincolnshire), English poet and a major literary innovator.

Gascoigne attended the University of Cambridge, studied law at Gray's Inn in 1555, and thereafter pursued careers as a politician,

George Gascoigne, woodcut, 1576
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

country gentleman, courtier, soldier of fortune, and man of letters, all with moderate distinction. He was a member of Parliament (1557–59). Because of his extravagance and debts, he gained a reputation for disorderly living. He served with English troops in the Low Countries, ending his military career as a repatriated prisoner of war. In 1575 he helped to arrange the celebrated entertainments provided for Queen Elizabeth I at Kenilworth and Woodstocke and in 1576 went to Holland as an agent in the royal service. Among his friends were many leading poets, notably George Whetstone, George Turberville, and Edmund Spenser.

Gascoigne was a skilled literary craftsman, memorable for versatility and vividness of expression and for his treatment of events based on his own experience. His chief importance, however, is as a pioneer of the English Renaissance who had a remarkable aptitude for domesticating foreign literary genres. He foreshadowed the English sonnet sequences with groups of linked sonnets in his first published

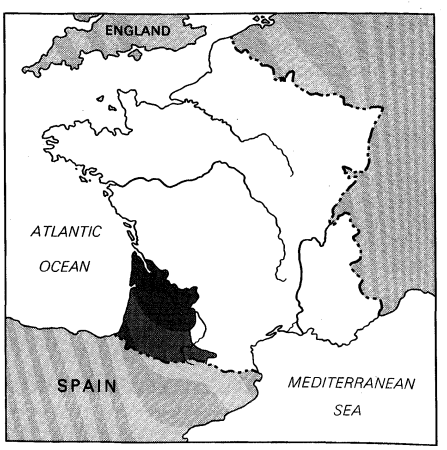
work, *A Hundreth Sundrie Flowres* (1573), a collection of verse and prose. In *The Posies of George Gascoigne* (1575), an authorized revision of the earlier work, which had been published anonymously, he included also "Certayne notes of Instruction," the first treatise on prosody in English. In *The Steele Glas* (1576), one of the earliest formal satires in English, he wrote the first original nondramatic English blank verse. In two amatory poems, the autobiographical "Dan Bartholomew of Bathe" (published in *A Hundreth sundrie Flowres*) and *The Complainte of Phylomene* (1576), Gascoigne developed Ovidian verse narrative, the form used by Shakespeare in *Venus and Adonis* and *The Rape of Lucrece.*

"The Adventures of Master F.J.," published in *A Hundreth sundrie Flowres,* was the first original prose narrative of the English Renaissance. Another prose work, *The Spoyle of Antwerpe* (1576), is an early example of war journalism, characterized by objective and graphic reporting.

Gascoigne's *Jocasta* (performed in 1566) constituted the first Greek tragedy to be presented on the English stage. Translated into blank verse, with the collaboration of Francis Kinwelmersh, from Lodovico Dolce's *Giocasta,* the work derives ultimately from Euripides' *Phoenissae.* In comedy, Gascoigne's *Supposes* (1566?), a prose translation and adaptation of Ariosto's *I Suppositi,* was the first prose comedy to be translated from Italian into English. A dramatically effective work, it provided the subplot for Shakespeare's *The Taming of the Shrew.* A third play, *The Glasse of Government* (1575), is a didactic drama on the Prodigal Son theme. It rounds out the picture of Gascoigne as a typical literary man of the early Renaissance.

Gascony, French GASCOGNE, historic and cultural region encompassing the southwestern French *départements* of Landes, Gers, and Hautes-Pyrénées and parts of Pyrénées-Atlantiques, Lot-et-Garonne, Tarn-et-Garonne, Haute-Garonne, and Ariège and coextensive with the historic region of Gascony.

During ancient Roman rule in Gaul, the area, predominantly Iberian rather than Celtic in ethnic composition, was detached from Aquitania to form Novempopulana. Taken from the Visigoths by the Franks after the Battle of Vouillé (507), the region was overrun from 561 by the Basques, or Vascones; in 602 the Frankish kings recognized Vasconia, or Gascony, as a duchy under the national leader Genialis. In the latter half of the 7th century, the Gascon duke Loup (Lupus) extended his power over adjacent areas, and despite minor setbacks his successors, by the latter half of the 10th century, controlled all of Gascony as well as Bordeaux, Bazadais (the country around Bazas), and Agenais (now Agen).



The duchy of Gascony *c.* 1035

From W. Shepherd, *Historical Atlas,* Harper & Row, Publishers (Barnes & Noble Books), New York; revision Copyright © 1964 by Barnes & Noble, Inc.

In 1032 a war of succession broke out, and Gascony was eventually won in 1052 by Guy-Geoffrey (from 1058 William VIII, duke of Aquitaine). Meanwhile, effective power within the duchy had devolved on the greater counts and viscounts (such as those of Armagnac and Lomagne), who dominated Gascony for centuries. In the 12th century the ducal title passed with the Aquitanian inheritance to the Plantagenet kings of England. Throughout the years of intermittent warfare between England and France, up to the definitive French reconquest at the end of the Hundred Years' War, Gascony remained the kernel of English royal power in southwestern France. Gascony was merged with Guyenne in the *gouvernement* of Guyenne-et-Gascogne during the ancien régime.

The region consists of the northern foothills of the Pyrenees mountain chain and extends from the Basque Country along the France–Spain border in the extreme southwestern corner of France eastward some 150 miles (240 km) to the vicinity of Toulouse on the upper course of the Garonne River. The traditional farmstead of the Basque Country is built of cob and covered with wood shingles; above the portal is a placard that features the date of construction or the name of the proprietor. The patriarch of the Basque family is the *etcheko jaun;* his primary task is to preserve the patrimony intact, and the custom of undivided inheritance has resulted in the emigration of disinherited sons and daughters. Pastures in the Basque Country are often collectively owned.

The Basques, who were not converted to Christianity until the 10th century, are predominantly Roman Catholic. The Basque language continues to be spoken by approximately one-fifth of the Basques living in France. The Gascon dialect is a variant of Occitan and is distinguished by strong Basque influences. French was adopted as the literary language in the 16th century; numerous folkloric poems in the Gascon dialect have been preserved. The stereotyped Gascon of French popular literature is impetuous and hotheaded (*e.g.,* the elder Alexandre Dumas's character d'Artagnan and Edmond Rostand's Cyrano de Bergerac).

Gascoyne, David (Emery) (b. Oct. 10, 1916, Harrow, Middlesex, Eng.), English poet deeply influenced by the French Surrealist movement of the 1930s.

Gascoyne's first book of poems, *Roman Balcony,* appeared in 1932, and his only novel, *Opening Day,* the next year. His important introductory work, *A Short Survey of Surrealism* (1935), and his verses *Man's Life Is This Meat* (1936) were milestones of the movement in England. *Poems 1937–42* (1943) marked the beginning of his religious verse and contain his noted good-bye to the '30s—his "Farewell Chorus." *Night Thoughts,* a long, semidramatic poem, was broadcast in 1955 and published the next year.

Gascoyne's early poetry bears the Surrealist impress boldly, and through his translations and critical writings he did much to make the movement known in Britain. He was less interested in Surrealism's exploration of the subconscious than in its exploitation of visionary and mystical elements. Thus, when he abandoned Surrealism as an aesthetic guide at the end of the 1930s, it was only a short step to the powerful religious poetry of his later years.

Gascoyne's *Collected Poems* appeared in 1965. His *Collected Verse Translations,* chiefly from the French, was published in 1970. *Paris Journal 1937–1939* (1978) covers the years of his first visit to France. (He also lived there 1954–65.)

Gascoyne-Cecil, James Edward Hubert: *see* Salisbury, James Edward Hubert Gascoyne-Cecil, 4th Marquess of.

Gascoyne-Cecil, (Edgar Algernon) Robert: *see* Cecil (of Chelwood), (Edgar Algernon) Robert Gascoyne-Cecil, 1st Viscount.

Gascoyne-Cecil, Robert: *see* Salisbury, Robert Arthur Talbot Gascoyne-Cecil, 3rd Marquess of.

Gascoyne River, ephemeral river of west-central Western Australia. It rises in the northeastern Robinson Ranges west of the Gibson Desert, flows generally westward for 475 miles (760 km) through gold-mining and sheep-raising country and empties into the Indian Ocean at Carnarvon on Shark Bay. It is joined by the 225-mile- (360-kilometre-) long Lyons River about 100 miles (160 km) above its mouth. Although frequently dry, it is the chief source of water for Carnarvon. Bananas and vegetables are grown along its lower course on land irrigated from wells dug in the riverbed. The wool-producing region along its upper course is known as the Gascoyne. The river was first sighted in 1839 by Captain (later Sir) George Grey, who became governor of South Australia (1841–45), and was named for his friend, one Captain Gascoyne of the Royal Navy.

gases, kinetic theory of: *see* kinetic theory of gases.

Gash River, Arabic NAHR AL-QĀSH, river rising in northern Ethiopia near Asmera; it flows approximately 300 miles (480 km) northwestward across Ethiopia into northeastern Sudan to lose itself in the desert. In time of flood it reaches the ʿAṭbarah River. It is known as the Mareb on its upper course and is used for irrigation around Teseney, Ethiopia, and around Kassalā, The Sudan.

Gaskell, Elizabeth Cleghorn, *née* STEVENSON (b. Sept. 29, 1810, Chelsea, London, Eng.—d. Nov. 12, 1865, near Alton, Hampshire), English novelist, short-story writer, and first biographer of Charlotte Brontë.

Mrs. Gaskell was a daughter of a Unitarian minister. When her mother died, she was brought up by a maternal aunt in the Cheshire village of Knutsford in a kindly atmosphere of rural gentility that was already old-fashioned

Elizabeth Gaskell, chalk drawing by George Richmond, 1851; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

at the time. In 1832 she married William Gaskell, a Unitarian minister, and settled in the overcrowded, problem-ridden industrial city of Manchester, which remained her home for the rest of her life. Domestic life—the Gaskells had six children, of whom four daughters lived to adulthood—and the social and charitable obligations of a minister's wife claimed her time but not all her thoughts. She did not begin her literary career until middle life, when the death of her only son had intensified her sense of community with the poor and her desire to "give utterance" to their "agony." Her first novel, *Mary Barton,*

reflects the temper of Manchester in the late 1830s. It is the story of a working-class family in which the father, John Barton, lapses into bitter class hatred during a cyclic depression and carries out a retaliatory murder at the behest of his trade union. Its timely appearance in the revolutionary year of 1848 brought the novel immediate success, and it won the praise of Charles Dickens and Thomas Carlyle. Dickens invited her to contribute to his magazine, *Household Words,* where her next major work, *Cranford* (1853), appeared. This social history of a gentler era, which describes, without sentimentalizing or satirizing, her girlhood village of Knutsford and the efforts of its shabby-genteel inhabitants to keep up appearances, has remained her most popular work.

The conflict between Mrs. Gaskell's sympathetic understanding and the strictures of Victorian morality resulted in a mixed reception for her next social novel, *Ruth* (1853). It offered an alternative to the seduced girl's traditional progress to prostitution and an early grave.

Among the many friends attracted by Mrs. Gaskell was Charlotte Brontë, who died in 1855 and whose biography Charlotte's father, Patrick Brontë, urged her to write. The *Life of Charlotte Brontë* (1857), written with warmhearted admiration, disposed of a mass of firsthand material with unforced narrative skill. It is at once a work of art and a well-documented interpretation of its subject.

Among her later works, *Sylvia's Lovers* (1863), dealing with the impact of the Napoleonic Wars upon simple people, is notable. Her last and longest work, *Wives and Daughters* (1864–66), concerning the interlocking fortunes of two or three country families, is considered by many her finest. It was left unfinished at her death.

gasoline, also spelled GASOLENE, also called PETROL, mixture of volatile, flammable liquid hydrocarbons derived from petroleum and used as fuel for internal-combustion engines. It is also used as a solvent for oils and fats. Originally a by-product of the petroleum industry (kerosine being the principal product), gasoline became the preferred automobile fuel because of its high energy of combustion and capacity to mix readily with air in a carburetor.

Gasoline was at first produced by distillation, simply separating the volatile, more valuable fractions of crude petroleum. Later processes, designed to raise the yield of gasoline from crude oil, split large molecules into smaller ones by processes known as cracking. Thermal cracking, employing heat and high pressures, was introduced in 1913 but was replaced after 1937 by catalytic cracking, the application of catalysts that facilitate chemical reactions producing more gasoline. Other methods used to improve the quality of gasoline and increase its supply include polymerization, converting gaseous olefins, such as propylene and butylene, into larger molecules in the gasoline range; alkylation, a process combining an olefin and a paraffin such as isobutane; isomerization, the conversion of straight-chain hydrocarbons to branched-chain hydrocarbons; and reforming, using either heat or a catalyst to rearrange the molecular structure.

Gasoline is a complex mixture of hundreds of different hydrocarbons. Most are saturated and contain 4 to 12 carbon atoms per molecule. Gasoline used in automobiles boils mainly between 30° and 200° C (85° and 390° F), the blend being adjusted to altitude and season. Aviation gasoline contains smaller proportions of both the less-volatile and more-volatile components than automobile gasoline.

The antiknock characteristics of a gasoline—its ability to resist knocking, which indicates that the combustion of fuel vapour in the cylinder is taking place too rapidly for efficiency—is expressed in octane number. The addition of tetraethyllead to retard the combustion was initiated in the 1930s but was discontinued in the 1980s because of the toxicity of the lead compounds discharged in the combustion products. Other additives to gasoline often include detergents to reduce the buildup of engine deposits, anti-icing agents to prevent stalling caused by carburetor icing, and antioxidants (oxidation inhibitors) used to reduce "gum" formation.

In the late 20th century the rising price of petroleum (and hence of gasoline) in many countries led to the increasing use of gasohol, which is a mixture of 90 percent unleaded gasoline and 10 percent ethanol (ethyl alcohol). Gasohol burns well in gasoline engines and is a desirable alternative fuel for certain applications because of the renewability of ethanol, which can be produced from grains, potatoes, and certain other plant matter. *See also* petroleum.

gasoline engine, any of a class of internal-combustion engines that generate power by burning a volatile liquid fuel with ignition initiated by an electric spark.

A brief treatment of gasoline engines follows. For full treatment, *see* MACROPAEDIA: Energy Conversion.

The gasoline engine is the most widely used form of internal-combustion engine. The majority of automobiles are powered by gasoline engines, as are many motorcycles and small trucks and tractors. A few large systems capable of up to 35,000 horsepower are employed as aircraft engines, while small, light-weight models provide motive power for such machines as lawnmowers and snowblowers.

Principles of operation. Although gasoline engines vary significantly in size, weight per unit of power generated, and arrangement of components, they all are basically similar. The principal type of gasoline engine is the reciprocating-piston engine. Such engines can be subdivided into two groups according to whether the operating cycle is completed in two or in four strokes of the piston. In the four-stroke cycle basic to automobile engines, the piston first descends on the intake stroke, during which the inlet valve is held open. Fresh charge (air mixed with gasoline vapour) is drawn into the cylinder by the partial vacuum created by the descent of the piston. The piston then ascends on the compression stroke with both the inlet and exhaust valves closed, and the charge is ignited by an electric spark as the end of the stroke is approached. The power stroke follows, with both valves still closed and gas pressure acting on the piston crown because of the expansion of the burned charge. The exhaust stroke then completes the cycle, with the ascending piston forcing the spent products of combustion past the exhaust valve, now held open by the valve train. The cycle then repeats itself. Each cycle thus requires four strokes of the piston—intake, compression, power (expansion), and exhaust—and two revolutions of the crankshaft.

In a two-stroke cycle the compression and power strokes of the four-stroke cycle are carried out without the inlet and exhaust strokes. In short, the two-stroke cycle is completed in one upstroke and one downstroke of the piston and a single revolution of the crankshaft. Because of this, the size, weight, and cost of the engine per horsepower are reduced. Accordingly, two-stroke-cycle engines are used in a variety of motorcycles and smaller machines (*e.g.,* lawnmowers and power rakes).

A second major type of gasoline engine is the rotary engine. Among the different versions that have been introduced over the years, the rotary-piston engine designed by Felix Wankel, a German engineer, has proved to be the most practical, though the Tri-Dyne engine (a British design) is thought by some to be superior in certain respects. The Wankel engine is structurally different from the conventional reciprocating-piston engine. The Wankel has a rotor shaped like an equilateral triangle instead of pistons that move up and down in cylinders. The rotor turns in a closed chamber, and the three apexes of the rotor maintain a continuous sliding contact with the curved inner surface of the casing. The curve-sided rotor forms three crescent-shaped chambers between its sides and the wall of the casing. The volume of each chamber varies with the rotor motion. Maximum volume is attained in a chamber when the side of the rotor forming it is parallel with the major diameter. Pockets recessed in the flanks of the rotor control the shape of the combustion chamber and establish the compression ratio of the engine. In turning about its central axis, the rotor has to follow a circular orbit about the geometric centre of the casing. It is guided by fitting its central bore to an eccentric formed on the output shaft that passes through the centre of the stationary pinion. This eccentric also harnesses the rotor to the shaft so that torque is applied when gas pressure is exerted against the rotor flanks as the fuel-and-air mixture burns. A 3-to-1 gear ratio causes the output shaft to turn three times as fast as the rotor turns about the eccentric. Each quarter turn of the rotor completes an expansion or a compression, thereby permitting intake, compression, expansion, and exhaust during one turn of the rotor.

The Wankel engine is lighter and more compact than the conventional reciprocating-piston type, and it is less expensive to manufacture because of its mechanical simplicity. Other advantages include quiet and vibrationless operation and much higher operating speeds, primarily due to the absence of inertial forces from reciprocating parts. The Wankel engine has been employed for automotive and marine applications on a limited scale.

Development of the gasoline engine. In 1862 Alphonse Beau de Rochas, a French engineer, established the principle of the four-stroke cycle. In 1876 the German engineer Nikolaus Otto applied Beau de Rochas's principle in constructing what is commonly considered a prototype of the modern automobile engine. Sir Dougald Clerk developed the two-stroke cycle in 1878. A simplified, more efficient version of this operation was introduced in 1891 by Joseph Day. The rotary gasoline engine was not developed until the 20th century.

Gasparri, Pietro (b. May 5, 1852, Capovalazza de Ussita, Papal States [Italy]—d. Nov. 18, 1934, Rome), Italian cardinal who, by appointment of Pope St. Pius X, in 1904 directed the new Code of Canon Law, a systematic arrangement of ecclesiastical law now practiced by the Roman Catholic church.

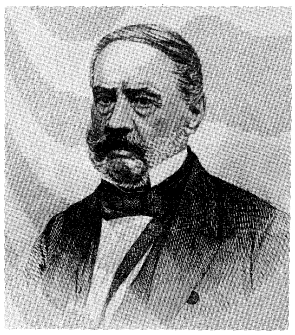
Ordained in 1877, he was professor of canon law at the Catholic Institute, Paris (1880–98). In 1907 Gasparri was made cardinal, and in 1914 Pope Benedict XV appointed him secretary of state. His new code (*Codex Juris Canonici*) was promulgated in 1917. He was retained by Pope Pius XI and in 1926 began the secret negotiations with Prime Minister Benito Mussolini of Italy that resulted in the Lateran Treaty (1929), an agreement securing papal independence from Italy.

Gaspé, town, Bas-Saint-Laurent-Gaspésie region, eastern Quebec province, Canada, at the mouth of the York River, overlooking Gaspé Bay. The name derives either from the navigator Gaspar Corte-Real, who came there about 1500, or from the Indian *gespeg,* meaning "end of the world." Its site was visited in 1534 by the explorer Jacques Cartier, who set up a cross there, claiming the Canadian mainland for the king of France. The fishing port that later developed survived a disastrous attack

by the British under Gen. James Wolfe in 1758. While fishing is still important (it is the site of a provincial fish hatchery), lumbering, tourism, and, more recently, copper and oil production have become the main industries. Gaspé is the eastern terminus of the Canadian National Railway and the seat of a Roman Catholic diocese. Pop. (1981) 17,261.

Gaspé, Philippe Aubert de (b. Oct. 30, 1786, Quebec—d. Jan. 29, 1871, Quebec), author of the first important French-Canadian novel.

The son of a distinguished Quebec family, Gaspé inherited the family estate on the St. Lawrence River. He received a classical education in Quebec, studied law there, and later became sheriff. Bankruptcy, for which he spent over three years in debtors' prison, forced his withdrawal from public life in his 40s into a quiet life of reading and meditation.



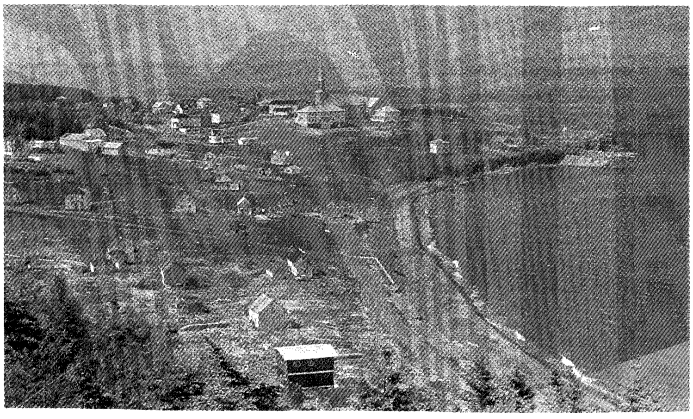
Gaspé, engraving, 1871
By courtesy of the Public Archives of Canada

When he was 76 years old, inspired by a rebirth of Canadian nationalism in the mid-19th century, Gaspé wrote *Les Anciens Canadiens* (1863; *The Canadians of Old,* 1864). A French-Canadian classic, it is a romantic historical novel set in Canada at the time of the British conquest (1760). Its idealization of the "good old days," the farmer's loyalty to the soil, and distrust of English Canada influenced the Canadian regionalist school of literature that flourished into the 1930s.

Gaspé Current, outflow from the St. Lawrence River, which moves around the Gaspé Peninsula and along the southern shore of the Gulf of St. Lawrence. It merges with a cold branch of the Labrador (Cabot) Current before flowing through the Cabot Strait and into the North Atlantic Ocean. The current responds to the river's flow, being strong and warm in the summer and cold and weak in the winter.

Gaspé Peninsula, French PÉNINSULE DE LA GASPÉSIE, English GASPESIA, peninsula in Bas-Saint-Laurent-Gaspésie region, eastern Quebec province, Canada, extending east-northeastward for 150 mi (240 km) from the Matapédia River into the Gulf of St. Lawrence. It lies between the St. Lawrence River (north) and Chaleur Bay and New Brunswick (south). The well-forested Monts Chic-Choc (Shickshock Mountains), an extension of the Appalachians, parallel the St. Lawrence in the north central portion and rise to Mt. Jacques Cartier (4,160 ft [1,268 m]). Many rivers drain the peninsula, including the Cascapédia, Saint-Jean, York, Grande, and du Grand Pabos. Chief settlements are along the coast: Matane, Gaspé, Percé, Chandler, and New-Carlisle.

Much of the region is within conservation areas, which include the Gaspesian Provincial Park. A highway encircling the peninsula affords views of the rugged and picturesque coastal and mountain scenery. Forillon, a national park occupying 59,404 ac (20,040 ha), is at the northeastern tip of the peninsula. Both sporting and local interests benefit from the excellent hunting and fishing; the peninsula is drained by several outstanding salmon rivers. Lumbering is also a main economic activity; and there is some mining of copper, lead, and zinc and the production of pulp for papermaking.



Petit Cap, a fishing village on the Gaspé Peninsula coast, Que.
Ed Cooper—Shostal/EB Inc.

Gaspee, Burning of the (June 10, 1772), in U.S. colonial history, act of open civil defiance of British authority when Rhode Islanders boarded and sank the revenue cutter "Gaspee" in Narragansett Bay. Headed by a leading merchant, John Brown, eight boatloads of armed, reputable citizens overpowered the crew of the "Gaspee," which had run aground in pursuit of a smuggling vessel, disabled her commander, and set fire to the ship. Despite concerted British efforts to bring the culprits to justice, the raiding party was never punished.

gaspereau (fish): *see* alewife.

Gasperi, Alcide de: *see* De Gasperi, Alcide.

Gaspesian Provincial Park, French PARC PROVINCIAL DE LA GASPÉSIE, park in Bas-Saint-Laurent–Gaspésie region, eastern Quebec province, Canada, occupying 500 sq mi (1,295 sq km) on the Gaspé Peninsula, near the mouth of the St. Lawrence River. It was established in 1937 to protect the fast-diminishing herds of caribou as well as to preserve the natural beauty of the region, which is heavily wooded with many lakes and streams. Extending from east to west are the Monts Chic-Choc (Shickshock Mountains), with some rare species of Alpine flora; Mt. Jacques Cartier (4,160 ft [1,268 m]) is the highest peak. The park's domain includes Port-Daniel (southeast), the Saint-Jean-Rivière district (east), the Lapetite-Cascapedia-Rivière (south), and the Matane River country (west)—all well known for salmon fishing.

Gasprinski, Ismail, also called ISMAIL GASPIRALI (b. 1851, Avci, near Bakhchisaray, Crimea, Russian Empire—d. Sept. 11, 1914, Bakhchisaray), Turkish journalist and writer who was an advocate of pan-Islāmic unity and whose writings significantly contributed to the growth of cultural identity within the Turkic community of Russia.

An ethnic Turk, Gasprinski was educated at a Moscow military school. In 1871 he travelled to Vienna and then to Paris, where he came in contact with liberal Ottoman refugees. Back in his native Crimea three years later, he was appointed mayor of Bakhchisaray (1878), and in the following year, upon being denied permission to publish a newspaper, he became a correspondent of the Russian-language newspaper *Tavrida,* for which he wrote a series of articles on the cultural problems of the predominantly Turkish Muslims in Russia. Finally (1883) he was permitted to publish his own bilingual Russian and Turkish paper, *Tercümān* ("The Interpreter"), which, as a medium for the transmission of Western ideas and for the promotion of pan-Islāmic and pan-Turkic unity, became the most influential Turkish newspaper of Russia.

Gasprinski devoted all his time to *Tercümān,* on behalf of which he travelled extensively in the Middle East as well as to the various Turkic communities of Russia. He was also an active supporter of what he called the *usul jadid* ("new method") in education, which advocated the phonetic teaching of Arabic and curriculum reforms that included such subjects as mathematics, history, and geography.

Gasquet, Francis (Neil) Aidan (b. Oct. 5, 1846, London—d. April 5, 1929, Rome), English Roman Catholic historian, a cardinal from 1914, and prefect of the Vatican archives from 1917.

Educated at Downside School (Somerset), he entered the Benedictine monastery there and was prior from 1878 to 1885. From 1888 onward he published works on monastic history, including *Henry VIII and the English Monasteries* (1888–89), which has considerable value but is by some regarded as biased and occasionally inaccurate. Other works include *A History of the Church in England* (2 vol; 1897) and *Parish Life in Medieval England* (1909).

Gass, William H(oward) (b. July 30, 1924, Fargo, N.D., U.S.), U.S. writer noted for his experimentation with stylistic devices.

Gass called his fiction works "experimental constructions," and each of his books contains stylistic innovations. His first novel, *Omensetter's Luck* (1966), is about a man whose purity and good fortune are tainted when he is maliciously and falsely connected to a mysterious death. By piecing together various viewpoints, Gass creates levels of insight into character and setting; he does this, however, without the use of quotation marks to distinguish speakers. His novella *Willie Masters' Lonesome Wife* (1968)—a woman's reflections on her life and on language—makes use of typographical and other visual devices. Gass's lush, acrobatic style has been criticized by some as being achieved at the expense of characterization, plot, and such conventions as punctuation.

Gass's other work includes *In the Heart of the Heart of the Country* (1968), short stories; *Fiction and the Figures of Life* (1970), collected critical essays; *On Being Blue* (1976), imaginative interpretations of the colour blue; and *The World Within the Word* (1978), another collection of critical essays. Gass taught philosophy at the College of Wooster (Wooster, Ohio), Purdue University (West Lafayette, Ind.), and Washington University (St. Louis, Mo.).

Gassendi, Pierre, Gassendi also spelled GASSEND (b. Jan. 22, 1592, Champtercier,

Provence, Fr.—d. Oct. 24, 1655, Paris), French scientist, mathematician, and philosopher who revived Epicureanism as a substitute for Aristotelianism, attempting in the process to reconcile mechanistic Atomism with Christian belief in immortality, free will, an infinite God, and creation.

Gassendi received a doctorate in theology at Avignon (*c.* 1614) and was ordained a priest the following year. Persuaded by the mathematician–theologian Marin Mersenne to abandon mathematical and theological pursuits in favour of philosophy, he turned to Epicureanism. In *Syntagma Philosophicum,* published posthumously (1658; "Philosophical Treatise") among his collected works, he followed the Epicurean triple division of philosophy. In part one (logic) he rejected the innate ideas of Descartes and emphasized the inductive method and the senses as primary sources of knowledge; however, as a mathematician, he also accepted deductive reasoning. In part two (physics) he defended a mechanistic explanation of nature and sensation. His proof for a rational and immortal soul derived from man's awareness of moral values, universal ideas, and the power of reflective thought. Gassendi saw in the harmony of nature proof for the existence of God. In part three (ethics) he viewed happiness (peace of soul and absence of bodily pain) as the end of man, only imperfectly attainable in this life.

Gassendi's philosophical writings include several works on the life, pleasures, and ethics of Epicurus and rather lengthy objections (1641) to Descartes's *Meditations.* His *Disquisitio Metaphysica* (1644; "Disquisition on Metaphysics") was a consequence of Descartes's reply to his criticism.

Gassendi was the first to observe a planetary transit, that of Mercury in 1631, predicted by Kepler. His publications on science were considerable, but his greatest influence was through philosophical Atomism.

Gasser, Herbert Spencer (b. July 5, 1888, Platteville, Wis., U.S.—d. May 11, 1963, New York City), American physiologist, corecipient (with Joseph Erlanger) of the Nobel Prize for Physiology or Medicine in 1944 for fundamental discoveries concerning the functions of different kinds of nerve fibres.

At Washington University, St. Louis, Mo. (1916–31), where he was professor of pharmacology, Gasser collaborated with Erlanger in studying the barely detectable electrical impulses carried by isolated mammalian nerve fibres. By 1924 they had succeeded in adapting the oscillograph to physiological research, enabling them to visualize amplified nerve impulses on a fluorescent screen. Using this device, they demonstrated that different nerve fibres exist for the transmission of specific kinds of impulses, such as those of pain, cold, or heat. Their work also made it possible to construct improved recording machines to diagnose brain and nervous disorders and to ascertain the success of treatments for these diseases.

In 1931 Gasser was appointed professor of physiology at Cornell University, Ithaca, N.Y., and four years later he succeeded Simon Flexner as director of the Rockefeller Institute, New York City (1935–53).

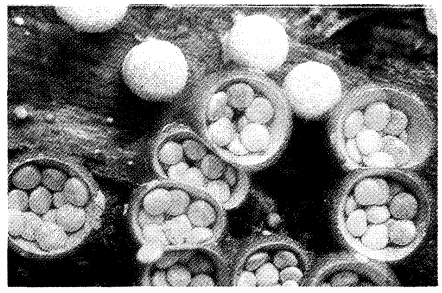
Gastein (Austria): *see* Badgastein.

Gastein, Convention of, also called CONVENTION OF BADGASTEIN, agreement between Austria and Prussia reached on Aug. 14, 1865, after their seizure of the duchies of Schleswig and Holstein from Denmark in 1864; it temporarily postponed the final struggle between them for hegemony over Germany. The pact provided that both the emperor of Austria and the king of Prussia were to be sovereign over the duchies, Prussia administering Schleswig and Austria administering Holstein (which was sandwiched between Schleswig to the north and Prussian territory to the south). Both duchies were to be admitted to the Zollverein (German Customs Union), headed by Prussia, though Austria was not a member.

This joint administration led to disputes between the two powers that ended with Austria's defeat and exclusion from Germany (1866).

Gastein Valley, German GASTEINERTAL, side valley of the Salzach River, in *Bundesland* (federal state) Salzburg, west-central Austria. Lying along the north slope of the Hohe Tauern Mountains and traversed by the Gasteiner River, it is a popular scenic area centred on the resorts of Badgastein (*q.v.*) and Bad Hofgastein.

Gasteromycetes, name often given to a group of fungi of the class Basidiomycetes (division Mycota) consisting of more than 700 species. Their spores, called basidiospores, are borne within a variety of fruiting bodies (basidiocarps) that are often spherical or egg-shaped and resemble mushrooms. Included among the Gasteromycetes are the bird's nest fungi (*Cru-*



Bird's nest fungi (*Crucibulum vulgare*)
Peter Katsaros

cibulum of the order Nidulariales), earthstars (*Geastrum* species of the order Lycoperdales), puffballs (Lycoperdales), and stinkhorns and other phalloids (Phallales). The basidiospores are not forcibly discharged but are freed after the basidiocarp disintegrates.

gasterosteiform, any member of the order Gasterosteiformes, a group of bony, tube-mouthed fishes that contains well-known forms such as the sea horse, pipefish, and stickleback as well as the less familiar snipefish, tubesnout, shrimpfish, and ghost pipefish. Gasterosteiforms are of little economic value to humans except for the popularity of a few species as aquarium fish.

A brief treatment of gasterosteiforms follows. For full treatment, *see* MACROPAEDIA: Fishes.

Gasterosteiforms range in size from 3 cm (about 1 inch) to 200 cm (80 inches). They typically have soft fin rays, a swim bladder unconnected to the gut, pelvic fins located on the abdomen, and a covering of bony, ganoid plates. They are abundant in the waters of the Northern Hemisphere.

Except for snipefishes, gasterosteiforms inhabit areas of dense aquatic plant growth. Their defensive behaviour generally consists of resting vertically among grasses, sea urchins, corals, and similar structures. This posture serves to camouflage the fish and presents its body spines to any predator. Sea horses use their prehensile tails to grasp vegetation and hold themselves in place; they can also use their swim bladder to rise or settle at different depths. Snipefishes can swim backward or forward equally well.

Gastfenger, Polykarpus: *see* Hoffmann, Heinrich.

Gaston III, byname GASTON PHOEBUS, or PHĒBUS (b. 1331—d. August 1391), count of Foix from 1343, who made Foix one of

Gaston III giving orders to men, manuscript illumination from *Livre de la Chasse,* 14th century; in the Bibliothèque Nationale, Paris
By courtesy of the Bibliotheque Nationale, Paris

the most influential and powerful domains in France. A handsome man (hence the surname Phoebus), his court in southern France was famous for its luxury. His passion for hunting led him to write the treatise *Livre de la chasse* ("Book of the Hunt"). It was translated into English by Edward of Norwich, 2nd Duke of York, as the bulk of the first English book on hunting, *The Master of Game.*

In 1345, early in the Hundred Years' War (1337–1453), Gaston fought against the English and in 1347 was named special lieutenant general in southern France. Suspected of conspiring with his brother-in-law Charles II the Bad, king of Navarre, against France, he was imprisoned in 1356. When he was released, he went to fight the pagans in Prussia.

In 1358, after his return to France, he saved some members of the royal family as they were besieged in the marketplace of Meaux during the peasant revolt called the Jacquerie. He was forced to depart immediately to combat the Count d'Armagnac in an old family rivalry over the countship of Bigorre. Having defeated him in 1372, Gaston arranged a truce that was sealed by the marriage of his son to one of the daughters of the Count d'Armagnac.

In 1380 Gaston Phoebus was named lieutenant general of Languedoc by Charles V of France but upon the latter's death that same year he lost the position to the Duke de Berry. Enraged, Gaston defeated the duke in combat and then retired to his mountain estates.

Suspecting his only son (also named Gaston) of plotting to poison him, Gaston had the youth put in prison, where he died.

Gaston DE FRANCE: *see* Orléans, Gaston (-Jean-Baptiste), duc d'.

Gastonia, city, seat (1909) of Gaston county, south-central North Carolina, U.S., in the central Piedmont Plateau. The site was settled in the late 18th century and named for William Gaston, a congressman and judge. After the establishment of its first cotton mill in 1848, Gastonia became one of the nation's largest textile-manufacturing centres. In 1929 the city was the scene of a sensational strike during which the chief of police was killed. The episode and ensuing murder trials inspired several novels, notably, *Strike!* (1930) by Mary Heaton Vorse and *To Make My Bread* (1932) by Grace Lumpkin. Gaston College at nearby Dallas was founded in 1963, and Belmont Abbey Cathedral and College (1878) is 8 miles (13 km) east. Kings Mountain National Military Park, site of an American Revolutionary War battle, is 20 miles (32 km) southwest. Inc. city, 1877. Pop. (1986 est.) city, 49,656; Charlotte–Gastonia–Rock Hill metropolitan area (MSA), 1,065,400.

gastrectomy, surgical removal of all or part of the stomach, a procedure that is used to treat peptic ulcers. The operation eliminates the gastric-acid-secreting parietal cells in the

stomach lining and halts the production of the acid-stimulating hormone gastrin, thus removing the cause of the ulcer. Once a common method of treatment for patients with painful ulcers, gastrectomy is now used only as a last resort if the appropriate drugs have failed or if an ulcer is perforated or hemorrhaging.

The most common procedure is antrectomy, which removes the lower half of the stomach (antrum), the chief site of gastrin secretion. The remaining stomach is then reconnnected to the first section of the small intestine (duodenum). In a more extensive procedure, subtotal gastrectomy, as much as three-quarters of the stomach is removed, including all of the antrum. The remaining stomach may then be reattached directly to the duodenum or to the jejunum, a more distal part of the intestine beyond the usual site of ulceration.

The incidence of ulcer recurrence after gastrectomy is very low (about 2 percent) when the antrum is completely removed. The most significant drawback to gastrectomy is general malnutrition, caused by decreased appetite and by the stomach's decreased ability to digest food.

gastric gland, any of the simple branched tubules in the inner lining of the stomach that secrete gastric juice and protective mucus.

The gastric glands are of three types, distinguished from one another by location and type of secretion. The cardiac gastric glands are located at the very beginning of the stomach; the intermediate, or true, gastric glands in the central stomach areas; and the pyloric glands in the terminal stomach portion. Both the cardiac and pyloric glands secrete mucus, which coats the stomach and protects it from self-digestion by helping to dilute acids and enzymes.

The intermediate gastric glands produce most of the digestive substances secreted by the stomach. These glands are narrow tubules composed of three major cell types: zymogenic, parietal, and mucous neck cells. At the base of the gland are the zymogenic (chief) cells, which are thought to produce the enzymes pepsin and rennin (pepsin digests proteins and rennin curdles milk). Parietal, or oxyntic, cells occur throughout the length of the gland and are responsible for the production of hydrochloric acid, which is necessary to activate the other enzymes. The mucous neck cell's sole purpose is to secrete mucus.

There is usually a small, constant production of gastric juices, but their secretion can be stimulated by numerous means. Tasting, smelling, or thinking of food tends to increase enzyme secretions. Their production is limited while a person is asleep, but production resumes upon awakening. Consumed food provides the tactile stimulation necessary for mucus secretion. Some foods also contain chemicals that activate enzyme production. Psychological states of fear, sadness, or withdrawal tend to reduce gastric secretion, while excitement and aggressiveness increase it.

Gästrikland, *landskap* (province), eastern Sweden. It lies along the Gulf of Bothnia, in the administrative *län* (county) of Gävleborg. With a land area of 1,614 square miles (4,181 square km), it is one of the smaller traditional provinces of Sweden. Bounded on the south by the province of Uppland, on the north by that of Hälsingland, and on the west by that of Dalarna, it is transitional in character between central Sweden and the region of Norrland. Inland from its rocky coast, which has many fine beaches, there are numerous lakes and wooded hills. Because of the province's extensive forests, leading industries include lumbering, sawmilling, and the manufacture of wood pulp and paper. Ironworks are also prevalent, having flourished since the Middle Ages; this is especially true of the area around Sandviken, which is famous for its saws. Gävle is the major town. Pop. (1987 est.) 145,654.

gastrin, any of a group of digestive hormones secreted by the wall of the pyloric end of the stomach (the area where the stomach joins the small intestine) of mammals. Gastrin is a polypeptide. Released into the bloodstream when food enters the stomach, gastrin is carried by the circulatory system to the gastric cells in the stomach wall, where it triggers the secretion of gastric juice. This juice consists primarily of hydrochloric acid, which helps break apart fibrous matter in food and kills bacteria that may have been ingested, and pepsinogen, which is a precursor of the protein-splitting enzyme pepsin. Gastrin also increases the motility of the stomach, thereby helping to churn the food and eventually to empty the stomach; to a lesser degree, gastrin also increases the motility of the upper small intestine and the gallbladder.

gastritis, acute or chronic inflammation of the mucosal layers of the stomach. Acute gastritis may be caused by dietary indiscretions, excessive intake of alcohol, the ingestion of irritating drugs, food poisoning, and infectious diseases. The chief symptoms are severe upper-abdominal pain, nausea, vomiting, loss of appetite, thirst, and diarrhea; the illness develops suddenly and subsides rapidly. The only treatment necessary is temporary avoidance of food, followed by a nonirritating diet, sedatives, and antispasmodics; rarely, fluids by intravenous injection may be required. The ingestion of corrosives (acids, alkalies) causes a severe chemical gastritis, necessitating immediate emptying and thorough washing of the stomach and then general supportive care.

The cause of chronic gastritis and the conditions contributing to its development are not established; specific irritants as well as nutritional deficiencies and emotional disturbances have been implicated. The symptoms are indefinite and often resemble the manifestations of functional digestive disorders. The symptoms may include discomfort, fullness or pain in the upper abdomen, poor appetite, flatulence, belching, and variable bowel habits. There is no specific treatment for chronic gastritis; nor, indeed, is therapy usually necessary. Reassurance as to the absence of serious illness, a bland diet, and tranquilizers to relieve nervous tension are helpful. Vitamins and other nutritional supplements are indicated when the food intake has been poor.

gastrocnemius muscle, also called LEG TRICEPS, large posterior muscle of the calf of the leg. It originates at the back of the femur (thighbone) and patella (kneecap) and, joining the soleus (another muscle of the calf), is attached to the Achilles tendon at the heel. Action of the gastrocnemius pulls the heel up and thus extends the foot downward; the muscle provides the propelling force in running and jumping.

gastroenteritis, acute infectious syndrome of the stomach lining and the intestines. It is characterized by diarrhea, vomiting, and abdominal cramps. Other symptoms can include nausea, fever, and chills. The severity of gastroenteritis varies from a sudden but transient attack of diarrhea to a life-threatening disease with severe dehydration.

Numerous viruses, bacteria, and parasites can cause gastroenteritis, and the specific cause of the disease can be identified in only about two-thirds of cases. Microorganisms produce gastroenteritis by secreting toxins that stimulate excessive water and electrolyte loss, causing watery diarrhea; or by directly invading the walls of the gut, triggering an inflammatory response that destroys the balance between the digestive system's absorption of nutrients and the secretion of wastes.

Among the forms of gastroenteritis besides the aforementioned are classic food poisoning, cholera, and traveler's diarrhea, which develops within a few days after traveling to a country or region that has unsanitary water or food. Traveler's diarrhea is caused by exposure to enterotoxin-producing strains of the common intestinal bacterium *Escherichia coli*.

The treatment of gastroenteritis depends on the cause and the severity of symptoms and may include antibiotics or simply supportive care. Adults tend to have milder cases of the illness than do children and the very old, who run the risk of dehydration due to diarrhea and vomiting.

gastroenterology, medical specialty concerned with the digestive system and its diseases. The first scientific studies of the digestive system were performed by Jan Baptist van Helmont in the 17th century. In 1833 the publication of William Beaumont's observations threw new light on the nature of gastric juice and the digestive process in general.

A major advance in treatment in the 19th century was the use of gastric lavage (washing out of the stomach) to treat stomach poisoning; this became a standard treatment for all forms of gastric irritation, and the long tube used to introduce the lavage fluid was also adapted to view the stomach for diagnostic use. The first truly useful instrument for viewing the stomach, a tube that could be inserted down the esophagus and upon which a light was mounted to illuminate the area visualized, was invented in about 1889; this rigid instrument was soon replaced by the flexible gastroscope, developed by Rudolph Schindler in 1932. In the 1890s Walter Cannon used X rays to visualize the stomach and digestive organs, and he also used bismuth salts to coat the gastrointestinal lining and thus make digestive movements visible by fluoroscopy.

Major diagnostic advances in the 20th century included the development by Bertram W. Sippy of a dietary schedule for healing peptic ulcers, and surgical vagotomy, in which the vagus nerve is severed to eliminate stomach-acid secretion, an operation first performed by Lester Dragstedt in 1943.

Modern-day gastroenterologists diagnose and treat the diseases and disorders of the stomach, intestines, liver, and pancreas. Among the most common disorders they must deal with are gastric and duodenal ulcers, malignant tumours, inflammatory bowel diseases, and rectal disorders. In the past decades, highly effective drug treatments that have been developed minimize the need for surgery for patients with ulcers.

gastrointestinal tract, that portion of the digestive system which includes the stomach, the small intestine, and the large intestine (*qq.v.*). *See also* digestion.

gastronomy, the art of selecting, preparing, serving, and enjoying fine food.

A brief treatment of gastronomy follows. For full treatment, *see* MACROPAEDIA: Gastronomy.

Prehistoric man took a major step toward the development of gastronomy with the use of fire to cook his food. Two early centres of gastronomy were Rome and China. Although the Romans were noted for the vulgarity and ostentation of their banquets, their cuisine seems to have been one of memorable sophistication. In the Orient, references are made to a fully developed gastronomy as early as the 5th century BC. Through trade, war, and cultural assimilation, this gastronomy spread to Japan, Korea, and much of Southeast Asia.

The foundations of Western gastronomy were laid during the Renaissance. The marriage of Catherine de Médicis to the future King Henry II of France occasioned an influx of sophisticated Italian culinary principles to France. Refined further during the peri-

ods of the kings Louis XIV, XV, and XVI, the French Grande Cuisine reached its apex in the works and writings of Marie-Antoine Carême, the first major codifier of French cuisine; Georges-Auguste Escoffier, who worked to simplify and refine a sometimes florid culinary style; and Prosper Montagné, who created *Larousse Gastronomique* (1938), the basic encyclopaedia of French gastronomy.

In France and China, countries long noted for their use of a variety of foods, beef, lamb, pork, fowl of all varieties, fish and shellfish, herbs, roots, legumes, cereals, and more are staples. In the Pacific, coconut and taro form the basis of many dishes, and in Africa, peanuts (groundnuts) are widely used. Yogurt, eggplant, olives, and lamb are basic to the Middle Eastern diet. In the cooking of India and Indonesia, spices are a distinctive feature. Corn (maize) is central to the cuisine of much of Latin America. In Italy, together with pastas of all shapes and sizes, rice and polenta serve as staples in many regions. Salmon and herring are two of the more popular varieties of fish featured in the northern countries of Europe. In Japan, also, fish is widely used, as are vegetables of all types. In Germany, game and particularly sausages abound, with varieties ranging from the simple *Weisswurst* to elaborate preparations involving venison, boar, and wild fowl.

Regardless of regional differences or interpretations, the primary consideration in the selection of ingredients is freshness. Refrigeration and transport by air have increased the variety of fresh foods available in many parts of the world. Although modern food-processing technologies (canning, freeze-drying, etc.) have made possible the use of ingredients not regionally or seasonally available, these foods are generally regarded as substitutes for fresh ingredients. The care given to the processing and cooking of the chosen ingredients is an extension of the care taken in their selection. Involved here are techniques, recipes, and menus that are frequently learned only through much practice and experience. The paper-thin slicing of raw fish for Japanese sushi and sashimi and the carving of floral-shaped garnitures for the German *Sulzkoteletten* (pork chops in aspic) are techniques that may take years to perfect. Similarly, the organization and preparation of a menu for a state banquet will frequently require the attention of a staff of highly trained professionals.

The art of gastronomy is not limited, however, to intricate methods of preparation and cooking. Many of its expressions are well within the capabilities and budgets of many households. The paella (a rice dish served with clams, mussels, chicken, sausages, shrimp, and saffron), for which Spain is noted, and the Indonesian rijsttafel (a platter of seasoned rice surrounded by smaller dishes of various meats and condiments) are complicated but can nonetheless be prepared at home.

There are other considerations involved in the preparation of food: complementarity or opposition of taste, as in the sweet and pungent dishes of the Orient; textures, as in the crispness of the pickle and onion accompanying smoked fish on a Danish *smorrebrod* (open-faced sandwich); colour harmony and accent, as in the white and green Italian pasta. The sense of accomplishment in melding disparate elements together into an appealing whole, the sensual enjoyment of tastes, the appreciation of harmonies and balances, and the recognition and appreciation of subtleties and nuances all enhance the pleasures of the table.

gastropod, any member of the class Gastropoda, the largest group of the phylum Mollusca, consisting of about 60,000 species.

A brief treatment of gastropods follows. For full treatment, *see* MACROPAEDIA: Mollusks.

Gastropods are distributed worldwide, occurring in most marine, freshwater, and terrestrial environments. A typical gastropod, such as a sea snail, has a large foot with a flat sole for crawling, a single coiled shell that covers the viscera, and a head bearing a pair of eyes and tentacles. During development, the viscera, in many species rotate 180° relative to the head and foot (in a process called torsion) so that the gills and anus lie above the head. Gastropods are so diverse that there are many exceptions to these group characteristics. Sea slugs and garden slugs, for example, lack shells, while the species of one genus of snails have shells consisting of two halves like that of a bivalve (*q.v.*).

Most gastropods feed by using a radula, a ribbon of small horny teeth that tear the food into pieces that are then collected by the lips. In many marine snails, the mouth and radula are situated at the end of an extensible proboscis (*i.e.,* a tubular sucking organ). Gastropods may be herbivorous or carnivorous, predatory or parasitic, or they may feed on plankton and deposits of detritus filtered from the water.

Gastropods are commonly divided into three major groups: prosobranchs, opisthobranchs, and pulmonates. The prosobranchs include most shelled marine snails as well as some terrestrial forms; they characteristically have gills in the cavity of the body wall (mantle) and a lidlike structure (operculum) attached to the foot for closing the opening of the shell. The opisthobranchs, which include seahares, nudibranchs (seaslugs), and bubble shells, either lack a shell or have a reduced shell that is partly embedded in the body. The pulmonates, consisting of most land and freshwater snails and slugs, have no gills and use the mantle cavity as a lung. For further information on members of the gastropod group, *see* opisthobranch; prosobranch; pulmonate.

gastrotrich, any of about 1,800 species of the class Gastrotricha, a group of microscopic aquatic invertebrates belonging to the phylum Aschelminthes. They occur in salt water and fresh water and also on sandy seashores.

The body of a gastrotich, which ranges in size from 0.1 to 1.5 millimetres (0.004 to 0.06 inch), is covered by a cuticle that is often scaly and spiny. The head is swollen and lobelike. Adhesive tubules are used for anchorage. Cilia—especially on the head and on the ventral, or bottom, surface—are used for locomotion.

Bacteria, organic debris, and certain protozoans (diatoms) are ingested by a sucking muscular pharynx, which leads to the intestine. Many species are hermaphroditic (*i.e.,* reproductive organs of both sexes occur in the same individual). One group, Chaetonotoidae, has only parthenogenetic females (*i.e.,* they produce unfertilized eggs that, in turn, produce females). Two types of eggs are known for freshwater gastrotrichs: tachyblastic eggs, which develop immediately, and opsiblastic eggs, which remain inactive for long periods and can survive dry and freezing conditions.

gastrula, early multicellular embryo, composed of two or more germinal layers of cells from which the various organs later derive. The gastrula develops from the hollow, single-layered ball of cells called a blastula which itself is the product of the repeated cell division, or cleavage, of a fertilized egg. This cleavage is followed by a period of development in which the most significant events are movements of cells relative to one another.

An adult, multicellular animal typically possesses a concentric arrangement of tissues of the body. These adult tissues are derived from three embryonic cell layers called germinal layers; the outer layer is the ectoderm, the middle layer is the mesoderm, and the innermost layer is the endoderm. Gastrulation involves the drastic reshuffling of the blastula's cells into these three germinal layers, which in turn become the various organ systems of the animal's body.

Gastrulation consists of the inward movement, or invagination, of the cells of one side of the blastula until they are juxtaposed to the opposite side; thus the spherical embryo is converted into a double-walled cup, or gastrula. The involuted part of the blastula, lining the inside of the double-walled cup, gives rise to the endoderm and the mesoderm, and the cells remaining on the exterior of the cup become the ectoderm. From this ectoderm, or outside layer, will be derived the outer part of the animal's integument (the skin covering) and its nervous system and sense organs.

The inward movement of one side of the blastula's cells has contracted or eliminated the blastocoel, which was the cavity of the blastula, but a new cavity is formed in the hollow of the cup. This primitive gut cavity is the endoderm and forms the rudiment of the animal's future gut and many of its associated digestive organs and glands. Before either ectoderm or endoderm begins to differentiate into their future structures, however, a third layer of cells lying between them becomes apparent. This third layer is the mesoderm, from which will later be derived the bulk of the animal's musculature and, in most cases, its excretory system and reproductive system.

The diversification of cells in the embryo progresses rapidly during and after gastrulation. The visible effect is that the germinal layers become further subdivided into aggregations of cells that assume the rudimentary form of various organs and organ systems of the embryo. Thus the period of gastrulation is followed by the period of organ formation, or organogenesis.

Gat (Libya): *see* Ghāt.

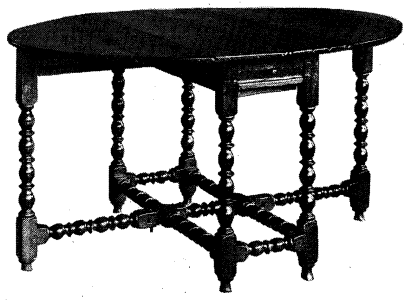
Gatchina, formerly (until 1929) KHOTCHINO, or (1929–44) KRASNOGVARDEYSK, city, Leningrad *oblast* (administrative region), northwestern Russian Soviet Federated Socialist Republic, lying 15 mi (24 km) southwest of Leningrad. The first mention of Khotchino dates from 1499, when it was a possession of Novgorod. Later it belonged to Livonia and Sweden. After 1721 it was returned to Russia and in the 1720s belonged to the sister of Peter I the Great, Natalia. The town grew only after the building, between 1766 and 1772, of a summer palace there for Catherine II's favourite, Count Orlov. The palace was designed by the Italian architect Antonio Rinaldi; it had about 600 rooms, a theatre, and many works of art, and was also surrounded by a fine park. Upon Orlov's disgrace the palace passed to Catherine's son, Paul I, who transformed it into a combination of palace, fortress, and barracks. Although badly damaged during World War II, the palace was restored and is now a museum. The modern city is a railway junction, with machine building, metalworking, and light industries. Pop. (1984 est.) 78,000.

gate, in hydraulic engineering, movable barrier for controlling the passage of fluid through a channel or sluice. River and canal locks have a pair of gates at each end. When closed, the gates meet at an obtuse angle that points upstream in order to resist the water pressure. When opened, they swing into recesses in the walls of the lock. Gates also regulate the outflow of water from storage reservoirs and through, around, or over dams. Leaf gates, planes perpendicular to the direction of fluid flow, open either by swinging about one hinged side or by sliding upward. Radial gates are segments of cylinders that lift entirely clear of the water. The rolling gate, often used on the crest of a dam, is raised by rolling it up the inclined face of a pier.

Gate Theatre, Dublin dramatic company, founded in 1928 by Hilton Edwards and Micheál MacLiammóir, whose repertoire included works from many periods and countries, unlike that of the established Abbey Theatre. From 1928 to 1930 the Gate Theatre made its home at the Peacock, then moved to its own building. The Abbey and the Irish National Theatre Society had provided a stage for national playwrights who concentrated on realism and everyday Irish life, seeking isolation from the European theatre. The Gate, on the other hand, sought to foster the development of writers with new subjects and styles, and its performances resembled those in other parts of Europe.

Edwards and MacLiammóir expanded on the National Theatre Society's work, producing classics and continental plays that attracted such actors as James Mason and Orson Welles. Their repertoire embraced a wide range of writers, from Shakespeare, Ibsen, Strindberg, and Shaw to Denis Johnston, An Philibin, Mary Manning, and David Sears. Longford Productions, a company with comparable goals, shared the theatre from 1936 to 1961. Beginning in 1969, the Gate received a government subsidy that allowed it to renovate the theatre and continue producing its eclectic repertoire.

gateleg table, type of table first used in England in the 16th century. The top had a fixed section and one or two hinged sections, which, when not in use, folded back onto the fixed section or were allowed to hang vertically. The hinged section, or flap, was supported on



Gateleg table of turned oak, English, *c.* 1660
By courtesy of *Country Life*, London

pivoted legs joined at the top and bottom by stretchers and so constituting a gate. Large flaps had two supports, which had the advantage of providing freer leg space in the centre.

A variant introduced in the third quarter of the 18th century is the spider-leg table, in which the turned legs are exceptionally slender. In the 18th century, gateleg tables were popular in the American Colonies, where local variations were introduced.

Gates, Frederick T(aylor) (b. July 2, 1853, Maine, N.Y., U.S.—d. Feb. 6, 1929, Phoenix, Ariz.), American philanthropist and businessman, a major figure in the Rockefeller interests, who spearheaded the endowment drive that created the University of Chicago.

During his college days at the University of Rochester, Gates worked as a bank clerk. His undergraduate studies were followed by three years at the Rochester Theological Seminary and his ordination as a Baptist minister. After eight years as a clergyman, Gates resigned to help raise $50,000 for the Pillsbury Academy. For this work, he was made corresponding secretary of the American Baptist Education Society and focused his efforts on establishing religious schools throughout the United States. Recognizing a need for a major Baptist university in the Midwest, Gates began a publicity and fund-raising campaign that won the approval of John D. Rockefeller, Sr. In 1889 Rockefeller made an initial gift of $600,000, and the University of Chicago opened its doors in 1892.

Gates then went to work for Rockefeller and was entrusted with directing the oilman's vast philanthropic contributions. He also served as an astute business and financial adviser to many of Rockefeller's businesses, including railroads, mines, and manufacturing plants. Gates was the organizer and director of the Lake Superior Consolidated Iron Mine until it was sold to United States Steel in 1900 for $75,000,000. He organized and served as president of the Rockefeller Institute for Medical Research and the General Educational Board, which promoted education free of discrimination on the basis of sex, race, or religion. He also played an important role in the creation of the Rockefeller Foundation.

Gates, Horatio (b. *c.* 1728, Maldon, Essex, Eng.—d. April 10, 1806, New York City), English-born American general in the U.S. War

Horatio Gates, detail of an engraving
By courtesy of the Library of Congress, Washington, D.C.

of Independence (1775–83) whose signal victory over the British at the Battle of Saratoga (fall 1777) turned the tide of victory in behalf of the Revolutionaries.

Gates first served in North America in the French and Indian War (1754–63), emerged as a major, and returned to England. In 1772 he immigrated to the region that is now West Virginia. Sympathizing with colonial complaints against the crown, in 1775 he was made adjutant general of the Continental Army, and in 1777 he superseded Gen. Philip Schuyler in northern New York. In the two battles of Saratoga his army forced Gen. John Burgoyne to surrender, partly, however, because of the previous maneuvers of Schuyler and the initiative of Gen. Benedict Arnold. Congress next elected Gates president of the Board of War. At the same time a group of army officers, among them Gen. Thomas Conway, became involved in a plan to replace Gen. George Washington with Gates. The "Conway Cabal" soon collapsed, and in the spring of 1778 Gates returned to his command in New York. Transferred to the south (June 1780), Gates was disastrously defeated by Lord Cornwallis at Camden, S.C., on August 16. An official inquiry into his conduct was ordered but charges were never pressed. After the war Gates freed his slaves, moved to New York, and served one term in the state legislature.

Gates, John Warne (b. May 8, 1855, Turner Junction, Ill., U.S.—d. Aug. 9, 1911, Paris), American financier and steel magnate who leveraged an $8,000 investment in a barbed-wire plant into the $90,000,000 American Steel & Wire Co.

Dissatisfied with his partnership in a country hardware store at the age of 19 and impressed with the possibilities of a new product known as barbed wire, Gates became a traveling barbed-wire salesman. To convince the doubting Texas cattlemen of the value of his fencing wire, Gates dramatically challenged the ranchers to test his product by enclosing their wild range steers in a barbed-wire corral in the middle of San Antonio. The stunt was a success, and he immediately sold hundreds of miles of wire. With $8,000, he and a partner launched their own wire plant. Gates bought out his partner in 1880 and began the Southern Wire Co. In 1882 he merged with his major competitor, creating the Braddock Wire Co., which quickly acquired many of its smaller rival firms.

Gates formed the American Steel & Wire Co. of Illinois in 1897 with a capital of $24,000,000 and then the American Steel & Wire Co. of New Jersey with a capital of $90,000,000. With a virtual monopoly on barbed wire, Gates used his huge fortune to acquire interests in other industries. His bold investment approach to the stock market earned him the nickname of "Bet-A-Million" Gates. His investments also included iron, steel, railroads, and extensive real estate holdings in Texas. He virtually owned the city of Port Arthur, Texas, which he helped transform from a frontier watering hole to a major Gulf port city.

Gates of Paradise, Italian PORTA DEL PARADISO, the pair of gilded bronze doors (1425–52) designed by the sculptor Lorenzo Ghiberti for the east entrance of the Baptistery of San Giovanni in Florence. Each wing of the Gates of Paradise contains five rectangular reliefs of scenes from the Old Testament between figurated borders containing statuettes in niches and medallions with busts. The entire surface of the door is gilt. The classically modeled figures within the reliefs are placed in landscapes or in perspectivally rendered architecture to suggest a greater depth to the reliefs than actually exists. The ten relief panels are among the greatest works of Early Renaissance sculpture. They dramatically demonstrate the mastery of linear perspective and the classical idiom achieved in Florence by the early 15th century.

Gates of the Arctic National Park and Preserve, formerly GATES OF THE ARCTIC NATIONAL MONUMENT, national park and preserve in northern Alaska, U.S., lying entirely north of the Arctic Circle. Proclaimed a national monument in 1978, the area underwent boundary changes in 1980 and the name was altered in 1981. It includes a portion of the Central Brooks Range, the northernmost extension of the Rocky Mountains, characterized by jagged peaks, gentle Arctic valleys, wild rivers, and many lakes. The southern slopes are forested, contrasting with the barren northern reaches at the edge of Alaska's North Slope. Wildlife includes caribou, grizzly bears, Dall sheep, moose, wolves, and raptorial birds. The total area (including the preserve) is 8,440,000 ac (3,416,000 ha).

Gateshead, district (borough), metropolitan county of Tyne and Wear, England, covering an area of 55 sq mi (142 sq km). The small settlement grew up at the southern end of a medieval bridge, opposite the fortress (later city) of Newcastle upon Tyne, and was under the jurisdiction of the bishop of Durham. Gateshead has iron, steel, engineering, and food industries. The Team Valley Trading Estate, accommodating small-scale light industries, was developed after 1936 on a 700-ac (270-ha) site. The district has an art gallery, a museum, and a large technical college. Pop. (1981) town, 91,893; (1984 est.) district, 209,600.

Gath, one of the five royal cities of the Philistines, the exact location of which in modern Israel has not been determined. The name occurs several times in the Old Testament, especially in connection with the history of David. Goliath, the Philistine champion, came from Gath.

The records of Sargon II of Assyria show that he took it in 712 BC. Gath was evidently a place of importance, a walled city (II Chron. 26:6), but its exact location has

been lost since the time of Sennacherib (7th century BC). The *Onomasticon* of Eusebius fixes the site near the Roman road five miles from Eleutheropolis (Bet Guvrin) on the way to Diospolis (Lod). The excavations seeking it in this and other areas, however, have proved disappointing, and all identifications of Gath are, to date, highly questionable.

Gāthā, oldest form in Zoroastrian scripture. *See* Avesta.

gathering society: *see* hunting and gathering society.

Gathorne-Hardy, Gathorne: *see* Cranbrook, Gathorne Gathorne-Hardy, 1st earl of.

Gatineau River, French RIVIÈRE GATINEAU, river in Outaouais region, southwestern Quebec province, Canada. The river rises in a chain of lakes north of Baskatong Reservoir and flows generally southward for 240 mi (390 km) to join the Ottawa River at Hull. It was named for Nicholas Gatineau, a fur trader who is reputed to have drowned there about 1683. Having served for centuries as a major artery for the lumber trade, the Gatineau has also become an important source of hydroelectric power in the 20th century.

Gatlinburg, city, Sevier County, eastern Tennessee, U.S., 30 mi (48 km) southeast of Knoxville, at the western entrance to the Great Smoky Mountains National Park. It was established in about 1830 on Little Pigeon River by English and Scots-Irish settlers. Originally called White Oak Flats, it was renamed in 1860 for Radford Gatlin, who opened a store there in 1855. In a Civil War skirmish (1863) near Gatlinburg, Federal forces routed a Confederate force of white men and Cherokee Indians, marking what was said to be the last engagement east of the Mississippi River in which Indians participated. Gatlinburg developed as a resort and convention centre for the Smokies region, with skiing facilities and scenic sky-lift rides. The park headquarters is nearby. The city is noted for its mountain handicraft shops. Points of interest include the Homespun Valley Mountaineer Village and the Christus Gardens, a series of dioramas depicting the life of Christ. Inc. 1945. Pop. (1982 est.) 3,308.

Gatling, Richard Jordan (b. Sept. 12, 1818, Maney's Neck, N.C., U.S.—d. Feb. 26, 1903, New York City), American inventor best known for his invention of the Gatling gun (*q.v.*), a crank-operated, multibarrel machine gun, which he patented in 1862.

Gatling's career as an inventor began when he assisted his father in the construction and perfecting of machines for sowing cotton seeds and for thinning cotton plants. In 1839 he perfected a practical screw propeller for steamboats, only to find that a patent had been granted to John Ericsson for a similar invention a few months earlier. He established himself in St. Louis, Mo., in 1844, and, taking the cotton-sowing machine as a basis, he adapted it for sowing rice, wheat, and other grains. The introduction of these machines did much to revolutionize the agricultural system in the country.

Becoming interested in the study of medicine during an attack of smallpox, Gatling completed a course at the Ohio Medical college in 1850. In the same year, he invented a hemp-breaking machine, and in 1857 a steam plow. At the outbreak of the Civil War he devoted himself at once to the perfecting of firearms. In 1861 he conceived the idea of the rapid-fire machine gun that is associated with his name. By 1862 he had succeeded in perfecting the weapon; but the war was practically over before the federal authorities consented to its official adoption.

Gatling gun, hand-driven machine gun, the first to solve the problems of loading, reliability, and the firing of sustained bursts. It was invented by Richard J. Gatling (1818–1903) during the American Civil War (about 1862). After early experiments with a single barrel using paper cartridges (which had to have a separate percussion cap), he saw in the newly invented brass cartridge (which had its own percussion cap) an opportunity to fashion a truly rapid-fire weapon. Gatling contrived a cluster of 10 barrels, each of which, when rotated by a crank, was loaded and fired once during a complete rotation. The barrels were loaded by gravity and the camming action of the cartridge container, located directly above the gun. Each barrel was loaded and fired during a half-rotation around the central shaft, and the spent cases were ejected during the second half-rotation.

Without equal in the era of hand-operated machine guns, the Gatling gun could fire 3,000 rounds per minute if externally powered. It and all other hand-operated machine guns were made obsolete by the development of recoil- and gas-operated guns that followed the invention of smokeless gunpowder. *See also* machine gun.

Gatooma (Zimbabwe): *see* Kadoma.

GATT: *see* General Agreement on Tariffs and Trade.

Gattamelata, also called EQUESTRIAN MONUMENT OF ERASMO DA NARNI, bronze statue of the Venetian *condottiere* Erasmo da Narni, (popularly known as Gattamelata, meaning "honeyed cat") by the 15th-century Italian Early Renaissance sculptor Donatello. Completed between 1447 and 1450 but not installed on its pedestal in the Piazza del Santo in front of the church of S. Antonio in Padua until 1453, the statue established a prototype for equestrian monuments in the West.

Gatton, town and shire, southern Queensland, Australia, on Lockyer Creek, about 58 mi (93 km) west of Brisbane. Probably named after Gattonside near Roxburgh in the Borders region, Scotland, it was gazetted as the site for a village in 1855 and, by 1858, was a place of call for travelers between Brisbane and the Darling Downs. It is now the service centre for a mixed-farming district that produces about 70 percent of Queensland's potato crop. Nearby is the Queensland Agricultural College. Pop. (1981) 4,190.

Gatún, Lago, English GATUN LAKE, long artificial lake in Panama, constituting part of the Panama Canal system; its area is 166 sq mi (430 sq km). It was formed by damming the Chagres River and its smaller affluents at Gatun at the north end of the lake. Its dam (completed 1912) and spillway, a key structure of the Panama Canal, operate at a range of 5 ft (1.5 m) between water levels of 87 and 82 ft above sea level. The main function is to hold sufficient water in the Gaillard Cut to the south, a gorge blasted through the Cordillera, for canal passage and for use in the canal's locks during dry spells. In the centre of the lake is Guacha Island, a wildlife sanctuary.

Gaua (Vanuatu): *see* Santa Maria.

Gaucher's disease, rare inherited metabolic disorder characterized by anemia, mental and neurologic impairment, yellowish pigmentation of the skin, and bone deterioration resulting in pathological fractures. In Gaucher's disease, a deficiency of the enzyme glucocerebrosidase causes the lipid glucocerebroside to accumulate in the cells. Large, wrinkled-appearing cells, called Gaucher's cells, are usually found in the bone marrow. The disease is transmitted as an autosomal recessive trait.

There are three forms of Gaucher's disease: infantile, juvenile, and adult. In infantile disease, symptoms including an enlarged liver and spleen, erosion of long bones, and mental retardation appear in the first months of life, and death from respiratory failure usually occurs by the first birthday. The juvenile form is similar but has less effect on the central nervous system and develops more slowly; death usually occurs in early adolescence. The adult variety lacks the mental and neurologic symptoms seen in younger patients, and longevity is only slightly reduceed.

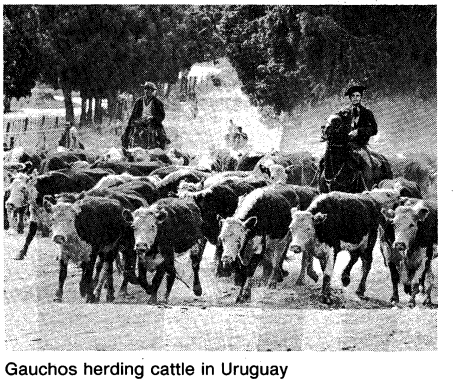
Gauches, Cartel des (French: "Coalition of the Left"), in the French Third Republic (1870–1940), a coalition of left-wing parties in the Chamber of Deputies (lower house of the legislature); it governed France from 1924 to 1926.

The Socialist Party, which usually disdained association with the bourgeois parties of the right, joined an electoral alliance with the Radicals, who had dominated prewar ministries. Together they formed the Cartel in opposition to the Bloc National—the right-wing nationalist group elected at the end of World War I—and defeated it in the elections of May 11, 1924. In the victory they gained more than 300 seats to 200 for the Bloc National and then set up a Cabinet under the Radical leader Édouard Herriot. In an attempt to unify the left, the Radical leaders followed a policy of anticlericalism, trying to enforce secular education in strongly religious Alsace-Lorraine, which had been recently recovered from Germany. In international affairs, a policy of security through negotiation (in contrast to the militant stance of the Bloc National) was pursued by the foreign minister Aristide Briand.

A financial crisis caused by continuing inflation led to the Cartel's downfall. The Socialists, demanding a direct tax to meet government expenses, found themselves in disagreement with the Radicals, who hesitated to move in any direction, especially in support of a proposal so violently opposed by business interests. On April 10, 1925, the Herriot government fell. Succeeding ministries under Paul Painlevé and Briand were able neither to solve the financial problem nor to maintain the fragile unity of the Cartel.

gaucho, the nomadic and colourful horseman and cowhand of the Argentine and Uruguayan Pampas (grasslands), who flourished from the mid-18th to the mid-19th century and has remained a folk hero similiar to the cowboy in western North America.

Gauchos were usually mestizos (persons of mixed European and Indian ancestry) but sometimes were white, black, or mulatto (of mixed black and white ancestry). From their own ballads and legends a literature of the gaucho—*la literatura gauchesca*—grew and became an important part of the Argentine cultural tradition. Beginning late in the 19th century, after the heyday of the gauchos, Argentine writers celebrated them. Examples include José Hernández' epic poem, *El gaucho Martín Fierro* (1872), and Ricardo Güiraldes' novel, *Don Segundo Sombra* (1926).



Gauchos herding cattle in Uruguay
Carl Frank—Photo Researchers

In the mid-18th century, when British, Dutch, French, and Portuguese traders provided a profitable contraband business in hides and tallow in the frontier regions around Buenos Aires, gauchos arose to hunt the large herds of escaped horses and cattle that had roamed freely, bred prodigiously, and remained safe from predators on the extensive Pampas. Gaucho weapons were the lasso, knife, and *boleadoras* (or bolas), a device made of leather cords and three iron balls or stones that was thrown at the legs of an animal to entwine and immobilize it. Gauchos subsisted largely on meat. Their costume, still worn by modern Argentine cowhands, included a chiripa girding the waist, a woolen poncho, and long, accordion-pleated trousers, called bombachas, gathered at the ankles and covering the tops of high leather boots. The gauchos lived in small mud huts, roofed with grass mats, and slept on piles of hides. Their marriages were seldom solemnized, and their religious beliefs consisted mainly of age-old superstitions varnished with Catholicism. Their pastimes included gambling, drinking, playing the guitar, and singing doggerel verses about their prowess in hunting, fighting, and lovemaking.

By the end of the 18th century, private owners had acquired the half-wild livestock on the Pampas and hired the gauchos as skilled animal handlers. By the later 19th century the Pampas had been fenced into huge estancias (estates), and the old pastoral economy had given way to more intensive use of the land, as purebred animals replaced the scrub herds and as alfalfa was grown to feed them. The once free-spirited gaucho thus became a farmhand or peon.

In the early 19th century the gauchos had been the mainstay of the armies of the Río de la Plata region, which first had thrown off the Spanish colonial regime and had then engaged in decades-long internal struggles between rival caudillos (provincial military leaders). An unruly group of horsemen called the *montonera* fought in these wars, usually under the federalist caudillos of the provinces outside of Buenos Aires. The people of the Rio Grande do Sul state in Brazil are called *gaúchos.*

gaucho literature, Spanish-American poetic genre that imitates the *payadas* ("ballads") traditionally sung to guitar accompaniment by the wandering gaucho minstrels of Argentina and Uruguay. By extension, the term includes the body of South American literature that treats the way of life and philosophy of the itinerant gauchos. Long a part of South American folk literature, gaucho lore became the subject of some of the best verse of the 19th-century Romantic period. The gaucho's story found its highest poetic expression in Rafael Obligado's three poems (1887) on the legendary gaucho minstrel Santos Vega. The gaucho was humorously portrayed in the mock epic *Fausto* (1866) by Estanislao del Campo. Later the gaucho aroused the national conscience and received epic treatment in the classic poem *El gaucho Martín Fierro* (1872–79) by José Hernández.

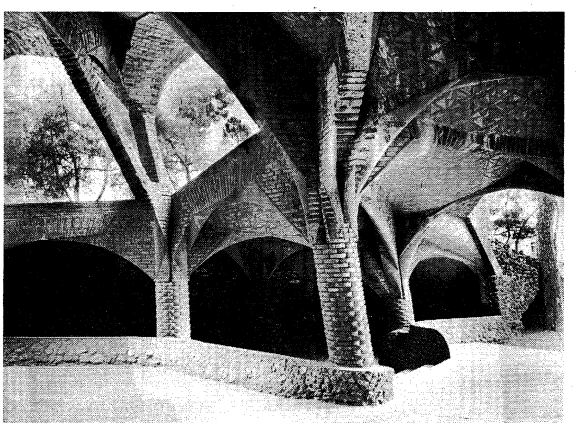
In prose the first serious use of gaucho lore was made by Domingo Faustino Sarmiento in *Facundo* (1845; "Eloquent"), a classic account of the cultural clash between the Pampas and the civilizing forces of the city. This theme of the clash between the old and the new informed a rich literature ranging from the sombre descriptive pages of Uruguay's early outstanding short-story writer Javier de Viana and the keen psychological portrayal of rural types in *El terruño* (1916; "The Native Soil") by Carlos Reyles, also of Uruguay, to the simple humorous narrative of *El inglés de los güesos* (1924; "The Englishman of the Bones") by Argentina's Benito Lynch and the image-studded, evocative prose epic of the gaucho *Don Segundo Sombra* (1926) by the Argentine Ricardo Güiraldes. In *Doña Bárbara* (1929), Rómulo Gallegos, one of South America's masters of plot technique, gave a dramatic and poetic depiction of similar forces at work on the Venezuelan Llanos.

Gauḍa, a city, a country, and a literary style in ancient India. The city is better-known under its Anglicized form, Gaur. Its first recorded reference is by the grammarian Pāṇini (5th century BC), and its location may be inferred to have been in eastern India.

The name Gauḍa, in Sanskrit literature, is commonly applied to a country in what is now eastern India. In this sense it occurs fairly widely in the *Purāṇa*s and other sources. It seems always to have coincided roughly with the modern Murshidābād district of West Bengal. The name is often used in a wider sense for the western parts of Bengal, as opposed to Vaṅga (modern Bangladesh).

From early times the inhabitants of Gauḍa were known as seafarers. In literature, the poetic style Gauḍa or Gauḍī, also known as Prācyā (eastern), is described by Daṇḍin in his work on poetics, *Kāvyādarśa.*

Gaudí (i Cornet), Antoni (Catalan), Spanish ANTONIO GAUDÍ Y CORNET (b. June 25, 1852, Reus, Spain—d. June 10, 1926, Barcelona), Catalan architect whose distinctive style is characterized by freedom of form, voluptuous colour and texture, and organic unity. Gaudí worked almost entirely in or near Barcelona. Much of his career was occupied with the construction of the Expiatory Temple of the Holy Family (Sagrada Familia), which was unfinished at his death.



The Colonia Güell church by Antoni Gaudí, 1898–*c.* 1915; in Santa Coloma de Cervelló, Spain

By courtesy of Archivo Amigos de Gaudi, Barcelona; photograph, Foto Aleu

Life. Gaudí was born in provincial Catalan on the Mediterranean coast of Spain. Of humble origins, he was the son of a coppersmith who was to live with him in later life, together with a niece; Gaudí never married.

Showing an early interest in architecture, he went in 1869/70 to study in Barcelona, then the political and intellectual centre of Catalonia as well as Spain's most modern city. He did not graduate until eight years later, his studies having been interrupted by military service and other intermittent activities.

Gaudí's style of architecture went through several phases. On emergence from the Provincial School of Architecture in Barcelona in 1878, he practiced a rather florid Victorianism that had been evident in his school projects, but he quickly developed a manner of composing by means of unprecedented juxtapositions of geometric masses, the surfaces of which were highly animated with patterned brick or stone, gay ceramic tiles, and floral or reptilian metalwork. The general effect, although not the details, is Moorish—or Mudéjar, as Spain's special mixture of Muslim and Christian design is called. Examples of his Mudéjar style are the Casa Vicens (1878–80) and "El Capricho" (1883–85) and the Güell Estate and Güell Palace of the later 1880s, all but "El Capricho" located in Barcelona. Next, Gaudí experimented with the dynamic possibilities of historic styles: the Gothic (at the Episcopal Palace, Astorga, 1887–93, and Casa de los Botines, León, 1892–94) and the Baroque (Casa Calvet at Barcelona, 1898–1904). But after 1902 his designs elude conventional stylistic nomenclature.

Except for certain overt symbols of nature or religion, Gaudí's buildings became essentially representations of their structure and materials. In his Villa Bell Esguard and the Güell Park, in Barcelona, and in the Colonia Güell church, south of that city, he arrived at a type of structure that has come to be called equilibrated—that is, a structure designed to stand on its own without internal bracing, external buttressing, and the like—or, as Gaudí observed, as a tree stands. Among the primary elements of his system were piers and columns that tilt to transmit diagonal thrusts, and thin-shell, laminated tile vaults that exert very little thrust. Gaudí applied his equilibrated system to two multistoried Barcelona apartment buildings: the Casa Batlló, a renovation that incorporated new equilibrated elements, notably the facade; and the Casa Milá, the several floors of which are structured like clusters of tile lily pads with steel-beam veins. As was so often his practice, he designed the two buildings, in their shapes and surfaces, as metaphors of the mountainous and maritime character of Catalonia.

As an admired, if eccentric, architect, Gaudí was an important participant in the Catalan *Renaixensa,* an artistic revival of the arts and crafts combined with a political revival in the form of fervent anti-Castilian "Catalanism"; both movements sought to reinvigorate the way of life in Catalonia that had long been suppressed by the Castilian-dominated and Madrid-centred government in Spain. The religious symbol of the *Renaixensa* in Barcelona was the church of the Holy Family, a project that was to occupy Gaudí throughout his entire career. He was commissioned to build this church as early as 1883, but he did not live to see it finished. Working on it, he became increasingly pious; after 1910 he abandoned virtually all other work and even secluded himself on its site and resided in its workshop. In his 75th year, while on his way to vespers, he was struck down by a trolley car, and he died from the injuries.

In his drawings and models for the uncompleted church of the Holy Family (only one transept with one of its four towers was finished at his death), he equilibrated the cathedral-Gothic style beyond recognition into a complexly symbolic forest of helicoidal piers,

hyperboloid vaults and sidewalls, and hyperbolic paraboloid roof that boggles the mind and outdoes the bizarre concrete shells built throughout the world in the 1960s by engineers and architects inspired by Gaudí. Apart from this and a similar, often uncritical, admiration for Gaudí by Surrealist and Abstract Expressionist painters and sculptors, Gaudí's influence was quite local, represented mainly by a few devotees of his equilibrated structure. He was ignored during the 1920s and '30s, when the International Style was the dominant architectural mode. By the 1960s, however, he came to be revered by professionals and laymen alike for the boundless and tenacious imagination that he used to attack each design challenge with which he was presented.

Assessment. The architectural work of Gaudí is remarkable for its range of forms, textures, and polychromy and for the free, expressive way in which these elements of his art seem to be composed. The complex geometries of a Gaudí building so coincide with its architectural structure that the whole, including its surface, gives the appearance of being a natural object in complete conformity with nature's laws. Such a sense of total unity also informed the life of Gaudí; his personal and professional lives were one, and his collected comments about the art of building are essentially aphorisms about the art of living. He was totally dedicated to architecture, which for him was a totality of many arts.

(G.R.Co.)

MAJOR WORKS. Most of the major works of Gaudí are in or near Barcelona. Casa Vicens (1878–80); Expiatory Temple of the Holy Family (Sagrada Familia; begun 1882, Gaudí in charge 1883–1926); Villa "El Capricho," Comillas, Santander (1883–85); Güell Estate (*c.* 1884–87); Güell Palace (1885–89); Episcopal Palace, Astorga (1887–93); College of St. Teresa of Jesus (1889–94); Casa de los Botines, León (1892–94); Casa Calvet (1898–1904); Colonia Güell church, Santa Coloma de Cervelló (1898–*c.* 1915); Villa Bell Esguard (1900–02); Güell Park (1900–14); liturgical renovation of the cathedral of Palma, Majorca (1901–14); Casa Batlló (1904–06); Casa Milá (1905–10).

Gaudí's surviving drawings and modern measured drawings of his works are also in Barcelona, mainly at the Higher School of Architecture, the Amigos de Gaudí, and the Holy Family workshop. Small museums of Gaudí's work exist at Güell Park and at the church of the Holy Family in Barcelona.

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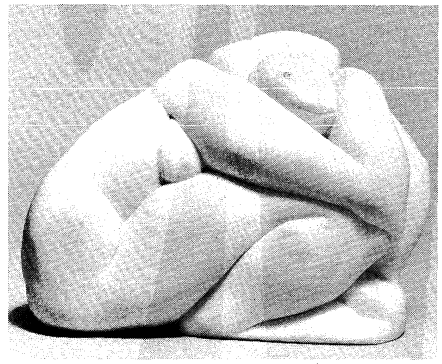
Gaudier-Brzeska, Henri, original name HENRI GAUDIER (b. Oct. 4, 1891, Saint Jean-de-Braye, Fr.—d. June 5, 1915, Neuville-Saint-Vaast), French artist, one of the earliest abstract sculptors and an outstanding exponent of the Vorticist movement; he was instrumental in introducing modern art to England during the early years of the 20th century.



"Crouching Figure," marble by Henri Gaudier-Brzeska, *c.* 1914; in the Walker Art Center, Minneapolis, Minn.

Collection Walker Art Center, Minneapolis, Minn.

Gaudier did not take up sculpture until 1910, after he had completed his artistic training at Orléans. The following year, he met Sophie Brzeska, who remained his devoted companion, and added her last name to his. The next year, he moved to London, where the poet Ezra Pound became his patron and propagandist; the writer and painter Wyndham Lewis drew him into the Vorticist movement just before World War I. The early carvings of Sir Jacob Epstein affected him, but he showed original attitudes toward form and content that reflected a deep understanding of the French avant-garde movement called Cubism, ultimately moving beyond it into pure abstraction.

Gaudier-Brzeska was killed in combat in World War I. The premature death of this magnetic prodigy spawned a legend of unfulfilled genius.

Gaudin, Martin-Michel-Charles, DUC (duke) DE GAËTE (b. Jan. 19, 1756, Saint-Denis, Fr.—d. Nov. 5, 1841, Gennevilliers), French finance minister throughout the French Consulate and the First Empire (1799–1814) and founder of the Bank of France (1800). Although offered the Ministry of Finance by the Directory, Gaudin twice refused, accepting the post only on Nov. 10, 1799, after Napoleon Bonaparte's coup d'état.

Gaudin worked hard to preserve the framework of the old financial institutions while trying to make them more efficient and to adopt some of the innovations introduced by the Revolution. He created a body of permanent officials to assess and levy direct taxes; reimposed certain major indirect taxes in 1804; proposed a fairer distribution of the land tax; and in 1807 helped to introduce the cadastre, a survey of land for taxing purposes (authorized in 1791 but not enforced). For his conscientious efforts, Napoleon made him duke de Gaëte (Gaeta) in 1809.

Later Gaudin served as a moderate deputy for Aisne in the Chambre Introuvable (1815–16) and again in the succeeding Chamber of Deputies (1816–18). He then served as governor of the Bank of France (1820–34). His *Mémoires, souvenirs, opinions et écrits* (1826–34) was published in three volumes. A new edition appeared in 1926.

Gaugamela, Battle of, also called BATTLE OF ARBELA (Oct. 1, 331 BC), clash between the forces of Alexander the Great of Macedonia and Darius III of Persia that decided the fate of the Persian Empire. Attempting to stop Alexander's incursion into the Persian Empire, Darius prepared a battleground on the Plain of Gaugamela, near what is now Mosul, Iraq, and posted his troops to await Alexander's advance.

Greatly outnumbered but well-trained, Alexander's force faced Darius' massive battle line and organized for attack, charging the left of the enemy line with archers, javelin throwers, and cavalry, while defending against Darius' outflanking cavalry with reserve flank guards. The battle broke when Alexander and his personal cavalry penetrated a gap in the Persian line, driving Darius into flight. The Macedonian victory spelled the end of the Persian Empire founded by Cyrus II the Great and left Alexander master of southwest Asia.

gauge, also spelled GAGE, in manufacturing and engineering, a device used to determine, either directly or indirectly, whether a dimension is larger or smaller than another dimension that is used as a reference standard. Some devices termed gauges may actually measure the size of the object to be gauged, but most gauges merely indicate whether the dimensions of the test object are sufficiently close to those of the standard, *i.e.,* whether they are in the range between set limits, known as the tolerance, for a particular object. Gauges may operate mechanically or electrically.

Gauges are usually regarded as either fixed-type or deviation-type instruments. Fixed-type gauges are used to indicate whether a given dimension is larger or smaller than the standard. They may be of hard steel, soft steel, or glass. Sometimes, chrome plating or tungsten-carbide coatings are used to prevent wear.

Plug, ring, snap, and limit gauges are fixed gauges usually made to satisfy special requirements. To check the accuracy of a hole, a cylindrical bar (plug gauge) with highly finished ends of different diameters is used. If the hole size is correct within tolerable limits, the small end (marked "go") will enter the hole, while the large end ("not go") will not. Ring gauges for checking the dimensions of cylindrical parts also utilize the tolerance principle, with "go" and "not go" sections. A snap gauge is formed like the letter C, with outer "go" and inner "not go" jaws, and is used to check diameters, lengths, and thicknesses.

Flush-pin gauges have one moving part and are used to gauge the depth of shoulders or holes. Form gauges are used to check the profile of objects; two of the most common types are radius gauges, which are packs of blades with both concave and convex circular profiles that are used to check the radii of grooves and corners, and screw-thread pitch gauges, which are blades with triangular serrations spaced to correspond with various pitches, or numbers of threads per inch or per centimetre.

Gauge blocks, also known as Johannsson blocks, after their inventor, came into significant industrial use during World War I. They are small steel blocks, usually rectangular, with two exceptionally flat surfaces parallel to each

other and a specified distance apart. They are sold as sets of blocks that can be wrung together in increments of ten-thousandths of an inch to gauge almost any linear dimension. Angle gauge blocks can be put together to measure angles.

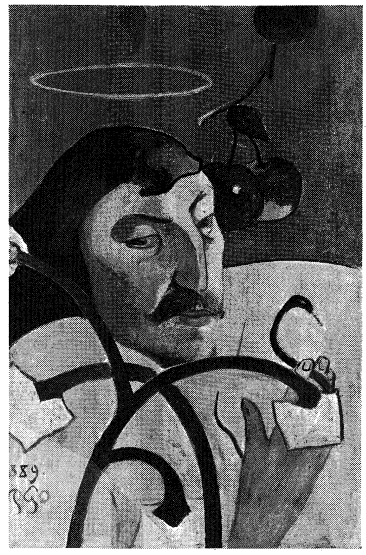
Deviation-type gauges indicate the amount by which the object being gauged deviates from the standard. This deviation is usually shown in units of measurement, but some gauges show only whether the deviation is within a certain range. They include dial indicators, in which movement of a gauging spindle deflects a pointer on a graduated dial; wiggler indicators, which are used by machinists to centre or align work in machine tools; comparators, or visual gauges; and air gauges, which are used to gauge holes of various types. Very precise measurements may also be obtained by the use of light-wave interference, but the instruments that do so are referred to as interferometers.

gauge, a measure of the bore of a shotgun. *See* bore.

gauge theory, class of quantum field theory, a mathematical theory involving both quantum mechanics and Einstein's special theory of relativity that is commonly used to describe subatomic particles and their associated wave fields. In a gauge theory there is a group of transformations of the field variables (gauge transformations) that leaves the basic physics of the quantum field unchanged. This condition, called gauge invariance, gives the theory a certain symmetry, which governs its equations. In short, the structure of the group of gauge transformations in a particular gauge theory entails general restrictions on the way in which the field described by that theory can interact with other fields and elementary particles.

The classical theory of the electromagnetic field, proposed by the British physicist James Clerk Maxwell in 1864, is the prototype of gauge theories, though the concept of gauge transformation was not fully developed until the early 20th century by the German mathematician Hermann Weyl. In Maxwell's theory the basic field variables are the strengths of the electric and magnetic fields, which may be described in terms of auxiliary variables (*e.g.,* the scalar and vector potentials). The gauge transformations in this theory consist of certain alterations in the values of those potentials that do not result in a change of the electric and magnetic fields. This gauge invariance is preserved in the modern theory of electromagnetism called quantum electrodynamics (*q.v.*), or QED. Modern work on gauge theories began with the attempt of the U.S. physicists Chen Ning Yang and Robert L. Mills (1954) to formulate a gauge theory of strong interaction. The group of gauge transformations in this theory dealt with the isospin (*q.v.*) of strongly interacting particles. In the late 1960s Steven Weinberg, Sheldon Glashow, and Abdus Salam developed a gauge theory that treats electromagnetic and weak interactions in a unified manner. This theory, commonly called the Weinberg–Salam theory, has had notable success and is now widely accepted. During the mid-1970s much work was done toward developing quantum chromodynamics (QCD), a gauge theory of the interactions between quarks (*see* quark). For various theoretical reasons, the concept of gauge invariance seems fundamental, and many physicists believe that the final unification of the fundamental interactions (*i.e.,* gravitational, electromagnetic, strong, and weak) will be achieved by a gauge theory. *See also* quantum field theory.

Gauguin, (Eugène-Henri-)Paul (b. June 7, 1848, Paris—d. May 8, 1903, Atuana, Marquesas Islands), one of the leading French painters of the Postimpressionist period, whose development of a conceptual method of representation was a decisive step for 20th-century art. After spending a short period with van Gogh in Arles (1888), Gauguin increasingly abandoned imitative art for expressiveness through colour. From 1891 he lived and worked in Tahiti and elsewhere in the South Pacific. His masterpieces include the early "Vision After the Sermon" (1888) and "Where Do We Come From? What Are We? Where Are We Going?" (1897–98).



"Self-Portrait," panel painting by Paul Gauguin, 1889; in the National Gallery of Art, Washington, D.C.

By courtesy of the National Gallery of Art, Washington, D.C., the Chester Dale Collection

Early years. Gauguin was the son of a journalist from Orléans and of a mother who was half French and half Peruvian Creole. After Napoleon III's coup d'etat, the Gauguin family moved in 1851 to Lima, and four years later Paul and his mother returned to Orléans. At the age of 17 he went to sea and for six years sailed about the world in freighters or men-of-war. In 1871 he joined the stockbroking firm of Bertin in Paris and in 1873 married a young Danish woman, Mette Sophie Gad. His artistic leanings were first aroused by his guardian, Gustave Arosa, whose collection included pictures by Corot, Delacroix, and Millet, and by a fellow stockbroker, Émile Schuffenecker, with whom he started painting. Gauguin soon started going to a studio to draw from a model and receive artistic instruction. In 1876 his "Landscape at Viroflay" was accepted for the official annual exhibition, the Salon. He developed a taste for Impressionist painting and between 1876 and 1881 assembled an impressive group of paintings by Manet, Cézanne, Pissarro, Monet, and Jongkind.

Gauguin met Camille Pissarro in 1875–76 and began to work with him, struggling to master the techniques of drawing and painting. In 1880 he was invited to contribute to the fifth Impressionist exhibition, and this invitation was repeated in 1881 and 1882. He spent holidays painting with Pissarro and Paul Cézanne and made visible progress, though his early works are often marred by clumsiness and have drab colouring. Gauguin thus became more and more absorbed by painting, and, in 1883, when the Paris stock exchange crashed and he lost his job, he decided "to paint every day." This was a decision that changed the course of his whole life. He had a wife and four children, but he had no income and no one would buy his paintings. In 1884 Gauguin and his family moved to Copenhagen, where his wife's parents proved unsympathetic, and his marriage broke up. He returned to Paris in 1885, determined to sacrifice everything for his artistic vocation. From then on he lived in penury and discomfort, his health was undermined by hardship, he became an outcast from the society to which he had belonged and could never establish himself in any other, and he came to despise Europe and civilization.

In 1886 the expressive possibilities of colour were revealed to him in the pictures of Georges Seurat and Paul Signac, and he began to occupy himself with this aspect of painting at Pont-Aven, Brittany. Gauguin then had two decisive experiences: a meeting with Vincent van Gogh in Paris (1886) and a journey to Martinique (1887). The one brought him into contact with a passionate personality who had similar pictorial ideas and tried to involve him in working them out communally; this attempt came to a disastrous end after a few weeks at Arles in 1888. The other enabled Gauguin to discover for himself the brilliant colouring and sensuous delights of a tropical landscape and to experience the charm of a primitive community living the "natural" life. Gauguin decided to seek through painting an emotional release, in consequence of which he reacted against Impressionism. The key to his artistic attitude from 1888 on is to be found in these significant phrases:

> Primitive art proceeds from the spirit and makes use of nature. The so-called refined art proceeds from sensuality and serves nature. Nature is the servant of the former and the mistress of the latter. She demeans man's spirit by allowing him to adore her. That is the way by which we have tumbled into the abominable error of naturalism.

Break with Impressionism. Gauguin therefore set out to redeem this error by "a reasoned and frank return to the beginning, that is to say to primitive art." A possible method for arriving at a new form of pictorial representation was suggested to him by Émile Bernard, a young artist well acquainted with stained glass, manuscripts, and folk art. He pointed out that in these arts reality was generally depicted in nonimitative terms and that the pictorial image was made up of areas of pure colour separated by heavy black outlines. Such was the origin of the style known as *cloisonnisme,* or *synthétisme,* which attained its most expressive possibilities in such paintings by Gauguin as "The Vision After the Sermon," "Bonjour Monsieur Gauguin!" and "The Yellow Christ" (1889).

When Gauguin broke with his Impressionistic past, he gave up using lines and colours to fool the eye into accepting the flat painted image as a re-creation of an actual scene and explored instead the capacity of these pictorial means to induce in a spectator a particular feeling. His forms became ideated and his colours suggestive abstractions. Maurice Denis, in *Théories* (1920), described a small painting executed by Paul Sérusier under Gauguin's direction in 1888; this landscape seemed to

> have no form as a result of being synthetically represented in violet, vermilion, Veronese green and other pure colours. . . . "How does that tree appear to you?" Gauguin had asked. "It's green isn't it? All right, do it in green, the finest green on your palette. And that shadow? Isn't it blue? Well then, don't be frightened of making it as blue as possible." Thus [writes Denis] was presented to us for the first time, in a paradoxical but unforgettable manner, the fertile conception of a painting as "a flat surface covered with colours arranged in a certain order."

Gauguin indulged in "primitivism" because he could make a more easily intelligible image; his simple colour harmonies intensified this image; and, because he wanted his pictures to be pleasing to the eye, he aimed at a decorative effect. His purpose in all this

was to express pictorially an "idea." It was as a result of this that he was acclaimed as a leading painter of the Symbolist movement. Gauguin's whole work is a protest against the soul-destroying materialism of bourgeois civilization. "Civilization that makes you suffer. Barbarism which is to me rejuvenation," he wrote (1891) to the Swedish playwright August Strindberg. So Gauguin installed himself in Brittany (Pont-Aven and Le Pouldu, 1889–90, 1894), Tahiti (1891–93, 1895–1901), and the Marquesas Islands (1901–03), where he could paint scenes of "natural" men and women.

Before 1891, Gauguin tended to flatten things deliberately, and his effect was often strained, but throughout the 1890s his primitivism became less aggressive as the influences of J.-A.-D. Ingres and Puvis de Chavannes led to increasingly rounded and modelled forms and a more sinuous line. This process can be followed in works such as "Nafea Faa Ipoipo" ("When Shall We Be Married?"), "Nave Nave Mahana" ("Holiday"), and "Golden Bodies." Simultaneously, Gauguin's images became more luxuriant and more naturally poetic as he developed his marvellously orchestrated tonal harmonies. His chief Tahitian work—"Where Do We Come From? What Are We? Where Are We Going?"—is an immense canvas painted in 1897–98. This is the consummate expression of much that he had painted in the previous six years, and the aura of dreamlike, poetic inconsequence which surrounds this semi-philosophical allegory of primitive life is most powerful.

From 1899 on, Gauguin became increasingly ill and was continually in pain; he was also involved in frequent rows with the governing authorities for siding with the natives against them. Yet despite melancholy, his last pictures still have serenity and hope.

Influence. In 1889–90 a group of young followers had gathered round him at Pont-Aven, including Sérusier, Charles Filiger, and Denis, who transmitted Gauguin's ideas to Édouard Vuillard and Pierre Bonnard. The Norwegian painter Edvard Munch owed much to Gauguin, as did the painters of the Fauve group—Henri Matisse in particular—who profited from his use of colour. Gauguin's primitivism and stylistic simplifications greatly affected the young Picasso and led to the aesthetic appreciation of black art and hence to the evolution of Cubism. In Germany, too, Gauguin's influence was strong.

Gauguin was unique in his ability to hold a mysterious balance between idea, perception, and visual image. His pictures make their effect visually, not as a result of literary overtones. He was a great stylistic innovator, and, when he rejected the conception of a picture as a mirror image of an actual scene and turned from an empirical to a conceptual method of pictorial representation, his influence was wide and long-ranging. (D.C.)

MAJOR WORKS. *France.* "La Seine au Pont d'Iéna" (1875; Louvre, Paris); "Seamstress" (1880; Ny Carlsberg Glyptotek, Copenhagen); "Still Life in an Interior" (1885; private collection, U.S.); "Dance of Four Breton Women" (1886; Neue Pinakothek, Munich); "Martinique Landscape" (1887; National Gallery of Scotland, Edinburgh); "The Vision After the Sermon" (1888; National Gallery of Scotland); "The Swineherd" (1888; N. Simon Collection, Los Angeles); "Old Women of Arles" (1888; Art Institute of Chicago); "La Belle Angèle" (1889; Louvre); "Bonjour Monsieur Gauguin!" (1889; Národní Galerie, Prague); "Self-Portrait" (1889; National Gallery of Art, Washington, D.C.); "The Yellow Christ" (1889; Albright-Knox Art Gallery, Buffalo); "Marie Derrien" (1890; Art Institute of Chicago); "La Perte du pucelage" (1890–91; Chrysler Art Museum, Provincetown, Mass.).

Tahiti. "Femmes de Tahiti ou sur la plage" (1891; Louvre); "Street in Tahiti" (1891; Toledo Museum of Art, Ohio); "Suzanne Bambridge" (1891; Musées Royaux des Beaux-Arts, Brussels); "Reverie" (1891; William Rockhill Nelson and Atkins Museum of Fine Arts, Kansas City, Mo.); "Ia Orana Maria" (1891; Metropolitan Museum of Art, New York City); "Nafea Faa Ipoipo" ("When Shall We Be Married?"; 1892; Kunstmuseum, Basel, Switz.); "The Market" (1892; Kunstmuseum); "Manao Tupapau" (1892; private collection, U.S.); "Hina Tefatou" (1893; Museum of Modern Art, New York City); "Poèmes Barbares" (1896; Fogg Art Museum, Cambridge, Mass.); "The Moulin David" (1896; Louvre); "Women with Mangoes" ("The King's Wife"; 1896; Pushkin Museum, Moscow); "Nave Nave Mahana" ("Holiday"; 1896; Musée des Beaux-Arts, Lyon); "Te Rerioa" (1897; Courtauld Institute Galleries, London); "Nevermore" (1897; Courtauld Institute Galleries); "Where Do We Come From? What Are We? Where Are We Going?" (1897–98; Museum of Fine Arts, Boston); "The White Horse" (1898; Louvre); "Two Tahitian Women" (1899; Metropolitan Museum of Art); "Sunflowers and Pears" (1901; private collection, Paris); "Golden Bodies" (1901; Louvre); "L'Appel" (1902; Cleveland Museum of Art); "Contes barbares" (1902; Museum Folkwang, Essen, Ger.).

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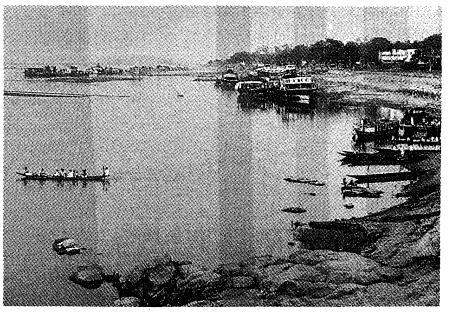
Consult the INDEX *first*

Gauhāti, town, administrative headquarters of Kāmrūp district, western Assam state, northeastern India. Located on the Brahmaputra River, it was the capital of the Hindu kingdom of Kāmarūpa (under the name of Prāgjyotiṣa) around AD 400. In the 17th century the town repeatedly changed hands between the Muslims and Ahoms (a Tai-speaking people who had migrated from Yunnan, China, in the 13th century AD) until it became the seat of the Ahom governor of Lower



Brahmaputra River at Gauhāti, Assam, India
David Channer—Nancy Palmer Agency

Assam in 1681; in 1786 the Ahom raja made it his capital. The Burmese held Gauhāti from 1816 until 1826, when it became the British capital of Assam. The capital was moved 67 mi (108 km) south to Shillong in 1874.

Gauhāti is an important river port and Assam's greatest commercial centre. It has an oil refinery and a state farm, and its industries include tea processing, milling of agricultural products, and soap manufacturing. Gauhāti University (founded 1948), Earle Law College, the state high court, the state museum, several scientific museums, and a zoological garden are located there. Several Hindu pilgrimage centres and temple ruins are nearby. Gauhāti is served by an airport and a rail line. Pop. (1971) town, 146,026; metropolitan area, 200,377.

Gaul, Latin GALLIA, the region inhabited by the ancient Gauls, comprising modern-day France and parts of Belgium, western Germany, and northern Italy. A Celtic race, the Gauls lived in an agricultural society divided into several tribes ruled by a landed class.

A brief treatment of Gaul follows. For a full treatment, *see* MACROPAEDIA: France.

By the 5th century BC the Gauls had migrated south from the Rhine Valley to the Mediterranean coast. By the middle of the 4th century various Gallic tribes had established themselves across northern Italy from Milan to the Adriatic coast. The region of Italy occupied by the Gauls was called Cisalpine Gaul (Gaul this side of the Alps) by the Romans. In 390 BC the Gauls seized and plundered the city of Rome. This humiliation helped to inspire the Romans' drive to conquer Gaul. The Cisalpine Gauls pushed into central Italy by 284. In a series of confrontations, the Romans defeated the tribe of the Insubres, took Milan, and established colonies in a buffer zone. In the Second Punic War Hannibal of Carthage made an alliance with the Gallic Cenomani against the Romans; the Romans prevailed, however, and by 181 Rome had subjugated and colonized Cisalpine Gaul.

By the 2nd century BC, when the Romans extended their territory across the Alps into the south of France, they already controlled most of the commerce in that part of the Mediterranean. An alliance with the Aedui against their enemies the Allobroges and the Arverni brought the Romans control of the Rhône Valley after 120. The Roman colony of Narbo Martius (Narbonne) was founded on the coast in 118, and the southern province became known as Gallia Narbonensis. An invasion by Germanic Cimbri and Teutones was defeated by Marius in 102, but 50 years later a new wave of invasions into Gaul, by the Helvetii from Switzerland and the Suevi from Germany, triggered the Roman conquest of the rest of Gaul by Julius Caesar between 58 and 50 BC.

During 53–50 Caesar was engaged in suppressing a Gallic revolt led by Vercingetorix. He treated the Gauls generously, leaving their cities with a significant measure of autonomy, and thus secured the allegiance of Gallic soldiers in his civil wars against Pompey in 49–

45. A former religious centre of Gallic society, Lugdunum (Lyon) became the capital of Roman Gaul. The country was divided into four provinces: Narbonensis, Aquitania to the west and south of the Loire, Celtica (or Lugdunensis) in central France between the Loire and the Seine, and Belgica in the north and east. The Romans built towns and roads throughout Gaul and taxed the old Gallic landowning class while promoting the development of a middle class of merchants and tradesmen. The emperor Tiberius was obliged to suppress a rebellion of the nobles in 21 AD, and the assimilation of the Gallic aristocracy was secured when the emperor Claudius (41–54 AD) made them eligible for seats in the Roman Senate and appointed them to governing posts in Gaul.

The next two centuries were marked by occasional revolts, by increasingly frequent invasions of Germanic tribes, against whom a line of *limes,* or fortifications, was erected from the middle Rhine to the upper Danube, and by the introduction of Christianity early in the 2nd century. During the reign of the emperor Marcus Aurelius (161–180), Germanic invaders crossed the *limes.* Frontier legions rebelled along the Rhine, spurring the civil wars that followed the death of the emperor Commodus in 192. An economic recession, marked by inflation and rising prices, hurt the towns and the small farmers.

In 260 Gaul, Spain, and Britain formed an independent Gallic empire, governed from Trier. The emperor Aurelian reclaimed Gaul for Rome in 273, but Germanic tribes devastated the country as far as Spain. Under Diocletian and his successors, reforms in defense and administration were instituted, but Gaul became a centre of the unrest that was fragmenting the empire. In the middle of the 4th century the tide of invasions swelled. By the 5th century the Visigoths had taken Aquitania, the Franks ruled Belgica, and the Burgundians dominated the Rhine. By the time the kingdom of the Frankish Merovingians arose, in the early 6th century, the Romans had lost control of Gaul.

In the end, Gaul proved to be an important repository of Roman culture. Gallic writers long kept the classical Roman literary tradition alive. Many of the amphitheatres, aqueducts, and other Roman works built in Gaul still stand.

Gaul, Narbonese: *see* Narbonensis.

Gaulish language, ancient Celtic language or languages spoken in western and central Europe and Asia Minor before about 500. Gaulish is attested by inscriptions from France and northern Italy and by names occurring in classical literature. Modern knowledge of the vocabulary and sounds of Gaulish is slight, and its exact relation to the Celtic languages of Britain and Ireland is not clear.

Gaulle, Charles(-André-Marie-Joseph) de (b. Nov. 22, 1890, Lille, Fr.—d. Nov. 9, 1970, Colombey-les-Deux-Églises), French soldier, writer, statesman, and architect of France's Fifth Republic.

Education and early career. De Gaulle was the second son of a Roman Catholic, patriotic and nationalist, upper-middle-class family. The family had produced historians and writers, and his father taught philosophy and literature. But as a boy Charles de Gaulle already showed a passionate interest in military matters. He was trained at the Military Academy of Saint-Cyr and, in 1913, as a young second lieutenant, joined an infantry regiment commanded by Colonel Philippe Pétain.

De Gaulle was an intelligent, hard-working, and zealous young soldier and, in his military career, a man of original mind, great self-assurance, and outstanding courage. In World War I, he fought at Verdun, was three times wounded, spent two years and eight months

De Gaulle, 1967
Bruno Barbey—Magnum

as a prisoner of war (during which time he made five unsuccessful attempts to escape), and was three times mentioned in dispatches. After a brief visit to Poland as a member of a military mission, a year's teaching at Saint-Cyr, and a two-year course of special training in strategy and tactics at the École Supérieure de Guerre (War College), he was promoted by Marshal Pétain in 1925 to the Staff of the Conseil Supérieur de la Guerre (Supreme War Council). During 1927–29 he served as major in the army occupying the Rhineland and could see for himself both the potential danger of German aggression and the inadequacy of the French defense. He also spent two years in the Middle East and then, having been promoted to lieutenant colonel, spent four years as a member of the secretariat of the Conseil Supérieur de la Défense Nationale (National Defense Council).

His writing career began with a study of the relation of the civil and military powers in Germany (*La Discorde chez l'ennemi,* 1924; "Discord Among the Enemy"), followed by lectures on his conception of leadership, *Le Fil de l'epée* (1932; *The Edge of the Sword*). A study on military theory, *Vers l'armée de métier* (1934; *The Army of the Future*), defended the idea of a small professional army, highly mechanized and mobile, in preference to the static theories exemplified by the Maginot Line, which was intended to protect France against German attack. He also wrote a memorandum in which he tried, even as late as January 1940, to convert politicians to his way of thinking. His views made him unpopular with his military superiors, and the question of his right to publish under his name a historical study *La France et son armée* (1938; *France and Her Army*) led to a dispute with Marshal Pétain.

World War II. At the outbreak of the war he commanded a tank brigade attached to the French 5th Army. In May 1940, having been made a temporary brigadier general in the 4th Armoured Division—the rank that he retained for the rest of his life—he was twice given the opportunity to apply his theories on tank warfare. He was mentioned as "an admirable, energetic, and courageous leader." On June 6 he entered the government of Paul Reynaud as undersecretary of state for defense and war, and he undertook several missions to England to explore the possiblities of continuing the war. When the Reynaud government was replaced by that of Marshal Pétain, who intended to seek an armistice with the Germans, de Gaulle left for England. On June 18, he broadcast from London his first appeal to his compatriots to continue the war under his leadership. On Aug. 2, 1940, a French military court tried him and sentenced him in absentia to death, deprivation of military rank, and confiscation of property.

De Gaulle entered on his wartime career as a political leader with tremendous liabilities. He had only a handful of haphazardly recruited political supporters and volunteers for what were to become the Free French Forces. He had no political status and was virtually unknown both in England and in France. But he had an absolute belief in his mission and conviction that he possessed the qualities of leadership. He was totally devoted to France and had the strength of character (or obstinacy, as it often appeared to the British) to fight for French interests as he saw them with all the resources at his disposal.

In his country, to the politicians of the left, a career officer who was a practicing Roman Catholic was not an immediately acceptable political leader, while to those on the right he was a rebel against Philippe Pétain, a national hero and France's only field marshal. Broadcasts from London, the action of the Free French Forces, and the contacts of resistance groups in France either with his own organization or with those of the British secret services brought national recognition of his leadership. But full recognition by his allies came only after the liberation of Paris.

In London, de Gaulle's relations with the British government were never easy, and de Gaulle often added to the strain, at times through his own misjudgment or touchiness. In 1943 he moved his headquarters to Algiers, where he became president of the French Committee of National Liberation, at first jointly with General Henri Giraud. De Gaulle's successful campaign to edge Giraud out gave the world proof of his skill in political maneuver. On Sept. 9, 1944, he and his shadow government returned from Algiers to Paris. He headed two successive provisional governments but, on Jan. 20, 1946, abruptly resigned, apparently owing to irritation with the political parties forming the coalition government.

Until 1958 he opposed what became, in November 1946, the Fourth French Republic. He campaigned against the new constitution, which he disapproved of as being likely to lead to a repetition of the political and governmental inadequacies of the Third Republic. In 1947 he formed the Rally of the French People (Rassemblement du Peuple Français; RPF), a mass movement that grew rapidly in strength and that to all intents and purposes became a political party in 1951, when it obtained 120 seats in the National Assembly in the elections of that year. The movement expressed de Gaulle's hostility to the constitution, to the party system, and, in particular, to the French Communists, because of their unswerving loyalty to Moscow directives. He became dissatisfied with the RPF, however, and in 1953 severed his connection with it. In 1955 it was disbanded.

The general made no public appearances in 1955–56 but retired to his home in Colombey-les-Deux-Églises, where he worked on his memoirs: *L'Appel* (1940–42; *The Call to Honour*), *L'Unité* (1942–44; *Unity*), and *Le Salut* (1944–46; *Salvation*). The last volume was completed only after his return to power in 1958. Precisely when he began to feel that he might be called on to take up his mission again is a question on which accounts differ.

Postwar return to public life. His compatriots were deeply divided on the question of his return. The reasons for their hesitations belong to the political history of the period. The opportunity presented itself in May 1958, when the insurrection that had broken out in Algiers threatened to bring civil war to France. De Gaulle must have seen it as the most carefully balanced calculation in a life that had had its share of political gambles. He was cautious, for it was by no means certain that the French Parliament would accept his return on any conditions that he could accept. He affirmed

his determination not to come to power by other than legal means, and there was never any evidence of his association with insurgent plans to bring him back. His carefully worded statements (on May 15, 19, and 27), however, certainly helped the insurgents. On June 1, three days after Pres. René Coty threatened to resign unless de Gaulle's return to power was accepted, he presented himself before the National Assembly as a prime minister designate and on the following day attended the session (having been duly "invested" as prime minister) and was authorized to reform the constitution and accorded the special powers that he demanded.

On Dec. 21, 1958, de Gaulle was elected president of the Republic. The powers given to the president in the new constitution, which had been approved by referendum on Sept. 28, 1958, and especially those providing for the use of the referendum and for presidential rule during a state of emergency, reflected his firm conviction that a strong state required a leader with power to make decisions. He realized that his fellow citizens would accept him only in a crisis and that he must, therefore, take steps to retain the support of the general public and to disarm the power of "the system of parties" in Parliament, always potentially hostile to him. His tactics were first to obtain consent to the personal control of government policy by the president and then to ensure its renewal in regular consultations through elections or referendums. He, therefore, undertook throughout his presidency what was virtually a continuous election campaign, in the form of provincial tours, in which he visited every *département* and during which he was able to meet ordinary citizens as well as local notabilities. He appeared on television several times a year. He relied as far as possible on ministers who were *compagnons*, those whose Gaullist loyalties went back to the wartime days, and he relied on their use of the constitutional provisions to curb the powers of the deputies to obstruct parliamentary business or harass governments. He retained the essential parliamentary function in a democracy; namely, the right to criticize governments and to withdraw confidence in them. There were frequent complaints of pro-governmental bias on the radio, but these had been regularly made under pre-Gaullist regimes. Under a law of 1881, insults to the president of the Republic constitute an offense, and, though there was certainly more recourse to this law under the presidency of de Gaulle than under previous regimes, it presented no obstacle at all to political criticisms of Gaullist policies and Gaullist ministers in the press and in political parties, which were continuous and widespread.

Until 1962 de Gaulle's providing the only remaining hope of ending the Algerian war without civil disorder protected him from serious challenge. But the Algerian war prevented him from doing more than prepare the way for future positive policies. He strengthened the country's economic situation, planned the reorganization of the army, developed an independent nuclear deterrent, and prevented fresh "Algerias" in the future by providing for the constitutional transformation of the African overseas territories into 12 politically independent states. From mid-1962 onward, however, with the recognition of an independent Algerian state, he had to consolidate his own position by obtaining a fresh vote of confidence from the electorate, for he was no longer politically indispensable.

One lesson that he had learned was that his personal position was stronger if he remained, at least in theory, above the political and party battle, as he had tried to do during the wartime and early postwar years. Before the elections of 1958, he had therefore forbidden his supporters to use his name, "even in the form of an adjective," in the title of any group or candidate. In 1962 he offered the electors the choice between his resignation and acceptance of a constitutional amendment substituting election by universal suffrage for election by an electoral college consisting of some 80,000 members, mainly mayors and local notabilities. The electors favoured the amendment overwhelmingly. The general election in November gave the Gaullist party an additional 64 seats, thus obtaining, with the support of a group of some 30 conservative deputies, a majority in the National Assembly. From then on, he was in a position to carry out, with public consent, the plans that he regarded as essential in order to restore France to the status of a great power. As a statesman, he fought his political battles like a military campaign, using all the devices that he had learned to transform France's postwar international position of weakness into one of strength and to overcome opposition to his plans at home. These devices have been often described by his fellow citizens: "egoism, pride, aloofness, guile," according to Raymond Aron; "empiricism, intuition, flexibility of mind if not of soul . . ." according to one of the most perceptive of his biographers (Jean Lacouture, *De Gaulle*).

During the period from 1962 until his reelection as president in 1965, he used the European Economic Community (EEC) to serve French interests, especially agricultural interests. France's participation in the supranational defense organizations of the North Atlantic Treaty Organization (NATO) was progressively withdrawn, because de Gaulle's policy for France was one of "national independence" and of international cooperation based only on agreements between nation-states. This was the main theme of his presidential campaign in 1965. On December 21, he was reelected, though only on the second ballot, and on March 7, 1966, he announced France's complete withdrawal from NATO, though not from the Atlantic Alliance.

During the remainder of his second term as president, he turned his attention increasingly to wider fields. He had already begun the policy of "détente and cooperation" with countries behind the Iron Curtain, by encouraging trade and cultural relations with the Soviet Union and the countries of eastern Europe, and by recognizing Communist China in January 1964. For the solution of the conflict in Indochina he advocated a policy of neutrality for all nations concerned. This was to be based on a negotiated peace, of which a necessary preliminary was to be the withdrawal of all U.S. troops from Vietnam. These activities, together with visits to Mexico, all the countries of Latin America, Canada, and the Far East, formed part of a policy aiming first at increasing the influence of France in French-speaking countries or countries in which there existed some bond derived from a common attachment to Latin culture; then in Europe, which he saw as going, sooner or later, beyond the boundaries created by membership in the EEC or the division into western and eastern blocs; and finally in the world, in which he foresaw the gradual dissolution of the two great blocs.

Circumstances were against his success. He felt obliged to take up attitudes that were generally interpreted as anti-American. The theory of what he called "desatellization," the progressive loosening of the Soviet hold on the countries of eastern Europe, was brutally invalidated by the Soviet invasion of Czechoslovakia in 1968. Nor was there any evidence that France carried any real weight with the countries that it hoped to influence. As the political and economic crisis of May 1968 revealed, France had neither the internal cohesion nor the financial resources to play the role of leader in what de Gaulle called "Europe from the Atlantic to the Urals."

His strength had been in his appeal for unity against a common enemy—in 1940, Germany; in 1958, subversion and civil disorder. In 1968 there was no common enemy. Once order had been restored, the students' and workers' revolt was seen for what it was, a temporary outburst of hysteria by sections of the community with real grievances but mutually incompatible aims. The solution of their problems required the patient negotiation of a government rather than leadership by a man of destiny. A broadcast on May 30, brought a massive demonstration of support and a landslide Gaullist victory in the subsequent election, but the victory was for peace and normality rather than for the President and his policies.

When, in April 1969, he called once again for a referendum, it was not clear whether or not he really wanted to remain in power. The referendum, calling for the acceptance of regional reorganization and a reform of the Senate, was presented to the electors, as other referenda had been, as a choice between acceptance of both (though the second measure was generally unpopular) or of his own resignation. The diplomatic methods that had been welcomed during his first term, as assertions of France's claim to equality with, and influence among, the great powers had been creating increasing unease for the past few years. In 1966, his advocacy of Vietnamese neutrality had been widely interpreted as an expression of personal anti-Americanism. In 1967, on his visit to Canada, he had seemed to be actively encouraging French-Canadian separatism. His declarations of neutrality in the Arab–Israeli War had seemed to show pro-Arab bias. France was not actively involved in, but had not formally withdrawn from, the Atlantic Alliance, and the so-called independent nuclear deterrent was neither independent nor within France's means. The question: "After de Gaulle, who?" had been answered by the President himself when he dismissed Georges Pompidou in 1968 after a record six years as prime minister, thus leaving him free to present himself as a credible and acceptable successor to the presidency.

On April 28, 1969, following his defeat in the referendum, de Gaulle resigned and returned to Colombey-les-Deux-Églises, to permanent retirement and a resumption of the writing of his memoirs. He died there of a heart attack. Throughout his presidency, his aims and actions had been the subject of more exegesis and speculation than those of any other French statesman. (D.M.P./Ed.)

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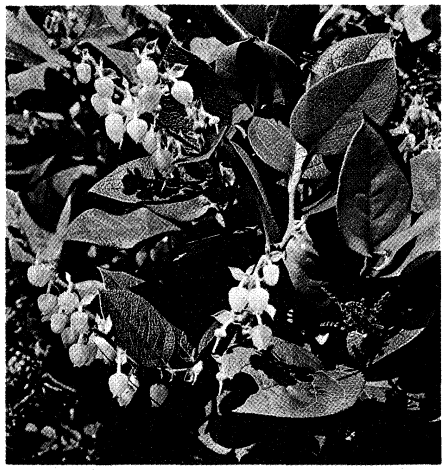
Gaulli, Giovanni Battista (Italian painter): *see* Baciccia.

Gaullists (French political party): *see* Rally for the Republic.

Gaultheria, genus of about 100 species of upright or prostrate evergreen shrubs, of the heath family (Ericaceae), occurring in North and South America, Asia, and Australia. The plants are distinguished by alternate, ovate leaves, white or pink flowers, and round fruit that contains numerous minute seeds. *G. shallon,* the salal or lemonleaf of florists, is a slender, diffuse shrub of the California redwood forests; it grows 0.3–1.8 metres (1–6 feet) tall and has dark-purple edible berries.



Salal (*Gaultheria shallon*)
A.J. Huxley—EB Inc.

G. procumbens, commonly known as checkerberry, teaberry, or wintergreen (*q.v.*), is a creeping shrub with white, bell-shaped flowers, spicy red berries, and, shiny aromatic leaves. *G. hispidula,* commonly known as creeping snowberry, is a mat-forming evergreen with small, pointed leaves that give a spicy odour when crushed.

Gaultier, Denys, also called GAULTIER LE JEUNE (the Younger) (b. 1597 or 1603, Marseille?—d. January 1672, Paris), celebrated, lute virtuoso whose style influenced the French school of harpsichord music.

Gaultier came from a renowned family of lutenists that also included Jacques and Ennemond Gaultier. Little is known of his life except that he lived many years in Paris. He was the last great representative of the Parisian school of lutenists prominent in the early and middle years of the Baroque era. His music explores the full range of the French style—graceful and subtle ornamentation, broken chords, skillful exploitation of the lute's resources to suggest polyphonic texture. These facets of the lute style were transferred to the keyboard in the compositions of Chambonnières and the later *clavecinistes,* as were also the characteristic arrangement of stylized dances into suites and the fanciful and descriptive titles given to the individual pieces. The suites also influenced the keyboard style of Froberger. Gaultier's compositions include the *Pièces de luth* and a collection of 69 compositions arranged in suites, in each of the 12 modes, *La Rhétorique des dieux* (1664–72; "The Rhetoric of the Gods"). He was enormously popular in his own time, and much of his music was transcribed from lute tablature into staff notation so that it might reach the growing public of keyboard players. Gaultier also originated the *tombeau,* a small piece written to the memory of a great personage.

Gaulus (Malta): *see* Gozo.

Gaumata (pretender to Persian throne): *see* Smerdis.

Gaunilo, French GAUNILON (fl. 11th century), Benedictine monk of the Marmoutier Abbey near Tours, Fr., who opposed St. Anselm of Canterbury's ontological argument for God's existence. His *Liber pro insipiente* ("In Defense of the Fool") was a critique of the rationality of Anselm's assertion that the concept of "that than which nothing greater can be thought" (*i.e.*, God) implies God's existence. Gaunilo argued by analogy, pointing out that one's concept of a "perfect island" does not imply that such a place exists. The title of his book was taken from Anselm's reference to the atheistic "fool" of the 14th Psalm.

Gaunt, John of: *see* John of Gaunt, duke of Lancaster.

gaur (*Bos gaurus*), one of several species of wild cattle, family Bovidae (order Artiodactyla). The gaur lives in small herds in the mountain forests of India, southeastern Asia, and the Malay Peninsula. Larger than any other wild cattle, it attains a shoulder height of 1.8 metres (6 feet) or more. It is heavy bodied, typically blue eyed, and has curving horns, a high ridge on the forepart of the back, and white "stockings" on the legs. Bulls are dark brown or blackish, cows and young reddish brown. Greatly reduced in numbers, gaurs survive only in scattered herds in India, Burma, and West Malaysia. The Malayan gaur, or seladang (*B.g. hubbacki*) is listed as endangered in the *Red Data Book.*

Gaurs (*Bos gaurus*)
J.A. Hancock—Photo Researchers

Gaurāṅga (Hindu mystic): *see* Caitanya.

Gause's principle (biology): *see* competitive exclusion, principle of.

gauss, unit of magnetic induction in the centimetre-gram-second system of physical units. One gauss corresponds to the magnetic flux that will induce an electromotive force of one abvolt (10^{-8} volt) in each linear centimetre of a wire moving laterally at one centimetre per second at right angles to a magnetic flux. One gauss corresponds to 10^{-4} Tesla, the International System Unit. Magnets are rated in gauss. The gauss was named for the 19th-century German scientist Carl Friedrich Gauss. Before 1932 it was applied to the unit of magnetic-field strength now called the oersted. The term gauss sometimes is used still in this earlier sense (*e.g.*, the Earth may be said to have a magentic-field strength of about one gauss). *See* flux density, magnetic.

Gauss, Carl Friedrich, original name JOHANN FRIEDRICH CARL GAUSS (b. April 30, 1777, Brunswick—d. Feb. 23, 1855, Göttingen, Hanover), German mathematician who had a long career in the applications of mathematics to astronomy, geodesy, and physics.

A brief account of the life and works of Carl Friedrich Gauss follows; for a full biography, *see* MACROPAEDIA: Gauss.

Gauss, of Nether-Saxon peasant origin, was a prodigy, particularly in mental computation. In secondary school he distinguished himself in ancient languages and mathematics and conceived almost all of his fundamental mathematical discoveries by the age of 17. At the age of 22 he obtained his doctorate from the university at Helmstedt; in his thesis he developed the concept of complex numbers and proved the fundamental theorem of algebra. Two years later he published his theory of numbers, one of the most brilliant achievements in the history of mathematics. In 1807 he became professor of astronomy and director of the observatory at the University of Göttingen, where he remained for the rest of his life.

Gauss provided a new way for calculating the orbits of asteroids and the theory of squares. He contributed theoretical studies of the size and shape of the Earth and introduced the Gaussian error curve. He was a pioneer in applying mathematics to gravitation, electricity, and magnetism and developed the related potential theory and real analysis. His *Collected Works* were published over a long period—from 1863–1933.

Gauss elimination, in linear and multilinear algebra, a process for finding the solutions of a system of simultaneous linear equations by first solving one of the equations for the first variable (in terms of all the others) and then substituting this expression into the remaining equations. The result is a new system in which the number of equations and variables is one less than in the original system. The same procedure is applied to the second variable and continued with the other variables until there remains one equation, in which the only unknown quantity is the last variable. Solving this equation makes it possible to solve either of two earlier equations in which the last two variables were unknown. This process is continued until all of the originally unknown variables have been evaluated.

Gaussian distribution (mathematics): *see* normal distribution.

Gauss's theorem, also called GAUSS'S LAW, either of two statements describing electric and magnetic fluxes. Gauss's law for electricity states that the electric flux across any closed surface is proportional to the net electric charge enclosed by the surface. The law implies that isolated electric charges exist and that like charges repel one another while unlike charges attract.

Gauss's law for magnetism states that the magnetic flux across any closed surface is zero; this law is consistent with the observation that isolated magnetic poles (monopoles) do not exist.

Mathematical formulations for these two laws—along with Ampère's law (concerning the magnetic effect of a changing electric field or current) and Faraday's law of induction (concerning the electric effect of a changing magnetic field)—are collected in a set called Maxwell's equations (*q.v.*), which provide the basis of unified electromagnetic theory.

Gautama, Siddhārtha: *see* Buddha.

Gauthey, Emiland-Marie (b. Dec. 3, 1732, Châlon-sur-Saône, Fr.—d. July 14, 1806, Paris), French engineer, best known for his construction of the Charolais Canal, or Canal du Centre, uniting the Loire and Saône rivers in France, thus providing a water route from the Loire to the Rhône.

Gauthey studied at the École des Ponts et Chaussées (School of Bridges and Highways) in Paris, then taught there while making important pioneering contributions to the study of building materials. About 1767 he drew up plans for a canal linking the Loire and the Rhône. Work began under his direction in 1783, and the project was completed nine years later. The canal involved construction of locks and several bridges. He also directed the building of a church at Givry between 1773 and 1791 and restored the castle of Chagny (both in Saône-et-Loire *département*) in 1780.

Gauthier DE MÉS EN LOHERAINS (poet): *see* Gautier de Metz.

Gautier D'ARRAS (d. 1185), author of early French romances. He lacked the skill and profundity of his contemporary, Chrétien de Troyes, but his work, emphasizing human action and its psychological foundations, exercized an important influence on the genre known as *roman d'aventure* (romance of adventure).

An official of Philippe d'Alsace, count of Flanders, he is named in many charters between 1160 and 1185. His romance *Eracle,* a mythical life of the Byzantine emperor Her-

aclius, was begun in 1176–78 for Marie de Champagne and Thibaut V of Blois but was finished, perhaps in 1179–81, for the young Baldwin V of Hainaut. *Ille et Galeron*, a Breton romance, was written for Beatrix of Vienne, the wife of Frederick I Barbarossa.

Gautier DE METZ, also known as GAUTHIER DE MÉS EN LOHERAINS (fl. 13th century), French poet and priest who is usually credited with the authorship of the treatise about the universe, *L'Image du monde* (*c.* 1246; "The Mirror of the World"; also called *Mappemonde*), based on the medieval Latin text *Imago mundi* by Honorius Inclusus. Gautier's poem is one of several medieval "encyclopaedic" works that describes creation, geography, and astronomy with factual as well as imaginary passages. Monsters, treasures, and distant lands are discussed in the pseudoscientific poem, which was translated into many languages during the Middle Ages and was beautifully illustrated in many manuscripts.

Gautier, Hubert (b. Aug. 21, 1660, Nîmes, Fr.—d. Sept. 27, 1737, Paris), French engineer and scientist, author of the first book on bridge building.

After beginning a career in medicine, Gautier turned first to mathematics and then to engineering and served for 28 years as the engineer of the province of Languedoc. He was named inspector of bridges and highways of the realm in 1716, the year after publication of his *Treatise on the Constructions of Roads in France.* His *Treatise on Bridges,* which appeared in 1716, remained the standard work on bridge building for some 70 years.

Gautier, (Émile-Théodore-)Léon (b. Aug. 8, 1832, Le Havre, Fr.—d. Aug. 25, 1897, Paris), literary historian who revived an interest in early French literature, particularly with his translation and critical discussion of the *Chanson de Roland* (1872) and with his research on the chansons de geste.

In Paris in 1859, Gautier became keeper of

Léon Gautier

By courtesy of the Bibliotheque Nationale, Paris; photograph, J.P. Ziolo

the imperial archives and of the archives of the *département* of Haute-Marne. In 1871 he became professor of paleography at the École des Chartres, the school in which he had been educated (1852–55). He was elected member of the Académie des Inscriptions et Belles-Lettres in 1887 and became chief of the historical section of the national archives in 1893. His works include *Les Épopées françaises,* 3 vol. (1886–88; "The French Epics," 2nd ed., 5 vol., 1878–97, with a bibliography of chansons de geste).

Gautier, Théophile, byname LE BON THÉO (b. Aug. 31, 1811, Tarbes, Fr.—d. Oct. 23, 1872, Neuilly-sur-Seine), poet, novelist, critic, and journalist whose influence was strongly felt in the period of changing sensibilities in

Théophile Gautier, portrait in black crayon by Jean-Baptiste Clésinger, 1853; in the Musée National de Versailles et des Trianons

Cliche Musees Nationaux, Paris

French literature—from the early Romantic period into the aestheticism and Naturalism of the end of the 19th century.

Gautier lived most of his life in Paris. At the Collège de Charlemagne he met Gérard de Nerval and began a lasting friendship. He studied painting but soon decided that his true vocation was poetry. Sympathetic to the Romantic movement, he took part in the cultural battle that ensued when Victor Hugo's play *Hernani* was first performed in Paris in 1830.

He humorously recalled this period in *Histoire du romantisme* (1874; "History of Romanticism") and in *Portraits contemporains* (1874; "Contemporary Portraits"), in which he gave an excellent description of his friend, Honoré de Balzac. He satirized his own extravagances, as well as those of other Romanticists, in *Les Jeunes-France* (1833; "Young France"). *Les Grotesques* (1834–36) is a book about more obscure earlier writers whose individualism anticipated that of the Romantics.

Gautier's first poems appeared in 1830. *Albertus,* a long narrative about a young painter who falls into the hands of a sorcerer, was published in 1832. At this time he turned from the doctrines of Romanticism and became an advocate of art for art's sake. The preface to *Albertus* and the novel *Mademoiselle de Maupin* (1835) express his views, which caused a considerable stir in literary circles by their disregard of conventional morality and insistence on the sovereignty of the beautiful.

In 1840 Gautier visited Spain for five months; the colour of the land and people inspired some of his best poetry, in *España* (1845), and prose, in *Voyage en Espagne* (1845). After this trip, Gautier found travelling to be a welcome escape from the constant pressures of his journalistic work, which he pursued to support himself, two mistresses, and his three children, as well as his two sisters. From 1836 to 1855 he was a weekly contributor to *La Presse* and *Le Moniteur Universel;* in 1851, editor of *Revue de Paris;* in 1856, *L'Artiste.* Besides this work he contributed to many other periodicals and papers. Gautier often bemoaned the conditions of his existence; he felt that journalism was draining off the creative energy that should have been reserved for poetry.

Travelling, especially in Greece, strengthened his theory of art, his admiration of Classical forms. He felt that art should be impersonal, free from the obligation of teaching moral lessons. The aim of the artist is to concentrate on achieving perfection of form. He developed a technique in poetry that he called *transposition d'art* ("transposing art"), recording his exact impressions when experiencing a painting or other work of art. These poems, published in *Émaux et camées* (1852; "Enamels and Cameos"), are among his finest. This book was a point of departure for other writers who were aesthetes: Théodore de Banville and Leconte de Lisle. Charles Baudelaire paid tribute to Gautier in the dedication of *Les Fleurs du mal.*

Gautier's poetic and fantastic imagination is seen to advantage in his fiction: evocations of ancient Pompeii or Egypt and stories of the supernatural, *La Mort amoureuse, Avatar* (1857; "The Dead Lover, Avatar"). His literary output was prodigious, but his art and dramatic criticism alone—partly reprinted in *Les Beaux-Arts en Europe* (1855) and in *Histoire de l'art dramatique en France depuis vingt-cinq ans* (6 vol., 1858–59; "History of Drama in France for Twenty-Five Years")—would ensure his reputation. As a ballet critic he remains unrivalled. He also wrote plays and the popular ballet *Giselle,* written in collaboration with Vernoy de Saint-Georges.

Gautier was held in esteem by many of his contemporaries who were also prominent literary figures: Flaubert, Sainte-Beuve, the Goncourt brothers, Banville, and Baudelaire. In his last years he became the friend of the Princess Mathilde, who gave him a sinecure post as a librarian to ease his financial strain.

Gautsch von Frankenthurn, Paul, Freiherr (Baron) (b. Feb. 26, 1851, Döbling, Austria—d. April 20, 1918, Vienna), statesman who served three times as Austrian prime minister.

A graduate of the University of Vienna, Gautsch von Frankenthurn entered the imperial Ministry of Education (1874) and served as Austrian minister of education in the cabinets of Eduard, Graf von Taaffe (1885–93), and Kasimir, Graf von Badeni (1895–97). With the fall of Badeni, he was appointed prime minister (November 1897), but the failure of his proposed reform of the Bohemian language laws prompted his resignation (March 1898).

After several years as president of the government accounting office, Gautsch von Frankenthurn was recalled to the post of prime minister (Jan. 1, 1905), but again his ministry foundered, this time because of suffrage reform (May 1906). He was recalled once more in June 1911, but his third ministry expired after a few months. Ever faithful to the imperial summons, he remained, until the death of the emperor Francis Joseph I, one of the most trusted servants of the crown.

gauze, light, open-weave fabric made of cotton for surgical dressings and of silk and other fibres for dress trimming. The name is derived from that of the Palestinian city of Gaza, where the fabric is thought to have originated. It is made either by a plain weave or by a leno weave.

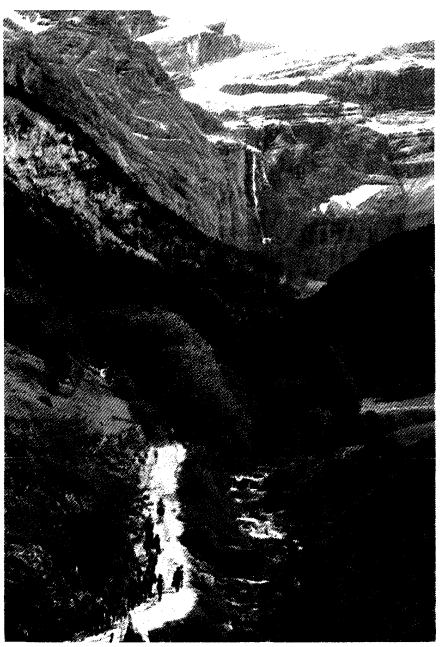
Similar fabrics include cheesecloth, made of cotton, originally used as a wrapping for pressed cheese and now used in bookbinding, as reinforcing in paper where high strength is desired, and for dustcloths and the like; bunting, made of cotton or wool, dyed and used for flags and decorations; scrim, made of cotton and used for curtains; and tobacco cloth, used as shade covering for tobacco plants. The main differences between them are in the finishing (for example, cheesecloth that is bleached and stiffened may be called scrim) and in the quality of the fibre (tobacco cloth is commonly made of low-grade yarns).

Metal wires and plastic filaments are woven into gauzes and used as window screens and filters. *See also* crinoline.

Gavarni, Paul, pseudonym of GUILLAUME-SULPICE CHEVALIER (b. Jan. 13, 1804, Paris—d. Nov. 24, 1866, Paris), French lithographer and painter, whose work lacks the power of his great contemporary Daumier but is enjoyable for its polished wit, cultured observation, and the panorama it presents of the life of his time. Unlike Daumier, he did no political caricatures.

About 1831 Gavarni began publishing his scenes of everyday contemporary life, and praise from writers such as Balzac gained him popularity. In 1833 he began publication of the *Journal des gens du monde,* which failed after 18 numbers and was responsible for Gavarni's imprisonment for debt in 1835 for almost a year. From 1839 to 1846 he issued his famous series "Les Lorettes," "Les Débardeurs" and "Les Fourberies de Femmes." After the death of his mother and his marriage, about 1845, his style changed, deepening in seriousness and subtlety. Enhanced by a deeper insight into human nature, Gavarni's compositions of this time generally bear the stamp of a bitter philosophy. In 1847 he left for London, and spent his time in England observing the life of the poor and producing some of his most compelling work. He travelled in Scotland in 1849 and did much work for English publications. After his return to Paris he devoted more time to watercolour and in 1851 met the Goncourt brothers, who had long been his admirers; their book *Gavarni: L'Homme et l'oeuvre* appeared in 1873. Again Gavarni took up lithography and in the periodical *Paris* brought forth another of his great series, "Masques et visages." At the time of his death he was working in etching, lithography, and a new process, electric engraving. J. Armelhaut and E. Bocher's *L'Oeuvre de Gavarni, catalogue raisonné* (1873), lists about 8,000 of the artist's pictures.

Gavarnie, mountain village and valley, on the approach to the Cirque de Gavarnie, a natural amphitheatre, *département* of Hautes-Pyrénées, Midi-Pyrénées region, in the central Pyrenees, on the French side of the Franco-Spanish frontier. The village, at an altitude of 4,452 ft (1,357 m) in the valley of the Gave (torrent) de Pau, was a resting place in medieval times for pilgrims travelling to Santiago



The Cirque de Gavarnie seen from a trail in the valley of Gavarnie, France

F. Jalain—TOP

de Compostela in northwestern Spain, one of the chief shrines of Christendom.

The Cirque de Gavarnie, about 2½ mi (4 km) south of the village, is described by the 19th-century French writer Victor Hugo as "a mountain and a wall at the same time . . . the colosseum of nature." From its floor, glacially eroded rock walls rise to about 5,000 ft. It has three conspicuous terraces in which precipitous faces are succeeded upward by steep slopes of ice and snow. The Grande Cascade plunges about 1,400 ft from the eastern side. Above are the high summits of the Franco-Spanish frontier ridge, rising to nearly 11,000 ft. Also conspicuous is the deep cleft known as the Brèche de Roland. Nearby is the Grotte Casteret, containing a frozen underground stream. Pop. (1982) 115.

Gavāter, Khalij-e (Iran and Pakistan): *see* Gwādar Bay.

Gavazzi, Alessandro (b. March 21, 1809, Bologna, Kingdom of Italy—d. Jan. 9, 1899, Rome), reformer in church and politics during the Risorgimento (Italian unification) who inveighed against the neglect of social problems and Italian unity by the papacy.

Gavazzi at first became a monk (1825) and attached himself to the Barnabites at Naples, where he afterwards (1829) acted as professor of rhetoric. In 1840, having already expressed liberal views, he was removed to Rome to fill a subordinate position. Leaving his own country after the capture of Rome by the French, he carried on a vigorous campaign against priests and Jesuits in England, Scotland, and North America, partly by means of a periodical, the *Gavazzi Free Word.*

During a lecture tour of North America, Gavazzi, on June 6, 1853, speaking in strongly Catholic Quebec, provoked a riot that was quelled by troops. Another demonstration occurred three days later, while Gavazzi was lecturing in Montreal. Troops were once again called out to maintain order; this time they fired on the demonstrators, killing 11 of them. These incidents (known historically as the Gavazzi Riots) aggravated religious antagonisms in Canada, and the Hincks-Morin administration was criticized for its handling of the riots.

While in England he gradually went over (1855) to the Evangelical Church and became head and organizer of the Italian Protestants in London. Returning to Italy in 1860, he served as army chaplain with Garibaldi. In 1870 he became head of the Free Church (*Chiesa libera*) of Italy, united the scattered congregations into the Unione Delle Chiese Libere in Italia, and in 1875 founded in Rome the theological college of the Free Church, in which he himself taught dogmatics, apologetics, and polemics. In his teachings he aimed to restore Christianity to its original simplicity while avoiding the prolix doctrinal controversies between Protestants and Roman Catholics.

Gaveston, Piers, EARL OF CORNWALL (b.*c.* 1284—d. June 19, 1312, near Warwick, Warwickshire, Eng.), favourite of the English king Edward II. The King's inordinate love for him made him rapacious and arrogant and led to his murder by jealous barons.

The son of a Gascon knight, he was brought up at the court of Edward I as foster brother and playmate for his son Edward, the future king. Strong, talented, and ambitious, Gaveston gained great influence over young Edward, and early in 1307 he was banished from England by the King; but he returned after the death of Edward I a few months later (July 1307), and at once became the chief adviser of Edward II. Made earl of Cornwall, he received both lands and money from the King and added to his wealth and position by marrying Edward's niece, Margaret, daughter of Gilbert de Clare, earl of Gloucester (d. 1295). He was regent of the kingdom during the King's short absence in France in 1308 and took a very prominent part at Edward's coronation in February of this year. These proceedings aroused the anger and jealousy of the barons, and their anger was diminished neither by Gaveston's superior skill at the tournament nor by his haughty and arrogant behaviour toward themselves. They demanded his banishment; and the King, forced to assent, sent his favourite to Ireland as lieutenant, where he remained for about a year.

After his recall by Edward in July 1309 (an event sanctioned by some of the barons), Gaveston became more insolent than ever, and the old jealousies soon broke out afresh. In 1311 the King was forced to agree to the election of the "Ordainers," and the Ordinances that they drew up provided, among other things, for the perpetual banishment of his favourite. Gaveston then retired to Flanders, but returned secretly to England at the end of 1311. Soon he was publicly restored by Edward, and the barons had taken up arms. Deserted by the King, he surrendered to Aymer de Valence, earl of Pembroke, at Scarborough in May 1312 and was taken to Deddington in Oxfordshire, where he was seized by Guy de Beauchamp, earl of Warwick. Conveyed to Warwick Castle, he was beheaded on Blacklow Hill near Warwick. His body was buried with great ceremony in 1315 at King's Langley, in Hertfordshire, on orders of the King.

gavial, also called GHARIAL (*Gavialis gangeticus*), long-snouted reptile belonging to the order Crocodilia; it is related to alligators and crocodiles but classified as the sole species in the separate family Gavialidae. The gavial inhabits the rivers of northern India. Like other crocodilians, it is lizard like and reproduces by

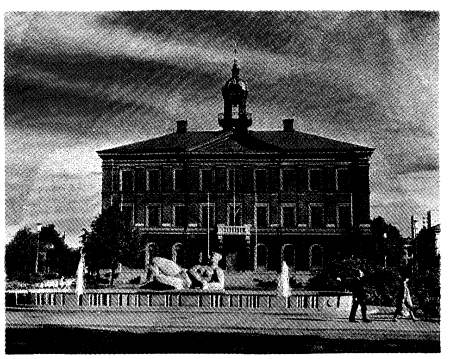
Gavial (*Gavialis gangeticus*)

E.R. Degginger

means of hard-shelled eggs laid in nests built by the female. It is distinguished, however, by its long, very slender, and sharp-toothed jaws, which it sweeps sideways in order to catch fish, its main prey. The gavial normally attains a length of about 4–5 metres (12–15 feet). It does not attack man but apparently does feed on corpses set afloat in funeral ceremonies on the Ganges River.

The false gavial (*Tomistoma schlegeli*) looks like a gavial but is placed with the crocodiles in the family Crocodilidae. It is found in southeastern Asia.

Gävle, town and port, capital of Gävleborg *län* (county), east central Sweden, on an inlet



The 18th-century courthouse in Gävle, Swed.

T. Lindeberg—Ostman Agency

of the Gulf of Bothnia, northwest of Stockholm. Although first mentioned in documents in the 8th century, it was not chartered until 1446. Despite several devastating fires, it grew from a fishing village into the main centre and export city for Norrland and the northern part of the iron-producing Bergslagen region. Manufactures range from paper to leather goods and porcelain; there is also a shipbuilding yard. The town has a restored late-16th-century castle and an 18th-century courthouse. Nearby Furuvik is a popular resort, and southeast of the city, at Järvsta, is a Viking burial ground. Pop. (1984 est.) mun., 87,671.

Gävleborg, *län* (county), east central Sweden, on the shores of the Gulf of Bothnia. Its land area of 7,024 sq mi (18,191 sq km) is composed of the traditional *landskap* (province) of Gästrikland, most of that of Hälsingland, and a small part of that of Dalarna. Although low and level along the coast, it rises inland toward a wooded highland. The rivers—Ljusnan, Voxnan, Jädraån, Gävleån, and Dalälven—are not suitable for navigation but are used to produce hydroelectric power. Agriculture is not of great importance, though grain and potatoes are grown, and there is some stock raising. Along the coast, particularly around Gävle, the capital, there is extensive industrial development; paper and textiles are manufactured, and lumbering and sawmilling are important. Sandviken, which has had a steel industry since 1860, is noted for its saws. Other principal cities are Söderhamn, Bollnäs, and Hudiksvall. Pop. (1984 est.) 291,497.

gavotte, lively peasants' kissing dance that became fashionable at the 17th- and 18th-century courts of France and England. Supposedly originated by the natives of Gap (Gavots) in the southeastern French province of Dauphiné, the gavotte was danced in royal ballrooms as a round with skipping steps adapted from the branle. Couples concluded

"Gavotte," illustration by Randolph Caldecott from *Bretonfolk*

By courtesy of the Victoria and Albert Museum, London

improvised duet performances by kissing their partners. Later the dance developed more formal figures, and flowers were exchanged instead of kisses. At the French court in the 18th century, the gavotte was at first stately and later more ornate; its slow walking steps were in $\frac{4}{4}$ time, with upbeats on beats 3 and 4.

In a suite the gavotte appears among the optional subordinate movements called *galanteries.* Its three-part composition is written in its early lusty $\frac{2}{2}$ rhythm but retains the later two upbeats; its second section is a musette, a pastoral air in which a drone bass runs throughout.

Gavrilo, original name GAVRILO DOŽIČ, or DOŽITCH (b. May 17, 1881, Morača, Montenegro—d. May 7, 1950, Belgrade), patriarch of the Serbian Orthodox Church (1938–50), noted for his anti-Nazi stand and, later, for his limited accommodations with the Communists.

Gavrilo was educated at Prizren in Serbia and at Athens and Istanbul. In 1910 he became bishop of Peć and in 1920 metropolitan of Crnagora and Primorje (Montenegro and the Littoral). Elected by 50 out of 59 votes in a secret ballot of bishops to the patriarchate of the Serbian Orthodox Church, vacant since the death of Patriarch Varnava on July 24, 1937, he was enthroned on Feb. 21, 1938.

Gavrilo was one of the instigators of the coup d'etat of March 27, 1941, that overthrew the pro-Axis government. After Germany had invaded Yugoslavia that same year, Gavrilo remained in his country but was arrested, interned first at monasteries, and then sent to the concentration camp at Dachau. Liberated on April 30, 1945, by the U.S. Army, he lived for a time in Rome, returning to Belgrade in November 1946. In December 1946 Gavrilo spoke at an all-Slav congress in Belgrade. A year later he called on the Orthodox clergy to cooperate with the government but, nevertheless, later refused to recognize the League of Serbian Priests, sponsored by the Communist Party. In July 1948, accompanied by Metropolitan Josip of Skopje, Gavrilo was present at the congress of the Orthodox churches in Moscow, but he refused to recognize the patriarch of Moscow and All-Russia as head of the Orthodox churches throughout the world.

Gawain, hero of Arthurian legend and romance. A nephew and loyal supporter of King Arthur, Gawain appeared in the earliest Arthurian literature as a model of knightly perfection, against whom all other knights were measured. In the 12th-century *Historia regum Britanniae,* by Geoffrey of Monmouth, Gawain (or Walgainus) was Arthur's ambassador to Rome; his name (spelled "Galvaginus") is carved against one of the figures on the 12th-century archivolt of Modena cathedral in Italy. In the verse romances of Chrétien de Troyes in the 12th century, he was never a hero but always a leading character who displayed outstanding prowess, which was, however, surpassed by that of Lancelot (who was inspired by the power of courtly love) and by that of the Grail-winner Perceval (who received spiritual inspiration).

As the Grail theme began to emerge as an important element of Arthurian romance, in the great prose romances of the 13th century known as the Vulgate cycle, Gawain was no longer seen as the ideal knight. In the *Queste del Saint Graal,* especially, he was unable to perceive the spiritual significance of the Grail, refused to seek divine aid through the sacraments, relied on his own prowess, and failed utterly in the quest. This deterioration of character was even more marked in later romances, such as the prose *Tristan,* in which a number of episodes depict him as treacherous and brutal to women. These darker aspects of his character were transmitted to English-speaking readers in Sir Thomas Malory's late 15th-century prose work *Le Morte Darthur.*

In Middle English poetry, however, Gawain was generally regarded as a brave and loyal knight. Perhaps his most important single adventure was that described in a fine, anonymous 14th-century poem, *Sir Gawayne and the Grene Knight* (*q.v.*), which tells the much older story of a beheading challenge.

In several of the romances and in Malory, Gawain's strength waxed and waned with the sun, and Sir John Rhys (*Studies in the Arthurian Legend,* 1891) traced Gawain's links with the solar deity of Celtic mythology, Gwalchmei (with whom Gawain was also equated in a Welsh translation of Geoffrey's *Historia*). *See also* Arthurian legend; Grail.

Gawler, town, South Australia, northeast of Adelaide. It lies at the confluence of the North and South Para rivers (which there form the Gawler River), at the western foot of the Mt. Lofty Ranges. Surveyed in 1839, it was named after George Gawler, governor and resident commissioner in South Australia (1838–41), and was proclaimed a municipality in 1857. Fast becoming a dormitory town for Adelaide 25 mi (40 km) south, it serves as a marketing centre for a district producing wheat, fruits, sheep, dairy products, wine grapes, and flowers. Industries include flour milling, wine making, and the manufacture of agricultural machinery, clothing, cement, and bricks. Roseworthy Agricultural College is 7 mi north, and Parra Wirra Recreational Park and Sandy Creek Conservation Park are nearby. Pop. (1981) 9,433.

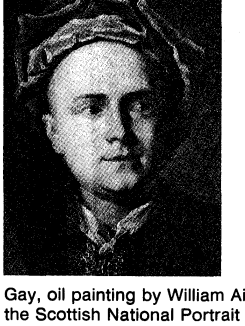
Gawler Ranges, mountains and hills in South Australia, extending 100 mi (160 km) east–west across the northern part of Eyre Peninsula, south of Lake Gardner; in altitude they rise in the west to as high as 1,550 ft (475 m) in Mount Bluff. The ranges were first sighted by the European explorer Edward John Eyre in 1839 and named in honour of the local governor George Gawler. The semi-arid shrub vegetation that covers them allows only limited livestock raising, but the eastern sector, known as the Middleback Ranges, contains rich iron-ore deposits, mined since the early part of the 20th century. The region includes Yantanabie Historic Reserve, site of an old Aboriginal quarry, and Yardea National Estate, site of picturesque columns of porphyry.

Gay, Jean-Baptiste-Sylvère (French statesman): *see* Martignac, Jean-Baptiste-Sylvère Gay, vicomte de.

Gay, John (b. June 30, 1685, Barnstaple, Devon, Eng.—d. Dec. 4, 1732, London), English poet and dramatist, chiefly remembered as the author of *The Beggar's Opera,* a work distinguished by good-humoured satire and technical assurance.

A member of an ancient but impoverished Devonshire family, Gay was educated at the free grammar school in Barnstaple. He was apprenticed to a silk mercer in London but was released early from his indentures and, after a further short period in Devonshire, returned to London, where he lived most of his life. Among his early literary friends were Aaron Hill and Eustace Budgell, whom he helped in the production of *The British Apollo,* a question-and-answer journal of the day. Gay's journalistic interests are clearly seen in a pamphlet, *The Present State of Wit* (1711), a survey of contemporary periodical publications.

From 1712 to 1714 he was steward in the household of the Duchess of Monmouth, which gave him leisure and security to write. He had produced a burlesque of the Miltonic style, *Wine,* in 1708, and in 1713 his first important poem, *Rural Sports,* appeared. This is a descriptive and didactic work in two short books dealing with hunting and fishing but containing also descriptions of the countryside and meditations on the Horatian theme of retirement. In it he strikes a characteristic note



Gay, oil painting by William Aikman; in the Scottish National Portrait Gallery, Edinburgh

By courtesy of the Scottish National Portrait Gallery, Edinburgh

of delicately absurd artificiality, while a deliberate disproportion between language and subject pays comic dividends and sets a good-humoured and sympathetic tone. His finest poem, *Trivia: or, The Art of Walking the Streets of London* (1716), displays an assured and precise craftsmanship in which rhythm and diction underline whatever facet of experience he is describing. A sophisticated lady crossing the street, for example:

> Her shoe disdains the street: the lady fair
> With narrow step affects a limping air.

The couplet does not aim to startle the reader, yet the experience is perfectly conveyed. Another couplet, on the presence of spring felt throughout the whole of creation, states:

> The seasons operate on every breast:
> 'Tis hence that fawns are brisk,
> and ladies drest.

Here the effect is at once satirical, sympathetic, and—in its correlation of the animal and human kingdoms—philosophical. It is in such delicate probing of the surface of social life that Gay excels. *The Shepherd's Week* (1714) is a series of mock classical poems in pastoral setting; the *Fables* (two series, 1727 and 1738) are brief, octosyllabic illustrations of moral themes, often satirical in tone.

The Beggar's Opera was produced in London on Jan. 29, 1728, by the theatre manager John Rich at Lincoln's Inn Fields Theatre. It ran for 62 performances (not consecutive, but the longest run then known). A story of thieves and highwaymen, it was intended to mirror the moral degradation of society and, more particularly, to caricature the prime minister Sir Robert Walpole and his Whig administration. It also made fun of the prevailing fashion for Italian opera. The play was stageworthy, however, not so much because of its pungent satire but because of its effective situations and "singable" songs. The production of its sequel, *Polly,* was forbidden by the lord chamberlain (doubtless on Walpole's instructions); but the ban was an excellent advertisement for the piece, and subscriptions for copies of the printed edition made more than £1,000 profit for the author. (It was eventually produced in 1777, when it had a moderate success.) His *Beggar's Opera* was successfully transmitted into the 20th century by Bertholt Brecht and Kurt Weill as *Die Dreigroschenoper* (1928; *The Threepenny Opera*).

"Honest" John Gay lost most of his money through disastrous investment in South Sea stock, but he nonetheless left £6,000 when he died. He was buried in Westminster Abbey, next to the poet Geoffrey Chaucer, and his epitaph was written by Alexander Pope.

Gay, Sophie, in full MARIE-FRANÇOISE-SOPHIE NICHAULT DE LAVALETTE GAY (b. July 1, 1776, Paris, Fr.—d. March 5, 1852, Paris), French writer and grande dame who wrote romantic novels and plays about upper-class French society during the early 19th century.

The daughter of a bursar to the Count de Provence (later King Louis XVIII), she married twice, the second time to a financier named Gay. Her first published writings, in 1802, yielded a novel, *Laure d'Estell,* but she did little other writing for 11 years, during which she led a somewhat notorious life. Among her numerous later novels were *Léonie de Montbreuse* (1813), *Malheurs d'un amant heureux* (1818, 1823; "Misfortunes of a Happy Lover"), *Le Moqueur amoureux* (1830; "The Amorous Mocker"), *La Physiologie du Ridicule* (1833; "The Physiology of Ridicule"), and *Le Mari confident* (1849; "The Confident Husband"). Mme Gay also wrote for the theatre, both drama and comic operas, with words and music; the play *La Duchesse de Châteauroux* (1834) received great success.

During the reign of Louis-Philippe, Mme Gay's salon was one of the most fashionable in Paris.

gay liberation movement, also called GAY RIGHTS MOVEMENT: *see* homosexual rights movement.

Gay-Lussac, Joseph-Louis (b. Dec. 6, 1778, Saint-Léonard-de-Noblat, Fr.—d. May 9, 1850, Paris), French chemist and physicist, pioneer investigator of the behaviour of gases and of techniques of chemical analysis, and one of the founders of meteorology.

Early investigations. Young Gay-Lussac entered the new École Polytechnique in Paris

Gay-Lussac, engraving by Ambroise Tardieu
By courtesy of the Bibliotheque Nationale, Paris

in 1797 and was graduated in 1800. He started further engineering studies at the School of Bridges and Highways but withdrew in 1801 when invited to become assistant to the distinguished chemist Claude-Louis Berthollet. Much of Gay-Lussac's early research was done in the laboratory at Berthollet's country house at Arcueil, near Paris. This village was the centre of an active group of young scientists known as the Arcueil circle and guided by Berthollet and Pierre-Simon Laplace, both of whom enjoyed the patronage of Napoleon.

Gay-Lussac's first major investigation was a study of the thermal expansion of gases. In 1802 he showed that all gases expand by the same fraction of their volume for the same increase in temperature. The existence of this common thermal-expansion coefficient made it possible to define a new temperature scale, the profound thermodynamic significance of which was later established by Sir William Thomson (later Lord Kelvin).

On Aug. 24, 1804, Gay-Lussac and Jean-Baptiste Biot ascended in a hydrogen-filled balloon to a height of some 13,000 feet (about 4,000 m) in order to study the variation of the Earth's magnetic intensity with altitude. Gay-Lussac made a second ascent alone on September 16 of the same year, reaching a height of 23,018 feet (7,016 m), an altitude record that was unbroken for half a century. On his second flight Gay-Lussac repeated the magnetic measurements, studied the variation of pressure and temperature, and collected samples of air at an altitude of more than 20,000 feet (6,000 m). He concluded from his observations and subsequent analyses that both the Earth's magnetic intensity and the chemical composition of the atmosphere were constant up to the altitude he had reached.

Shortly after the balloon flights, Gay-Lussac began to collaborate with Alexander von Humboldt, a Prussian nobleman, world traveler, self-taught scientist, and (later) scientific popularizer, who was then a new member of the Arcueil circle. Their experiments led in 1805 to a precise determination of the relative proportions with which hydrogen and oxygen combine to form water. Gay-Lussac emphasized that the proportion by volume rather than by weight should be studied, and the results justified his position: one volume of oxygen combines with two volumes of hydrogen in forming water.

Gay-Lussac's law. On Dec. 31, 1808, the year in which he was married, Gay-Lussac announced the law that now bears his name. By this time he had been elected a member of the Institute of France and appointed to a professorship in Paris. His chemical researches in collaboration with another French chemist, Louis-Jacques Thenard, had brought him back to the problem of the proportions in which chemical reagents combine. His own experiments, in conjunction with results already reported by others, led Gay-Lussac to the conclusion that "gases combine in very simple proportions" and that "the apparent contraction in volume which they experience on combination has also a simple relation to the volume of the gases, or at least to one of them." This relationship is known as the law of combining volumes and as Gay-Lussac's law. Among the simple proportions he cited as examples were the equal combining volumes of hydrogen chloride and ammonia and the 2:1 ratio of the combining volumes of carbon monoxide and oxygen.

Gay-Lussac pointed out that the simple regularities of his law were realized only for gases, for which matter behaves in the simplest and most universal manner. It is worth noting that the English chemist John Dalton's laws of definite and multiple proportions in chemical composition (formulated in the same period) referred to combining weights and not to volumes. This basic difference in approach led each scientist to be skeptical of the other's results, and they did not reach mutual understanding. (The Italian physicist Amedeo Avogadro showed how the results of Dalton and Gay-Lussac could be reconciled.)

Other chemical researches. The collaborative work that Gay-Lussac did with Thenard was prompted by Sir Humphry Davy's successful electrochemical research, and they used methods similar to Davy's to study the chemical effects of the electric current. After Davy isolated potassium and sodium, Gay-Lussac and Thenard prepared much larger quantities of the two newly discovered elements by purely chemical methods and were able to establish the properties of potassium. They anticipated Davy in discovering the element boron, which they named. Gay-Lussac and Davy independently and virtually simultaneously studied the properties of iodine (named by Gay-Lussac) in 1813.

Gay-Lussac's studies of hydrogen chloride, hydrogen iodide, and hydrogen fluoride prepared the way for a new theory of the nature of acids, although Gay-Lussac himself did not formulate it. (It had been held several years earlier by Antoine Lavoisier that oxygen is a common constituent of all acids.) In further work along this line, Gay-Lussac showed prussic acid (hydrocyanic acid, or hydrogen cyanide) to be composed only of hydrogen, carbon, and nitrogen. In 1815 he identified the gas cyanogen $(CN)_2$ and pointed out that the combination of one carbon atom (C) and one nitrogen atom (N) acted as a compound radical—*i.e.,* a group of atoms acting as a single unit in chemical reactions.

Among Gay-Lussac's many other investigations were his early analyses of vegetable and animal substances, his studies of the solubility of salts as a function of temperature, and his important contributions to volumetric analysis. In 1832 he gave up his professorship of physics to accept the chair of chemistry at the National Museum of Natural History in Paris. He also held a number of advisory positions, in which he used his technical knowledge to suggest improvements in industrial chemical processes.

He was elected to the Chamber of Deputies in 1831, 1834, and 1837 and in 1839 accepted a peerage from Louis-Philippe, after having

refused one that had been offered years earlier by Charles X.

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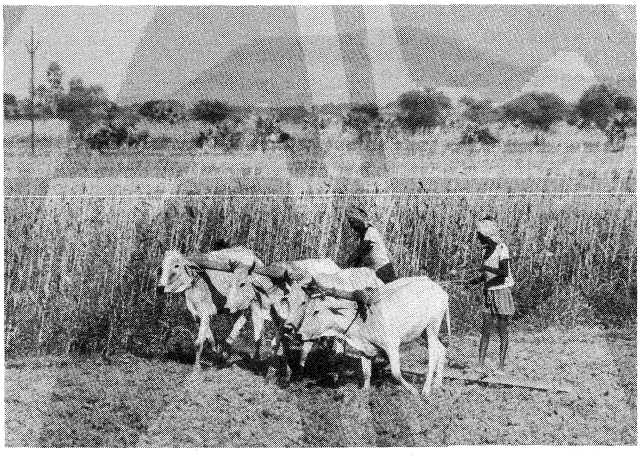
Gayā, town, west-central Bihār state, northeastern India, on the Phalgu River, a tributary of the Ganges. With major rail, road, and air connections, Gayā is a major centre of commerce.

The town lies near the junction of the Gangetic Plain and the Choṭa Nāgpur plateau and is notoriously hot in summer. It is a noted Hindu pilgrimage centre, visited by about 300,000 pilgrims annually. There are 45 sacred places between Pretsil hill (north) and Buddh Gayā (south), but most are in Gayā itself. The principal shrine is the Vishnu temple built by the Marāṭhā princess Ahalyā Bāī in 1787. Others are the rocky, temple-covered hills of Ramsilla and Brahmajini, the latter identified with the Gayāśīrṣa hill on which the Buddha preached. The town also contains several libraries and several colleges affiliated with Magadh University. Gayā was constituted a municipality in 1865.



Farmers plowing in Gayā, Bihār state, India
Milt and Joan Mann—CAMERAMANN INTERNATIONAL

In the surrounding region, grains, oilseeds, and sugarcane are grown with the aid of irrigation from the Son, Pūnpūn, Morhar, and Phalgu rivers and the Patna Canal system. Building stone and mica deposits are worked in the region. Pop. (1981) 247,075.

gayal, also called MITHAN (*Bos frontalis*), one of the species of true cattle, belonging to the subfamily Bovinae (order Artiodactyla), from India and Burma. Considered a domestic form of the gaur, the gayal has larger dewlaps and thicker horns that extend outward without curving. Bulls stand 1.5 m (5 feet) at the shoulder and are blackish with white leg markings that look like stockings and a tail tuft, while the slightly shorter cows and the young are more brown than black. Woodland dwellers, they browse rather than graze. Traditionally, the gayal is never milked but is slaughtered for ceremonies or exchanged in payment of bride-price.

Gayley, James (b. Oct. 11, 1855, Lock Haven, Pa., U.S.—d. Feb. 25, 1920, New York City), American metallurgist who invented a device to ensure uniform humidity in the air stream going into blast furnaces.

Gayley enjoyed a long and brilliant career in a variety of positions with steel companies. Beginning as a chemist for the Crane Iron Company, in Pennsylvania, by the age of 30 he had worked his way up to superintendent of blast furnaces at a Pennsylvania steel plant that later became Carnegie Steel Company. By 1901 he was first vice president of the newly formed United States Steel Corporation (which included Carnegie Steel Company).

Throughout his career Gayley developed numerous devices to improve the construction of blast furnaces and the quality of iron produced in them, the most important of which was a device (patented with improvements 1894–1911) to prevent water vapour in the air from entering the furnace with the air blast and absorbing heat; previously, such vapour (a particular problem in regions with hot, humid summers) had harmed the quality of the pig iron. Gayley's basic idea, although improved upon or varied by his successors, has remained in wide use.

In addition to his many inventions improving blast furnaces, Gayley was a prolific author of technical papers on the subject. With the gains from his varied career, he endowed the Gayley Hall of Chemistry and Metallurgy at Lafayette College, Easton, Pa.

gaylussite, a carbonate mineral, hydrated sodium and calcium carbonate [formulated $Na_2Ca(CO_3)_2 \cdot 5H_2O$], that precipitates from soda lakes. It has been identified in deposits at Lagunillas, Venezuela; in the eastern Gobi Desert, Mongolia; near Ragtown, Nev.; at Borax Lake, Mono Lake, and Searles Lake, Calif.; and Independence Rock, Wyo. Gaylussite readily weathers to calcite. For detailed physical properties, *see* carbonate mineral (table).

Gayōmart, Avestan GAYŌ MARETAN ("Mortal Life"), in later Zoroastrian creation literature, the first man, progenitor of mankind "Who first from Ahura Mazdā / Heard the mind and teachings, / From whom, too, Ahura Mazdā / Formed the Aryan countries' household / And the seed of the Aryan countries." Gayōmart's spirit, with that of the primeval ox, lived for 3,000 years during the period in which creation was only spiritual. His mere existence immobilized Ahriman, the evil spirit who craved to invade creation. Then Ahura Mazdā created Gayōmart incarnate—white and brilliant, shining like the sun—and put in him and the primeval ox, alone of all created things, a seed whose origin was in fire.

Ahura Mazdā gave Gayōmart the boon of sleep for respite from the onslaught of Ahriman. But after 30 years of fervid attack, Ahriman and his foul pack destroyed Gayōmart. His body became the Earth's metals and minerals. Gold was his seed, and from it sprung the human race.

Gaza, kingdom established in the highlands of the middle Sabi River in Mozambique in the 1830s by Soshangane, the Ndwandwe general who fled from Zululand after his defeat at the hands of Shaka during the Zulu–Nguni wars known as the Mfecane. Soshangane extended his control over the area between the Inkomati and the Zambezi, incorporating the local Tsonga and Shona peoples into his Zulu-type state and reducing the Portuguese to tributary status. The kingdom lasted until 1897, when, weakened by internal tensions, it was overthrown by the Portuguese.

Gaza, Arabic GHAZZAH, Hebrew 'AZZA, largest city of the Gaza Strip, in southwest Palestine, and since 1967 the administrative headquarters for the occupying Israeli military forces.

Records exist of its continuous habitation for more than 3,000 years; the earliest is a reference by Pharaoh Thutmose III (18th dynasty; 15th century BC). It is also mentioned in the Tell el-Amarna tablets, the diplomatic and administrative records of ancient Egypt. After 300 years of Egyptian occupation, one of the Sea Peoples, the Peleset (Philistines) settled the city and surrounding area. Gaza became an important centre of the Philistine Pentapolis (league of five cities). There the biblical hero Samson perished while toppling the temple of the god Dagon. Because of its strategic position on the Via Maris, the ancient coastal road linking Egypt with Palestine and the lands beyond, Gaza knew little peace in antiquity; it fell, successively, to the Israelite king David and to the Assyrians, Egyptians, Babylonians, and Persians. Alexander the Great met stiff resistance there; he sold its inhabitants into slavery. Throughout its history it was a prosperous trade centre; in Hellenistic and Roman times, the harbour, about 3 miles (5 km) from the city proper, was called Neapolis (Greek: "New City"). In AD 635 the Arabs took Gaza, and it became a Muslim city. Reputed site of the burial place of Hāshim ibn 'Abd Manāf, great-grandfather of the Prophet Muḥammad, and birthplace of ash-Shāfi'ī (767–820), founder of the Shāfi'ite school of Muslim legal interpretation, Gaza has long been an important centre of Islāmic tradition. The city declined during the Crusades and never regained its former importance. After Saladin (Ṣalāḥ ad-Dīn) defeated the crusaders at the Battle of Ḥaṭṭīn (1187), Gaza reverted to Muslim control, passing to the Ottoman Turks in the 16th century. In World War I it was stoutly defended by the Turks and was not taken by the British forces until November 1917.

After the war Gaza became part of mandated Palestine; a small coastal port (fishing, lighterage) was operated on the coast. When the Palestine partition plan was promulgated by the United Nations (1947), Gaza was assigned to the Arab state. This state, however, was not set up, and Gaza was occupied in 1948 by Egyptians. At the time of the signing of the Israeli–Egyptian armistice (February 1949), Egypt held Gaza and its environs, a situation that resulted in creation of the Gaza Strip. Egypt did not annex the city and territory but administered it through a military governor. Gaza and its surroundings continue to be greatly overpopulated by Arab refugees from Palestine.

During the Sinai Campaign of November 1956, Gaza and environs were taken by Israeli troops, but international pressure soon forced Israel to withdraw. Reoccupied in the Six-Day War (June 1967), the city has since been under Israeli military administration.

Long a prosperous citrus centre, Gaza also has extensive truck farms within the city limits. Dark pottery, food products, and finished textiles are manufactured, and the city has a long-standing textile industry.

Sites of interest include a mosaic floor at the

harbour (6th century AD; Byzantine period), evidently of an early synagogue, showing King David playing the harp and dressed as the Greek hero Orpheus. Pop. (1979 est.) 120,000.

Gaza Strip, Arabic QIṬĀʿ GHAZZAH, Hebrew REẒUʿAT ʿAZZA, territory occupying 140 square miles (363 square km) in southwest Palestine, since 1967 under Israeli military administration; previously (1949–56; 1957–67) it was under Egyptian military rule, though never annexed by Egypt. Except for Jammu and Kashmir in the northwestern Indian subcontinent, it is the world's only densely settled area not recognized as a *de jure* part of any extant country. A relict of the Arab–Israel War of 1948–49, it represents the only stretch of contiguous Palestinian territory held by Egypt when the Egyptian–Israeli armistice was signed (February 1949). The armistice provided that the boundaries should not be considered political or territorial. The Israel–Egypt peace treaty of 1980, implemented in 1982, established its southwestern border.

The chief economic and social problem of the area since its creation has been the presence of large numbers of Palestinian Arab refugees, living in extreme poverty in squalid camps. Not considering the area its territory, Egypt did not allow the refugees to become citizens or to migrate to Egypt proper or to other Arab countries where they might be integrated into the population. Israel, on the other hand, did not allow them to return to their former homes. The refugees have been maintained largely through the aid of the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA). Many of the younger refugees became fedayeen (Arab commandos operating against Israel); their attacks on the Israeli civil populace were one of the causes precipitating the Sinai campaign of 1956, when the strip was taken by Israel. In the brief period (November 1956–March 1957) when the area was under Israeli rule, the coastal railway connecting it with Israel was reopened, and electricity and water-supply projects were instituted. The strip reverted to Egyptian control following strong international pressures on Israel. In the Six-Day War (June 1967) the area was retaken by Israel, which has administered it since. The Palestinian mayors of Gaza refused to accept the autonomy plan outlined in the Israel–Egypt peace treaty (1980), and the territory remained under military administration. In December 1987 the overpopulated region saw rioting and violent clashes between Palestinian Arabs and the occupying Israeli troops.

Agriculture is the economic mainstay of the employed population; nearly three-fourths of the land area is under cultivation. The chief crop, citrus fruits, raised on irrigated lands, is exported to European and other countries under arrangement with Israel. Truck crops, wheat, and olives are also produced. Light industry and handicrafts are centred in Gaza, the chief city of the area. About one-tenth of the Palestinian population travels daily to Israel (where they are not allowed to stay overnight) to work in menial jobs.

The first accurate census, conducted in September 1967, showed a population smaller than had previously been estimated by the UNRWA or by Egypt, with nearly half of the people living in refugee camps. Pop. (1987 est.) 545,000.

Gazankulu, formerly MACHANGANALAND, or MATSHANGANA-TSONGA, nonindependent black state, northeastern Transvaal, South Africa, designated for the Shangaan and Tsonga people. It is made up of three detached portions of low veld, two of which adjoin Kruger National Park. The total area in the early 1980s was 2,606 square miles (6,750 square km). The Tsonga people, the traditional inhabitants of the area, were joined by 19th-century Shangaan migrants from what is now Mozambique, culminating in a final wave of refugees, after the Gaza kingdom (ruled by the Shangaan chief, Gungunhana) was conquered by the Portuguese in 1898.

Gazankulu had a territorial assembly from 1962 until 1972, when a legislative assembly was created. The state became officially self-governing in 1973 and held an election the same year. The capital is Giyani, in the northern detached portion of the state.

Most of the land in Gazankulu is devoted to cattle grazing. There are also cultivated fields producing corn (maize), sorghum, wheat, cowpeas, fruit, and sisal. Manganese is mined, and gold and other minerals may be present. Industries produce timber and wood products, wearing apparel, quarried stone, and beverages. Letaba, which lies on a railway, has been selected as a centre for industrial development. Economic planning has moved faster in Gazankulu than in the other black states of South Africa: by the mid-1970s, plans had been drawn up for nearly all of the land in the state. Pop. (1985 prelim.) 497,213.

gazebo, lookout or belvedere in the form of a turret, cupola, or garden house set on a height to give an extensive view. The name is

Gazebo after a design by Antonio Petrini, near Würzburg, Ger.
Peter Coats

an 18th-century joke word combining "gaze" with the Latin suffix *ebo*, meaning "I shall." As a structured form, it is as old as garden history: it is the "viewing pavilion" of the Chinese or the summerhouse on the summit of a garden mount referred to by the 17th-century philosopher Francis Bacon.

The name should be applied not to any garden house but only to those with extensive views, perhaps only those with views in all directions. Few late 18th- or 19th-century "rustic" gazebos survive, but 17th-century turrets built up in an angle of the garden wall to give a prospect are not uncommon.

gazelle, any of the numerous antelopes of the genus *Gazella,* family Bovidae (order Artiodactyla). Graceful in build and small to medium in size, gazelles range over open plains and semideserts in herds that usually contain about 5 to 10 individuals but may include up to several hundred.

Gazelles are found from Mongolia westward to the Atlantic coast of northern Africa and throughout eastern and central tropical Africa. Alert, attractive animals, gazelles stand from 60 to 90 cm (2 to 3 feet) at the shoulder. They are generally some shade of brown with white underparts and rump, and many have a horizontal dark band running along each side. Horns, often lyre-shaped, are present in both sexes, except in the Persian, or goitered, gazelle (*G. subgutturosa*). The *Red Data Book* lists Pelzeln's gazelle (*G. pelzelni*) and the slender-horned gazelle (*G. leptoceros*) as critically endangered; a number of subspecies of other species are also considered endangered or seriously depleted in population.

There are about 12 species and more than 50 recognized forms of gazelles. Representatives include the following:

Dama gazelle (*G. dama*): the largest gazelle; found in northern Africa; coat ranges from reddish brown with white rump, underparts, and head and a white spot on neck in the western races, such as the critically endangered mhorr gazelle (*G. d. mhorr*), to white with reddish-brown neck and shoulders in the eastern, red-necked gazelle (*G. d. ruficollis*); horns bent sharply backward, then curved up and forward at tips.

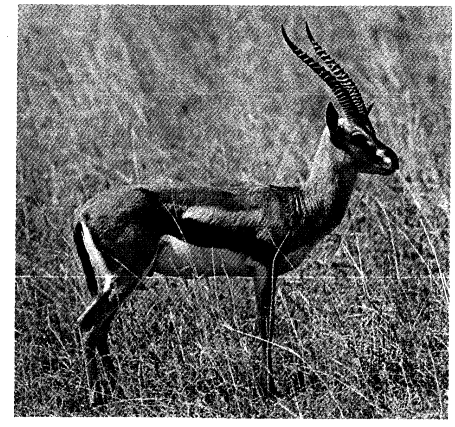
Dorcas gazelle (*G. dorcas*): small, northern African species; pale yellowish brown with faint reddish brown stripe on each side, white and reddish brown stripes on face; horns ringed, lyre-shaped.

Grant's gazelle (*G. granti*): large gazelle of eastern Africa; pale brown with dark nose spot and a distinct white stripe running from each horn to muzzle; horns long, strong, and curved, and exceptionally wide-spreading in Robert's gazelle (*G. granti robertsi*).

Persian, or goitered, gazelle (*G. subgutturosa*): found from Asia Minor to Mongolia; brownish with indistinct darker band on each side; female with rudimentary or no horns; named goitered gazelle because the larynx of the male swells during the breeding season.

Red-fronted gazelle (*G. rufifrons*): found from Senegal in the west to The Sudan in the east; reddish brown with sides marked by narrow, black streak bordered below by narrow, reddish brown band; horns strong, slightly curved.

Thomson's gazelle (*G. thomsoni*): most common gazelle in East Africa; often called Tommy; small; pale reddish brown with distinct black stripe along each side; black spot on nose, white stripes on face; horns slightly curved.



Thomson's gazelle (*Gazella thomsoni*)
E.R. Degginger—EB Inc.

Clark's gazelle (*Ammodorcas*) is the dibatag (*q.v.*); Waller's gazelle (*Litocranius*) is the gerenuk (*q.v.*).

Gazelle Peninsula, peninsula extending northeast from the island of New Britain, Bismarck Archipelago, Papua New Guinea, southwestern Pacific. It is about 50 miles (80 km) wide but tapers to 20 miles (32 km) at the isthmus joining it to the main part of the island. From coastal plains its surface rises as high as 7,999 feet (2,438 m) at Mount Sinewit of the central Baining Mountains. The area is actively volcanic (Mount Vulcan erupted in 1937), and therefore highly fertile. The peninsula is the most populous portion of the island (particularly on the east), the Germans having established their centre

of settlement there late in the 19th century. Many copra and cocoa plantations along the coast ship their produce through the ports of Rabaul and Kokopo, both on Blanche Bay, and Keravat, on Ataliklikun Bay. These settlements are served by good secondary roads.

Gazelle River (The Sudan): *see* Baḥr al-Ghazāl.

gazette, originally, a newssheet containing an abstract of current events, the forerunner of the modern newspaper. The word is derived from the Italian *gazzetta,* a name given to informal news or gossip sheets first published in Venice in the mid-16th century. Similar sheets soon made their appearance in France and in England. The type of gazette originating from the private newsletter existed in England before the middle of the 16th century but was confined mainly to detailed accounts of diplomatic maneuvers. Upon the accession of Queen Elizabeth I, however, a far greater variety of such sheets began to appear. Aimed at a wide popular audience, they disseminated gossip, trivia, unofficial news accounts from nongovernmental sources, news of recent explorations, commercial advertisements, and the more sensational news items of the day—reports of lurid crimes, supposed miracles, witchcraft, and the like. The news collected in these sheets was contributed by volunteers, was frequently based on the accounts of anonymous witnesses, and was notorious for its inaccuracy. In the 17th century the term was increasingly applied to official government publications, such as the *Oxford Gazette* (founded 1665), which is considered to be England's first true newspaper. The *Oxford* later became the *London Gazette,* which is still published as a court journal, containing records of honours, official appointments, names of bankrupts, and public notices.

Gaziantep, city, south-central Turkey. It is situated near the Sacirsuyu, a tributary of the Euphrates, in limestone hills north of Aleppo, Syria.

The city was strategically situated near ancient trade routes, and recent excavations have unearthed fragments of pottery indicating settlement there in the early 4th millennium BC. Known as Hamtap in the Middle Ages, the city was an important stronghold guarding the Syrian routes and was captured by Turks in 1183. Thereafter it changed hands among various Turkmen and Arab dynasties and Mongol and Timurid invaders until its final absorption into the Ottoman Empire in the early 16th century. Called Ayıntab (Arabic ʿAynṭāb: "Good Spring") under the Ottomans, it was occupied by the British in 1919 and by the French until 1921. By then it had become a centre of Turkish nationalist resistance to European occupation. Upon its return to Turkey in 1922, Mustafa Kemal (later called Atatürk), founder of the republic, renamed it in honour of its heroic stand (Turkish *gazi,* "champion of Islām"). Well-built, with stone houses, paved streets, and covered bazaars, Gaziantep is bordered by gardens, vineyards, and olive and nut groves.

Historical buildings include the ruined fortress built by the Byzantine emperor Justinian I (6th century AD) and mosques dating from the 11th and 16th centuries. A medieval theological college houses an archaeological museum that has an outstanding collection of Hittite seals unearthed in the region.

The surrounding area is delimited on the south by Syria and on the east by the Euphrates River. It is noted for its production of wines, *halvah*s and *baklava* (sweets), and *pekmez* (grape preserve); other products include pistachio nuts, aniseed, tobacco, and goatskin rugs. A region settled since antiquity, it includes the ancient sites of Duluk (ancient Doliche; site of the shrine of Jupiter Dolichenus); Kilis (the Assyrian Kilisi); and the neo-Hittite city of Samal (Zincirli Hüyük; *q.v.*). Pop. (1985 prelim.) city, 466,302.

gazpacho, cold soup of Spanish cuisine, especially that of Andalusia. It is an ancient dish mentioned in Greek and Roman literature, although two of the main ingredients of the modern version, tomatoes and green peppers, were brought to Spain from the New World only in the 16th century. Spanish cookbooks classify gazpacho as a salad.

The most frequently encountered gazpacho is an uncooked mixture of tomatoes, garlic, olive oil, water, vinegar, onions, cucumbers, and green peppers, thickened with bread crumbs. The word gazpacho is derived from the Arabic for "soaked bread." Gazpacho may be served with croutons, additional chopped vegetables, and chopped egg that the diners add to taste. The gazpacho of Málaga province in Andalusia is based on almonds and contains grapes.

Gbaja, also spelled GBAYA, or GBEYA (people): *see* Baya.

Gbandi (people): *see* Ngbandi.

Gbarnga, also called GBANGA, or GBANKA, city, north central Liberia, West Africa, at the intersection of roads from Monrovia and northern Sierra Leone. A rural administrative and local trade centre, it has government and church secondary schools, several churches, and a mosque. Cuttington University College (Episcopalian) and Phebe Hospital are near Suakoko, 10 miles (16 km) west. Commercial poultry farming is a local activity, and eggs and chickens are marketed throughout the country. A rubber factory began operation in 1976 to semiprocess latex into crumb rubber. Pop. (1980 est.) 10,860.

G.B.E., knight grand cross, or dame grand cross, of the British Empire, member of the highest class of a British order of knighthood. *See* British Empire, The Most Excellent Order of the.

G.C., the George Cross, a British decoration for bravery. *See* George Cross.

G.C.B., knight grand cross, or dame grand cross, of the Bath, member of the highest rank of knightly class in a British order of knighthood. *See* Bath, The Most Honourable Order of the.

G.C.M.G., knight grand cross, or dame grand cross, of St. Michael and St. George, member of the highest rank of a British order of knighthood. *See* Saint Michael and Saint George, The Most Distinguished Order of.

gcod (Tibetan: "to cut off," or "to cut up"), esoteric Tibetan Buddhist rite, performed only after extensive spiritual preparation under the guidance of a guru, that aims at "cutting off" the human ego and thus destroying the illusion of duality between samsara (the world of appearances and of death and rebirth) and Nirvāṇa. The rite is practiced by the Zhi-byed-pa sect.

The rite has been called a mystery play with but one actor. The participant performs a dance, alone, in an isolated spot, to his own accompaniment of skull drums (*ḍamaru*s) and thigh-bone trumpet. The ritual consists of conjuring up a number of terrifying deities to whom the participant symbolically offers himself as a sacrificial meal. Properly performed, he should remain conscious while undergoing the impression that the goddess Vajrayoginī cuts off his head and uses it as a caldron to hold his dismembered body. The ritual incorporates many shamanistic as well as Buddhist features (the pre-Buddhist Tibetan religion of Bon has a similar rite) and is basically initiatory, in that the participant experiences a symbolic death and rebirth.

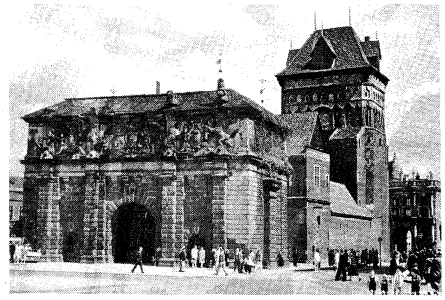
G.C.V.O., knight grand cross, or dame grand cross, of the Royal Victorian Order, member of the highest rank of a British order of knighthood. *See* Royal Victorian Order.

Gdańsk, *województwo* (province), north central Poland. It lies along the Baltic Sea and is surrounded by the provinces of Elbląg on the east, Bydgoszcz on the south, and Słupsk on the west. Its area is 2,855 square miles (7,394 square km); the landscape ranges from the sand dunes of the Baltic coastal plain in the north to the rolling moraines of the Pomeranian lakes region in the south. The delta of the Vistula River in east central Gdańsk province is a heavily cultivated, well-irrigated agricultural area growing rye and wheat. The three-port complex of Gdańsk (*q.v.*) city (the provincial capital), Gdynia, and Sopot handles more than half of the nation's shipping. Shipyards, lumber mills, metallurgical and chemical plants, oil refineries, and food-processing industries form the basis of the provincial economy. The Gdańsk Oil Refinery, the hydroelectric and thermonuclear power plants in Żarnowiec, and the thermoelectric power plant near Gdańsk city provide energy for the province's heavy industry. Resort towns are scattered along the Baltic coast. Pop. (1985 est.) 1,387,400.

Gdańsk, German DANZIG, city, capital of Gdańsk *województwo* (province), north central Poland, situated at the mouth of the Vistula River on the Baltic Sea.

First mentioned as a Polish city in 997 or 999, Gdańsk was part of the Polish diocese of Włocławek as noted in a papal bull of 1148. It was granted municipal autonomy in 1260 and developed as a trade centre. In 1308 the Teutonic Knights seized the city, which they held until 1466, when King Casimir IV of Poland regained the territory after a 13-year war. Granted local autonomy by the king in gratitude for its loyalty, Gdańsk expanded greatly, reaching its peak during the Renaissance as the most prosperous port on the Baltic. By 1754 it had the largest population (77,000) of any eastern European city and annual grain exports of more than 200,000 tons.

The Swedish wars of the 17th century halted the city's economic growth and began its decline. In 1772 Gdańsk was seized by Prussia, resulting in a rapid dissolution of port trade; and in 1793 it was incorporated as part of Prussia. Napoleon granted it the privileges of a free city in 1807, but its territorial separation from Poland, because of the existence of a Prussian corridor to the sea, ruined its economy. Gdańsk appealed for reunification with Poland (1813–14); but when the Congress of Vienna instead partitioned Poland among Russia, Austria, and Prussia, the city was relegated to the province of West Prussia. Gdańsk became somewhat industrialized but failed to regain its stature as a great Baltic trading port.



Brama Wyżynna (High Gate), Gdańsk, built 1574
By courtesy of CAF

From 1919 to 1939 it again had the status of a free city, under the Treaty of Versailles, with Poland having administrative governance over it. The Gdańsk legislative assembly, however, which was of German composition, tended to

antagonize the Polish overseer whenever possible. Poland finally built another port on Polish territory at Gdynia, 10 mi to the north. Gdynia grew rapidly, and Gdańsk also flourished. German control of the city grew stronger as the German National Socialist (Nazi) Party won a majority of the assembly seats in the 1933 and 1935 elections. In 1938 Hitler demanded that Gdańsk be given to Germany; Poland's refusal was used by Germany as provocation for its attack on Poland on Sept. 1, 1939, which precipitated World War II.

The city was greatly damaged during the war and was returned to Poland in March 1945. Now fully reconstructed, it counts among its restored buildings St. Catherine's Church, sections of which date from the 14th century, and the medieval town hall. As Danzig it was the childhood home of the contemporary German writer Günter Grass, several of whose novels were set in the locality.

The city centre, known as Stare Miasto (Old Town), lies on the Motława, a tributary of the Vistula, 2 miles (3 km) inland. The city has two main port areas. The older Nowy Port (New Port) is a major industrial centre for shipyards, metallurgical and chemical plants, timber mills, and food-processing facilities. The shipyards launched their first warship in 1572. In modern times, shipbuilding there has been an important source of foreign currency. Labour unrest in the Gdańsk shipyards in 1980 led to the creation of the Solidarity union. The Polish maritime commission was first begun there in 1568 to handle questions of defense and trade. The newer Port Północny (North Port) is Poland's largest maritime development project (its first stage completed in 1975); it handles coal exports and petroleum imports, much of the latter being processed at a nearby refinery, completed in 1975.

Gdańsk is also an important cultural seat containing schools of medicine, engineering, and fine arts; a maritime centre; many fine churches, museums, theatres, and gardens; and a concert hall and an opera house. The University of Gdańsk was opened in 1970. Gdańsk is part of the Trójmiasto (Three-City) urban area, comprising the towns of Gdańsk, Gdynia, and Sopot. Pop. (1985 est.) 467,200.

Gdańsk, Gulf of, Gdańsk also spelled DANZIG, Polish ZATOKA GDAŃSKA, Russian GDANSKAYA BUKHTA, southern inlet of the Baltic Sea, bordered by Poland on the west, south, and southeast and by Kaliningrad *oblast* (administrative region) of the Soviet Union on the east. The gulf extends 40 miles (64 km) from north to south and 60 miles from east to west and reaches its maximum depth, more than 371 feet (113 m), in its northern section.

Within the gulf are Puck Bay on the west and the Vistula Lagoon (Zalew Wiślany) on the southeast and east. The gulf receives the Vistula River and, through the Vistula Lagoon, the Nogat, Pasłeka, and Pregel rivers. Its ports include Gdańsk (Danzig), Gdynia, Sopot, Elbląg, Baltiysk, and Kaliningrad. Coastal activities include shipbuilding, fishing, and the resort trade.

Gdynia, town, Gdańsk *województwo* (province), north central Poland. It lies along the Gulf of Gdańsk, just northwest of Gdańsk city.

First mentioned in 1253, Gdynia began as a fishing settlement. Major growth came only after World War I, when Gdynia was returned from Germany to Poland by the Treaty of Versailles. When the German-controlled legislative assembly in Gdańsk barred Poland's use of that port's facilities, Poland chose Gdynia as the site for its new port. From 1924 to 1939 Gdynia was the major Baltic port, surpassing Gdańsk and Szczecin. The Nazis destroyed the town and harbour during World War II, but Gdynia was quickly rebuilt after the war. It is the site of the "Paris Commune" shipyard, one of Europe's most modern. Gdynia is part of the Trójmiasto (Three-City) urban area, along with Gdańsk and Sopot, and is the main passenger port for the three cities. It is a manufacturing centre and the home port of the Polish Navy. Its chief exports are lumber, coal, and sugar, while iron ore and food products are the main imports. The town contains a naval museum and several maritime schools. Pop. (1985 est.) 243,100.

Ge, also spelled GÊ, South American Indian peoples who speak languages of the Macro-Ge group. They inhabit eastern and southern Brazil and part of northern Paraguay. The Ge peoples include the Northwestern Ge (Timbira, Northern and Southern Kayapó, and Suyá), the Central Ge (Xavante, Xerente, and Akroá), the Jeikó, the Kamakan, and the Southern Ge, or Kaingang (Guayaná, Coroado, and others). The Ge were originally hunters and gatherers who became semisedentary farmers, although most groups retained hunting and gathering as their primary source of food. Their number probably does not exceed 10,000.

The Ge social organization is unique among South American Indians in its complexity. Every village is divided into moieties (dual groupings), clans, and associations according to age, sex, and occupation. These are found in various forms and combinations in different places. Participation in almost all aspects of life—games, ceremonies, warfare, settlement patterns, marriage, handicrafts, names, friendships—is governed by the individual's relationships and associations. The diversity among Ge peoples makes for further complexity. Some groups are matrilineal (descent being reckoned in the female line), others patrilineal; some are exogamous (marriage being restricted to individuals outside one's clan, moiety, etc.), others endogamous; some are matrilocal (the married couple residing with the female's family), others patrilocal. The infusion of social structure into every aspect of Ge life results in a decentralization of authority, since collective activities tend to be performed by those groups most capable of or best suited for their realization.

The Ge peoples share certain general beliefs about the universe and practice similar forms of magic, although there are many specific differences. Their major deities are the sun and the moon. They have shamans to cure sickness; they believe in spirits inhabiting natural phenomena; and they conduct elaborate ceremonies in which the different divisions and groups play particular roles.

Their manufactures have been influenced by modern technology, such as the use of metal tools. Neither men nor women wear any dress except body ornamentation and elaborate painting.

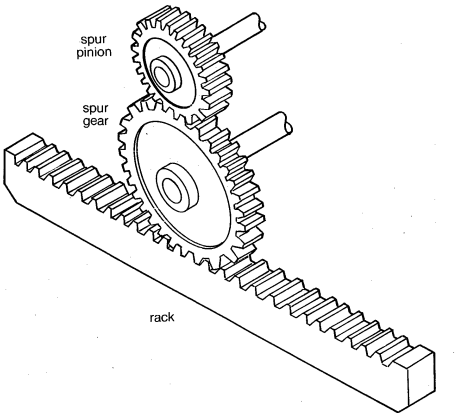
GE: *see* General Electric Company.

Ge Hong (Taoist alchemist): *see* Ko Hung.

Ge languages, a group of about 10 South American Indian languages that extend through inland eastern Brazil as far as the Uruguayan border. Most linguists classify the Ge languages with a number of smaller groups (most of which were located closer to the Atlantic coast and are now extinct) in a Macro-Ge grouping.

gear, machine component consisting of a toothed wheel attached to a rotating shaft. Gears operate in pairs to transmit and modify rotary motion and torque (turning force) without slip, the teeth of one gear engaging the teeth on a mating gear. If the teeth on a pair of mating gears are arranged on circles, *i.e.,* if the gears are toothed wheels, the ratios of the rotary speeds and torques of the shafts are constant. If the teeth are arranged on noncircular bodies the speed and torque ratios vary.

Most gears are circular. To transmit motion smoothly and with a nonvarying speed ratio at every instant, the contacting surfaces of gear teeth must be carefully shaped to a specific profile. If the smaller of a gear pair (the pinion) is on the driving shaft, the pair acts to reduce speed and to amplify torque; if the pinion is on the driven shaft the pair acts as



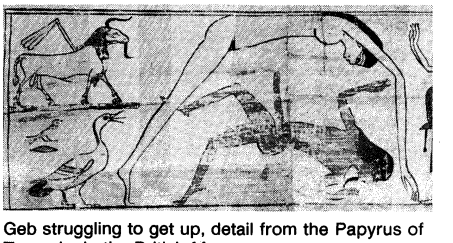
Pair of spur gears and a gear rack

a speed increaser and a torque reducer. If the driven gear has twice as many teeth as the pinion, for example, the torque of the driven gear is twice the pinion torque, whereas the pinion speed is twice the speed of the driven gear.

The shafts that gears connect must be relatively close, but they may have practically any spatial relationship with respect to one another; they may be parallel or nonparallel and intersecting or nonintersecting. For each of these arrangements of the shafts, gears having appropriate capabilities can be made. Parallel shafts can be connected by gears with teeth that are straight lengthwise and parallel to the shaft axes (spur gears) or by gears with twisted, screwlike teeth (helical gears). Intersecting shafts are connected by gears with tapered teeth arranged on truncated cones (bevel gears). Nonparallel, nonintersecting shafts are usually connected by a worm and gear. The worm resembles a screw, and the gear resembles a quarter section of a long nut that has been bent around a cylinder. The commonest angle between nonparallel shafts, either intersecting or nonintersecting, is a right angle (90°).

Because it is basically a screw, a worm gear may have only one thread (tooth), whereas to maintain continuous contact with parallel shaft gears (spur and helical), the pinion must have at least five teeth. For this reason, to obtain a large speed ratio in a single gear pair, a worm and gear are well suited. If the shafts must be parallel, it may be necessary to use several gear pairs in series (a train) to obtain a large ratio. *See also* differential gear.

Geb, also called KEB, or SEB, in ancient Egyptian religion, the god of the earth, the physical support of the world. Geb constituted, along with Nut (*q.v.*), his sister-spouse, the second generation in the Ennead (group of nine gods)



Geb struggling to get up, detail from the Papyrus of Tameniu; in the British Museum

By courtesy of the trustees of the British Museum

of Heliopolis. In Egyptian art Geb was often depicted lying under the feet of Shu, the air god, with Nut, the goddess of the sky, arched above them. Geb was usually portrayed as a man without any distinguishing characteristics, but at times he was represented with his head surmounted by a goose, the hieroglyph of his name. In Egyptian mythology he was the third divine pharaoh; the human pharaohs claimed to be descended from him, and in the Pyramid Texts the royal throne was referred to as "the throne of Geb."

Geber (fl. 14th century), unknown author of several books that were among the most influential works on alchemy and metallurgy during the 14th and 15th centuries. The name Geber, a Latinized form of Jābir, was adopted because of the great reputation of the 8th-century Arab alchemist Jābir ibn Ḥayyān. A number of Arabic scientific works credited to Jābir were translated into Latin during the 11th to the 13th century. Thus, when an author who was probably a practicing Spanish alchemist began to write in about 1310, he adopted the westernized form of the name, Geber, to give added authority to his work, which nevertheless reflected 14th-century European alchemical practices rather than earlier Arab ones.

Four works by Geber are known: *Summa perfectionis magisterii* (*The Sum of Perfection or the Perfect Magistery,* 1678), *Liber fornacum* (*Book of Furnaces,* 1678), *De investigatione perfectionis* (*The Investigation of Perfection,* 1678), and *De inventione veritatis* (*The Invention of Verity,* 1678). They are the clearest expression of alchemical theory and the most important set of laboratory directions to appear before the 16th century. Accordingly, they were widely read and extremely influential in a field where mysticism, secrecy, and obscurity were the usual rule.

Geber accepted most of the Arabic alchemical theories and spread them throughout western Europe. He assumed that all metals are composed of sulfur and mercury and gave detailed descriptions of metallic properties in those terms. He also explained the use of an elixir in transmuting base metals into gold.

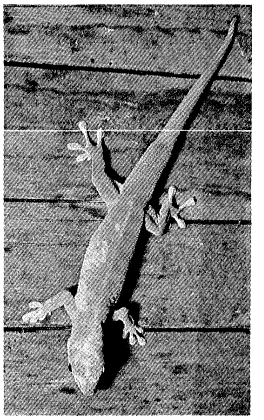
Geber's rational approach, however, did much to give alchemy a firm and respectable position in Europe. His practical directions for laboratory procedures were so clear that it is obvious he was familiar with many chemical operations. He described the purification of chemical compounds, the preparation of acids (such as nitric and sulfuric), and the construction and use of laboratory apparatus, especially furnaces. Geber's works on chemistry were not equaled in their field until the 16th century with the appearance of the writings of the Italian chemist Vannoccio Biringuccio, the German mineralogist Georgius Agricola, and the German alchemist Lazarus Ercker.

Gebhard OF DOLLNSTEIN-HIRSCHBERG (pope): *see* Victor II.

Gebrauchsmusik (German: "music for use"), also called UTILITY MUSIC, music intended, by virtue of its simplicity of technique and style, primarily for performance by the talented amateur rather than the virtuoso. *Gebrauchsmusik* is, in fact, a modern reaction against the intellectual and technical complexities of much 19th- and 20th-century music, complexities that exalt the professional virtuoso and exclude the amateur from active participation. The purpose of *Gebrauchsmusik,* then, is to allow the nonprofessional musician to regain his role as an amateur music maker by providing him with a composition suitable for impromptu, nonvirtuoso performance.

In a sense, *Gebrauchsmusik* can be traced back to the simple keyboard and lute pieces of the Renaissance, as well as to the chamber music of the Baroque and Classical eras. The term itself is a child of the 20th century, however, and most *Gebrauchsmusik* represents a species of neoclassicism (the use of old genres, but with contemporary techniques). The leading exponent of the *Gebrauchsmusik* movement was Paul Hindemith (1895–1963), who probably coined the term but later disavowed it. Bach's church music was cited as the earliest example, and later practitioners included Kurt Weill and Ernst Krenek.

gecko, also spelled GEKKO, any lizard of the harmless but noisy family Gekkonidae, which contains about 80 genera and about 750 species. Geckos are small, usually nocturnal reptiles with a soft skin, a short, stout body, large head, and weak limbs often equipped with suction-padded digits. Most species are 3 to 15 centimetres (1⅕ to 6 inches) long, including tail length (about half the total). They have adapted to habitats ranging from deserts to jungles. Many species frequent human habitations, and most feed on insects.



Diurnal gecko (*Phelsuma*)
Anthony Bannister—EB Inc.

Most geckos have feet modified for climbing. The pads of their long, flattened toes are covered with small plates that are in turn covered with numerous tiny, hairlike processes that are forked at the end. These microscopic hooks cling to small surface irregularities, enabling geckos to climb absolutely smooth and vertical surfaces and even to run across smooth ceilings. Some geckos also have retractable claws. Like snakes, most geckos have a clear protective covering over the eyes. The pupils of common nocturnal species are vertical and are often lobed in such a manner that they close to form four pinpoints. The tails of geckos may be long and tapering, short and blunt, or even globular. The tail probably serves in some species as a storehouse of reserve nutriment on which the animal can draw during unfavourable conditions. The tail may also be extremely fragile and if detached is quickly regenerated in its original shape. Geckos' colours are usually drab, with grays, browns, and dirty whites predominating, though one genus, *Phelsuma,* of Madagascar, comprises bright-green types active in the daytime. Unlike other reptiles, most geckos have a voice, the call differing with the species and ranging from a feeble click or chirp to a shrill cackle or bark. Most species are oviparous, the eggs being white and hard-shelled and usually laid beneath the bark of trees or attached to the underside of leaves. A few species in New Zealand have live births.

Geckos are abundant throughout the warm areas of the world, at least a few species occurring on each continent. The banded gecko (*Coleonyx variegatus*), the most widespread North American species, grows to 15 cm and is pinkish to yellowish tan with darker bands and splotches. The tokay gecko (*Gekko gecko*), the largest species, attains a length of 25 to 35 cm. It is gray with red and whitish spots and bands. The tokay gecko, native to Southeast Asia, is frequently sold in pet shops.

Ged, William (b. 1690, Edinburgh—d. Oct. 19, 1749, Leith, Midlothian, Scot.), Scottish goldsmith who invented (1725) stereotyping, a process in which a whole page of type is cast in a single mold so that a printing plate can be made from it. His work was opposed by typefounders and compositors, and the process was abandoned until the early 1800s.

Although Ged's system made fair copy, the opposition to his work resulted in its complete rejection by printers. He experimented in secret and won a contract to supply Bibles and prayer books to the University of Cambridge, but he was ruined by the dishonesty of his London collaborator. He then became a goldsmith and jeweler.

Gedaliah, fast of, a minor Jewish observance (on Tishri 3) that mournfully recalls the assassination of Gedaliah, Jewish governor of Judah and appointee of Nebuchadrezzar, the Babylonian king. Gedaliah, a supporter of Jeremiah, was slain by Ishmael, a member of the former royal family of Judah. When the remaining Jews fled to Egypt, Jewish self-rule was thus effectively ended. Liturgically, the fast of Gedaliah follows the ritual of other fast days but adds certain penitential prayers. The festival is postponed one day if Tishri 3 falls on the Sabbath.

Geddes, James (b. July 22, 1763, near Carlisle, Pa.—d. Aug. 19, 1838, Geddes, N.Y., U.S.), American civil engineer, lawyer, and politician who played a leading role in the construction of the Erie Canal, one of the first great engineering works in North America.

Around 1794 Geddes moved from his birthplace to Syracuse, N.Y., where he worked in the salt industry. He later studied law, was admitted to the bar, and in 1804 won a seat in the New York State Assembly. While serving in the Assembly, he met the New York surveyor general, Simeon DeWitt, who persuaded him that a canal connecting the Hudson River and the Great Lakes was feasible. Geddes then traveled around the state to gather information and to arouse enthusiasm; despite his lack of technical training, he surveyed a possible route in 1808 and reported his findings to the Assembly on Jan. 20, 1809. The route he proposed at that time was close to the one eventually followed. Between 1816 and 1822 Geddes was one of the four principal engineers involved in the construction of this, the Erie Canal, which helped to establish New York City as one of the most important ports in the United States.

In 1822 Geddes directed the construction of a canal in Ohio and six years later planned a canal in Pennsylvania. He also served one term in the U.S. Congress (1813–15).

Geddes, Norman Bel, original name NORMAN MELANCTON GEDDES (b. April 27, 1893, Adrian, Mich., U.S.—d. May 8, 1958, New York City), American theatrical designer whose clean, functional decors were a substantial contribution to the trend away from naturalism in 20th-century stage design. As an important industrial designer he helped popularize "streamlining" as a distinct modern style.

Following brief study at the Cleveland Institute of Art and the Art Institute of Chicago, Geddes became interested in the theatre and staged his first play, *Nju,* and five others for the Los Angeles Little Theatre in 1916. In New York City in 1918 he did scenic designs for the Metropolitan Opera. He designed, produced, or directed some 200 operas, films, plays, and musical comedies.

Toward the end of the 1920s, Geddes adapted his ideas to industrial design, gradually building an organization that employed 2,000

people. His designs ranged from skyscrapers, inkwells, yachts, radios, and interiors to refrigerators. One of his best-remembered designs was the General Motors Futurama building and exhibit at the New York World's Fair (1939–40). Geddes also designed theatres worldwide. He staged circuses, developed equipment and techniques for the armed services, and wrote books on many subjects.

An autobiography, *Miracle in the Evening* (1960), edited by William Kelley, depicts the designer through his theatrical work.

Geddes, Sir Patrick (b. Oct. 2, 1854, Ballater, Aberdeen, Scot.—d. April 17, 1932, Montpellier, Fr.), Scottish biologist and sociologist who was one of the modern pioneers of the concept of town and regional planning.

Greatly influenced by Charles Darwin's evolutionary arguments and their application to society, Geddes chose to study biology in London under Darwin's champion, Thomas Henry Huxley. While professor of botany at University College in Dundee, Angus (1889–1919), he emphasized the development of sexual reproduction as a major step in organic evolution and, with the naturalist John Arthur Thomson, published *The Evolution of Sex* (1889).

Geddes turned his attention to sociology after an attack of blindness in Mexico hampered his biological experimentation. His researches in India, where he served as professor of sociology and civics at Bombay University (1920–23), and in Palestine, Mexico, and Scotland formed the basis of his conviction that the development of human communities was primarily biological in nature, consisting of interactions among people, their environment, and their activities. He developed an innovative philosophy of urban planning, summarized in *City Development* (1904) and *Cities in Evolution* (1915). After his return from India, Geddes directed Scots College in Montpellier. He was knighted in 1932.

BIBLIOGRAPHY. Studies of his life and ideas include Paddy Kitchen, *A Most Unsettling Person* (1975); Philip Boardman, *The Worlds of Patrick Geddes: Biologist, Town Planner, Re-educator, Peace-warrior* (1978); and Helen Meller, *Patrick Geddes: Social Evolutionist and City Planner* (1990).

Gedeon (Old Testament hero): *see* Gideon.

Gediminas (Lithuanian), Polish GEDYMIN (b. *c.* 1275—d. 1341), grand duke of Lithuania, the strongest contemporary ruler of eastern Europe.

Gediminas succeeded his brother Vytenis (Witen) in 1316 and started the Gediminian dynasty, which included his grandson Jagiełło, later Władysław II of Poland. Gediminas' domain was composed not only of Lithuania proper and Samogitia but also of Volhynia, the northwestern Ukraine, and Belorussia to the Dnieper River. It was his difficult task to neutralize the threat of the Teutonic and Livonian Knights while still maintaining the delicate balance between his pagan Lithuanian and Samogitian subjects, his Orthodox subjects in Russia, and his occasional Roman Catholic allies in Poland and Riga. Gediminas' policy, therefore, was necessarily tentative and ambiguous.

In 1322 and 1323 he wrote to Saxon Dominicans and Franciscans and to several cities of the Hanseatic League, offering protection and privileges to monks, merchants, and artisans who would accept his invitation to settle in Lithuania. He also opened direct negotiations with the Holy See, soliciting Pope John XXII's protection against the Knights and claiming that the necessity of national defense against them, rather than any hostility to the church, had kept Lithuania pagan. In October 1323 various ecclesiastical representatives and the grand master of the Teutonic Order assembled at Vilnius, which Gediminas had recently made his capital, and a compact was signed confirming peaceful relations.

The Teutonic Knights, however, strove to nullify Gediminas' gains and refused to abide by the treaty. In response, Gediminas made an alliance with the archbishop and citizens of Riga, attained peaceful promises from his other neighbours, and further strengthened his position by entering an alliance with Roman Catholic Poland and marrying his daughter Aldona to Casimir, son of King Władysław I the Short, in 1325. The Teutonic Knights thereupon resumed the war against Gediminas, and for the remainder of his reign he was primarily concerned with defending his realm against the Knights, whose strength was reinforced by Western crusaders when it became evident that Gediminas would not honour his promise of conversion.

Gedling, district (borough), county of Nottinghamshire, east-central England. With an area of 46 square miles (120 square km), the district takes its name from the former village of Gedling, which was engulfed in the expansion of the eastern suburbs of the city of Nottingham. The district extends from the River Trent in the south to the outskirts of Hucknall and Kirkby-in-Ashfield in the northwest and includes much of Sherwood Forest. Pop. (1986 est.) 107,100.

Gedrosia, historic region west of the Indus River, in what is now the Baluchistan region of Pakistan. In 325 BC Alexander the Great's forces suffered disastrous losses there from the effects of the desert, supply shortages, and monsoons. They captured the area, but after Alexander's death his general Seleucus Nicator was forced to make peace with Chandragupta Maurya by trading Gedrosia and all his territories east of the Hindu Kush for 500 elephants. His departure ended Greek intervention on the subcontinent of India.

Gedymin (Lithuanian ruler): *see* Gediminas.

Gee, Kenneth (b. 1916, Wigan, Lancashire, Eng.), English rugby player, a member of the powerful Wigan club that won the Rugby League (RL) Challenge Cup in 1948. He was also vital as forward in Wigan's RL championship wins of 1945–46, 1946–47, and 1949–50 and the Challenge Cup victory of 1951.

During his career, Gee kicked 528 goals and scored 58 tries (touchdowns). His domineering plays between 1935 and 1955 earned him 17 British caps. He toured Australia in 1946 and 1950.

Geel, also spelled GHEEL, *commune,* Antwerp *province,* northern Belgium, in the Kempenland (Campine) Plateau, east of Antwerp. Renowned for its unique system of family care for the mentally ill, it is linked by tradition with the Irish martyr St. Dymphna, who was beheaded there by her pagan father in the 7th century and at whose tomb persons suffering from mental illness are said to have been cured. A cathedral was built in her honour, and the afflicted pilgrims were accommodated in a sickroom built next to the church. When the room became too crowded (*c.* 14th century), the patients were lodged in the homes of the inhabitants. In 1850 this religious-municipal system became a medically supervised government institution.

Served by railroads, canals, and highways, and having some small industries, Geel is now part of the Zuiderkempen, an area zoned for industrial development. The city contains a 16th-century church and a 17th-century town hall. Pop. (1982) mun., 31,438.

Geelong, second largest city of Victoria, Australia, and a major port on Corio Bay (an extension of Port Phillip Bay). Founded in 1837, its name is a derivation of the Aboriginal word *jillong,* which means "the place of the native companion," referring to a long-legged water bird. Formally declared a town in 1838, it was proclaimed a municipality in 1849. Depopulated by news of gold strikes (1851), Geelong began to recover when its rail link to Melbourne was completed (1857). It became a city in 1910 and grew rapidly after World War II.

The city is a transportation hub. Besides its port, which ranks high nationally in total trade, there are rail lines to Melbourne, Ballarat, and the Western District (an area of sheep farms, intensive agriculture, and pine plantations), the Prince's Highway to South Australia, and the Great Ocean Road along the southwest coast.

Geelong markets a significant portion of Australia's total wool clip. It ships crude and refined petroleum, grains (including a large portion of the Australian wheat export), meat, steel, and motor vehicles and parts. Other industries include the manufacture of woolens, automobiles, rope and cordage, superphosphate fertilizers, agricultural machinery, glass, and petrochemicals. Aluminum is refined at nearby Point Henry.

Geelong is an educational centre with a large library, the Gordon Institute of Technology (textiles), and several private schools, notably the Anglican Geelong Grammar School (1854). Deakin University was founded in 1977. Laboratories of the Commonwealth Scientific and Industrial Research Organization have done much to improve the area's sheep industry. The city, 40 percent of whose area is parkland, is the centre of a resort district that includes several neighbouring coastal towns. Pop. (1987 est.) 149,300.

Geer, Dirk Jan de (b. Dec. 14, 1870, Groningen, Neth.—d. Nov. 28, 1960, Soest), conservative statesman and prime minister of The Netherlands (1926–29, 1939–40) who was disgraced for attempting to negotiate a peace settlement between Great Britain and Nazi Germany in 1940.

After receiving his doctorate in law in 1895, de Geer worked as a journalist and acted as town councillor of Rotterdam (1901–07). He served as a Christian Historical member of Parliament (1907–21), minister of finance (1921–23, 1926–33, 1939–40), and minister of the interior (1925–26). He continued his second term as prime minister in London after the German invasion of The Netherlands in May 1940.

De Geer's abortive attempt to mediate between Great Britain and Germany following the collapse of France in June 1940 was disavowed by Queen Wilhelmina of The Netherlands and her Cabinet (in exile in England), and he resigned on Sept. 3, 1940. He was then entrusted with a mission to the Dutch East Indies but instead returned to The Netherlands and was denounced on a Netherlands government-in-exile broadcast (Radio Orange) from London on Feb. 6, 1941. For his mediation efforts of 1940 he was, on May 23, 1947, fined 20,000 guilders and sentenced to one year's imprisonment. The prison sentence was suspended because of his poor health and advanced age.

Geer, Gerhard (Jakob), Friherre De: *see* De Geer, Gerhard (Jakob), Friherre.

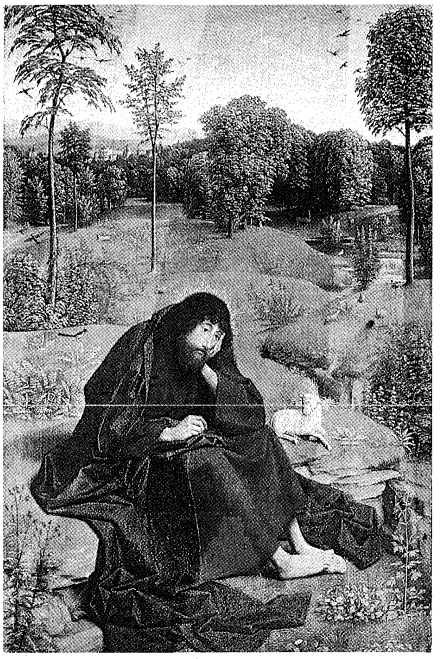
Ge'ermu (China): *see* Golmud.

Geert Groote (Dutch religious leader): *see* Groote, Geert.

Geertgen TOT SINT JANS (b. *c.* 1465—d. *c.* 1495), Dutch painter of religious subjects, notable for his harmonious fusion of the elements of the landscape.

Little is known of Geertgen's life: his surname derived from his living with the religious order of the Knights of St. John at Haarlem, Neth., where he was a pupil of the painter

Ouwater at Haarlem. Many of his works have been destroyed, but portions of his masterpiece, a large triptych for the high altar of the Knights of St. John, survive. One wing, preserved in the Vienna gallery of painting and fine arts, presages the great portrait groups of 17th-century Dutch painting.



"St. John the Baptist in the Wilderness," panel by Geertgen tot Sint Jans; in the Staatliche Museen Preussischer Kulturbesitz, Berlin

By courtesy of the Staatliche Museen Preussischer Kulturbesitz Gemaldegalerie, Berlin

Several other paintings are ascribed to Geertgen on stylistic grounds, such as "St. John the Baptist" and "Virgin and Child" in Berlin, "The Resurrection of Lazarus" in the Louvre (Paris), "The Virgin's Kindred" and "Adoration of the Magi" in Amsterdam, "The Man of Sorrows" at Utrecht, and a triptych in Prague. His "Nativity" in the National Gallery, London, is a night scene remarkable for its rendering of chiaroscuro.

Geertz, Clifford (James) (b. Aug. 23, 1926, San Francisco, Calif., U.S.), American cultural anthropologist, a leading rhetorician and proponent of symbolic anthropology and interpretive anthropology.

After service in the U.S. Navy in World War II (1943–45), Geertz studied at Antioch College, Ohio (B.A., 1950), and Harvard University (Ph.D., 1956). He taught or held fellowships at a number of schools before joining the anthropology staff of the University of Chicago (1960–70) and then became professor of social science at the Institute for Advanced Study at Princeton University (from 1970).

At Chicago Geertz became a champion of symbolic anthropology, which gives prime attention to the role of thought—of "symbols"—in society. Symbols guide action. Culture, according to Geertz, is "a system of inherited conceptions expressed in symbolic forms by means of which men communicate, perpetuate, and develop their knowledge about and attitudes toward life." The function of culture is to impose meaning on the world and make it understandable. The role of anthropologists is to try—though complete success is not possible—to interpret the guiding symbols of each culture.

Geertz's writings tend to be rhetorical and idiosyncratic, more given to metaphors and examples than bald exposition. Among his major works are *The Religion of Java* (1960), *Person, Time, and Conduct in Bali* (1966), *The Interpretation of Cultures* (1973), *Local Knowledge: Further Essays in Interpretive Anthropology* (1983), and *Works and Lives: The Anthropologist as Author* (1988).

geese: *see* goose.

Ge'ez language, also spelled GEEZ, also called ETHIOPIC, liturgical language of the Ethiopian church. Ge'ez is a Semitic language of the Southern Peripheral group, to which also belong the South Arabic dialects and Amharic, the official language of Ethiopia. Both Ge'ez and the related languages of Ethiopia are written and read from left to right, in contrast to the other Semitic languages.

Extinct as a vernacular language, Ge'ez is the ancestor of the modern Tigrinya and Tigre languages of Ethiopia. The oldest known inscription in the language dates from the 3rd or 4th century and is written in a script that does not indicate vowels. Subsequent inscriptions found in the ancient Ethiopian capital of Aksum were written from the 4th through the 9th century in a script that does indicate vowels. The Bible was translated into Ge'ez between the 5th and 7th centuries. Although the language ceased to be spoken popularly sometime between 900 and 1200, it continues as a liturgical language; the period of classical Ge'ez literature was between the 13th and 17th centuries.

Gefara (Africa): *see* Jifārah, al-.

Gegenbaur, Karl (b. Aug. 21, 1826, Würzburg, Bavaria [Germany]—d. June 14, 1903, Heidelberg, Ger.), German anatomist who demonstrated that the field of comparative anatomy offers important evidence in support of evolutionary theory.

Gegenbaur

BBC Hulton Picture Library

A professor of anatomy at the universities of Jena (1855–73) and Heidelberg (1873–1903), Gegenbaur was a strong supporter of Charles Darwin's theory of organic evolution. His *Grundzüge der vergleichenden Anatomie* (1859; *Elements of Comparative Anatomy*) became the standard textbook of evolutionary morphology, emphasizing that structural similarities in different animals constitute clues to their evolutionary history. In this work Gegenbaur stated that "the most important part of the business of comparative anatomy is to find indications of genetic connections in the organization of the animal body." He pointed out that the most reliable clue to these connections is homology, the comparison of those parts that have a common evolutionary origin, such as a man's arm, a horse's foreleg, and a bird's wing.

Gegenbaur confirmed German zoologist Theodor Schwann's hypothesis that all eggs and sperm are single cells (1861), and he supported the British biologist Thomas Huxley in disproving the concept that the vertebrate skull arose from expanded vertebrae.

gegenschein, also called COUNTERGLOW, oval patch of faint luminosity exactly opposite to the Sun in the night sky. The patch of light is so faint it can be seen only in the absence of moonlight, away from city lights, and with the eyes adapted to darkness. The gegenschein is lost in the light of the Milky Way in the summer and winter. The best observing periods are February, March, April, August, September, and October. The gegenschein and the zodiacal light, a similar phenomenon not restricted to a position opposite the Sun, form the most notable parts of a band of very faint light along the ecliptic. The spectrum of the gegenschein is similar to that of the Sun, and it is generally believed that it is the result of the reflection of sunlight from meteoric material or other dust in the Earth's orbital plane.

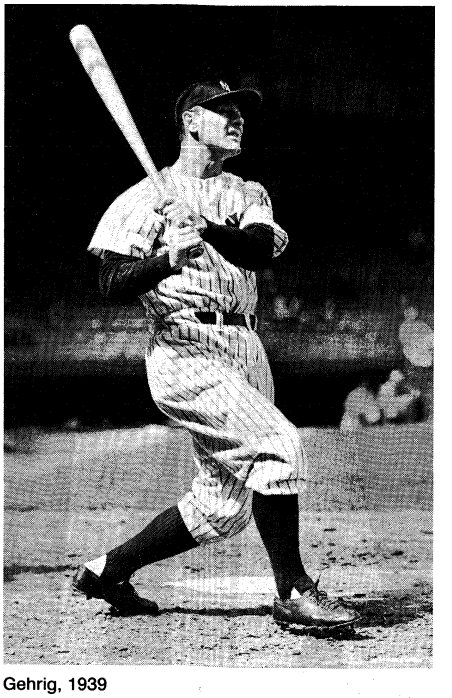
Geheime Staatspolizei: *see* Gestapo.

Gehenna, also called GEHINNOM, abode of the damned in the afterlife in Jewish and Christian eschatology (the doctrine of last things). Named in the New Testament in Greek form (from the Hebrew Ge Hinnom, meaning "Valley of Hinnom"), Gehenna originally was a valley west and south of Jerusalem where children were burned as sacrifices to the Ammonite god Moloch. This practice was carried out by the Israelites during the reigns of King Solomon in the 10th century BC and King Manasseh in the 7th century BC and continued until the Babylonian Exile in the 6th century BC. Gehenna later was made a garbage centre to discourage a reintroduction of such sacrifices.

The imagery of the burning of humans supplied the concept of "hellfire" to Jewish and Christian eschatology. Mentioned several times in the New Testament (*e.g.,* Matthew, Mark, Luke, and James) as a place in which fire will destroy the wicked, it also is noted in the Talmud, a compendium of Jewish law, lore, and commentary, as a place of purification, after which one is released from further torture.

gehlenite, mineral composed of calcium aluminum silicate, $Ca_2Al_2SiO_7$, one end-member of the melilite mineral series (*see* melilite).

Gehrig, Lou, byname of HENRY LOUIS GEHRIG (b. June 19, 1903, New York, N.Y., U.S.—d. June 2, 1941, New York City), the most durable player in American professional baseball and one of its great hitters. From June 1, 1925, to May 2, 1939, the "Iron Horse," playing first base for the New York Yankees,



Gehrig, 1939

AP/Wide World Photos

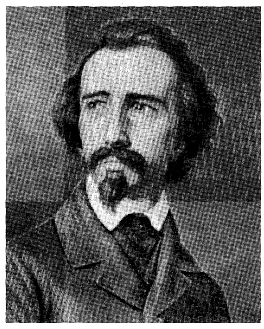
appeared in 2,130 consecutive games, a feat never approached by any other player.

Gehrig attended Columbia University before joining the Yankees' organization. In each of seven major league seasons he batted in 150 or more runs, and in 1931 he established the American League record of 184, which persisted into the 1980s. On June 3, 1932, he hit four consecutive home runs in one game. In 1934 he led the American League in batting average, home runs, and runs batted in. In that season, and again in 1936, he hit 49 home runs. He left baseball with a career batting average of .340, 493 home runs, and 1,990 runs batted in, all during regular season play. In seven World Series (34 games), he batted .361, hit 10 home runs, and drove in 35 runs.

A quiet, gentle man, Gehrig was somewhat overshadowed by his colourful teammate Babe Ruth, whom he followed in the Yankees' batting order. In 1939, when it was known that Gehrig was dying of a form of sclerosis, he was elected to the Baseball Hall of Fame.

Geiami (Japanese artist): *see* Shingei.

Geibel, (Franz) Emanuel (August) von (b. Oct. 17, 1815, Lübeck, Ger.—d. April 6, 1884, Lübeck), German poet and dramatist who was the centre of a circle of literary figures drawn together in Munich by Maximilian II of Bavaria. This group belonged to the Gesellschaft der Krokodile (Society of the Crocodiles), a literary society that cultivated traditional poetic themes and forms.



Geibel, engraving by A. Semmler after a portrait by G. Quentell
Historia-Photo

After completing his university studies, Geibel devoted himself to travel and became, in 1838, tutor to the Russian ambassador in Athens. In 1840 his extremely successful *Gedichte* ("Poems") appeared. It ran to 100 editions in his lifetime and earned him a lifelong pension from the king of Prussia, Frederick William IV. Returning to Lübeck, he taught at the *Gymnasium* until 1852, when Maximilian called him to Munich as an honorary professor of German literature and aesthetics. In 1868 he was dismissed by Maximilian's successor because of his incautious support of Prussian hegemony, and he spent the rest of his life living on his pension.

Geibel's lyrics—*Zeitstimmen* (1841; "Voices of the Times"), *Junius-Lieder* (1848; "June Songs"), and *Spätherbstblätter* (1877; "Leaves of Late Autumn")—reflect the taste of the time: classical, idealistic, and non-topical. He also made excellent translations of Romantic and ancient poets, *Spanisches Liederbuch* (1852; "Spanish Songbook") and, with Paul von Heyse, *Klassisches Liederbuch* (1875; "Classical Songbook").

Geiger, Abraham (b. May 24, 1810, Frankfurt am Main—d. Oct. 23, 1874, Berlin), German-Jewish theologian, author, and the outstanding leader in the early development of Reform Judaism.

In 1832 Geiger went to Wiesbaden as a rabbi and in 1835 helped to found, and thereafter edited, the *Wissenschaftliche Zeitschrift für jüdische Theologie* ("Scientific Journal of Jewish Theology"). In 1838 he became junior rabbi in Breslau, where his known Reform leanings aroused Orthodox opposition. Remaining in Breslau until 1863 (he became senior rabbi in 1843), Geiger organized the Reform movement there and wrote some of his most important works, including a translation into German of the works of Judah ben Samuel ha-Levi (1851), considered the greatest Hebrew poet of 12th-century Spain, and Geiger's own magnum opus, *Urschrift und Übersetzungen der Bibel in ihrer Abhängigkeit von der innern Entwicklung des Judentums* (1857; "The Original Text and the Translations of the Bible: Their Dependence on the Inner Development of Judaism"). In the latter work, Geiger analyzes the Sadducees and the Pharisees, Jewish sects in whose history he sees a paradigm of a basic idea of Reform Judaism: in some respects, the Jewish religious consciousness grows and changes, and this development is reflected in the succeeding editions and translations of the Bible.

In a series of rabbinical conferences at Brunswick (1844), Frankfurt (1845), and Breslau (1846), Geiger incisively presented other main tenets of Reform Judaism: the necessity of simplifying ritual and of using a liturgy spoken in one's native tongue; an emphasis on the prophetic teachings as presenting the core of Judaism, a core that will not lose validity with changing time and place, unlike other components of religion; and a deemphasis on a return to the land of Israel. Geiger's last years were spent as a rabbi at Frankfurt and at Berlin, where he also lectured at the Hochschule für die Wissenschaft des Judentums (Institute of Jewish Science), the liberal seminary.

Geiger, Hans, original name JOHANNES WILHELM GEIGER (b. Sept. 30, 1882, Neustadt an der Haardt, Ger.—d. Sept. 24, 1945, Potsdam, Ger.), German physicist who introduced the first successful detector (the Geiger counter) of individual alpha particles and other ionizing radiations.

Geiger was awarded the Ph.D. by the University of Erlangen in 1906 and shortly thereafter joined the staff of the University of Manchester, where he became one of the most valuable collaborators of Ernest Rutherford. At Manchester Geiger built the first version of his particle counter and used it and other radiation detectors in experiments that led to the identification of the alpha particle as the nucleus of the helium atom and to Rutherford's correct proposal (1912) that, in any atom, the nucleus occupies a very small volume at the centre.

Moving in 1912 to the Physikalisch-Technische Reichsanstalt (German National Institute for Science and Technology) in Berlin, Geiger continued his studies of atomic structure and, with Walther Bothe, devised the technique of coincidence counting and used it in 1924 to clarify the details of the Compton effect. In 1925 Geiger accepted his first teaching position, at the University of Kiel. There, he and Walther Müller improved the sensitivity, performance, and durability of the particle counter; the Geiger-Müller counter detects not only alpha particles but beta particles (electrons) and ionizing electromagnetic photons. In 1929 Geiger took up a post at the University of Tübingen, where he made his first observation of a cosmic-ray shower. He continued to investigate cosmic rays, artificial radioactivity, and nuclear fission after accepting a position in 1936 at the Technische Hochschule in Berlin, which he held until he died.

Geiger, Rudolf Oskar Robert Williams (b. Aug. 24, 1894, Erlangen, Ger.—d. 1981), German meteorologist, one of the founders of microclimatology, the study of the climatic conditions within a few metres of the ground surface. His observations, made above grassy fields or areas of crops and below forest canopies, elucidated the complex and subtle interactions between vegetation and the heat, radiation, and water balances of the air and soil.

Geiger taught and conducted his research at several institutions in Germany, and was director of the Meteorological Research Institute in the Bavarian Forest Service and of the Meteorological Institute of the University of Munich. He was the author of the classic treatise *Das Klima der bodennahen Luftschicht* (1927; Eng. trans., *The Climate near the Ground,* 1950), a comprehensive survey of microclimatological observations and of the effects of microclimate on plants, animals, and man.

Geiger, Theodor Julius (b. Nov. 9, 1891, Munich—d. June 16, 1952, at sea), German sociologist and first professor of sociology in Denmark, whose most important studies concerned social stratification and social mobility.

Geiger served in World War I, after which he returned to Munich to take his doctorate in law. Influenced by Marxism, he believed for a time in the existence (specifically in Germany) of a well-defined class structure; but by 1948, when his *Klassesamfundet i Støbergryden* ("Class Society in the Melting Pot") was published, he had abandoned that idea. His basic textbook was *Sociologi* (1939).

In Berlin (1920) he worked as a journalist, teacher, and government statistician, but his primary concern was writing Marxist-oriented articles and books, which gained him the chair of sociology at the Brunswick Institute of Technology (1928–33). After the rise to power of the Nazis, of whom he was an early critic, he fled to Copenhagen, where a Rockefeller Foundation fellowship and an appointment to the Institute of History and Economics sustained him until 1938, when he was given full professorship at the University of Arhus, in Denmark.

During the German occupation of Denmark in World War II, Geiger fled to Stockholm (1943), teaching there and in Uppsala, where work with the Uppsala school of legal and moral philosophy influenced his work on value philosophy, ideology, and law.

After the war, Geiger returned to Århus (1945), where he founded and directed the first Scandinavian institute of sociological research and developed the academic journal, "Acta Sociologica." His work on social stratification and mobility included studies of Danish intellectuals and a detailed examination of the people of Århus, *Soziale Umschichtungen in einer dänischen Mittelstadt* (1951; "Social Changes in a Medium-Sized Danish City"). He died at sea in 1952 when he was returning to Europe after a year spent as visiting professor in Toronto.

He published many works on the sociology of society. Long interested in the sociology of public order, he wrote *Vorstudien zu einer Soziologie des Rechts* (1947; reprinted 1964, "Preliminary Studies on the Sociology of Law"), which dealt with law and regulation in society. *Ideologie und Wahrheit* (1953; posthumous, "Ideology and Truth") discusses ideology as incompatible with cognition and its role as creator of mass society. *Demokratic ohne Dogma* (1964; posthumous, "Democracy Without Dogma") is notable for Geiger's vision of a society depersonalized by ideology but redeemed by interpersonal bonds leading to self-realization.

Geiger counter, also called GEIGER-MÜLLER COUNTER, type of ionization chamber (*q.v.*) especially effective for counting individual particles of radiation.

Geigy AG (Swiss company): *see* CIBA-GEIGY AG.

Geijer, Erik Gustaf (b. Jan. 12, 1783, Ransäter, Värmland, Swed.—d. April 23, 1847, Stockholm), Swedish poet, historian, philosopher, and social and political theorist who was a leading advocate, successively, of the conservative and liberal points of view.

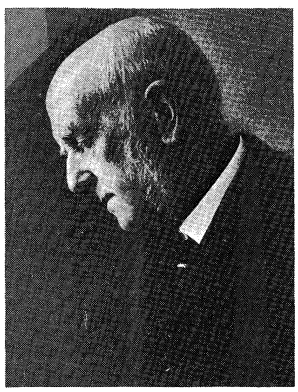
Geijer, detail of an oil painting by J.G. Sandberg, 1826; in the Nationalmuseum, Stockholm

By courtesy of the Nationalmuseum, Stockholm

A trip to England directly after his university days made a great impression on Geiger and gave him political insight into the life of a major power. A collection of his diaries and letters was published as *Geijer i England* (1814; *Impressions of England,* 1932). The defeat that Sweden suffered in 1809 through the loss of Finland to Russia led him to a rather extreme nationalism. He was one of the founders, in 1811, of *Götiska förbundet* (The Gothic Society), which aimed at furthering national feeling through historic study. In 1817 Geijer became professor of history at Uppsala, where he was in close contact with the New Romantic Group, which briefly led him into a political conservatism. His main historical works are *Svea rikes räfder* (1825; "The Annals of the Kingdom of Sweden") and *Svenska folkets historia,* 3 vol. (1832–36; *The History of the Swedes,* 1845). Geijer's historical investigations, however, rather than furthering his nationalism or conservatism, brought him to radically new political ideas: universal suffrage, equal educational opportunities for all, and elimination of poverty.

In the posthumously published philosophical *Människans historia* (1856; "Man's History"), Geijer interprets historical events as a combination of tradition and creation. Some of his best poems are those set to his own music and written between 1838 and 1841. They were published in his collected works (1849–55).

Geikie, Sir Archibald (b. Dec. 28, 1835, Edinburgh—d. Nov. 10, 1924, Haslemere, Surrey, Eng.), British geologist who became the foremost advocate of the fluvial theories of erosion.



Geikie

The Mansell Collection

In 1855 Geikie was appointed to the Geological Survey of Great Britain, under Sir Roderick I. Murchison. Ten years later he was elected a fellow of the Royal Society, and, when a separate branch of the Geological Survey was established for Scotland in 1867, Geikie became director. In 1871 he became the first Murchison professor of geology and mineralogy at the University of Edinburgh. A man of great energy, wide interests, and vision, he confined his studies primarily to Scotland.

In 1882 Geikie became director general of the Geological Survey and immediately reorganized and increased the survey work, which had lagged under the previous director. He served as president of the Geological Society of London (1891–92 and 1906–08) and of the Royal Society (1908–13). He was knighted in 1891.

His best known works, which have remained in general use, are *The Scenery of Scotland* (1865, 3rd ed. 1901), *Life of Sir R.I. Murchison* (1875), *Text-Book of Geology* (1882, 4th ed. 1903), *The Founders of Geology* (1897, 2nd ed. 1905), *The Ancient Volcanoes of Great Britain* (1897), and *Outlines of Field Geology* (1876, 5th ed. 1900).

Geiler von Kaysersberg, Johann (b. March 16, 1445, Schaffhausen, Switz.—d. March 10, 1510, Strassburg), forceful and impressive preacher known as "the German Savonarola." Taken at the age of three to Kaysersberg in Upper Alsace, he studied at the University of Freiburg and lectured there until 1478. Then he accepted a call to fill an office as preacher, created for him, at the cathedral of Strassburg. His sermons were bold, incisive, and denunciatory, abounding in quaint illustrations.

Geisel, Ernesto (b. Aug. 3, 1908, Bento Gonçalves, Braz.), army general who became president of Brazil (1974–79).

A career army officer, Geisel joined the military coup led by Getúlio Vargas which overthrew the elected government and installed a dictatorship in 1930. Geisel supported Vargas for 15 years, serving in a variety of military and civil administrative posts, but in 1945 he played an important part in overthrowing Vargas' government. During the next 15 years he held several important offices, including deputy chief of the military staff of the presidency and military representative to the National Petroleum Council, gaining a reputation for incisive leadership. He participated in the military coup of 1964 and became head of Pres. Humberto Castelo Branco's Cabinet. In 1969 Geisel took charge of Petrobrás, the national oil corporation, expanding its scope and increasing production dramatically.

Placed in the president's seat by the military oligarchy (March 15, 1974), Geisel risked their opposition by beginning a gradual liberalization and demilitarization of the government, permitting open legislative elections in 1974, meeting with opposition leaders, and relaxing censorship. He outlined a new economic policy, "pragmatic nationalism," which called for shifting emphasis from exports to the development of domestic industry, such as mining, agriculture, and transportation networks. Although there had been some indication that he might be succeeded by an elected civilian president, Geisel and his conservative supporters saw that they would be defeated in open elections. Accordingly, Geisel took no further steps toward democratization, and official repression of the political opposition increased after 1977. Geisel did not run for reelection in 1979 but supported João Baptista de Oliveira Figueiredo, his successor as president.

Geisel, Theodor Seuss, pseudonym DOCTOR SEUSS (b. March 2, 1904, Springfield, Mass., U.S.), writer and illustrator of immensely popular children's books.

After undergraduate work at Dartmouth College, Hanover, N.H., and postgraduate work at Lincoln College, Oxford, and at the Sorbonne, Geisel began working for *Life, Vanity Fair,* and other publications as an illustrator and humorist. He served in the Information and Education Division of the Signal Corps during World War II. Later, Geisel went into advertising for a time, was made an editorial cartoonist for *PM* newspaper in New York City, and eventually in 1958 founded Beginner Books, Inc., which in 1960 became a division of Random House.

Geisel's books were valued not only for their unique brand of humour but also for their contribution to the education of children. The books coined new nonsense words and characters that went far beyond the traditional primers. They included *And To Think That I Saw It on Mulberry Street* (1937), *Horton Hatches the Egg* (1940), *How the Grinch Stole Christmas* (1957), *The Cat in the Hat* (1957), *Green Eggs and Ham* (1960), and *The Lorax* (1971). *The Butter Battle Book,* an allegory of the nuclear arms race, was published on Geisel's 80th birthday, in 1984.

Geisel also made documentary short films; *Hitler Lives* (1946) and *Design for Death* (1947, with his wife Helen Palmer Geisel [d. 1967]), both won Academy Awards. His animated cartoon *Gerald McBoing Boing* (1951) also won an Academy Award. He designed and produced animated cartoons for television, many of them based on his books. From 1948, Geisel lived in La Jolla, Calif., where he annually conducted a children's workshop at the La Jolla Museum of Art.

geisha, a member of a professional class of women in Japan whose occupation by ancient tradition is to entertain men, in modern times particularly at businessmen's parties, in public restaurants (*ryōri-ya*). The word geisha literally means "art person," and many of the women sing, dance, or play musical instruments, though the majority are adept only in the art of conversation. The main function of the geisha in society is to provide an atmosphere of chic and gaiety. The women are usually exquisitely dressed and delicately mannered and have a knowledge not only of the past but also of contemporary gossip.

The geisha system has ordinarily been a form of indentured labour, although some girls, attracted by the glamour of the life, volunteer. Usually, a girl at an early age is given by her parents for a sum of money to an organization. She is taught, trained, fed, and clothed for a period of years. Then she emerges into the society (known as *karyūkai,* the "world of flowers and willows") and begins earning money to repay her parents' debt and her past keep. Although an unaccomplished geisha may be hired for the equivalent of only a few dollars an hour, famous ones can command several hundred dollars for a single dance.

Geisha are often associated with the theatre (many marry actors), and plays frequently dramatize a geisha as a heroine. When a geisha marries, she retires from the profession. If she does not marry, she usually retires as a restaurant owner, teacher of music or dance, or trainer of young geisha.

Geissler, (Johann) Heinrich (Wilhelm) (b. May 26, 1815, Igelshieb, Thuringia, Saxe-Meiningen—d. Jan. 24, 1879, Bonn), German glassblower for whom the Geissler (mercury) pump and the Geissler tube are named.

He opened a shop in Bonn in 1854 to make scientific apparatus and devised his mercury air pump in 1855. Later, using an apparatus of his own invention, he was able to demonstrate, in collaboration with Julius Plücker, that water reaches its maximum density at 3.8° C (later determined to be 3.98°). Among

his other inventions were the vaporimeter and the Geissler tube, in which an electric current produces light when passed through a rarefied gas.

Gejiu (China): *see* Ko-chiu.

gekko (lizard): *see* gecko.

Gekoyo (people): *see* Kikuyu.

gel, coherent mass consisting of a liquid in which particles too small to be seen in an ordinary optical microscope are either dispersed or arranged in a fine network throughout the mass. A gel may be notably elastic and jellylike (as gelatin or fruit jelly), or quite solid and rigid (as silica gel, a material that looks like coarse white sand and is used as a dehumidifier). Gels are colloids (aggregates of fine particles, as described above, dispersed in a continuous medium) in which the liquid medium has become viscous enough to behave more or less as a solid. Contraction of a gel, causing separation of liquid from it, is called syneresis. *Compare* sol.

gel chromatography, also called GEL FILTRATION, in analytical chemistry, technique for separating chemical substances by exploiting the differences in the rates at which they pass through a bed of a porous, semisolid substance. The method is especially useful for separating enzymes, proteins, peptides, and amino acids from each other and from substances of low molecular weight. The separation of the components of a mixture by gel chromatography is based on the differences in the molecular sizes of the components. Small molecules tend to diffuse into the interior of the porous particles so that their flow is restricted, while large molecules are unable to enter the pores and tend to flow unhindered. Thus, the components of highest molecular weight leave the bed first, followed by successively smaller molecules. The bed materials most extensively used are polyacrylamide and a polymer prepared from dextran and epichlorohydrin. The dry polymers are usually suspended in suitable agents to form a homogeneous, semisolid mixture.

Gela, town, Caltanissetta province, southern Sicily, Italy, on the Gulf of Gela (of the Mediterranean Sea) with a fertile plain (ancient Campi Geloi) to the north. It was founded by Cretan and Rhodian colonists *c.* 688 BC and sent forth colonists to found Acragas (now Agrigento, 45 mi [72 km] northwest) in *c.* 581 BC. Gela enjoyed its greatest prosperity under the tyrant Hippocrates of Gela (498–491 BC), whose dominion extended over much of the island, but his even more powerful successor, Gelon, took possession of Syracuse unopposed and transferred his capital and half of the population there in 482. Gela later revived, but it was destroyed by the Carthaginians in 405 BC and abandoned by order of Dionysius I the Elder of Syracuse. The inhabitants returned and rebuilt the town but it was only refortified *c.* 337 in the time of the Greek statesman Timoleon. In 311 BC the Syracusan tyrant Agathocles put to death more than 4,000 of the inhabitants and, after its destruction by the Mamertini (Campanian mercenaries) in 281 BC, Phintias of Acragas transferred the remainder to the new town of Phintias (now Licata). Refounded in 1233 by Frederick II, the town was known as Terranova di Sicilia until 1928. In World War II Gela was one of the initial objectives of Allied landings in the invasion of Sicily.

Doric column of the temple of Athena, 5th century BC, at Gela, Sicily

© Mairani—CLICK/Chicago

An archaeological centre of great distinction, Gela's ancient remains include a temple of Athena (5th century BC), Greek fortifications that provide evidence of rebuilding under Timoleon, and the acropolis with a "Timoleontean" quarter on the site of earlier sanctuaries. Vast quantities of rich, decorative terra-cotta revetments have been recovered, and Greek vases found at Gela are famous throughout Europe.

Gela is the centre of a cotton-growing region. Fishing is important and petroleum deposits were discovered nearby in the 1950s and are today the basis of a large local petrochemical industry. Pop. (1981 prelim.) mun., 71,739.

gelada (*Theropithecus gelada*), large baboon-like monkey, family Cercopithecidae, differing from true baboons (*Papio*) in having the nostrils some distance from the tip of the muzzle. The gelada, or lion baboon, is a stocky animal with white eyelids, brown fur, a tufted tail, and a naked pink chest. The male bears a long, heavy mane and may be more than 70 centimetres (28 inches) long, excluding the somewhat shorter tail, with a weight of about 20 kilograms (44 pounds). The female is markedly smaller and has a necklace-like row of bead-shaped caruncles along the edges of the bare chest patch. The gelada inhabits the mountains of southern Ethiopia and lives in groups among the steep cliffs of rocky ravines. Diurnal and terrestrial, it feeds on leaves, roots, and tubers.

Gelada (*Theropithecus gelada*)
Tierbilder Okapia, Frankfurt am Main

Gelasius I, SAINT (b. probably Africa—d. Nov. 19, 496, Rome; feast day November 21), pope from 492 to 496.

Succeeding St. Felix III in March 492, Gelasius combatted the Acacian Schism that had arisen in the East under Patriarch Acacius (reigned 471–489) as a result of Rome's refusal to accept the *Henotikon*—a peace formula designed by the Eastern Roman emperor Zeno to reconcile the dissident Monophysites, advocators of the heretical doctrine that the human and divine in Christ constitute one nature. During that long, bitter struggle, Gelasius maintained papal authority, making him one of the great architects of Roman primacy in ecclesiastical affairs.

His writings include more than 100 treatises and letters; one of the most celebrated (494) was addressed to Zeno's successor, Anastasius I, in which Gelasius states: "There are two powers by which this world is chiefly ruled: the sacred authority of the priesthood and the authority of kings." Gelasius' doctrine that both sacred and civil power are of divine origin and independent, each in its own sphere, was then the most progressive thinking on the subject; had his formula been established, the subsequent history of the papacy probably would have been different. Among his acts, in 494 he changed the Lupercalia, a Roman pagan festival, into the feast of the Purification.

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Gelasius II, original name GIOVANNI DA GAETAN, English JOHN OF GAETA (b. Gaeta, Kingdom of Naples—d. Jan. 29, 1119, Cluny, Burgundy), pope from 1118 to 1119.

He was called to Rome from Montecassino, Italy, by Pope Urban II, who created him cardinal (1088) and papal chancellor (1089). He was elected pope on Jan. 24, 1118, as successor to Paschal II, whose pontificate had been damaged by dissension from the "investiture controversy," an administrative struggle between the popes and the Holy Roman emperors over the right to grant titles to ecclesiastics. Paschal's attempt to end the struggle with the Holy Roman emperor Henry V in 1111 had caused a revolt among the German bishops. Henry then fled Rome amidst an uprising there and took Paschal as his prisoner. Despite opposition from the Curia, Paschal—whom Gelasius fervently defended—granted Henry the right to investiture, but the controversy continued.

Gelasius' election was blackened by Henry, whose loyal supporter Cencius II Frangipani attacked and imprisoned the new pope. Driven twice from Rome by Henry, who installed Antipope Gregory VIII, Gelasius died while planning a council at Reims, leaving the close of the struggle to his successor, Calixtus II.

gelatin, animal protein substance having gel-forming properties, used primarily in food products and home cookery, also having various industrial uses. Derived from collagen, a protein found in animal skin and bone, it is extracted by boiling animal hides, skins, bones, and tissue after alkali or acid pretreatment. An easily digested, pure protein food, it is nutritionally an incomplete protein, deficient in certain amino acids. Unflavoured, granulated gelatin, almost tasteless and odourless, ranges from faint yellow to amber in colour. Gelatin is also available as a finely ground mix with added sugar, flavouring, acids, and colouring. When stored in dry form, at room temperature, and in an airtight container, it remains stable for long periods.

Immersed in a liquid, gelatin takes up moisture and swells. When the liquid is warmed, the swollen particles melt, forming a sol (fluid colloidal system) with the liquid that increases in viscosity and solidifies to form a gel as it cools. The gel state is reversible to a sol state at higher temperatures, and the sol can be changed back to a gel by cooling. Both setting time and tenderness are affected by protein and sugar concentration and by temperature. Gelatin may be whipped to form a foam and acts as an emulsifier and stabilizer. It is used to make such gel foods as jellied meats, soups, and candies, aspics, and molded desserts and to stabilize such emulsion and foam food products as ice cream, marshmal-

lows, and mixtures of oils or fats with water. Fruit jellies resemble gelatin products but achieve solidification as a result of a natural vegetable substance called pectin.

The food industry makes use of most of the gelatin produced. Gelatin is also used by the pharmaceutical industry for the manufacture of capsules, cosmetics, ointments, lozenges, and plasma products and by other industries.

gelatin process, also called GELATIN DRY-PLATE PROCESS, photographic process in which gelatin is used as the dispersing vehicle for the light-sensitive silver salts. The process, introduced in about 1880, superseded the wet collodion process, in which a wet negative was produced from a nitrocellulose (collodion) solution applied to a glass plate immediately prior to exposure. This chemical treatment necessitated the presence of a darkroom wherever a photograph was to be made. The development of a process in which a sensitized gelatin emulsion could be dried on the plate and stored, protected from light, for months before use revolutionized the world of photography. Gelatin is still the standard binding medium for the silver halide crystals used in ordinary photographic film.

Gelber, Jack (b. April 12, 1932, Chicago), American playwright known for *The Connection* (performed 1959, published 1960), and for his association with The Living Theatre (*q.v.*), an innovative, experimental theatre group.

After graduating from the University of Illinois, Urbana, Gelber began working with the struggling Living Theatre group in New York City. His first play, *The Connection,* is historically important for its disintegration of the traditional relationship between audience and actor; it was a breakthrough for The Living Theatre, and both the production and the playwright received wide notice.

Set in a slum apartment, the play was staged to suggest a naturalistic scene, with actors already on stage as the audience arrived (as if the audience were seeing life, not a play, in progress). This nontraditional technique was supported by other subversive techniques: by presenting an actor as an audience member; by using the theatre aisles as a performance area; and by having the actors (who represented drug addicts) panhandle the audience during the play's intermission. The play was imaginatively and brilliantly produced by The Living Theatre, though for all its appearance of improvisation, it was tightly structured.

The Apple (1961), Gelber's second play, also was written expressly for The Living Theatre. Its subject is the growing madness of an actor during a play rehearsal. With its second act written from the mad actor's point of view, this play too broke with the conventions of theatre. Less successful than its predecessor, *The Apple* had a run of 69 performances. Upon the departure of The Living Theatre for Europe, however, Gelber lost a performance group ideally suited to his drama.

His *Square in the Eye* (1965), a multimedia theatre piece, and the rest of his later plays—including *The Cuban Thing* (1968), *Sleep* (1972), and *Rehearsal* (1976)—continued to challenge theatrical conventions, though none matched the popular or critical success of his first play. In addition to writing plays, Gelber taught drama at several American colleges and universities and wrote a novel.

Gelder, Aert de, Aert also spelled ARENT (b. Oct. 26, 1645, Dordrecht, United Provinces [now The Netherlands]—d. Aug. 28, 1727, Dordrecht), the only Dutch artist of the late 17th and early 18th century to paint in the tradition of Rembrandt's late style.

De Gelder spent his life in Dordrecht, except for a period of time in about 1661 when he was

"The Artist Painting a Portrait of an Old Woman," painting on canvas by Aert de Gelder, 1685; in the Städelsches Kunstinstitut, Frankfurt-am-Main

By courtesy of the Stadelsches Kunstinstitut, Frankfurt-am-Main

Rembrandt's pupil in Amsterdam. His biblical paintings—*e.g.,* "Scenes from the Passion" (*c.* 1715)—feature warm colour and atmospheric light. In his portraits—*e.g.,* "The Family of Herman Boerhave" (*c.* 1722; Louvre, Paris)—his bold, broad manner of brushwork and surface texture contrasts markedly with the refined techniques and smoothly finished canvases of his contemporaries.

Gelderland, also called GUELDERS, *provincie,* eastern and central Netherlands; it occupies an area (1,935 square miles [5,011 square km]) extending from the German border westward to the narrow Lake Veluwe (separating Gelderland from several polders of Flevoland province) between the provinces of Overijssel (north) and Noordbrabant, Zuidholland, and Utrecht (south). Its capital is Arnhem.

The province's history began with the countship of Gelre, or Geldern, established in the 11th century around castles near Roermond and Geldern (now in Germany). The counts of Gelre acquired the Betuwe and Veluwe regions and, through marriage, the countship of Zutphen. Thus had the counts of Gelre laid the foundation for a territorial power that, through control of the Rhine, Waal, Meuse, and IJssel rivers, was to play an important role in the later Middle Ages. The geographical position of their territory dictated the external policy of the counts during the following centuries: they were committed to the interests of the Holy Roman Empire and to expansion south and west. Further enlarged by the acquisition of the imperial city of Nijmegen in the 13th century, the countship was raised to a duchy in 1339 by the German king, Louis the Bavarian. After 1379 the duchy was ruled from Jülich and by the counts of Egmond and Cleves. The duchy resisted Burgundian domination, but William the Rich (duke of Jülich, Cleves, and Berg) was forced to cede it to Charles V in 1543, after which it formed part of the Burgundian-Habsburg hereditary lands. The duchy revolted with the rest of the Netherlands against Philip II of Spain and joined the Union of Utrecht (1579). After the deposition of Philip II, its sovereignty was vested in the "estates" of Gelderland, and the princes of Orange were stadholders. In 1672 the province was temporarily occupied by Louis XIV; and in 1713 the southeastern part, including the ducal capital of Geldern, fell to Prussia. Part of the Batavian Republic (1795–1806), of Louis Bonaparte's kingdom of Holland (1806–10), and of the French Empire (1810–13), Gelderland became a province of the Kingdom of The Netherlands in 1815.

Gelderland is divided by the Lower Rhine (Neder Rijn) and the Oude ("Old") IJssel rivers. The main portion north of this line is a formerly glaciated region with sandy soil; south is fertile clay alluvium. The northern portion is divided by the broad valley (Gelderse) of the IJssel into the Veluwe ("Bad Land") region on the west and the Achterhoek on the east. The hill plateau of the Veluwe is covered with scantily cultivated heaths and some woods, of primarily fir and beech. There are two national parks (Hoge Veluwe and Veluwezoom) and a wildlife reserve. Much of the Veluwe is used for military purposes. In the south, the hills slope steeply along the Rhine, and the wooded part is residential, with some industry around Arnhem. The other large centre of the Veluwe is Apeldoorn along the eastern border. The Achterhoek is a well-watered and wooded pasture region supporting mixed farming, with dairy processing, meat-packing, and leather factories. The eastern part has textile works, and several foundries lie along the Oude IJssel. Zutphen and Doetinchem are the chief markets and have some industries. The valley of the IJssel, the Gelderse Valley (on the west along the Utrecht border), and the northern border of the Veluwe support mixed farming, especially poultry.

The southern division of the province is watered by the Rhine, Waal, and Maas (Meuse) rivers. In the east are some isolated hills and a sandy, wooded stretch south of Nijmegen, the province's largest town. The fertile marshy area of the Betuwe ("Good Land"), between the Rhine and the Waal, supports orchards (cherries and apples), market gardening, and mixed farming. Pop. (1987 est.) 1,771,972.

gelechiid moth, any member of the large, cosmopolitan insect family Gelechiidae (order Lepidoptera), containing more than 3,700 described species of moths, including several important pests. The brown adults have gray or silver markings and average 19 mm (¾ inch) in wingspan. The hindwings have somewhat concave outer margins and pointed tips, in contrast with the regular, narrow forewings.

The larval habits of gelechiid moths vary; larvae may mine or bore in plants, spin webs, form galls, or roll leaves. They are pale and naked and pupate within silken cocoons.

The whitish larvae of the Angoumois grain moth (*Sitotroga cerealella*) attack stored and growing grains, hollowing out the insides of kernels. The gray-coloured adult has blackish spots and a wing span of about 12 mm (about ½ inch).

The pink bollworm (*Pectinophora gossypiella*), deemed one of the most destructive insects, is a serious cotton pest. Though probably native to India, it is now distributed worldwide. It bores into cotton bolls, devouring blossoms and seeds. The pinkish-coloured bollworm generally pupates in a cocoon inside a boll or seed, in trash, or underground. The brown adult has fringed wings. In warm climates several generations occur annually.

The potato tuberworm (*Gnorimoschema operculella*) attacks potatoes, tomatoes, tobacco, and related plants, boring into tubers, burrowing in stems, and mining leaves. Pupation occurs in silken, dirt-covered cocoons, often found in rubbish. The adults are a dark mottled grayish brown.

The peach twig borer (*Anarsia lineatella*) attacks fruit trees. Less destructive gelechiid pests include the tomato pinworm (*Keiferia lycopersicella*) and the strawberry crown miner (*Aristotelia fragariae*). Several *Gnorimoschema* species produce galls in goldenrod stems, and many *Recurvaria* species mine leaves and pine needles.

Gelfand, Aleksandr Izrail Lazarevich: *see* Helphand, Alexander Israel (Lazarevitsch).

Gelfond, Aleksandr Osipovich (b. Oct. 24, 1906, St. Petersburg, Russia—d. Nov. 7, 1968, Moscow), Russian mathematician who originated basic techniques in the study of transcendental numbers (numbers that cannot be expressed as the root or solution of an algebraic equation with rational coefficients). He profoundly advanced transcendental-number theory and the theory of interpolation and approximation of complex-variable functions.

Gelfond taught mathematics at the Moscow Technological College (1929–30) and, from 1931, at Moscow State University, at various times holding chairs of analysis, theory of numbers, and history of mathematics.

In 1934 Gelfond proved that a^b is transcendental if a is an algebraic number not equal to 0 or 1, and if b is an irrational algebraic number. This statement, now known as Gelfond's theorem, solved the seventh of 23 famous problems that had been posed by the German mathematician David Hilbert in 1900. Gelfond's methods were readily accepted by other mathematicians and rapidly developed important new concepts in transcendental-number theory. Much of his work, including the construction of new classes of transcendental numbers, is found in his *Transtsendentnye i algebraicheskie chisla* (1952; *Transcendental and Algebraic Numbers*). In *Ischislenie konechnykh raznostey* (1952; "Calculus of Finite Differences"), he summarized his approximation and interpolation studies.

Gelimer (fl. early 6th century), last Vandal king (ruled 530–534) of the area called by the Romans "Africa" (roughly, modern Tunisia).

The great-grandson of the Vandal leader Gaiseric (ruled 428–477), Gelimer deposed King Hilderic, his pro-Roman cousin, in 530 and usurped the throne despite protests from the Eastern Roman emperor Justinian I. In June 533, Justinian sent an expeditionary force commanded by Belisarius against him. Landing in Africa in September 533, the Byzantines defeated Gelimer's army at Decimum, near Carthage, and then occupied the city. As a result of his tactical blunders, Gelimer was decisively defeated (mid-December 533). He fled to Numidia, near the edge of the Sahara, but was forced to surrender in March 534. Thus the Vandal kingdom was destroyed and Roman rule returned to Africa. After the defeat Gelimer was sent to Constantinople, and Justinian gave him an estate in Galatia.

Gell-Mann, Murray (b. Sept. 15, 1929, New York City), American physicist, winner of the Nobel Prize for Physics for 1969 for his work pertaining to the classification of subatomic particles and their interactions.

Having entered Yale University at the age of 15, Gell-Mann received his B.S. in physics in 1948 and his Ph.D. at the Massachusetts Institute of Technology in 1951. His doctoral research on subatomic particles was influential in the later work of the Nobel laureate (1963) Eugene P. Wigner. In 1952 Gell-Mann joined the Institute for Nuclear Studies at the University of Chicago. The following year he introduced the concept of "strangeness," a quantum property that accounted for previously puzzling decay patterns of certain mesons. As defined by Gell-Mann, strangeness is conserved when any subatomic particle interacts via the strong force—*i.e.*, the force that binds the components of the atomic nucleus.

In 1962 Gell-Mann and Yuval Ne'eman, an Israeli theoretical physicist, proposed a scheme for classifying previously discovered strongly interacting particles into a simple, orderly arrangement of families. Called the Eightfold Way (after Buddha's Eightfold Path to Enlightenment and bliss), the scheme grouped mesons and baryons (*e.g.*, protons and neutrons) into multiplets of 1, 8, 10, or 27 members on the basis of various properties. All particles in the same multiplet are to be thought of as variant states of the same basic particle. Gell-Mann speculated that it should be possible to explain certain properties of known particles in terms of even more fundamental particles, or building blocks. He later called these basic bits of matter "quarks," adopting the fanciful term from James Joyce's novel *Finnegans Wake*. One of the early successes of Gell-Mann's quark hypothesis was the prediction and subsequent discovery of the omega-minus particle (1964). Over the years, research has yielded other findings that have led to the wide acceptance and elaboration of the quark concept (*see also* quark).

Gell-Mann joined the faculty of the California Institute of Technology, Pasadena, in 1955 and was appointed Millikan Professor of Theoretical Physics in 1967. He published a number of works, notable among which are *The Eightfold Way* (1964), written in collaboration with Ne'eman, and *Broken Scale Variance and the Light Cone* (1971), coauthored with K. Wilson.

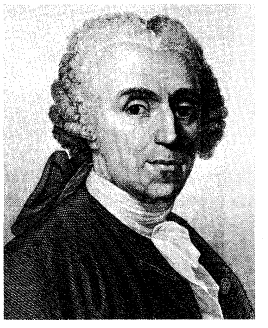
Gellée, Claude (painter): *see* Claude Lorrain.

Gellert, in Welsh tradition, the trusted hound of Prince Llewellyn the Great of Wales. Having been left to guard his master's infant son, Gellert killed a wolf that attempted to attack the child. Llewellyn, returning home to find the baby missing and Gellert's muzzle stained with blood, assumed that the dog had destroyed his son, and stabbed it. He later found the child unharmed beneath the overturned cradle, with the wolf's corpse beside him. The remorseful prince caused Gellert to be honourably buried on Mt. Snowden, and he named the place Beddgelert (Grave of Gellert).

The story, associated now with the historical Prince Llewellyn, is a late Welsh version of an ancient Indian folktale recounted in the Sanskrit *Pañca-tantra*. The legend is found in various forms in many European countries. It also exists in the Persian, Hebrew, and Buddhist traditions.

Gellert, Christian Fürchtegott (b. July 4, 1715, Hainchen, Saxony—d. Dec. 13, 1769, Leipzig), poet and novelist, a prominent representative of the German Enlightenment whose works were, for a time, second in popularity only to the Bible.

The son of a pastor, Gellert was reared in a poor and extremely pious family. After working as a tutor, he studied at the University of Leipzig, where he became a *Privatdozent* (unsalaried lecturer) in 1745 and a professor in 1751. Popular both for his work and for his



Gellert, lithograph
Historia-Photo

personality, his lectures on poetry, rhetoric, and ethics were exceptionally well attended.

Gellert was best known for his *Fabeln und Erzählungen* (1746–48; "Fables and Tales"), a collection of naïvely realistic fables and moralizing stories charming for their directness and simplicity. These tales not only had many readers among the common people but also influenced other fable writers. Equally popular was *Geistliche Oden und Lieder* (1757; "Spiritual Odes and Songs"), religious poems and hymns that combined religious feeling with the rationalism of the Enlightenment. The most famous of these, "Die Himmel rühmen des Ewigen Ehren" ("The Heavens Praise the Eternal Glories") and "Die Ehre Gottes aus der Natur" ("The Glory of God in Nature"), were later set to music by Beethoven and still appear in hymnbooks. Gellert also wrote a sentimental novel, *Das Leben der schwedische Gräfin von G* (1748; "The Life of the Swedish Countess of G"), which combined the late 17th-century novel of exotic adventure with the character novel of modern literature and introduced the moralistic "family novel" in German literature.

Gelligaer, mining community, Rhymney Valley district, Mid Glamorgan county, Wales, lying in the middle of Rhymney Valley. Old Gelligaer village is located on the site of a Roman fort, on the ridge-top road northward from Cardiff; but the main settlements of the community, chief among them Bargoed, are mining villages in the river valley. Coal mining is still the predominant economic base, but some light industry has been established since 1945. The locality contains the 8th-century Church of St. Cattwg and the 16th-century manor house of Llancaiach. An adjoining area, formerly part of Gelligaer, has been absorbed by Merthyr Tydfil. Pop. (1981) urban area, 16,905.

Gellius, Aulus (fl. 2nd century AD), Latin author remembered for his miscellany *Noctes Atticae* ("Attic Nights"), in which many fragments of lost works are preserved. Written in Athens to beguile the winter evenings, the work is an interesting source on the state of knowledge and scholarship of his time. Both in Rome, where he studied literature and rhetoric, and in Athens, where he studied philosophy, Gellius' teachers and friends included many distinguished men, anecdotes about whom he included in his book.

Gelmírez, Diego (b. *c.* 1068—d. *c.* 1139), Spanish bishop and archbishop of Santiago de Compostela, site of the supposed shrine of St. James, which he developed as a place of pilgrimage.

Gelmírez was consecrated bishop of Compostela in 1101, and in 1120 Pope Calixtus II promoted him to archbishop and appointed him papal legate in Spain. Gelmírez' ambition involved him both in bitter ecclesiastical quarrels and in the civil strife which characterized the minority of Alfonso VII of Castile. On several occasions he narrowly escaped death at the hands of the queen mother Urraca or the burgesses of Santiago, who found him a tyrannical overlord.

Gelmírez did much to develop the reputation of Santiago as a pilgrim shrine, his own wealth and influence being based on it. He reformed what had previously been a lax diocese and, at the Council of Compostela (1124), caused the Peace and Truce of God to be proclaimed for the first time in Castile. In civil war he showed himself to be a competent military commander; and, to defeat Moorish naval attacks on Galicia, he organized a small fleet—the first in medieval Castile. Gelmírez' inordinate desire to extend his power, however, caused Honorius II, the successor of Calixtus II (d. 1124), to deprive him of his legateship and incurred the distrust of his former protégé, Alfonso VII, who managed, by devious methods, to lay hands on some of Gelmírez' great wealth. His influence had, therefore, considerably declined when he died.

Gelon (b. *c.* 540 BC—d. 478), tyrant of the cities of Gela (491–485) and Syracuse (485–478) in Sicily.

On the death of Hippocrates, the tyrant of Gela, in 491, Gelon, who had been his cavalry commander, succeeded him. Gelon early became involved in inconclusive hostilities with Carthage. In 485, taking advantage of an appeal by the *gamoroi* (conservative landowners) of Syracuse, who had been driven out by the people, he made himself master of that city, leaving his brother Hieron to control Gela. Under Gelon, Syracuse grew rapidly in population and power. Mercenaries were recruited widely, and a strong fleet was built up. Gelon conquered the nearby Sicilian cities of Euboea and Megara Hyblaea (*c.* 483), selling

their common people into slavery and bringing their oligarchs to Syracuse. He controlled the Greek and Sicel communities of east Sicily and became linked by marriage with Theron, tyrant of Acragas (later the Roman Agrigentum, modern Agrigento). When the Carthaginians invaded Sicily in 480, Theron appealed to Gelon, who was primarily responsible for the decisive Greek victory of Himera.

Gelosi, Compagnia dei (Italian: "Company of Jealous Ones"), one of the earliest and most famous of the commedia dell'arte companies of 16th-century Italy. The name was derived from the troupe's motto, *Virtù, fama ed honor ne fèr gelosi* ("We are jealous of attaining virtue, fame, and honour").

Commedia dell'arte troupe, probably depicting Isabella Andreini and the Compagnia dei Gelosi, oil painting by unknown artist, *c.* 1580; in the Musée Carnavalet, Paris

CFL—Giraudon from Art Resource/EB Inc.

Formed in Milan *c.* 1568 under the leadership of Flaminio Scala, the Gelosi became highly popular throughout Italy. Their group was the first to be patronized by nobility, and in 1574 they were invited to perform before the visiting French king, Henry III, in Venice. Their fame spread abroad, and they were asked by King Henry to perform before his court in 1577. Thereafter the Gelosi carried the tradition and influence of the commedia all over Europe, playing in France, Poland, Spain, and Germany. They established a habit of touring that was quickly followed by other Italian companies. The star performers were Francesco Andreini, a scholarly and talented actor who specialized in the roles of Capitano and Dottore, and his wife, Isabella, who was one of the leading belles and most famous actresses of the age (*see* Andreini, Francesco; Andreini, Isabella). After her death in 1604 the company was dissolved.

Gelsenkirchen, city, North Rhine-Westphalia *Land* (state), western Germany, just north of Essen. It was a village of fewer than 1,000 inhabitants in 1850, but the opening of its first coal mine (1853) and its favourable position on the Rhine-Herne Canal stimulated Gelsenkirchen's rapid development as a Ruhr inland port and industrial centre. It was chartered in 1875 and absorbed the neighbouring towns of Buer and Horst in 1928. Buer, north of the Emscher River, which bisects the city, is surrounded by a 1,000-acre (400-hectare) greenbelt. The moated castles of Schloss Berge, Schloss Horst (restored Baroque), and Haus Lüttinghof survived the heavy bombings, which caused widespread destruction, during World War II.

Located in one of the largest coal-mining and coking areas of Germany, Gelsenkirchen is dominated by heavy industry, producing iron, steel, chemicals, glass, and clothing. Pop. (1989 est.) 287,255.

Geltzer, Yekaterina Vasilyevna (b. Nov. 14 [Nov. 2, old style], 1876, Moscow—d. Dec. 12, 1962, Moscow), prima ballerina of the Moscow Bolshoi Theatre who, during the period of disorder following the Revolution of 1917, helped preserve and pass on the classical technique and repertory of the Imperial Russian Ballet.

Though her father, Vasily Geltzer, an outstanding mime dancer and regisseur of the Bolshoi Theatre, believed her physique was unsuitable for dancing, Yekaterina persuaded him to enroll her at eight in the Bolshoi's ballet school. There she developed strong pointe and pirouette technique under her teacher Joseph Mendes and graduated in 1894. After two years with the Bolshoi company, she went to St. Petersburg to study with Christian Johansson, who helped her attain the elegant grace that earned her the title "queen of adagio." In 1901 she became prima ballerina. Though she danced in most of the classic ballets at the Bolshoi, including *Swan Lake, The Sleeping Beauty,* and *Coppélia,* she excelled in dramatic roles and in the so-called *demi-caractère* style of dance, in which classical ballet technique is used to perform character dance. She also performed in Paris (1910) with the Diaghilev company and in London (1911) with the famous Russian dancer and teacher Vasili Tikhomirov, whom she later married.

Yekaterina Geltzer, 1912

By courtesy of the Dance Collection, the New York Public Library at Lincoln Center

After the Revolution of 1917, Geltzer remained with the Moscow company, and in 1927 she created one of her most famous roles, that of Tao-Hoa, the self-sacrificing heroine of *The Red Poppy* who dies to save the life of a Soviet captain. Her career at the Bolshoi spanned more than 40 years, and she was one of the first to receive (1925) the title People's Artist of the Russian Soviet Federated Socialist Republic.

Gelukpa (Buddhist sect): *see* Dge-lugs-pa.

gem: *see* gemstone.

Gemara, a rabbinic commentary on and interpretation of the collection of Jewish law known as the Mishna. *See* Talmud.

gematria, the substitution of numbers for letters of the Hebrew alphabet, a favourite method of exegesis used by medieval Kabbalists to derive mystical insights into sacred writings or obtain new interpretations of the texts. Some condemned its use as mere toying with numbers, but others considered it a useful tool, especially when difficult or ambiguous texts otherwise failed to yield satisfactory analysis. Genesis 28:12, for example, relates that in a dream Jacob saw a ladder (Hebrew *sullam*) stretching from earth to heaven. Since the numerical value of the word *sullam* is 130 (60 + 30 + 40)—the same numerical value of Sinai (60 + 10 + 50 + 10)—exegetes concluded that the Law revealed to Moses on Mount Sinai is man's means of reaching heaven. Of the 22 letters in the Hebrew alphabet, the first ten are given number values consecutively from one to ten, the next eight from 20 to 90 in intervals of ten, while the final four letters equal 100, 200, 300, and 400, respectively. More complicated methods have been used, such as employing the squares of numbers or making a letter equivalent to its basic value plus all numbers preceding it.

Gemayel FAMILY, Maronite Christian family prominent in Lebanese politics before and after the start of that country's civil war in 1975.

Pierre Gemayel (b. Nov. 1/6, 1905, Bikfaya?, Leb.—d. Aug. 29, 1984, Bikfaya) was born into a Christian family already powerful in the region immediately north of Beirut. He attended St. Joseph University in Beirut and trained as a pharmacist. On a visit to Berlin to attend the 1936 Olympic Games, he was so impressed by the spirit and discipline of Nazi youth groups that on his return to Lebanon he helped found the right-wing authoritarian youth movement called the Phalange. He became the leader of the Phalange Party in 1937, retaining that position until 1980. This party became the political arm of the largest Christian community in Lebanon, the Maronites. Pierre was first elected to the Lebanese Parliament in 1960 and held several Cabinet posts during the 1960s. He ran unsuccessfully for the presidency (which was traditionally held by a Christian) in 1964 and 1970. When the civil war broke out in 1975, Gemayel led the powerful Phalangist militia in their clashes with Lebanese Muslims and Palestinian fighters. He was instrumental in creating a large, militarily secure Christian enclave north of Beirut and became Lebanon's preeminent Christian political chieftain.

Pierre's youngest son, Bashir Gemayel (b. Nov. 10, 1947, Bikfaya—d. Sept. 14, 1982, Beirut), emerged during the fighting of the late 1970s as the able and ruthless leader of the Phalangist militia. Bashir unified the military forces of the Maronite community in 1980 after launching several murderous surprise attacks on rival Christian militias. He formally took over control of the Phalangist Party from his father in 1980. Bashir was elected president of Lebanon by the Parliament in August

1982 in the face of opposition by many of the country's Muslims, who disliked his close association with sectarian violence. Bashir was assassinated in a bomb explosion 10 days before he was due to take office.

Bashir's older brother, Amin Gemayel (b. 1942, Bikfaya), was elected president of Lebanon a week after Bashir died. In contrast to his warlike brother, Amin had shown himself to be conciliatory toward the other religious groups in Lebanon during his 12 years as a member of the Lebanese Parliament (1970–82). He had been trained as a lawyer and had overseen the Phalangist Party's vast business interests while Bashir led the party's militia. As president, however, the ineffective Amin proved no more successful than his predecessors in securing an agreement between Lebanon's warring groups that would end the country's civil war.

Gemeinschaft and Gesellschaft, ideal types of social organizations that were systematically elaborated by the German sociologist Ferdinand Tönnies in his influential work *Gemeinschaft und Gesellschaft* (1887; *Community and Society*).

Tönnies' conception of the nature of social systems is based on his distinction between the *Gemeinschaft* (communal society) and the *Gesellschaft* (associational society). In the rural, peasant societies that typify the *Gemeinschaft,* personal relationships are defined and regulated on the basis of traditional social rules. People have simple and direct face-to-face relations with each other that are determined by *Wesenwille* (natural will)—*i.e.,* natural and spontaneously arising emotions and expressions of sentiment.

The *Gesellschaft,* in contrast, is the creation of *Kürwille* (rational will) and is typified by modern, cosmopolitan societies with their government bureaucracies and large industrial organizations. In the *Gesellschaft* rational self-interest and calculating conduct act to weaken the traditional bonds of family, kinship, and religion that permeate the *Gemeinschaft's* structure. In the *Gesellschaft* human relations are more impersonal and indirect, being rationally constructed to serve efficiency or other economic and political considerations.

The alienation and the breakdown of cohesive peasant values attending the rise of industrialization caused many disenchanted intellectuals to romanticize the *Gemeinschaft* after World War I. This misuse of Tönnies' dichotomy constituted a failure to understand that *Gemeinschaft* and *Gesellschaft* were ideal types and not categories of classification.

gemilut ḥesed (Hebrew: "bestowing kindness"), also called GEMILUT ḤASADIM ("bestowing kindnesses"), in Judaism, an attribute of God said to be imitated by those who in any of countless ways show personal kindness toward others. A Jew who does not manifest sensitive concern for others is considered no better than an atheist, regardless of his knowledge of the Torah. Although emphasis is on personal service rather than on money, many *gemilut ḥesed* societies have been organized to lend money without interest to those temporarily in need, an act of kindness considered superior to almsgiving because a loan does not humiliate the recipient.

Gemini (Latin: "Twins"), in astronomy, zodiacal constellation lying between Cancer and Taurus, at about 7 hours right ascension (the coordinate of the celestial sphere analogous to longitude on the Earth) and 22° north declination (angular distance north of the celestial equator). Its brightest stars are Castor and Pollux (Alpha and Beta Geminorum), Pollux being the brighter of the two. The summer solstice, the northernmost point reached by the Sun in its annual apparent journey among the stars, lies in Gemini.

In astrology, Gemini is the third sign of the zodiac, considered as governing the period *c.* May 21–*c.* June 21. It is represented by a set of twins (in Egyptian astrology by a pair of goats and in Arabian astrology by a pair of peacocks). In addition to their identification as Castor and Pollux, the twins have also been related to other celebrated pairs, such as the younger and older Horus, or Romulus and Remus.

Gemini, illumination from a Book of Hours, Italian, *c.* 1475; in the Pierpont Morgan Library, New York City (MS. G.14)

By courtesy of the Pierpont Morgan Library, New York, the Glazier Collection

Gemini, any of a series of 12 two-man spacecraft launched into orbit around the Earth by the United States between 1964 and 1967. The Gemini (Latin: "Twins") program was preceded by the Mercury series of one-man spacecraft and was followed by the Apollo series of three-man spacecraft. The Gemini program was chiefly designed to test the ability of astronauts to maneuver their spacecraft by means of manual control. The Gemini series, directed by the National Aeronautics and Space Administration (NASA), helped to develop the techniques for orbital rendezvous and docking with a target vehicle, procedures that were vital to the subsequent Apollo Moon-landing program. It also provided NASA engineers with an opportunity to improve environmental control and electrical power systems of spacecraft. During the Gemini 4 mission (launched June 3, 1965), astronaut Edward H. White practiced maneuvering outside the spacecraft for 20 minutes, demonstrating man's increasing ability to function in space. Gemini 5 (Aug. 21, 1965) completed an eight-day mission, the longest space flight undertaken up to that time. Gemini 12 (Nov. 11, 1966), the last in the series, made the first automatically controlled reentry into the Earth's atmosphere.

Geminiani, Francesco (baptized Dec. 5, 1687, Lucca, Tuscany—d. Sept. 17, 1762, Dublin), Italian composer, violinist, writer on musical performance, and a leading figure in early 18th-century music.

Geminiani may have studied under Corelli. He established his reputation as a brilliant performer in England, publishing (1716) his Opus 1 sonatas for violin and continuo, which were famous for their technical difficulty and were widely acclaimed as equal to Corelli's. His other popular works include concerti grossi, of which his Opus 2 and Opus 3 sets became extremely popular in England, holding a place in the popular repertory well into the next century. His theoretical writings, particularly *The Art of Playing on the Violin* (1730), had considerable influence, and the latter work remains an important reference on the performance of late Baroque music.

Gemistus Plethon, George, Plethon also spelled PLETHO (b. *c.* 1355, Constantinople—d. 1450/52, Mistra, Morea), Byzantine philosopher and humanist scholar whose clarification of the distinction between Platonic and Aristotelian thought proved to be a seminal influence in determining the philosophic orientation of the Italian Renaissance.

Plethon studied in Constantinople and at the Ottoman Muslim court in nearby Adrianople. He founded a school of esoteric religious philosophy at Mistra, an important citadel in the Peloponnesus, where he spent much of the rest of his life. He served as a consultant and composed proposals on social and governmental reform for the emperors Manuel II Palaeologus (reigned 1391–1425) and John VIII Palaeologus (1425–48). Most importantly, Plethon served as lay theologian with the Byzantine delegation to the 1438–45 general Council of Ferrara–Florence, which had been convened to reunite the Latin and Greek churches confronted by the rapid encroachment of the Ottoman Turks upon Constantinople.

Concerned more with the advancement of Neoplatonic philosophy than with religious questions, Plethon delivered to the Florentine humanists at the Council of Ferrara–Florence his treatise "On the Difference Between Aristotle and Plato." This work fired the humanists with a new interest in Plato (who had been ignored in the West during the Middle Ages because of the preoccupation with Aristotle) and inspired Cosimo de' Medici with the project of founding the Platonic Academy of Florence. Plethon also introduced the *Geography* of Strabo to the West (where it had hitherto been unknown) and led the way to the overthrow of Ptolemy's erroneous geographical theories. He thus greatly affected the Renaissance conception of the configuration of the Earth and so played an important, if indirect, role in the discovery of America by Christopher Columbus, who cited Strabo among his principal authorities.

On returning to the Peloponnesus, Plethon wrote his "Code of Laws," evocative of Plato's *Laws,* in which he set forth a social and political utopia modeled on classic Athenian culture and integrating with it elements of Platonism, Stoicism, Islāmic fatalism, and emperor worship. Plethon also composed orations and essays on Zoroaster, astronomy, music, history, rhetoric, and various theological subjects. Nearly all of his writing is marked by passionate devotion to Greece and a desire to restore its ancient glory.

Gemma Augustea (Latin: "Gem of Augustus"), sardonyx cameo depicting the apotheosis of Augustus. He is seated next to the goddess Roma, and both are trampling the armour of defeated enemies. It is one of the most impressive carved cameos of a series of Roman gems representing imperial persons. The Gemma Augustea (now in the Kunsthistorisches Mu-

Gemma Augustea, Roman sardonyx cameo, late 1st century BC; in the Kunsthistorisches Museum, Vienna

By courtesy of the Kunsthistorisches Museum, Vienna

seum, Vienna) was probably carved during the reign of Caligula (AD 37–41). Others in the series include the Grand Camée de France and the Blacas onyx cameo in the British Museum, London.

gemmail, plural GEMMAUX, in stained glass, technique employing fused layers of coloured glass fragments illuminated from behind, creating an illusion of three-dimensionality in the design. *Gemmail* is frequently used to reproduce works from other pictorial media. The technique was developed in the late 1930s by the French artist Jean Crotti.

A *gemmail* is constructed, piece by piece, on a pane of clear glass bearing the outline of the design. When all fragments have been glued in place, the work is dipped in transparent enamel and baked until fused. Works by Picasso, Braque, and Rouault have been reproduced in this medium, and the Franklin D. Roosevelt station of the Paris metro is decorated with a series of *gemmaux.*

Gempei War (1180–85), final struggle in Japan between the Taira and Minamoto clans that resulted in the Minamoto's establishment of the Kamakura shogunate, a military dictatorship that dominated Japan from 1192 to 1333.

The Taira clan had dominated the Imperial government from 1160 to 1185. Minamoto Yoritomo, the son of the great Minamoto leader Yoshitomo, had been spared after his father's defeat in 1160 because of his youth. Now an adult, he capitalized on the growing dissent with Taira leadership on behalf of members of both the Taira and Minamoto families and organized a new revolt in 1180. He soon gained control of the strategic east coast of Japan and by 1182 was ready to

Important gemstones

mineral formula	gem name	colour	Mohs hardness*	specific gravity*	refractive indices dispersion*	transparency	crystal system habit	remarks
beryl $Be_3Al_2(SiO_3)_6$	aquamarine	sky blue to greenish blue	7½–8	2.68–2.71	$\epsilon = 1.570–1.580$ $\omega = 1.574–1.586$ d = 0.014	transparent	hexagonal large, often flawless, crystals with complex terminations	
	emerald	green		2.68–2.74	$\epsilon = 1.571–1.581$ $\omega = 1.577–1.588$		simple hexagonal crystals terminated by a flat face; often contains inclusions	
	goshenite	colourless; greenish yellow, yellow green, brownish		same as aquamarine	same as aquamarine			
	heliodor	golden yellow		same as aquamarine	same as aquamarine			
	morganite	pink		2.80–2.90	$\epsilon = 1.580–1.590$ $\omega = 1.589–1.601$			
chrysoberyl $BeAl_2O_4$	alexandrite; also cymophane; cat's-eye	green in daylight, red in incandescent light	8½	3.6–3.8	$\alpha = 1.746$ $\beta = 1.748$ $\gamma = 1.756$ d = 0.015	transparent	orthorhombic flattened crystals often twinned	chrysoberyl cat's-eye is chatoyant
corundum Al_2O_3	padmaradschah	orange	9	4.0–4.1	$\epsilon = 1.757–1.768$ $\omega = 1.765–1.776$ d = 0.018	transparent	hexagonal	
	ruby	red					flat-terminated crystals	fluoresces in ultraviolet light; marked dichroism
	sapphire	blue; variable other than red					pointed dipyramids	marked dichroism
diamond C		colourless to faint yellowish tinge; also variable	10	3.52	$n = 2.4175$ d = 0.063	transparent	isometric flattened octahedrons; dodecahedrons	perfect cleavage parallel to octahedron face; sometimes fluorescent in long-wave ultraviolet light
feldspar								
potash feldspar $(K, Na)AlSi_3O_8$	orthoclase	pale yellow; flesh red	6	2.6	$\alpha = 1.518$ $\beta = 1.522$ $\gamma = 1.522$	transparent to opaque	monoclinic crystals	two excellent cleavages at right angles
	moonstone	colourless; also white to yellowish, and reddish to bluish gray			same as orthoclase		nodules; masses	blue opalescence; schiller
	amazonite (amazonstone)	yellow green to blue green			$\alpha = 1.514$ $\beta = 1.518$ $\gamma = 1.521$		triclinic large crystals	variety of microcline
plagioclase mixture of $CaAl_2Si_2O_8$ and $NaAlSi_3O_8$	peristerite	pastel pink to gray	6–6½	2.6–2.7	$\alpha = 1.527–1.577$ $\beta = 1.531–1.585$ $\gamma = 1.538–1.590$	transparent to opaque	triclinic prismatic crystals	iridescent
	sunstone (aventurine)	colourless with reddish glow provided by inclusions						spangled appearance
	labradorite	grayish					compact masses	brilliantly iridescent over large areas
garnet								
almandine $Fe_3Al_2(SiO_4)_3$	carbuncle	deep red with a trace of purple	7½	4.3	$n = 1.830$ d = 0.024	transparent (for light-coloured varieties) to opaque	isometric euhedral crystals, with dodecahedrons and trapezohedrons most common	
andradite $Ca_3Fe_2(SiO_4)_3$	demantoid; Uralian emerald	deep emerald-green	6½	3.9	$n = 1.887$ d = 0.057			
grossularite $Ca_3Al_2(SiO_4)_3$	hessonite; South African jade	brownish yellow or orange to orange, red, or green	7¼	3.6	$n = 1.734$ d = 0.028			
pyrope $Mg_3Al_2(SiO_4)_3$		dark blood red	7–7½	3.6	$n = 1.714$ d = 0.027			
spessartite $Mn_3Al_2(SiO_4)_3$		yellowish orange; brownish to orange red	7¼	4.2	$n = 1.800$			

*Properties given here are for gem-quality material, and hence may differ from those of the mineral.

advance on the capital at Kyōto. The Taira leaders fled, taking with them the infant emperor Antoku. In the sea battle of Dannoura (1185) on the Inland Sea in western Japan, the Taira were finally defeated. The emperor Antoku was drowned in the battle, losing a famous sword, one of the Imperial Treasures of Japan supposedly brought from heaven by the first Japanese emperor. The battle became legendary through accounts such as the *Gempei seisui-ki* ("Record of the Rise and Fall of the Minamoto and Taira").

gemsbok, African hoofed mammal, a subspecies of oryx (*q.v.*).

gemstone, any of various minerals highly prized for beauty, durability, and rarity. A few noncrystalline materials of organic origin (*e.g.*, pearl, red coral, and amber) also are classified as gemstones.

A brief treatment of gemstones follows. For full treatment, *see* MACROPAEDIA: Dress and Adornment.

Gemstones have fascinated man since ancient times. They have long been used for jewelry. Furthermore, their hardness, limpidity, iridescence, and lustre caused them to be regarded as miraculous and endowed with mysterious powers.

Of the more than 2,000 identified natural minerals, fewer than 100 are used as gemstones and only 16 have achieved importance. These are beryl, chrysoberyl, corundum, diamond, feldspar, garnet, jade, lazurite, olivine, opal, quartz, spinel, topaz, tourmaline, turquoise, and zircon. In virtually all cases, these minerals have to be cut and polished for use in jewelry.

Except for diamond, which presents special problems because of its very great hardness

Important gemstones (continued)

mineral formula	gem name	colour	Mohs hardness*	specific gravity*	refractive indices dispersion*	transparency	crystal system habit	remarks
jade								
jadeite $NaAlSi_2O_6$	Imperial jade	pure white to black, red, brown, yellow, blue, mauve, various greens	6	3.2–3.4	$\alpha = 1.640–1.658$ $\beta = 1.645–1.663$ $\gamma = 1.652–1.673$	translucent to opaque	monoclinic compact or fibrous masses	
nephrite $Ca_2(Mg, Fe)_5Si_8O_{22}(OH, F)_2$	mutton-fat jade	deep spinach green to near-white	5–6	3.0–3.4	$\alpha = 1.600–1.672$ $\beta = 1.614–1.686$ $\gamma = 1.627–1.693$	translucent to opaque	monoclinic compact or fibrous masses	
lazurite $Na_4Al_3Si_3O_{12}Cl$	lapis; lapis lazuli	deep blue, azure blue, greenish blue	5–5½	2.4–2.95	$n = 1.50$		isometric	lapis lazuli is a rock containing lazurite as its colouring agent; because it is a rock, its composition and properties are variable; properties given in parentheses are for the rock, the others for the mineral lazurite
		(bluish coloured with flecks of white and gold)	(5½)	(2.7–2.9)		(opaque)	(compact masses)	
olivine $(Mg, Fe)_2SiO_4$	peridot; chrysolite	yellow green; dark bottle green; olive green	6½–7	3.3–3.5	$\alpha = 1.635–1.671$ $\beta = 1.652–1.698$ $\gamma = 1.671–1.707$ d = 0.020	transparent	orthorhombic flattened prismatic crystals; granular masses	
silica								
quartz SiO_2	amethyst	purple	7	2.65	$\epsilon = 1.553$ $\omega = 1.544$ d = 0.013	transparent	hexagonal	
	cairngorm; smoky quartz	smoky gray to brown					octahedral crystals	
	citrine	yellow						
	rock crystal	colourless						
	rose quartz	pink						
	agate (moss agate, mocha stone)	variable				translucent to opaque	compact masses; nodules	
	chalcedony (onyx carnelian, sard, sardonyx, prase, chrysoprase, plasma, bloodstone, heliotrope)	variable						
	jasper	variable						
cristobalite $SiO_2 \cdot nH_2O$	opal	white to colourless; milky to bluish white; variable pale shades	7	2.0–2.3	$n = 1.435–1.455$	opaque	tetragonal submicrocrystalline aggregates; globular or kidney-like crusts; irregular concretions	contains a variable amount of water, causing the physical properties to vary
spinel $MgAl_2O_4$	Balas ruby rubicelle almandine	red; also variable	8	3.6	$n = 1.715–1.725$ d = 0.020	transparent	isometric octahedral crystals; rounded grains; massive	fluoresces red in long-wave ultraviolet light
topaz $Al_2SiO_4(F, OH)_2$		wine yellow; pale blue, green, violet, or red	8	3.5–3.6	$\alpha = 1.606–1.629$ $\beta = 1.609–1.631$ $\gamma = 1.616–1.638$ d = 0.014	transparent	orthorhombic prismatic crystals	
tourmaline complex aluminum borosilicate	achroite	colourless	7–7½	3.0–3.2	$\epsilon = 1.610–1.650$ $\omega = 1.635–1.675$ d = 0.016	transparent	hexagonal prismatic crystals, often rounded or barrel-shaped; massive	
	Brazilian emerald	green						
	dravite	brown						
	indicolite	dark blue						
	rubellite	pink						
	siberite	violet						
turquoise $CuAl_6(PO_4)_4(OH)_8 \cdot 4H_2O$		sky blue; greenish blue	6	2.6–2.8	$\alpha = 1.61$ $\beta = 1.62$ $\gamma = 1.65$	opaque	triclinic cryptocrystalline to fine granular massive	colour fades on contact with sunlight
zircon $ZrSiO_4$	jargon	variable	7½	4.6–4.7	$\epsilon = 1.968–2.015$ $\omega = 1.923–1.960$ d = 0.048	transparent	tetragonal square prismatic crystals; grains	
	Matura diamond	colourless						
	hyacinth (jacinth)	yellow, orange, red, brown						

*Properties given here are for gem-quality material, and hence may differ from those of the mineral.

(*see* diamond cutting), gemstones are cut and polished in any of three ways. Agate, opal, jasper, onyx, chalcedony (all with a Mohs hardness of 7 or less) may be tumbled; that is, they may be placed in a cylinder with abrasive grit and water and the cylinder rotated about its long axis. The stones become polished but are irregular in shape. Second, the same kinds of gemstones may instead be cut *en cabochon* and polished on water- or motor-driven sandstone wheels. This is the practice in Idar-Oberstein, Ger., where this industry has flourished unchanged for several centuries. Third, gemstones with Mohs hardness of more than 7 may be cut with a carborundum saw and then mounted in a holder (dop) and pressed against a revolving cast-iron wheel that is charged with carborundum grit, diamond dust, or other abrasives. The facets are ground onto the stone in this manner and then are polished as above.

Cutting can be done in a great variety of ways, but the four most common faceted forms are the brilliant cut, the rose cut, the step cut, and the drop cut (*qq.v.*). In addition to unfaceted stones being cabochon cut (*q.v.*), some are engraved. High-speed, diamond-tipped cutting tools are used. The stone is hand-held against the tool, with the shape, symmetry, size, and depth of cut being determined by eye. Gemstones can also be made by cementing several smaller stones together to create one large jewel. *See* assembled gem.

In some cases, the colour of gemstones is also enhanced. This is accomplished by any of three methods: heating under controlled conditions; exposure to X-rays or radium; or the application of pigment or coloured foil to the pavilion (base) facets.

In recent times various kinds of synthetic gems, including rubies, sapphires, and emeralds, have been produced. Two methods of fabrication are currently employed, one involving crystal growth from solution and the other crystal growth from melts.

Gemu Gafa, also spelled GEMU-GOFA, or GAMU GOFFA, province (*kifle hager*), southern Ethiopia, bordering Kenya and Lake Rudolf. Lake Abaya, Lake Shamo, and the salt lake Chew Bahir (Lake Stefanie) mark the course of the Great Rift Valley through the eastern part of the province. The rest of the province is rugged and mountainous. Herds of buffalo and other large animals abound. With a total area of about 15,500 sq mi (40,100 sq km), Gemu Gafa encompasses two national parks—Mago (850 sq mi) and Nachisar (270 sq mi)—and two game reserves—Stefanie (1,740 sq mi) and Mago (1,310 sq mi).

Coffee is raised in the highlands and cotton is cultivated on the shores of the lakes. Arba Minch, the capital and largest town (pop. [1982 est.] 16,732), lies between Lakes Abaya and Shamo. There are airports at Arba Minch, Bako, and Bulki. Pop. (1982 est.) 1,058,600.

genale (Ethiopia and Somalia): *see* Jubba River.

Genç Osman (Ottoman sultan): *see* Osman II.

Genck (Belgium): *see* Genk.

Gendarmeria Pontifica (Italian: Pontifical Police), force of 70 men used for police work in Vatican City. The Gendarmeria Pontifica is under the formal jurisdiction of the pope and is responsible for the internal order and security of Vatican City and its palaces as well as the Pontifical Villa of Castel-Gandolfo.

The protection of the pope's person is the responsibility of the Guardia Nobile, a contingent of officers drawn from noble families, and the Swiss Guard (Guardia Svizzera), a corps instituted by Julius II and consisting of Swiss citizens recruited at first from the original cantons of the Swiss confederacy and in modern times from nearly all the others as well. The most familiar of the Swiss Guards' several uniforms is the dark blue, red, and yellow Renaissance costume designed by Michelangelo. There is also a guard of honour (Guardia Palatina d'Onore).

gender, in language, a phenomenon in which the words of a certain part of speech, usually nouns, require the agreement, or concord, through grammatical marking (or inflection), of various other words related to them in a sentence. In languages that exhibit gender two or more classes of nouns control variation in words of other parts of speech (typically pronouns and adjectives and sometimes verbs). These other words maintain constant meaning but vary in form according to the class of the word that controls them in a given situation.

Among modern Indo-European languages such as French, Spanish, and Italian, nouns are classified into two genders, masculine and feminine. Russian and German nouns are grouped into three genders, the third being neuter. While nouns referring to masculine or feminine beings almost always take the logical gender in these languages, for most other nouns the gender is arbitrary.

In the following examples from French, the indefinite article and the adjective display a change in form depending on whether the noun that they modify is masculine (*poème,* "poem") or feminine (*pièce,* "play"): *un poème intéressant,* "an interesting poem," but *une pièce intéressante,* "an interesting play."

Swahili and many other languages have a gender system in which the relationship between the logical category of an object and its grammatical gender is specified to a much greater degree. Gender classes in such languages may include animate beings, inanimate objects, plants, animals, tools, and objects of a particular shape.

gender identity, an individual's self-conception as being male or female, as distinguished from actual biological sex. For most persons, gender identity and biological characteristics are the same. There are, however, circumstances in which an individual experiences little or no connection between sex and gender; in transsexualism, for example, biological sexual characteristics are distinct and unambiguous, but the affected person believes that he or she is—or ought to be—of the opposite sex (*see* transsexualism). Gender identity is not fixed at birth; both physiologic and social factors contribute to the early establishment of a core identity, which is modified and expanded by social factors as the child matures.

Basic gender identity—the concept "I am a boy" or "I am a girl"—is generally established by the time the child reaches the age of three and is extremely difficult to modify thereafter. In cases where biological sex was ambiguous at birth and errors in sexing were made, it has been almost impossible to reestablish the proper identity later in childhood or adolescence. Furthermore, a secondary gender identity can be developed over the core identity, as sex-associated behaviours may be adopted later in life; heterosexual or homosexual orientations also develop later.

Like an individual's concept of his or her sex role, gender identity develops by means of parental example, social reinforcement, and language. Parents teach sex-appropriate behaviour to their children from an early age, and this behaviour is reinforced as the child grows older and enters a wider social world. As the child acquires language, he also learns very early the distinction between "he" and "she" and understands which pertains to him or herself.

Gendje carpet, floor covering handwoven in or near the town of Gendje (now Kirovabad), Azerbaijan S.S.R., characterized by simple, angular designs and saturated (intense) colours. Gendje carpets most often have designs composed of octagons, stars, or three geometric medallions arranged on the carpet's longitudinal axis. Typical colours are blue, dark blue, and madder red.

Old Gendjes are made entirely of wool, but newer examples have piles of coarse wool knotted onto cotton foundation weaves. The weavers of the Gendje district sometimes place little importance on proper weaving techniques, and, consequently, the quality of their carpets is quite uneven.

gene, unit of hereditary information that occupies a fixed position (locus) on a chromosome. Genes achieve their effects by directing the synthesis of proteins.

A brief treatment of genes follows. For full treatment, *see* MACROPAEDIA: Genetics and Heredity, The Principles of.

Genes are composed of deoxyribonucleic acid (DNA), except in some viruses, which have genes consisting of a closely related compound called ribonucleic acid (RNA). A DNA molecule is composed of two chains of nucleotides that wind about each other to resemble a twisted ladder. The sides of the ladder are made up of sugars and phosphates; the rungs are formed by bonded pairs of nitrogenous bases. These bases are adenine (A), guanine (G), cytosine (C), and thymine (T). An A on one chain bonds to a T on the other (thus forming an A–T ladder rung); similarly, a C on one chain bonds to a G on the other. If the bonds between the bases are broken, the two chains unwind, and free nucleotides within the cell attach themselves to the exposed bases of the now separated chains. The free nucleotides line up along each chain according to the base-pairing rule—A's bond to T's, C's bond to G's. This process results in the creation of two identical DNA molecules from one original and is the method by which hereditary information is passed from one generation of cells to the next.

The sequence of bases along a strand of DNA determines the genetic code. When the product of a particular gene is needed, the portion of the DNA molecule that contains that gene will split. A strand of RNA with bases complimentary to those of the gene is created from the free nucleotides in the cell. (RNA has the base uracil [U] instead of thymine, so A and U form base pairs during RNA synthesis.) This single chain of RNA, called messenger RNA (mRNA), then passes to the organelles called ribosomes, where protein synthesis takes place. A second type of RNA, transfer RNA (tRNA), matches up the nucleotides on mRNA with specific amino acids. Each set of three nucleotides codes for one amino acid. The series of amino acids built according to the sequence of nucleotides forms a polypeptide chain; all proteins are made from one or more linked polypeptide chains.

Experiments indicate that one gene is responsible for the assembly of one polypeptide chain. This is known as the one gene–one-polypeptide hypothesis.

Other experiments have shown that many of the genes within a cell are inactive much or even all of the time. Thus, at any time, it seems that a gene can be switched on or off. The process by which genes are activated and deactivated in bacteria has been determined. Bacteria actually have three types of genes: structural, operator, and regulator. Structural genes code for the synthesis of specific polypeptides. Operator genes contain the code necessary to begin the process of transcribing the DNA message of one or more structural genes into mRNA. Thus, structural genes are linked to an operator gene in a functional unit called an operon. Ultimately, the activity of the operon is controlled by a regulator gene, which produces a small protein molecule

called a repressor. The repressor binds to the operator gene and prevents it from initiating the synthesis of the protein called for by the operon. The presence or absence of certain repressor molecules determines whether the operon is off or on. As was mentioned, this model applies to bacteria. Gene regulation in higher organisms is less clearly understood.

Mutations occur when the number or order of bases in a gene is disrupted. Nucleotides can be deleted, doubled, rearranged, or replaced, with each alteration having a particular effect. The mutation generally has little or no effect; when it does alter an organism, the change is frequently lethal. A beneficial mutation will rise in frequency within a population until it becomes the norm.

gene flow, also called GENE MIGRATION, the introduction of genetic material (by interbreeding) from one population of a species to another, thereby changing the composition of the gene pool of the receiving population. The introduction of new alleles through gene flow increases variability within the population and makes possible new combinations of traits. In human beings gene flow usually comes about through the actual migration of human populations, either voluntary or forced.

Articles are alphabetized word by word, not letter by letter

genealogy, the study of family origins and history. Genealogists compile lists of ancestors, which they arrange in pedigree charts. In forms varying from rudimentary to the comparatively complex, genealogy is found in all nations and periods.

A brief treatment of genealogy follows. For full treatment, *see* MACROPAEDIA: History, The Study of.

Genealogy is international in its scope and interest and, though now principally confined to European and American countries, has been studied in all civilized parts of the world. Wherever there has been a hereditary monarchy or aristocracy (*e.g.,* China and Japan), genealogy has been a necessity as well as a pastime. In Muslim countries descent from the Prophet Muhammad and claims on the caliphate have always had a political as well as a religious significance. In non-Christian countries the frequent practice of polygamy, the legal status given to concubinage, and the habit of adoption (as in India) have added problems of their own.

Because genealogy is an international science, attempts have been made to secure a uniform system of signs and abbreviations for universal use in constructing pedigrees. The first International Congress of Heraldry and Genealogy, held in Barcelona in 1928, greatly helped to stimulate interest on a worldwide basis. Many countries now possess societies for promoting genealogical research, and some have even established university professorships in it.

The genealogist needs to have some knowledge of paleography, to help him decipher ancient records (*e.g.,* parish registers and rolls, like the so-called Roll of Battle Abbey), and of chronology, so that he can recognize variations in the calendars and assess regnal years, etc. A knowledge of older languages such as Latin, as well as of the modern languages, is especially helpful. Old deeds, charters, seals, coins, medals, banners, tapestries (for example, the Bayeux tapestry), paintings, tombs, gravestones, and monumental tablets such as brasses may also provide valuable information.

Genealogy no longer concerns itself exclusively with the lineage of the highly placed but has an equal concern for all sorts and conditions of people. It furthermore possesses a genetic interest insofar as certain abilities and characteristics tend to repeat themselves in successive generations.

Oral traditions were of prime importance in the early days of civilization. Without written records, memory, along with such mnemonic devices as rhymes, was relied upon to provide a history. Genealogical information was orally transmitted most often as a list of names, as in the lineages of the ancient Irish kings. Sometimes outstanding events were also featured in such lists.

The long Oriental genealogies concern only great persons or princes. It is impossible to determine if the genealogies of the ancient families of India, which trace the descent of Indian princes from the earliest centuries, are fabricated because the genealogies are all that is known. In Africa another claim to a very long descent, that of the former emperor of Ethiopia, cannot be verified. The emperor was said to have descended from King Solomon's marriage to the Queen of Sheba; but, because this oral tradition was recorded over 15 centuries ago, there is no documentary proof.

The Old Testament contains many genealogies that have the purpose of showing descent from Adam, Noah, and Abraham. When these genealogies became part of the Jewish scriptures, the keeping of family records was reinforced by the concept of racial purity. Among the Gentiles, the idea of divine origin was manifested in the fables about heroes whose paternity was almost always ascribed to the gods. In Greek and Roman genealogies great men were usually begotten by gods or mortals that had become divine.

Early written family records originated in the ancient Mediterranean area, where the oral genealogies became poems and histories. But the invention of writing did not yet render genealogy a science. Writers dealt with genealogy either incidentally or out of concern with the lineage of their gods.

The recording of regal traditions began in the early Middle Ages. The first chroniclers were monks who documented the oral pedigrees of their kings. From approximately 1100 to 1500, genealogists concentrated on the pedigrees of noble and royal lines. Claims to a throne often involved genealogical trees, as when the death of Scotland's Alexander III in 1286 and of his direct heir, Margaret the Maid of Norway, in 1290 brought out a dozen claimants to the Scottish crown. Sometimes the truth was stretched for political purposes, but, in general, medieval European records are genealogically accurate. This is due to their primary purpose, which was to record land transactions, taxation, and lawsuits and not to provide genealogical information.

This period was also characterized by the appearance of pedigrees of common folk. Attention to pedigree became particulary important in the transition from serfdom to villenage, when a man would try to show that he was not a villein and the bailiff would try to prove that he was. It was only in the latest period in European genealogical history, from 1500 to the present, that records that included most ordinary people were begun. The emergence of a powerful mercantile and business community and the rise of the middle classes contributed to the proliferation of records. The Reformation's emphasis on individual religion and the Renaissance monarchs' desire for greater information about their subjects also led to the increased importance of keeping records and tracing ancestry.

In modern genealogy, professional genealogists are concerned with a large number of family histories and broad principles of genealogical research.

genecentre, also spelled GENECENTER, any of a number of areas on the Earth from which arose important crop plants and domestic animals. As few as four of these centres of origin have probably provided the great majority of the most useful plants and animals: (1) tropical southeastern Asia—rice, chickens; (2) temperate southwestern Asia—wheat, sheep, goats, asses; (3) subtropical or temperate Mexico and Central America—corn (maize), turkeys; and (4) the central Andes of South America—potatoes, guinea pigs, llamas. Genecentres are associated historically with areas of fairly high population that were suitable for moderately intense agriculture.

Genée, Dame Adeline, original name ANITA JENSEN (b. Jan. 6, 1878, Århus, Den.—d. April 23, 1970, Esher, Surrey, Eng.), ballerina whose classic style and precise technique were especially noteworthy during ballet's general decline in the years around 1900.

At eight she was adopted by her aunt and uncle, the dancers who trained her for the ballet. Her early appearances were in Germany. From 1897 until 1907 she was prima ballerina at the Empire Theatre in London. Although her repertoire was extensive, she is most frequently associated with *Coppélia,* a ballet revived for her in 1906.

Adeline Genée, *c.* 1900
BBC Hulton Picture Library

She made her U.S. debut in 1907 and during the following decade played five American seasons, mainly in musical revues. She retired from the stage in 1917 but continued to play an active part in English ballet, making occasional appearances until 1933 and serving as the first president, from 1920 until 1954, of the Association of Operatic Dancing of Great Britain (later the Royal Academy of Dancing). She was created Dame of the Order of the British Empire in 1950.

Geneina Fort (The Sudan): *see* Junaynah Fort, al-.

Generación del Noventa y Ocho (Spanish literature): *see* '98, Generation of.

general, title and rank of a senior army officer, usually one who commands units larger than a regiment or its equivalent or units consisting of more than one arm of the service. Frequently, however, a general is a staff officer who does not command troops but who plans their operations in the field. General, lieutenant general, and major general are the first,

second, and third grades of general officers in many armies. The United States Army, Air Force, and Marines have a fourth general officer grade, brigadier general (brigadier in the British Army). The highest U.S. Army rank, five-star general of the army, was created in 1944 and was conferred upon Hap Arnold, Dwight D. Eisenhower, Douglas MacArthur, and George C. Marshall in that year; the four-star rank of general of the army of the United States was established for Ulysses S. Grant in 1866 and was bestowed later upon William T. Sherman and Philip Sheridan; the unique four-star rank of general of the armies of the United States, created in 1799 for George Washington but never held by him, was conferred upon John J. Pershing in 1919.

General Agreement on Tariffs and Trade (GATT), organization and integrated set of bilateral trade agreements aimed at the abolition of quotas and the reduction of tariff duties among the contracting nations. When GATT was concluded by 23 countries at Geneva, in 1947 (to take effect on Jan. 1, 1948), it was considered merely an interim arrangement pending the formation of a UN agency to supersede it. When such an agency failed to emerge, GATT was amplified and further enlarged at several succeeding negotiations. It has since proved to be the most effective instrument of world trade liberalization.

An international organization for GATT is headquartered in Geneva. It has a secretariat, a Council of Representatives (meeting about eight times a year), an annual assembly called the Sessions, and an International Trade Center (established in 1964 to provide information and advice on marketing). By the late 1980s more than 90 nations were signatories to GATT.

GATT itself includes a long schedule of specific tariff concessions for each contracting nation, representing tariff rates that each country has agreed to extend to others. It also sets forth general rules that are, in effect, a code of commercial policy. They provide for unconditional most-favoured-nation clauses (which guarantee to other GATT countries the extension of any tariff concessions granted to non-GATT countries), the elimination of quotas and other quantitative trade restrictions, uniform customs regulations, and the obligation of each contracting nation to negotiate for tariff cuts upon the request of another. An escape clause allows contracting countries to alter agreements if their domestic producers suffer excessive losses as a result of trade concessions. Countries that are members of a customs union or free trade area are permitted to grant preferential tariff rates to each other; the resulting external tariffs of such unions, however, cannot be greater than the average of all the tariffs of those countries prior to the formation of the unions. In 1965 a historic principle was established, that developing countries should not be expected to offer reciprocity in negotiations with developed countries.

General Assembly, one of the six principal organs of the United Nations, the only body in which every member of the organization is represented. The General Assembly convenes annually or in special sessions and exercises deliberative, supervisory, financial, and elective functions relating to any matter within the scope of the UN charter. These functions include the admission of new nations to membership, control of the budget, choice of members of the Economic and Social Council and of the elective members of the Security Council and the Trusteeship Council, and participation in the election of judges of the International Court of Justice and in the appointment of the secretary general.

General Association of Regular Baptist Churches, association of independent, conservative Baptist churches in the United States, organized in 1932 after 22 Baptist churches withdrew from the Northern (later American) Baptist Convention. These churches withdrew because they felt that the Northern Baptists were accepting the teachings of the Modernists, or Liberals, who accepted biblical criticism and attempted to make the church relevant to social problems. They also felt that the Northern Baptist Convention was assuming too much control over the local churches and that the independence of the local church was being threatened.

The Regular Baptists accept conservative theological interpretations of the Christian faith, and they believe that Christ will come again. They require that the local churches in the General Association not participate in any cooperative church activities that include Modernists. Church government is congregational; the General Association holds an annual convention. Headquarters are in Des Plaines, Ill.

General Council of Congregational Christian Churches, Protestant church in the United States, organized in 1931 by a merger of the National Council of the Congregational Churches and the General Convention of the Christian Church. It was merged with the Evangelical and Reformed Church into the United Church of Christ in 1957.

The Congregational churches developed from the churches established by the settlers at Plymouth, Mass. (1620), and at Massachusetts Bay (1630). Local congregations were independent, and a national governing body was not established for many years, though the churches cooperated in many areas. In 1852 representatives from all the Congregational churches met in Albany, N.Y., to discuss a plan of union. In 1871 a national Congregational organization, the National Council, was established at Oberlin, Ohio, and national councils were held regularly from that date. At the time of the merger with the Christian Church in 1931, the Congregational churches had about 943,500 members.

The Christian Church developed from three independent groups that had withdrawn from the Methodist, Baptist, and Presbyterian denominations in the late 1700s and early 1800s. The three groups began cooperating a few years later in a General Council. The Bible was the only rule of faith, church government was congregational, and complete freedom of belief was allowed.

General Dynamics Corporation, major American defense contractor. Headquarters are in St. Louis, Mo.

The firm was incorporated under its present name in 1952 and has flourished with the proliferation of U.S. government contracts to arms manufacturers that began in the period after World War II. The original company, the Electric Boat Company, was founded in 1899 and built the first submarine purchased by the U.S. Navy, in 1900.

More than two-thirds of General Dynamics' annual revenues are derived from government contracts, chiefly with the United States. It is engaged in the development and manufacture of submarines, ships, missiles and space vehicles, military, commercial, and private aircraft, and advanced electronics and communications equipment. The company is a major builder of liquid natural gas tankers and is the prime contractor for the U.S. Navy's Trident nuclear submarine program. Its aerospace division produces the F-16 fighter jet, the F-111 fighter bomber, the M-1 tank, the Tomahawk cruise missile, and other tactical weapons systems of major importance.

In 1985 General Dynamics came under government investigation for alleged waste and widespread fraudulent billing practices in its development of several weapons systems for the U.S. Department of Defense. In December of that year the company was temporarily suspended from obtaining any new government contracts after being indicted on fraud charges in connection with cost overruns it had incurred.

General Electric Company (GE), major American corporation and one of the largest and most diversified corporations in the world. Its products include aircraft engines, medical imaging equipment, financial services, and a number of manufacturing concerns. Headquarters are in Fairfield, Conn.

The company was incorporated in 1892, acquiring all the assets of the Edison General Company and two other electrical companies. Edison General had been founded as Edison Electric Light Company in 1878 by Thomas Alva Edison to market his incandescent lamp and other later products. Edison remained associated with General Electric through his patents and consulting duties.

Since its founding, the company has grown through internal expansion and external acquisition. It produces one of the largest lines of electrical consumer goods in the world, and, through its General Electric and Hotpoint appliance brands, it is a top seller of virtually every type of home appliance manufactured.

In 1987 GE sold its consumer electronics division to Thomson SA, a state-owned French firm, and purchased Thomson's medical technology division. With the purchase of GE-owned RCA, Thomson was given use of the RCA label for an indefinite period of time.

While its consumer products are most visible to the general public, they account for only about one-sixth of the company's annual sales. General Electric is also engaged in manufacturing jet engines and aerospace equipment; industrial products and components; and power systems for electric utilities. The company is also one of the largest builders of nuclear reactors used to generate power. The GE Credit Corporation is involved in real estate and business financing; reinsurance; and investment banking. A substantial portion of the company's sales are to the U.S. Department of Defense.

General Eugenio A. Garay, formerly YRENDAGÜE, town, northwestern Paraguay just southeast of the Bolivian border. The town is named for the field commander who during the Chaco War (1932–35) seized water wells at Yrendagüe and thus forced a decisive battle (1934) with Bolivian forces. The town is extremely remote; it is situated 450 miles (750 km) northwest of Asunción, the national capital, at the terminus of the incompletely paved Paraguayan Trans-Chaco highway. It is the administrative headquarters of a desolate, largely uninhabited area of the wild Chaco Boreal. The few inhabitants of General Eugenio A. Garay are engaged in subsistence agriculture. Pop. (1982 prelim.) 231.

General Grant National Memorial, also called GRANT'S TOMB, mausoleum of President Ulysses S. Grant in New York City, standing on a bluff (130 feet [40 m] high) overlooking the Hudson River. It was designed by John H. Duncan. The monument, 150 feet (46 m) high in gray granite, was erected at a cost of $600,000 raised by public contributions. It was dedicated April 27, 1897, and made a national memorial in 1959. The memorial is a combination of several classical styles, its lower section (90 feet [27 m] square and 72 feet [22 m] high) supporting a rotunda surrounded by Ionic columns and surmounted by a conical dome. Massive bronze doors lead to a white marble interior, in the centre of which is an open crypt containing the sarcophagi of the general and his wife, Julia Dent Grant.

General Mills, Inc., leading American producer of packaged consumer foods, especially

flour, cereals, snacks, prepared mixes, and similar products. The company is also a leading manufacturer of institutional food products and commercial food ingredients. Headquarters are in Minneapolis, Minn.

General Mills was incorporated in 1928 to acquire Washburn Crosby Company, a flour-milling company formed in 1866, and four other milling companies. Specializing in cereals and flour products, the company grew as a food processor through the years of the Great Depression. Familiar products include Wheaties and Cheerios breakfast cereals, Gold Medal flour, and Bisquick baking mix. During those early years, the company also created one of America's most widely known food advisers, a corporate fabrication named Betty Crocker, and gave the name to a succession of cake and other pastry mixes.

When the flour industry encountered difficult times in the early 1960s, the company began to diversify its activities. It sold off a number of unprofitable mills and began to move into such areas as toys and fashion goods. By the mid-1980s, however, the company sold off many of the nonfood units it had acquired in the '60s and was restructured; three divisions remained—restaurants, consumer foods, and specialty retailing. These included Red Lobster restaurants, Talbot's women's clothing stores, and Eddie Bauer sportswear stores, in addition to the company's traditional food products line.

General Motors Corporation (GM), one of the world's largest industrial corporations. It was founded in 1908 to consolidate several motorcar companies and today operates manufacturing and assembly plants and distribution centres throughout the United States and Canada and many other countries. Its major products include automobiles and trucks, automotive components, locomotives, engines, mining and construction machinery, defense and aerospace matériel, and commercial and household appliances. A GM financial and insurance group finances and insures the installment sales of GM products. Corporate headquarters are in New York City.

As organized by William C. Durant (1861–1947), a wealthy carriage maker and Buick investor of Flint, Mich., General Motors Company from 1908 to 1911 initially consolidated firms producing Buick, Oldsmobile, Cadillac, Oakland (later Pontiac), Cartercar, and Elmore autos, as well as Reliance and Rapid trucks. Reincorporated, the company acquired its current name in 1916. Chevrolet and Delco Products joined the corporation in 1918, Fisher body and Frigidaire in 1919 (sold 1979). Under the presidency (1923–37) of Alfred P. Sloan, Jr. (1875–1966), the corporation further expanded, adding overseas operations: Vauxhall of England in 1925, Adam Opel of Germany in 1929, and Holden's of Australia in 1931. Yellow Truck & Coach Manufacturing Co. (now GMC Truck & Coach Division), organized in 1925, was one of many new divisions and subsidiaries to be established by GM. In 1984 the company reorganized into two main groups—the small car division, which included Chevrolet, Pontiac, and GM of Canada, and the large car division, which included Buick, Oldsmobile, and Cadillac. In 1986 GM acquired Britain's Group Lotus PLC, noted as an engineering and performance-car manufacturing firm, and established a GM Europe passenger-car unit.

From its early days, GM pioneered in the development of a decentralized concept of management (since emulated by other industrial enterprises) whereby various operating units, called divisions, retain a substantial degree of autonomy within a framework of overall policy. Research has been emphasized since the founding of GM Research Laboratories in 1920 and has resulted in such innovations as Hydra-Matic, the first completely automatic shift transmission; the lightweight two-cycle diesel engine, which replaced steam engines on American railroads; and shatter-resistant safety glass.

In the 1980s General Motors embarked on an ambitious diversification into the fields of aerospace and high technology. It bought Electronic Data Systems Corporation, a large data-processing company, in 1984 and acquired the Hughes Aircraft Company, a maker of weapons systems and communications satellites, in 1986.

General San Martín, formerly SAN MARTÍN, *cabecera* (county seat) and *partido* (county) of Gran ("Greater") Buenos Aires, Argentina, immediately northwest of the city of Buenos Aires, in Buenos Aires *provincia.* The county seat and county began as an early rural settlement centred around the 18th-century chapel of Santos Lugares. In 1836 the region's settlers petitioned the provincial government to establish the town of Santos Lugares de Rosas. The town experienced a short life, as many settlers were forced to leave in 1840, when the site was converted to a military camp. Finally, in 1856, the settlement was formally declared a town, and eight years later the county of San Martín (named for the Argentine liberator) was created. The county covers 22 square miles (56 square km). Besides the county seat of General San Martín, the major localities in the county are San Andrés, José L. Suárez, and Villa Ballester. In 1911 General San Martín town was given official city status, and since then it has grown into a major industrial centre, processing and manufacturing linseed oil, textiles, dairy products, frozen meat, cigarettes, liquor, and a variety of other products. The county is the birthplace of José Hernández (1834–86), the Argentine author who romanticized the role of the gaucho in the country's development, and in 1942 his birthplace was declared a historic site.

With the growth of the national capital, General San Martín has been absorbed into the northwestern area of Gran Buenos Aires. The area of the county is totally within the Gran Buenos Aires urban area, and the density of settlement is the fourth highest among Buenos Aires counties. Pop. (1980) *partido,* 385,625.

General Santos, formerly (1954) BUAYAN, chartered city, southern Mindanao, Philippines. The city is named for General Paulino Santos, who directed the pioneer settlement (mostly by Christian Filipino migrants) and development of the Koronadal Valley that began in the mid-1930s. General Santos city is located at the head of Sarangani Bay of the Celebes Sea along the southern shore of Mindanao. The city is a principal shipping point and is also administrative headquarters for the Koronadal settlement projects. A number of small-scale manufacturing companies are located there, and banana, pineapple, and cassava plantations have made the city an agro-industrial centre. Its national port, the largest in southern Mindanao, is the port of entry for overseas shipping in the region. General Santos also has a national airport. It is connected by road with Cotabato City, Davao, and the other distant cities of the island. Inc. city, 1968. Pop. (1980) 149,396.

General Sarmiento, *partido* (county) of Gran ("Greater") Buenos Aires, Argentina, northwest of the city of Buenos Aires, in Buenos Aires *provincia.* The early settlement of the county centred on the agricultural plantation San José del Pilar, established by Adolfo Sordeaux in 1862. This plantation settlement led Sordeaux to establish the towns of San Miguel and Bella Vista in 1872. In 1889 General Sarmiento county (named for Domingo Faustino Sarmiento, Argentine president, 1868–74) was created by expropriating lands from Pilar and Moreno counties. The county covers 76 square miles (196 square km). Besides the *cabecera* (county seat) of San Miguel, the major localities in the county are Bella Vista, Jose C. Paz, and Villa de Mayo. General Sarmiento lies almost totally within the Gran Buenos Aires urban area, and it had the second highest population increase of all counties in Gran Buenos Aires in both the 1960s and 1970s. Dairying, once an important industry, has declined. Three major railways running northwest from Buenos Aires serve the county. Pop. (1980) 502,926.

General Security, Committee of, French COMITÉ DE SÛRETÉ GÉNÉRALE, organ of the French Revolutionary government. It directed the political police and Revolutionary justice. Founded by the National Convention in 1792, the committee administered the Reign of Terror of 1793–94, along with the Committee of Public Safety. *See also* Revolutionary Tribunal.

general semantics, a philosophy of language-meaning that was developed by Alfred Korzybski (1879–1950), a Polish-American scholar, and furthered by S.I. Hayakawa, Wendell Johnson, and others; it is the study of language as a representation of reality. Korzybski's theory was intended to improve the habits of response to environment and of one individual to another. Drawing upon such varied disciplines as relativity theory, quantum mechanics, and mathematical logic, Korzybski and his followers sought a scientific, non-Aristotelian basis for clear understanding of the differences between symbol (word) and reality (referent) and the ways in which words themselves can influence (or manipulate) and limit human ability to think.

A major emphasis of general semantics has been in practical training, in methods for establishing better habits of evaluation, *e.g.,* by indexing words, as "man_1," "man_{37}," and by dating, as "$Roosevelt_{1930}$," "$Roosevelt_{1940}$," to indicate exactly which man or which stage of time one is referring to.

Korzybski's major work on general semantics is *Science and Sanity* (1933; 3rd ed., 1948). The International Society for General Semantics (founded 1942 as the Society for General Semantics) publishes a quarterly, *Review of General Semantics,* and *ETC.,* a periodical.

general staff, in the military, a group of officers that assists the commander of a division or larger unit by formulating and disseminating his policies, transmitting his orders, and overseeing their execution. Normally a general staff is organized along functional lines, with separate sections for administration, intelligence, operations, training, logistics, and other categories. In many countries a similar but more elaborately organized staff assists the supreme military authority. While a general staff contains specialists as well as more broadly trained officers, it is distinguished in character and functions from special staffs (in the U.S. Army) consisting of technical specialists in the various services: medical, police, communications, supply, and others.

Although the name general staff was sometimes applied to high military staffs in the 18th century, the institution did not appear in its modern form until the early 19th century, in the Prussian Army, and in other European countries after 1870. The U.S. Army created a general staff in 1903, the British Army in 1906. In the British and U.S. armies, however, the general staff differed from that of the Prussian Army in that the officers, although especially qualified, were not trained as an elite corps; they were individually selected from the officer corps as a whole just as for other assignments. The air force counterpart of army general staff is usually called the air staff.

general store, store characteristic of the 19th-century United States that served its community and the farmers surrounding it by supplying a wide range of goods, including food, clothing, housewares, and farm equipment. Because money was scarce in many rural areas, some of the trade was accomplished through barter. The general store also served as a meeting place for members of the community, of which the storekeeper was an important member, not only because he supplied material goods but because he was also the source of news, gossip, and credit.

In the history of U.S. retailing, the general store followed the trading post and was succeeded in the 20th century by the trend toward specialized stores, which were followed, in turn, by department stores and supermarkets.

general strike, stoppage of work by a substantial proportion of workers in each of a number of industries in an organized endeavour to achieve economic or political objectives. A strike covering only one industry cannot properly be called a general strike.

The general strike, as a deliberate part of the tactics of collective bargaining, came into use with the growth of the trade unions in Great Britain. In the 1820s and 1830s, the idea of a general stoppage of work was advocated by radical orators and union leaders as a means of securing the reform of Parliament and achieving the "rights of labour." In 1842 the Chartists, who agitated for political rights, tried to turn an outbreak of strikes in Lancashire into a general strike. They were successful in spreading the stoppage to neighbouring counties, but the strike eventually collapsed before the government's show of force.

After the Chartist failure, the general strike declined in Britain until early in the 20th century. The theory of the general strike as a method of social revolution developed mainly in France. The question was discussed at the Geneva Congress of the International Association of Workingmen (1866). Two big general strikes occurred in Belgium in 1893 and 1902 over the issue of universal manhood suffrage. A large-scale strike took place in Sweden in 1902 over similar issues, followed in 1909 by perhaps the biggest general strike to that date, which centred partly upon the wage-freeze policies adopted by employers because of falling profits. Nearly half of the total work force went out, and the stoppage lasted a month before the strike was settled.

Widespread support for the general strike developed in Great Britain after Tom Mann's return from Australia. In 1911 he established the Revolutionary Syndicalist League and had a hand in most of the large-scale strikes that occurred in 1910, 1911, and 1912. Between 1910 and 1914, industrial syndicalism gained a considerable following, and on the eve of World War I the road transport, railway, and miners' unions formed a "triple alliance" to secure improvements in wages and working conditions.

In 1926, Britain faced one of the biggest general strikes in its history, which began as a strike in the coal industry and spread to railways, road transport, iron and steel, and building and printing, the Trades Union Congress throwing its support behind the miners. The general strike lasted only nine days, but the miners stayed out for nearly six months. A negotiated settlement was reached, with the government taking an active role.

In the United States, labour has accepted in principle the inviolability of the collective contract and consequently has in principle always opposed the general strike. A general strike would lead to universal breaches of existing agreements and would expose weaker unions to reprisals from employers. There have, nevertheless, been regional general strikes, which were opposed by the national officers of many of the participating unions.

In Asian and African countries, trade unions allied with independence movements often resorted to general strikes as a means of political protest during colonial rule. The smallness of industry in these countries has limited all trade-union action. Wherever organized trade unions exist, however, they have continued to use the general strike as an instrument for achieving economic as well as political ends.

Although there have been industry-wide strikes in nearly all countries with autonomous trade-union movements, general strikes have been infrequent since World War II. Notable exceptions were the outbreak of a general strike in France (May 1967), touched off by student demands for educational reform, and nationwide strikes for social security and educational reform in Italy (November 1968) involving more than 12,000,000 workers.

General Stud Book, in horse breeding, prototype of the breeding record of purebred horses, or studbook (*q.v.*).

General Telephone and Electronics Corporation: *see* GTE Corporation.

General Union of Jewish Workers in Lithuania, Poland, and Russia: *see* Bund.

general will, theory of Jean-Jacques Rousseau, 18th-century French political philosopher, that in a democratic society the state represents the general will of the citizens, and that in obeying its laws each citizen is pursuing his own real interest. Rousseau distinguished the "general will" from particular wills. The general will is a moral will, a will that aims at the common good.

Rousseau assumed that all men are capable of taking the moral standpoint of aiming at the common good, and that if they did so they would reach a unanimous decision. Thus, in an ideal state, laws express the general will. An individual who disagrees with a law must be failing to look at things from the moral standpoint. The general will expressed by the law is what that individual, no less than others, would share if he took the moral, the truly human, view.

généralité, the basic administrative unit of 17th- and 18th-century France. It was first established in the late 14th century to organize the collection of royal revenues. In the 15th century, four *généralités* covered most of France. An edict of 1542 established their number at 16, each under a *receveur* ("receiver") *général* (from which the unit took its name).

In the 17th century the already existing *généralité* became the sphere of authority of the intendant, a direct agent of the king with wide police, justice, and finance powers. In the language of the time, *généralité* came to be synonymous with intendancy. In 1789 there were about 33 *généralités;* their boundaries were often arbitrarily chosen without any geographical or historical basis. The district seats (*chefs-lieux*), from which the *généralités* took their names, were themselves often inconveniently located in a corner of the territory.

generalization, in psychology, the tendency to respond in the same way to different but similar stimuli. For example, a dog conditioned to salivate to a tone of a particular pitch and loudness will also salivate with considerable regularity in response to tones of higher and lower pitch. The generalized response is predictable and orderly: it will measure less than that elicited by the original tone and will diminish as the new tone departs increasingly from the original. Similar behaviour is observed in humans, as children learning to talk may call anything that can be sat upon "chair" or any man "daddy." Adults conditioned by mild electric shock to fear a certain word will respond with symptoms of anxiety to any synonym of that word; in this instance, physical similarity, the usual basis of generalization, is less important than prior learning. Responses may also be generalized, allowing an individual to take an alternative course of action if the usual response is for some reason precluded. Learning may be considered a balance of generalization and discrimination (the ability to respond to differences among stimuli). An imbalance can lead to negative results. For example, a child who is scared by a man with a beard may fail to discriminate between bearded men and generalize that all men with beards are to be feared.

Generation of '98 (Spanish literature): *see* '98, Generation of.

generative grammar, a precisely formulated set of rules whose output is all (and only) the sentences of a language—*i.e.,* of the language that it generates. There are many different kinds of generative grammar, including transformational grammar as developed by Noam Chomsky from the mid-1950s. Linguists disagree as to which, if any, of these different kinds of generative grammar will serve as the best model for the description of natural languages.

Generative grammars do not merely distinguish the grammatical sentence of a language from ungrammatical sequences of words of the same language; they also provide a structural description, or syntactic analysis, for each of the grammatical sentences. The structural descriptions provided by a generative grammar are comparable with, but more precisely formulated than, the analyses that result from the traditional practice of parsing sentences in terms of the parts of speech.

género chico (Spanish: "little genre"), Spanish literary genre of light dramatic or operatic one-act playlets, as contrasted with the *género grande* of serious drama or opera. Developed primarily in the theatres of Madrid during the later 19th century, *género chico* works usually dealt with Madrid's lower classes, whose way of life was regarded with mingled sentimentality and satiric humour. Carlos Arniches, Ricardo de la Vega, and Tomás Luceño were the chief writers in the genre.

Genesee River, river, mainly in New York, U.S., flowing generally north from its headwaters in Pennsylvania, crossing the New York State Barge Canal, and bisecting Rochester to enter Lake Ontario after a course of 158 mi (254 km). At Portageville, midway along its course, the river flows into a 25-mi-long postglacial, winding rocky gorge with sides rising at some points 800 ft above its banks; known as the "Grand Canyon of the East," this gorge, cut into sedimentary rocks of the Appalachian Upland, is the focal point of Letchworth State Park (14,340 ac [5,803 ha]), known for its scenic beauty and site of a well-known Indian and Pioneer Museum, including the "last Council House of the Senecas." At Portage Falls, within the park, the Genesee cascades over three steps from heights of 66 ft, 110 ft, and 96 ft. There is a flood-control dam at Mount Morris, where the river leaves the gorge to enter a wide, preglacial moraine-filled plain. At Rochester it enters another (7-mi-long) gorge containing three waterfalls (98 ft, 20 ft, and 105 ft) which supply industrial power. Genesee is an Iroquoian Indian term meaning "beautiful valley"; the Senecas called it Casconchiagon ("river of many falls").

Genesee Stage, division of Devonian rocks and time in the eastern U.S. (the Devonian Period began about 395,000,000 years ago and lasted about 50,000,000 years); the Genesee Stage was named for excellent exposures studied along the Genesee River Valley in New York and especially in the river gorge below Portage, N.Y. The Genesee is correlative with

the lower portion of the Finger Lakes Stage; it precedes rocks of the Naples Stage and overlies the Hamilton Group. Red beds predominate in the east, and these grade laterally into black shales in the west.

Genesis, Hebrew BERESHIT ("In the Beginning"), the first book of the Old Testament. Its name derives from the opening words: "In the beginning . . . ." Genesis narrates the primeval history of the world (chapters 1–11) and the patriarchal history of the Israelite people (chapters 12–50). The primeval history includes the familiar stories of creation, the Garden of Eden, Cain and Abel, Noah and the Flood, and the Tower of Babel. The patriarchal history begins with the divine promise to Abraham that "I will make of you a great nation" (12:2) and tells the stories of Abraham (chapters 12–25) and his descendants: Isaac and his twin sons Jacob and Esau (chapters 26–36) and Jacob's family, the principal figure being Joseph (chapters 37–50), whose story tells how the Israelites came to be in Egypt. Their deliverance is narrated in the following book of Exodus. Genesis must thus be seen as a part of a larger unit of material traditionally understood to comprise the first five books of the Bible, called the Torah, or Pentateuch.

Scholars have identified three literary traditions in Genesis, as in Deuteronomy (*see also* biblical source), usually identified as the Yahwist, Elohist, and Priestly strains. The Yahwist strain, so called because it used the name Yahweh (Jehovah) for God, is a Judaean rendition of the sacred story, perhaps written as early as 950 BC. The Elohist strain, which designates God as Elohim, is traceable to the northern kingdom of Israel and was written 900–700 BC. The Priestly strain, so called because of its cultic interests and regulations for priests, is usually dated in the 5th century BC and is regarded as the law upon which Ezra and Nehemiah based their reform. Because each of these strains preserves materials much older than the time of their incorporation into a written work, Genesis contains extremely old oral and written traditions.

Genesis, Little: *see* Jubilees, Book of.

Genesis Apocryphon, pseudepigraphal work (not accepted in any canon of scripture), one of the most important works of the Essene community of Jews, part of whose library was discovered in 1947 in caves at Qumrān, near the Dead Sea, in Palestine. The scroll, the last of seven scrolls discovered in Cave I, is also the least well preserved. Examination of the entire scroll showed it to be a collection of apocryphal embellishments on leading figures in Genesis and not, as was first suspected, the long lost "Apocalypse of Lamech." The contents of the scroll comprise four major sections: the story of Lamech (columns 1–5), the story of Noah (columns 6–15), the table of the Peoples (columns 16–17), and the story of Abraham (columns 18–22).

The work is a good example of Essene biblical exegesis and shows striking similarities to the pseudepigraphal *Book of Jubilees,* which also presents a highly imaginative version of Genesis. Though their calculations differ, the two books show a common interest in the calendar. Because the scroll also contains material related to that found in *First Book of Enoch,* the *Genesis Apocryphon* was possibly the source for both *Jubilees* and *I Enoch.*

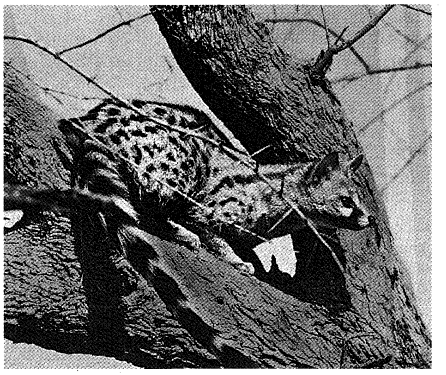
Written in Palestine in Aramaic, the scroll is the earliest example of a pseudepigraphal work in that language and is important for the study of its linguistic development. It dates from either the 1st century BC or AD. The date of the original text, however, is difficult to determine, since the scroll may be an Aramaic translation of a Hebrew original or an altered edition of an Aramaic original.

Genesius, Joseph (fl. 10th century), Byzantine scholar whose history of Constantinople is one of the few known sources on the relatively obscure 9th-century period of Byzantine history.

The details of Genesius' life are unknown. He apparently composed his history between 945 and 959 at the order of Emperor Constantine VII, using his high social position to gain eyewitness reports of events from members of the royal court. Also referring to a variety of manuscripts, including chronicles and the biographical accounts of patriarchs, the *History of Constantinople* covers the empire from the reign of Leo the Armenian (813) to the death of Basil I in 886.

Genêt (American writer): *see* Flanner, Janet.

genet, any of about five species of lithe, catlike carnivores of the genus *Genetta,* family Viverridae. Genets are elongate, short-legged animals with long, tapering tails; pointed noses; large, rounded ears; and retractile claws. Coloration varies among species but usually is pale yellowish or grayish, marked with dark spots and stripes; the tail is banded black and white. Adult genets weigh 1–2 kilograms (2.2–4.4 pounds) and are about 40–60 centimetres (16–24 inches) long, excluding the 40–55-cm tail.



Genet (*Genetta*)
Warren Garst—Van Cleve Photography

Except for the small-spotted genet (*G. genetta*), which also occurs in western Asia and southern Europe, they are found only in Africa. Genets live alone or in pairs and are active mainly at night. They frequent forests, grasslands, and brush and are as agile in the trees as on the ground. They prey on small mammals and birds. Litters contain two or three young.

Genet, Edmond-Charles, Genet also spelled GENEST (b. Jan. 8, 1763, Versailles, Fr.—d. July 14, 1834, Schodack, N.Y., U.S.), French emissary to the United States during the French Revolution who severely strained Franco-American relations by conspiring to involve the United States in France's war against Great Britain.

In 1781 Edmond succeeded his father, Edmé-Jacques Genet, as head of the translation department at the French Ministry of Foreign Affairs. Soon after the outbreak of the Revolution in 1789 he was made chargé d'affaires to the French legation in Russia; but his enthusiasm for the Revolution antagonized the empress Catherine II the Great, who expelled him from Russia in July 1792. Genet then identified himself with the moderate Girondin faction in the French Revolutionary government; and in April 1793 the Girondins secured his appointment as chargé d'affaires to the United States. He was instructed to seek repayment of part of the American debt to France or—at the very least—to obtain credit for purchasing the supplies needed for the war with Great Britain.

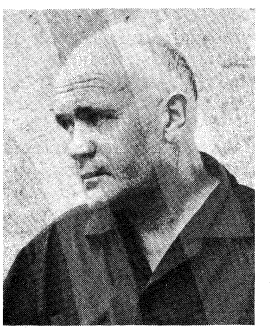
Nevertheless, Genet soon exceeded his diplomatic authority. Hailed as "Citizen Genet" by Americans who favoured the French cause, he conspired with those who opposed Washington's policy of neutrality. His efforts to bring the United States into the war and his highhanded arming of privateers in U.S. ports to operate against the British brought relations between the United States and France to the brink of war and risked the loss of France's sole source of credit abroad. In August 1793 Pres. George Washington, who was firmly committed to a policy of neutrality in the European conflict, requested that Genet be recalled. Realizing that he faced arrest if he returned to France, Genet chose to remain in the United States; he married the daughter of George Clinton, governor of New York, became a U.S. citizen, and settled down to farming.

Genet, Jean (b. Dec. 19, 1910, Paris—d. April 15, 1986, Paris), French criminal and social outcast turned writer who, as a novelist, transformed erotic and often obscene subject matter into a poetic vision of the universe and, as a dramatist, became a leading figure in the avant-garde theatre, especially the Theatre of the Absurd.

Genet, an illegitimate child abandoned by his mother, Gabrielle Genet, was raised by a family of peasants. Caught stealing at the age of 10, he spent part of his adolescence at a notorious reform school, Mettray, where he experienced much that was later described in the novel *Miracle de la rose* (1945–46; *Miracle of the Rose*). His autobiographical *Journal du voleur* (1949; *The Thief's Journal*) gives a complete and uninhibited account of his life as a tramp, pickpocket, and male prostitute in Barcelona, Antwerp, and various other cities (*c.* 1930–39). It also reveals him as an aesthete, an Existentialist, and a pioneer of the Absurd.

He began to write in 1942 while imprisoned for burglary at Fresnes and produced an outstanding novel, *Notre-Dame des Fleurs* (1944; *Our Lady of the Flowers*), vividly portraying the prewar Montmartre underworld of thugs, pimps, and perverts. His talent was brought to the attention of Jean Cocteau and later Jean-Paul Sartre and Simone de Beauvoir. When Genet in 1948 was convicted of burglary for the 10th time and condemned to automatic life imprisonment, a delegation of well-known writers appealed on his behalf to the President of the French republic, and he was reprieved.

After writing two other novels, *Pompes funèbres* (1947; *Funeral Rites*) and *Querelle de Brest* (1947; *Querelle of Brest,* filmed 1982), Genet began to experiment with drama. His early attempts, by their compact, neoclassical, one-act structure, reveal the strong influence of Sartre. *Haute Surveillance* (1949; *Deathwatch*) continues his prison-world themes. *Les Bonnes* (1947; *The Maids*), however, begins to explore the complex problems of identity that were soon to preoccupy other avant-garde dramatists such as Samuel Beckett and Eugène Ionesco. With this play Genet was established as an outstanding figure in the Theatre of the Absurd.



Jean Genet
© Jerry Bauer

His subsequent plays, *Le Balcon* (1956; *The Balcony*), *Les Nègres* (1958; *The Blacks*), and *Les Paravents* (1961; *The Screens*), are large-scale, stylized dramas in the Expressionist manner, designed to shock and implicate an audience by revealing its hypocrisy and complicity. This "Theatre of Hatred" attempts to wrest the maximum dramatic power from a social or political situation without necessarily endorsing the political platitudes of either the right or the left.

Genet, a rebel and an anarchist of the most extreme sort, rejected all forms of social discipline or political commitment. The violent and often degraded eroticism of his experience led him to a concept of mystic humiliation. Jean-Paul Sartre's study, *Saint Genet, comédien et martyr* (1952; *Saint Genet, Actor and Martyr*), compares Genet's evident pursuit of mortification and self-abasement to that of a saint.

genetic code, the sequence of nitrogen bases in deoxyribonucleic acid (DNA, the genetic material); this sequence provides the instructions for the synthesis of proteins. It does so by determining the sequence of the amino acids composing proteins. There are four kinds of nitrogen bases in DNA: adenine (A), guanine (G), cytosine (C), and thymine (T). Each amino acid is represented by a series of three bases, which, considered as a unit, is called a codon. There are 64 different possible codons, more than enough to form the approximately 20 amino acids that make up proteins. It is now known that the code is redundant—*i.e.,* that most of the 20 amino acids are each coded for by more than one codon. Furthermore, three of the codons do not specify an amino acid at all; instead they function as terminators, marking the end of an amino-acid chain. The genetic code appears to be universal; in all forms of life that have been studied—from bacteria to man—the same codons specify the same amino acids.

genetic drift, also called GENETIC SAMPLING ERROR, or SEWALL WRIGHT EFFECT, a change in the gene pool of a small population that takes place strictly by chance. Genetic drift can result in genetic traits being lost from a population or becoming widespread in a population without respect to the survival or reproductive value of the alleles involved. A random statistical effect, genetic drift can occur only in small, isolated populations in which the gene pool is small enough that chance events can change its makeup substantially. In larger populations, any specific allele is carried by so many individuals that it is almost certain to be transmitted by some of them unless it is biologically unfavourable. *See also* founder principle.

genetic engineering, any of a wide range of techniques for the deliberate modification of existing organisms and the potential generation of totally new types of organisms.

A brief treatment of genetic engineering follows. For full treatment, *see* MACROPAEDIA: Genetics and Heredity: *Genetic Engineering.*

The practice embraces both artificial selection and all the interventions of biomedical techniques, among them artificial insemination, *in vitro* fertilization (*e.g.,* "test-tube" babies), sperm banks, cloning, and gene manipulation. Of particular interest are the recombinant DNA experiments, in which molecules of deoxyribonucleic acid (DNA) from two or more sources are combined either within cells or *in vitro.*

DNA is the carrier of genetic information; it achieves its effects by directing the synthesis of proteins. Most recombinant DNA research has involved the insertion of foreign genes into the plasmids of common laboratory strains of bacteria. Plasmids are small rings of DNA; they are not part of the bacterium's chromosome (the main repository of the organism's genetic information). Nonetheless, they are capable of directing protein synthesis, and, like chromosomal DNA, they are reproduced and passed on to the bacterium's progeny. Thus, by incorporating foreign DNA (for example, a mammalian gene) into a bacterium, researchers can obtain an almost limitless number of copies of the inserted gene. Furthermore, if the inserted gene is operative (*i.e.,* if it directs protein synthesis), the modified bacterium will produce the protein specified by the foreign DNA.

Special concern has been focused on such microbiological experiments for fear that they might result in the introduction of unfavourable and possibly dangerous traits into microorganisms that were previously free of them: *e.g.,* resistance to antibiotics, production of toxins, or a tendency to cause disease. On the positive side, recombinant DNA research has advanced the understanding of many theoretical and practical aspects of genetic function and organization. Bacteria have been created that are capable of synthesizing human insulin, and the potential exists for the synthesis of a variety of biological proteins not now producible on a commercial scale. Plants may be made nitrogen-fixing by genetic adjustment. Genetic-based diseases can possibly be corrected by replacing "bad" genes with "normal" ones.

The results of recombinant DNA research were deemed patentable in 1980, and in 1986 the U.S. Department of Agriculture approved the sale of the first living genetically altered organism—a virus, used as a pseudorabies vaccine, from which a single gene had been cut.

genetics, the study of heredity in general and of genes in particular.

A brief treatment of genetics follows. For full treatment, *see* MACROPAEDIA: Genetics and Heredity, The Principles of.

Although the influence of heredity has been recognized since prehistoric times, scientific understanding of inheritance is a fairly recent event. Modern genetics began with the work of Gregor Mendel, an Austrian monk whose breeding experiments with garden peas led him to formulate the basic laws of heredity. Mendel concluded that his plants inherited two factors (one from each parent) for each of the hereditary traits he studied. He further deduced that these factors do not mix in the offspring, that some factors are dominant over others, and that a parent plant randomly transmits one factor from each pair to an offspring.

Mendel published his findings in 1866, but his discoveries were not appreciated by the scientists of his day. By the turn of the century, however, the intellectual climate had changed; in 1900 a number of researchers independently rediscovered Mendel's work and grasped its significance.

The infant science of genetics flowered rapidly. By 1902 Walter Sutton of the United States had proposed that chromosomes—major components of the cell nucleus—were the site of Mendel's hereditary factors. The Hardy–Weinberg law, which established the mathematical basis for studying heredity in populations, was idependently formulated by the English mathematician Godfrey H. Hardy and the German physician Wilhelm Weinberg in 1908. In 1910 the American geneticist Thomas Hunt Morgan began his studies with the fruit fly, *Drosophila melanogaster.* Morgan provided evidence not only that genes (as Mendel's factors had come to be called) occur on chromosomes but that those genes lying close together on the same chromosome form linkage groups that tend to be inherited together. He further showed that linkage groups often break apart naturally as a result of a phenomenon called crossing over.

During the 1940s, George W. Beadle and Edward L. Tatum of the United States demonstrated that genes exert their influence by directing the production of enzymes, proteins that facilitate chemical reactions in the cell. By 1944 Oswald T. Avery had shown that deoxyribonucelic acid (DNA) was the chromosome component that carried genetic information. About this time Barbara McClintock discovered mobile plant genes that affect heredity. The molecular structure of DNA, however, was not deduced until 1953 by James D. Watson of the United States and Francis H.C. Crick of Great Britain. By 1961 the French geneticists François Jacob and Jacques Monod had developed a model for the process by which DNA directs protein synthesis in bacterial cells. These developments led to the deciphering of the genetic code of the DNA molecule, which in turn made possible the recombinant DNA techniques that hold immense potential for genetic engineering (*q.v.*).

Modern genetics studies include population genetics (the study of genetic patterns within populations), classical genetics (how traits are transmitted and expressed), cytogenetics (the mechanics of heredity within the cell), microbial genetics (the heredity of microorganisms), and molecular genetics (the molecular study of genes and related structures). To some extent, these divisions are artificial; every field overlaps with other genetic fields, and all have implications for the other biological sciences. Genetics has been applied to the diagnosis, prevention, and treatment of hereditary diseases; to the breeding of plants and animals; and to the development of industrial processes that utilize microorganisms.

Geneva, French GENÈVE, German GENF, Italian GINEVRA, city, capital of Genève canton, southwestern Switzerland. The city, located in the Rhône Valley at the extreme southwestern corner of Lake Geneva (Lac Léman) near the French frontier, was the centre of the Calvinist Reformation. Modern Geneva is a centre of financial activity and the headquarters of many public and private international organizations.

A brief treatment of Geneva follows. For full treatment, *see* MACROPAEDIA: Geneva.

Geneva grew on a hill in the centre of a natural basin between the Alps and the Jura Mountains, where the Rhône River meets Lake Geneva. The city exhibits the classic pattern of old European cities, with a concentric arrangement of neighbourhoods around the original nucleus. The climate in and around Geneva is tempered by the presence of Lake Geneva, while the Jura create a barrier that diminishes rainfall.

Geneva has functioned primarily as a centre of commerce, important among both the Germanic and Mediterranean countries. Its economy emphasizes trade, banking, and insurance. Geneva is a sanctuary for international capital, holding half of all foreign capital in the country.

Local agriculture is in decline because of land shortages but continues to supply such commodities as wheat, rapeseed, dairy products, and wine. Industry, though hampered by lack of space and raw materials, has nevertheless developed diversified exports that include precision machinery and instruments, watches and jewelry, chemicals, and food.

Many international institutions have established headquarters in Geneva. The International Red Cross was founded there in 1864, and the League of Nations was installed in 1919. In 1945 Geneva became the European headquarters of the United Nations and its related organs.

The Haute-ville (Upper City), centred on Geneva's original hill site and marked by the Cathedral of St. Peter, is the historic heart and

civic centre of Geneva. Suburbs have grown up on the site of the old fortifications, mostly to the south of the Rhône, and beyond them is an irregular belt of working-class residential areas close to the railway stations and the industrial zone.

The University of Geneva, founded by the Reformation leader John Calvin in 1559 as Schola Genevensis (later called the Academy), draws a large number of foreign students attracted by its reputation in international studies, botany, and education. Geneva, birthplace of Jean-Jacques Rousseau and refuge of Voltaire, held an attraction for the elite of the Enlightenment. The city's modern cultural life is based on its museums, musical events, and international meetings.

Of the many roads radiating from Geneva, only a few connect the city to other Swiss towns, with most leading into France. Rail and highway facilities link the city to Swiss and French towns. Geneva's international airport is 3 miles (5 km) northwest of the city. Area city, 7 square miles (18 square km); metropolitan area, 80 square miles (208 square km). Pop. (1988 est.) city, 161,473; (1986 est.) metropolitan area, 382,000.

Geneva (*canton,* Switzerland): *see* Genève.

Geneva, town, Adams county, eastern Indiana, U.S., on the Wabash River, 35 miles (56 km) northeast of Muncie. Platted in 1853, it was called Buffalo until presumably renamed for the Swiss city. A rural community with many Old Order Amish families, it lies in the "Limberlost Country," a timber-swampland made famous by the novelist Gene Stratton Porter in such novels as *Freckles* (1904) and *A Girl of the Limberlost* (1909). It is now drained and treeless. Pop. (1986 est.) 1,330.

Geneva, Academy of, French ACADÉMIE DE GENÈVE, also called INSTITUT JEAN-JACQUES ROUSSEAU, private school of education founded at Geneva in 1912 by a Swiss psychologist, Édouard Claparède, to advance child psychology and its application to education. A pioneer of scientific-realist education, Claparède believed that, as opposed to automatic learned performance or simple reflex, thinking must be developed in children, and that education must be tailored to fit the child (*l'école sur mesure*—"the school made to measure"). The institute soon attracted students from all over the world. Claparède's work was furthered by his protégé Jean Piaget, who became director of research at the institute in 1921. Piaget's investigations resulted in a series of influential articles and books on child psychology, stressing the intellectual development of the child. In the 1930s, as vice-director and then director of the institute, Piaget helped to reorganize it as part of the University of Geneva.

Geneva, Lake, French LAC LÉMAN, or LAC DE GENÈVE, German GENFERSEE, largest Alpine lake in Europe (area 224 square miles [581 square km]), lying between southwestern Switzerland and Haute-Savoie *département,* southeastern France. About 134 square miles (347 square km) are Swiss, and 90 square miles (234 square km) are French. Crescent in shape, the lake is formed by the Rhône River, which enters it at the east end between Villeneuve, Switz., and Saint-Gingolph, Fr., and leaves it at the west end through the city of Geneva. The only important tributaries are the Dranse (south) and the Venoge (north). At an elevation of 1,220 feet (372 m), the lake is 45 miles (72 km) long, with a maximum width of 8.5 miles (13.5 km) and an average width of 5 miles (8 km). The maximum depth is 1,017 feet (310 m), the mean depth 262 feet (80 m). The strait of Promenthoux, or Nernier, separates the lake into two well-marked divisions, the Grand Lac (east) and the Petit Lac, the special Genevese portion. The water, unusually blue and transparent, is subject to remarkable fluctuations of level known as seiches, in which the whole fluid mass in the lake rhythmically swings from shore to shore. The lake is not as rich in fish as the other Swiss lakes; there are known to be 20 indigenous species and 6 that were introduced in the 19th century.

Prehistoric lake dwellings have been found on the shores. The Lacus Lemanus of classical Latin writers, it was known from the 16th century as the Lac de Genève, but the name Lac Léman was revived from the end of the 18th century.

The north shore forms a fertile wine-producing hinterland rising to the Jura Mountains, whereas the south and east shores are bordered by the Savoy and Valaisan Alps. Geneva and Lausanne are the largest lakeside cities, and there are numerous resorts, including Montreux and Vevey in Switzerland and Thonon-les-Bains and Évian-les-Bains in France.

Geneva Accords, collection of documents relating to Indochina and issuing from the Geneva Conference of April 26–July 21, 1954, attended by representatives of Cambodia, the People's Republic of China, France, Laos, the United Kingdom, the United States, the U.S.S.R., the Viet Minh (*i.e.,* the North Vietnamese), and the State of Vietnam (*i.e.,* the South Vietnamese). The 10 documents—none of which were treaties binding the participants—consisted of 3 military agreements, 6 unilateral declarations, and a Final Declaration of the Geneva Conference (July 21, 1954).

After intensive negotiations, beginning on May 8, 1954, the day after the fall of the French garrison at Dien Bien Phu, agreements were finally signed on July 21 between the French and Vietnamese, Laotian, and Cambodian representatives. The main provisions were for a cease-fire line along the 17th parallel (effectively dividing Vietnam in two); 300 days for each side to withdraw its troops to its side of the line; and communist troops and guerrillas to evacuate Laos and Cambodia, where free elections would be held in 1955 and where French troops could be stationed if the Laotian or Cambodian governments should so request. It was stipulated explicitly that the partition line "should not in any way be interpreted as constituting a political or territorial boundary." Execution of the agreements was to be supervised by a commission of representatives from India, Poland, and Canada. A provision known as the Final Declaration stipulated that all-Vietnamese elections were to be held under the supervision of the committee before July 1956 to reunify the country. This was of great importance in inducing the Viet Minh to accept temporary regrouping of its forces in the northern half of the country, as on the eve of the conference it controlled three-quarters of Vietnam.

Most of the nine participating countries pledged themselves to guarantee the agreements, but the United States made it clear that it was not bound by them. The South Vietnamese also withheld approval, and the Final Declaration was left unsigned by all parties. The U.S. government undertook to build a separate anticommunist state in South Vietnam and in 1956 supported South Vietnam's refusal to hold nationwide elections in consultation with North Vietnam.

Geneva Bible, also called BREECHES BIBLE, new translation of the Bible published in Geneva (New Testament, 1557; Old Testament 1560) by a colony of Protestant scholars in exile from England and working under the general direction of Miles Coverdale and John Knox and under the influence of John Calvin. The English churchmen had fled London during the repressive reign of the Roman Catholic Mary I, which had halted the publication of Bibles there.

The work acquired the sobriquet "Breeches Bible" because it described Adam and Eve as having made "breeches" to cover their nakedness (Genesis 3:7), instead of "aprons" or "loincloths." The Great Bible (named for its large page size and first ordered by Henry VIII in 1538) was restored to the churches after Elizabeth I's succession halted persecution of Anglicans and Protestants, but the Geneva Bible, imported from Europe and not printed in England until 1576, quickly surpassed the Great Bible in public favour. The work's enduring popularity made the Geneva Bible an important influence on the translators of the King James Version of 1611.

Geneva Catechism, doctrinal confession prepared by John Calvin to instruct children in Reformed theology. Recognizing that his first catechism (1537) was too difficult for children, Calvin rewrote it. He arranged the Geneva Catechism (1542) in questions and answers in an effort to simplify doctrinal complexities.

The Geneva Catechism is primarily concerned with man's relationship to God. It is composed of five sections: (1) faith, with an exposition of the Apostles' Creed, (2) the law (the Ten Commandments), (3) prayer, (4) the Word of God, (5) the sacraments. Used principally in Geneva and Scotland, it was superseded by the Heidelberg and Westminster catechisms, both of which were indebted to Calvin's work.

Geneva City Conservatory and Botanical Gardens, French CONSERVATOIRE ET JARDIN BOTANIQUES DE LA VILLE DE GENÈVE, major botanical research centre in Geneva, Switz., specializing in such areas as floristics, biosystematics, and morphology. Founded in 1817, the 19-hectare (47-acre) municipal garden cultivates about 15,000 species of plants; it has important collections of alpine plants and orchids, an arboretum, and special plantings for pedagogic purposes. Many of the plantings are arranged to show characteristic species of different geographic regions of the world. Of the garden's greenhouses, five are designed for public display and three for service functions. Its herbarium, consisting of about 5 million reference specimens with a worldwide geographic representation, is one of the great collections of Europe. The garden also has an extensive library and a large scientific staff.

Geneva Convention, any of a series of international treaties concluded in Geneva, Switz., between 1864 and 1949, for the purpose of ameliorating the effects of war on soldiers and civilians.

The history of the conventions is closely associated with that of the Red Cross, whose founder, Henri Dunant, initiated international negotiations establishing in 1864 the Convention for the Amelioration of the Wounded in Time of War. This provided for (1) the immunity from capture and destruction of all establishments for the treatment of wounded and sick soldiers and their personnel, (2) the impartial reception and treatment of all combatants, (3) the protection of civilians rendering aid to the wounded, and (4) recognition of the Red Cross symbol as a means of identifying persons and equipment covered by the agreement.

This first convention was ratified within three years by all the European great powers, as well as by many lesser states. It was amended and extended by the second Geneva Convention in 1906. Also, by the Hague conventions of 1899 and 1907, its provisions were applied to maritime warfare. In 1929 the third Geneva Convention, the Convention Relating to the Treatment of Prisoners of War, made provision for the protection of prisoners of war (a subject earlier dealt with in a Hague Convention of 1907), providing that belligerents must

treat prisoners humanely, supply information about them, and permit visits to prison camps by representatives of neutral states.

After World War II, because of the abuse by some belligerents of the principles contained in the earlier conventions, it was decided to extend and codify the existing provisions in an International Red Cross conference in Stockholm held Aug. 23–30, 1948. The conference developed four conventions which were approved in Geneva on Aug. 12, 1949: (1) Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field; (2) Convention for the Amelioration of the Condition of the Wounded, Sick, and Shipwrecked Members of Armed Forces at Sea; (3) Convention Relative to the Treatment of Prisoners of War; and (4) Convention Relative to the Protection of Civilian Persons in Time of War.

The first two conventions were elaborations of the principle of the neutralization of the sick and wounded outlined above. The convention covering prisoners of war further developed that of 1929, requiring humane treatment, adequate feeding, and delivery of relief supplies and forbidding pressure on prisoners to supply more than a minimum of information.

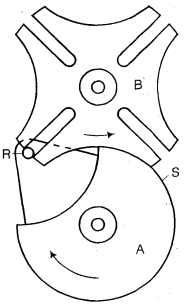
The provisions of the fourth convention contained little that was not established in international law prior to World War II. The disregard of humanitarian principles during that conflict, however, made a restatement and reaffirmation timely. The convention contained detailed provisions for the protection of individuals falling under the jurisdiction of a belligerent. The following practices were forbidden: deportation of individuals or groups, regardless of motive; the taking of hostages; outrages upon personal dignity; torture; collective punishment and reprisals; the unjustified destruction of property; and discrimination in treatment on the basis of race, religion, nationality, or political grounds.

In the decades following World War II, the growing number of anticolonial and insurrectionary wars threatened to render the Geneva conventions obsolete. After four years of negotiation under the sponsorship of the Red Cross, an international conference on June 8, 1977, approved two protocols to the 1949 conventions. These extended protection under the Geneva and Hague conventions to guerrilla combatants fighting wars of "self-determination" or civil wars in which they exercised "control" over significant measures of territory.

More than 150 nations (including the United Kingdom and the United States) have become parties to the 1949 conventions, but only slightly more than half that number have signed the 1977 protocols (the United Kingdom and the United States have not).

Geneva mechanism, also called GENEVA STOP, one of the most commonly used devices for producing intermittent rotary motion, characterized by alternate periods of motion and rest with no reversal in direction. It is also used for indexing (*i.e.,* rotating a shaft through a prescribed angle).

In the Figure the driver A carries a pin or roller R that fits in the four radial slots in the follower B. Between the slots there are four concave surfaces that fit the surface S on the driver and serve to keep the follower from rotating when they are fully engaged. In the position shown, the pin is entering one of the slots, and, on further rotation of the driver, it will move into the slot and rotate the follower through 90°. After the pin leaves the slot, the driver will rotate through 270° while the follower dwells—*i.e.,* stands still. The lowest practical number of slots in a Geneva mechanism is 3; more than 18 are seldom used. If



Geneva mechanism

one of the slot positions is uncut, the number of turns that the driver can make is limited. It is said that the Geneva mechanism was invented by a Swiss watchmaker to prevent the overwinding of watch springs. For this reason it is sometimes called a Geneva stop.

Early motion-picture projectors used Geneva mechanisms to give the film a quick advance while the shutter was closed, followed by a dwell period with the shutter open.

Genève (French), English GENEVA, German GENF, *canton,* southwestern Switzerland, between the Jura Mountains and the Alps and consisting mainly of its capital, the city of Geneva. With an area of 109 square miles (282 square km), of which 14 square miles (36 square km) are lake, it is one of the smallest cantons in the Swiss Confederation. Bordering on Vaud canton for 3.5 miles (5.5 km) in the extreme north, it is otherwise surrounded by French territory—the *département* of Haute Savoie to the south and that of Ain west and north. It is drained by the Rhône River from east to west and then along its southwest edge, and by the turbid L'Arve River, which flows from the Mont Blanc to join the Rhône within the city of Geneva.

Admitted into the Swiss Confederation in 1815, Genève was increased in 1815–16 by adding to the old territory belonging to the city 16 communes (to the south and east) ceded by Savoy and 6 communes (to the north) from the French district of Gex. The population, about one-half Roman Catholic and two-fifths Protestant, is primarily French-speaking.

Industry is concentrated in the city of Geneva and its suburbs. Market gardens, vineyards, and orchards occupy a large proportion of the soil, and cattle, horses, swine, goats, and sheep are raised. Besides building materials, such as sandstone and slate, the only mineral to be found within the canton is bituminous shale. Pop. (1988 est.) 365,525.

Genève (city, Switzerland): *see* Geneva.

Geneve, Lac de (Europe): *see* Geneva, Lake.

Geneviève, SAINT, French SAINTE GENEVIÈVE, German SANKT GENOVEFA (b. *c.* 422, city, Nanterre, Fr.?—d. *c.* 500, Paris; feast day January 3), patron saint of Paris, who allegedly saved that city from the Huns.

When she was seven, Geneviève was induced by Bishop St. Germain of Auxerre to dedicate herself to the religious life. On the death of her parents she moved to Paris, where she is said to have predicted the invasion of the Huns. When Attila threatened Paris (451), she persuaded the inhabitants to remain, assuring them that the attack would be inconsequential; Attila's army went on to Orléans, 70 miles (110 km) from Paris, and was defeated. Geneviève is reported to have had great influence over King Childeric I of the Salian Franks and, in 460, to have had a church built over the tomb of Saint Denis, patron saint of France.

She was buried in the Church of the Holy Apostles, popularly known as the Church of Sainte-Geneviève. During the French Revolution in 1793, her body was burned on the Place de Grève; the relics were enshrined in the Church of Saint-Étienne-du-Mont, where they still attract pilgrims.

Genevois, Charles-Emmanuel de Savoie, prince de: *see* Nemours, Charles-Emmanuel de Savoie, duc de.

Genf (Switzerland): *see* Geneva.

Genfersee (Europe): *see* Geneva, Lake.

Geng Jingzhong (Chinese general): *see* Keng Ching-chung.

Gengangere: *see* Ghosts.

Genghis Khan, Genghis also spelled CHINGGIS, CHINGIS, JENGHIZ, or JINGHIS, original name TEMÜJIN, also spelled TEMUCHIN (b. 1155, or 1162, or 1167, near Lake Baikal, Mongolia—d. Aug. 18, 1227), Mongolian warrior-ruler, one of the most famous conquerors of history, who consolidated nomadic tribes into a unified Mongolia and then extended his empire from China to Europe's Adriatic Sea.

A brief treatment of Genghis Khan follows. For full treatment, *see* MACROPAEDIA: Genghis Khan.

Leader of a destitute clan, Temüjin acquired a fighting force of 20,000 neighbouring tribesmen (according to the anonymous saga the *Secret History of the Mongols, c.* 1240) to settle an interclan feud. He broke with his rival, Jamuka; overcame all contenders, Mongolian and Tatar, through executions and forced service; and by 1206 was acknowledged as Genghis Khan ("Universal Ruler") of all Mongolian steppe people. Using more refined military tactics, he captured Peking (1215) and subjugated a declining China. He then led a savage devastation of the extensive Muslim empire of Khwārezm, now Uzbek S.S.R. (*c.* 1216–23), while his generals raided Persia and Russia. Learning the importance of towns and agriculture from his subjects, he improved his governmental structure.

Genghis Khan's idea of the state was simple: the nomad warrior elite should remain in the steppes, drawing tribute from the conquered civilized kingdoms. But this concept could not withstand two corrosive trends: the nomads split into groups, each facing toward the subject state (China, Iran, etc.) from which it drew tribute; and in each group those who had to be detached for garrison and administrative service tended to be corrupted (or civilized) by their subjects.

genie (spirit): *see* jinnī.

genius (Latin: "begetter"), plural GENIUSES, or GENII, in classical Roman times, an attendant spirit of a person or place.

In its earliest meaning in private cult, the *genius* of the Roman house-father and the *iuno,* or *juno,* of the house-mother were worshiped. These certainly were not the souls of the married pair, as is clear both from their names and from the fact that in no early document is there mention of the *genius* or *iuno* of a dead person. The *genius* and *iuno* were probably the male and female forms of the family's, or clan's, power of continuing itself by reproduction, which were in the keeping of the heads of the family for the time being and passed at death to their successors. In this as in all forms of his cult, the *genius* was often conceived as appearing in the form of a snake, although he is also shown in art as a young man, generally engaged in sacrificing. At every wedding a bed, the *lectus genialis,* was made for the *genius* and *iuno* of the husband and wife, and its presence in the house was a sign of matrimony.

Owing to the rise of individualism and also to the prevalence of Greek ideas concerning a guardian spirit, or *daimon,* the *genius* lost its original meaning and came to be a sort of personification of the individual's natural desires and appetites. Hence the phrases *indulgere ge-*

nio, genium defrudare, signifying, respectively, to lead a pleasurable life, and to lead a stingy life. The development, however, did not stop here. The *genius* came to be thought of as a sort of guardian angel, a higher self; and, as the Greek *daimon* was sometimes rationalized into the individual's character or temper, so also the poet Horace half-seriously said that only the *genius* knows what makes one person so different from another, adding that he is a god who is born and dies with each one of us. This individual *genius* was worshipped by each individual, especially on his birthday. A few inscriptions even mention the *genius* of a dead person, as Christian epitaphs sometimes speak of his angel.

To show reverence for the genius of another or to swear by it was a mark of deep respect; hence, it is not unnatural that the *genius* of Augustus and of his successors formed objects of popular cult. Thus, to worship the *genius Augusti* avoided affronting the feeling against worshipping any living emperor, which remained fairly strong in Italy; for, of course, all *genii* were divine and might properly be worshipped.

As with the Greek *daimones*, there was a vast variety of *genii*, or guardian spirits—those of places, *genius loci*, including buildings (*genius balneorum*, etc.), and of corporations of all sorts, from the state (*genius populi Romani*) to small bodies of troops, guilds of tradesmen, and so forth. A very curious development is that one sometimes heard of the *genius* of a god, even of Jupiter, or of the *iuno* of a goddess.

genius, in psychology, a person of extraordinary intellectual power. The word genius is used in two closely related but somewhat different senses. In the first sense, as popularized by U.S. psychologist Lewis M. Terman, genius refers to high intellectual ability as measured by performance on a standardized intelligence test. The exact intelligence quotient designating genius varies. Terman set the intelligence quotient for "potential genius" at 140 or over, a level reached by about 1 in 250 of the general population. This seemed insufficiently stringent to some writers, who set a higher standard. In any event, genius here means simply high intellectual ability and refers to potentiality rather than to attainment. In this sense, the term may be used to characterize children who have not yet had an opportunity to gain eminence by achievement. A growing and probably more practicable usage is to refer to children of this sort as "gifted" and to make a distinction between first-order gifted children, those in the upper 0.1 percent of the general population, and second-order gifted children, those in the upper 10 percent of the remaining population.

In the second and more popular sense, as derived from work of the 19th-century British scientist Sir Francis Galton, "genius" is used to designate creative ability of an exceptionally high order as demonstrated by actual achievement, always provided that such achievement is not merely of transitory value or the result of accident of birth, as in the case of hereditary rulers. Genius is distinguished from talent both quantitatively and qualitatively. Talent refers to a native aptitude for some special kind of work and implies a relatively quick and easy acquisition of a particular skill. Genius involves originality, creativeness, and the ability to think and work in areas not previously explored and thus to give the world something of value it would not otherwise possess. Although geniuses have usually left their unique mark in a particular field, studies of the early development of these people appear to show that their general intelligence is also exceptionally high.

There have been a variety of attempts to explain the nature and source of genius. One theory holds that the genius belongs to a separate psychobiological species, differing as much from ordinary man in his mental and emotional processes as man differs from the ape. Another theory looks upon genius as closely related to neurosis and psychosis. The Italian criminologist Cesare Lombroso is perhaps the most widely cited among those who held or hold this point of view. Although modern psychoanalytic theory would also hold that genius, like neurosis and psychosis, has its source in basic conflict between the self and environment, in the genius these conflicts are resolved in such a way that the symptoms and products are socially useful and valued. Investigations indicate that the genius is actually somewhat less prone to mental disorders, physical weakness, and bodily deformities than are people in general. Children who show exceptionally high general intelligence of the sort that may be classified as "gifted" or "potential genius" are on the average superior to other children in physique and health and in emotional and social adjustment.

Galton, who inaugurated the systematic study of genius, formulated the theory that genius is a very extreme degree of three combined traits—intellect, zeal, and power of working—that are shared by all persons in various "grades." In his *Hereditary Genius* (1869), he presented the first clear statistical evidence that genius, as measured by outstanding accomplishment, tends to run in families. Since then, scientists have differed over how much biological heredity, as distinct from education and opportunity, is responsible for the great differences in achievement of different individuals. The consensus is, however, that genius is a function of both hereditary and environmental factors. The original potentiality for exceptional achievement comes from heredity, but whether or not this potentiality is brought to fruition depends, at least to some extent, upon opportunity and training. *See also* gifted child; prodigy.

genizah, also spelled GENIZA (Hebrew: "hiding place"), plural GENIZOT, GENIZOTH, or GENIZAHS, in Judaism, a repository for timeworn sacred manuscripts and ritual objects, generally located in the attic or cellar of a synagogue. In the Middle Ages most synagogues had a *genizah*, because ceremonial burial (often with the remains of a pious, scholarly Jew) was thought to be the only fitting manner of disposing of sacred documents. Countless sacred manuscripts—called *shemot* ("names") because they contained the name of God—were thus left to gather dust or to disintegrate slowly.

In 1896 Solomon Schechter investigated a *genizah* in the old Ezra synagogue in Cairo. In time, some 90,000 manuscripts were uncovered there, a cache so priceless that biblical scholars subsequently referred to the site simply as "the *genizah.*" This vast collection of liturgical, legal, commercial, and literary documents—among them a fragment of the original Hebrew text of Ecclesiasticus—generally revolutionized the study of the medieval history of Palestinian and Middle Eastern Jewry. Schechter's conclusions regarding a Zadokite sect were confirmed years later, after the discovery (late 1940s and '50s) of the Dead Sea Scrolls. The scrolls were found in caves that apparently also served as *genizot.* The manuscripts from the Cairo *genizah* are now preserved in many of the great libraries of the world.

Genji monogatari (Japanese literature): *see* Tale of Genji, The.

Genk, formerly GENCK, municipality, Limburg province, northeastern Belgium, on the edge of the Kempenland (Campine) Plateau, north of Liège. Formerly a market centre and holiday resort with scenic marshes and woods (including the Bokrijk Nature Reserve), it has become industrialized with the discovery (before World War I) of rich coalfields in the Kempenland. Metallurgy and automobile assembly are now major economic factors, and natural gas (*grison*) is a local resource. Pop. (1982) mun., 61,643.

Genkū (Buddhist leader): *see* Hōnen.

Gennadios II SCHOLARIOS also spelled GENNADIUS II SCHOLARIUS, original name GEORGIOS SCHOLARIOS (b. *c.* 1405, Constantinople—d. *c.* 1473), first patriarch of Constantinople (1454–64) under Turkish rule and the foremost Greek Orthodox Aristotelian theologian and polemicist of his time. Scholarios became expert in European philosophy and theology and was called "the Latinist" derisively by his colleagues. He also taught and commented on Aristotelian and Neoplatonic texts, the chief expressions of classical Greek realism and idealism, respectively.

An imperial judge and lay preacher at the court of the Byzantine emperor John VIII Palaeologus, Scholarios was named a theological consultant to the general Council of Florence (1439) when the Greek Byzantine Church reluctantly consented to a union with the West in order to win military support against the advance of the Ottoman Turks. Later, in Constantinople, Scholarios repudiated the council's statement of doctrinal compatibility between Eastern and Western churches. He assumed leadership of the anti-unionist faction that proclaimed Orthodoxy's absolute autonomy and fundamental differences with Western Christianity. Out of favour with Emperor Constantine XI Palaeologus (1449–53), Scholarios became a monk at Constantinople's monastery of Pantocrator. When that city fell to the Ottoman Turks, May 1453, he was captured by a hospitable Muslim then invited to assume the vacant patriarchate by Sultan Mehmed II (1451–81) in order to stabilize the political situation. He was invested with ecclesiastical insignia and political authority as head of the Greek population, and the consequent treaty governed Greek Orthodox and Turkish relations for nearly 500 years. He helped persuade the Sultan to adopt a more conciliatory policy toward Christian peoples under Islāmic political control.

Scholarios' 10-year patriarchal office was twice interrupted by Greek–Arab tensions, and he finally abdicated and retired to the Prodromos monastery at Seres (near modern Thessalonica [Thessaloníki], Greece). There he produced a wealth of theological and philosophical literature, including commentaries, on the works of Thomas Aquinas (unusual for an Eastern theologian); polemical tracts supporting Aristotelian thought; and many other compositions in liturgy, ethics, and poetry.

Gennadius I OF CONSTANTINOPLE, SAINT (d. 471, Constantinople; feast day August 25), Byzantine theologian, biblical exegete, and patriarch, a champion of Christian Orthodoxy who strove for an ecumenical (Greek: "universal") statement of doctrine on the person and work of Christ to reconcile the opposing Alexandrian (Egyptian) and Antiochene (Syrian) theological traditions.

Abbot of a monastery in Constantinople, Gennadius became patriarch in 458 and, with the counsel of Pope Leo I (440–461), proceeded against the Monophysites (*q.v.*) and deposed their titular head, Bishop Timotheus Aelurus of Alexandria. To counter any Monophysite interpretation of the dogmas promulgated at Ephesus against the Nestorian heresy (*see* Nestorians), Gennadius composed a sharp critique of Cyril of Alexandria's anathemas, written against the empirically oriented school of Antioch; indeed, he charged Cyril with blasphemy for identifying Christ's human ac-

tions with divinity. Moreover, to demonstrate his own orthodoxy, he wrote a commendation of Pope Leo's celebrated letter of 449 to Patriarch Flavian of Constantinople, delineating for both the Latin and the Greek churches the authoritative statement on Christ's nature and identifying the degrees of erroneous interpretation; this definitive expression became the norm for the general Council of Chalcedon.

Only parts of Gennadius' biblical commentaries on the Old Testament book of Genesis and Letter of Paul to the Romans are extant. His contemporaries esteemed him as a scholarly man of letters and a sincere churchman dedicated to reform of simoniacal practices (buying or selling church offices), devoting a synod (*c.* 459) and an encyclical letter to the question. In the Eastern Orthodox Church Gennadius is revered as a saint.

Gennadius OF MARSEILLES (fl. late 5th century, Marseille), theologian-priest whose work *De viris illustribus* ("On Famous Men") constitutes the sole source for biographical and bibliographical information on numerous early Eastern and Western Christian authors. His further writings provide significant data on 5th-century Latin theological controversies about Christ's nature and the moral problem of divine predestination.

Having read widely in Greek and Latin, Gennadius, between 467 and 480, drew up his continuation of the chronicle *De viris illustribus,* initiated by the 4th-century Roman biblical scholar St. Jerome after the identically titled classic model of the 2nd-century Latin historian Suetonius. Gennadius' version comprised 91 entries on 4th- and 5th-century Greek and Latin theological writers; the work was augmented to 100 notices by later editors.

By his favourable comments, Gennadius appears to have supported the position of the Semi-Pelagian authors. He took a theological middle ground between the heretical stance of the 5th-century Irish monk Pelagius, who formulated a doctrine that man's basic capacity and responsibility enable him to choose a moral life without supernatural aid, and the strict anti-Pelagians, notably St. Augustine of Hippo (354–430), who attributed man's entire ability for moral action to God's inspiration.

In another treatise, Gennadius contested what he judged as a Pelagian disregard for biblical teaching that indicated the necessity of divine help to reach eternal beatitude. On the other hand, his *Liber ecclesiasticorum dogmatum* ("Book of Church Dogmas"), an abstract of Catholic doctrine, including his treatise *Adversus omnes haereses* ("Against All Heresies"), reinforced his Semi-Pelagian sympathies, even if his text underwent late-6th-century revisions.

Among Gennadius' other works, known only by their titles from his own bibliography in *De viris illustribus,* are included antiheretical tracts against the 5th-century Byzantine Eutyches, an exponent of Monophysitism, and the 5th-century Syrian Nestorius, who espoused a doctrine in diametrical opposition to Monophysitism. Current scholarship has revived interest in Gennadius' literature because of the new light it sheds on the theological issues of his time.

Gennadius OF NOVGOROD (d. after 1504), Russian Orthodox archbishop of Novgorod, Russia, whose leadership in suppressing Judaizing Christian sects occasioned his editing the first Russian translation of the Bible.

Named archbishop in 1485 by the grand prince of Moscow Ivan III (1462–1505), Gennadius initiated a persecution of Christian Judaizers, a movement of zealots stressing the monotheistic element of the Jewish religion and promulgating anti-Trinitarian doctrine. Collaborating with the monastic reformer Joseph of Volokolamsk (Russia), he convoked three synods to counter the heretical sectarians and consciously imitated the model of the 15th-century Spanish Catholic Inquisition against nonconforming Jewish, Arab, and Protestant Christians. When the Judaizers began distributing their own versions of the Old Testament Psalms, Gennadius published the first complete translation of the Old and New Testaments into the Old Church Slavonic language. The translation, made from the Greek, Hebrew, and Latin versions, was completed with the help of a Croatian Dominican friar, Benjamin.

Because of Moscow's governmental policy of expropriating church property as punishment for Novgorod's separatist tendencies, Gennadius was forced to resign in 1504 and was imprisoned on suspicion of treason.

Gennargentu Mountains, Italian MONTI DEL GENNARGENTU, massif in east central Sardinia. It rises to 6,017 ft (1,834 m) at Punta (point) la Marmora, Sardinia's highest peak.

Gennaro, SAINT: *see* Januarius, Saint.

Gennep, Arnold van, in full CHARLES-ARNOLD KURR VAN GENNEP (b. 1873, Württemberg, Ger.—d. 1957), French ethnographer and folklorist, best known for his studies of the rites of passage of various cultures.

Although Gennep was born in Germany and had a Dutch father, he lived most of his life and received his education in France, his mother's native country. Because of this cosmopolitan background, as well as his own talents and studies, Gennep learned a remarkable number of languages (he knew Arabic and studied Egyptology) and thus could effectively use linguistic and philological facts in his ethnographic studies. Gennep had brief affiliations with the University of Neuchâtel in Switzerland and with Oxford and Cambridge in England, but most of his work was done outside of, and occasionally at odds with, the academic community. He did, at various times, work for the French government and such cultural organizations as the Alliance Française and the International Congress of Popular Art.

Gennep's major work was *Les Rites de Passage* (1909; Eng. trans. *The Rites of Passage*), in which he systematically compared those ceremonies that celebrate an individual's transition from one status to another within a given society. He found a tripartite sequence in ritual observance: separation, transition, and incorporation. Gennep offered interpretations of the significance of these rites based on natural symbols, such as death and rebirth.

Gennep also made studies of European folklore, viewing folk literature and practices as aspects of a living culture rather than as remains of a dead one. Besides *Rites de Passage,* he also edited the Ethnographie-Folklore-Religions Préhistoire section in the publication *Mercure de France* and wrote *Religions, moeurs et légendes; Essais d'ethnographie et de linguistique* (1908; "Religions, Customs, and Legends; Essays of Ethnology and Linguistics").

Gennesaret, Lake of (Israel): *see* Galilee, Sea of.

Genoa, Italian GENOVA, city and Mediterranean seaport in northwestern Italy; it is the capital of Genoa province and of Liguria region and is the centre of the Italian Riviera.

Located about 75 mi (120 km) south of Milan on the Gulf of Genoa, the city occupies a narrow coastal plain and the western slopes of the Apennine Mountains. The city has a mild Mediterranean climate, with a mean July temperature of 82° F (28° C) and a mean January temperature of 40° F (4° C); average annual rainfall is about 50 in. (1,300 mm).

The site was settled by the Romans in the 3rd century BC and suffered numerous Germanic and Arab invasions before it became a republic in the 12th century AD. It gradually lost its power and was controlled successively by France, Milan, Spain, and Austria until it became part of the unified kingdom of Italy in 1861. By the early 20th century, Genoa had become the major seaport of Italy, and tunnels, railway building, and industrial development had extended its hinterland into the Po Valley.

Shipbuilding is the major industry; other industries produce petroleum, textiles, iron and steel, locomotives, paper, sugar, cement, chemicals, fertilizers, and electrical, railway, and marine equipment. Genoa also is a major centre for finance and commerce. The port of Genoa (740 ac [300 ha]) leads all other Italian ports in volume of passengers and freight traffic and is the main source of city income. It handles imports chiefly of coal, crude oil, and grain, and exports mainly of cotton and silk textiles, olive oil, and wine.

Genoa was the birthplace of Christopher Columbus (1451), who embodied the active maritime tradition of the city. It is noted for its many examples of medieval, Renaissance, Baroque, and Gothic architecture. The Ducal Palace, San Lorenzo Cathedral, Church of San Matteo, and Palazzo San Giorgio are some of the most important historical monuments. The Palazzo Bianco and the Palazzo Rosso are the two largest picture galleries; Choiossone Museum of Oriental Art and the Cathedral Treasury have extensive medieval collections. The Università degli Studi di Genova (founded 1471) is an important centre of higher learning in northern Italy. The city also has several commercial colleges and a school of navigation.

Genoa is linked with the major cities of Italy, France, and Switzerland by railway and highways. Its port serves as the chief outlet for the agricultural and industrial products of northern Italy and much of central Europe. Cristoforo Colombo International Airport, situated 4 mi west of the city, provides domestic and international flights. Area city, 92 sq mi (238 sq km). Pop. (1983 est.) mun., 754,432.

Genoa, unincorporated village, Douglas County, western Nevada, U.S., west of the Carson River and east of Lake Tahoe, 12 mi (19 km) south-southwest of Carson City. The first permanent white settlement in Nevada, it was founded in 1849 as a trading post stockade, later called Mormon Station (commemorated as a historic state monument). In 1855 the community was renamed, probably for Columbus' birthplace, by Mormon Elder Orson Hyde. During the mining boom Genoa was the site of a mass meeting (1857) that voted for separation from Utah and the creation of the Territory of Nevada. Nevada's first newspaper, *Territorial Enterprise,* started publication (Dec. 18, 1858) there prior to its move to Carson City and subsequently to Virginia City. Genoa served as county seat from 1861 until 1916, when it was supplanted by Minden, a few miles southeast. Ranching and tourism now support the small population. Pop. (1970) about 150.

Genoa, Conference of (April 10–May 19, 1922), post-World War I meeting to discuss the economic reconstruction of central and eastern Europe and to explore ways to improve relations between Soviet Russia and Europe's capitalist regimes.

Attended by representatives of 30 European countries and the British dominions, the conference, at Genoa, Italy, set up four commissions to investigate ways to enlist foreign capital for the "restoration of Russia," which had been devastated by German invasion, revolution, and civil war. Negotiations foundered when France and Belgium, pre-revolutionary Russia's main creditors, insisted on the integral repayment of prewar loans and integral

restitution of confiscated foreign-owned property in the Soviet Union.

Genoa, Gulf of, Italian GOLFO DI GENOVA, northern portion of the Ligurian Sea (an inlet of the Mediterranean Sea), extending eastward around the northwest coast of Italy for 90 mi (145 km), from Imperia to La Spezia. It receives the Magra, Roia, Centa, and Taggia rivers and includes the small gulfs of Spezia and Rapallo. The coastal region forms part of the Italian Riviera centred on Genoa (the gulf's main port); it is noted for its scenery, mild winter climate, and luxuriant subtropical vegetation. Resorts include Imperia, Savona, Rapallo, Sestri Levante, and La Spezia. The Gulf of Spezia, Italy's largest and best harbour, has been the site of the chief Italian naval station since the mid-19th century.

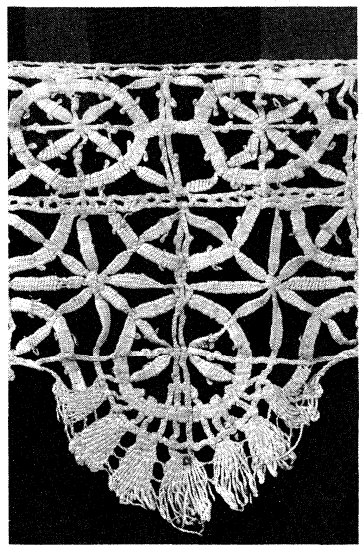
genocide, the deliberate and systematic destruction of a racial, religious, political, or ethnic group. The word, from the Greek *genos,* meaning "race," "nation," or "tribe," and the Latin *cide,* meaning "killing," was coined after events in Europe in 1933–45 called for a legal concept to describe the deliberate destruction of large groups. Despite many historical incidents of genocide and the modern case of the massacre of Armenians by the Turks at the outbreak of World War I, there had been no attempt until after World War II to construct a legal framework through which the international community could deal with cases of mass extermination of peoples.

In 1946, under the impact of revelations at the Nürnberg and other war-crimes trials, the General Assembly of the United Nations affirmed that "genocide is a crime under international law which the civilized world condemns, and for the commission of which principals and accomplices are punishable." In 1948 the General Assembly approved the Convention on the Prevention and Punishment of the Crime of Genocide, which went into effect in 1951.

The fact that under the convention genocide is a crime whether it is committed in time of peace or of war distinguishes it from the "crimes against humanity," defined by the International Military Tribunal at Nürnberg as acts committed in connection with crimes against peace, or war crimes. Under the terms of the convention, "genocide means any of the following acts committed with intent to destroy, in whole or in part, a national, ethnical, racial, or religious group, as such: (a) Killing members of the group; (b) Causing serious bodily or mental harm to members of the group; (c) Deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part; (d) Imposing measures intended to prevent births within the group; (e) Forcibly transferring children of the group to another group." Conspiracy, incitement, attempt, and complicity in genocide are also made punishable. Perpetrators may be punished whether they are constitutionally responsible rulers, public officials, or private individuals. They may be tried by a competent tribunal of the state in which the act was committed or by an international penal tribunal whose jurisdiction has been accepted by the contracting parties.

In the years following the convention, no court of international criminal jurisdiction materialized. But one of the results of the convention has been the establishment of the principle that genocide, even if perpetrated by a government in its own territory, is not an internal matter ("a matter essentially within the domestic jurisdiction") but a matter of international concern. Any contracting state may call upon the United Nations to intervene and to take such action under its Charter as it considers appropriate for the prevention and suppression of acts of genocide. *See also* Nürnberg trials.

Genoese lace, bobbin lace made at Genoa from the second half of the 16th century; it developed from the earlier knotted fringe called *punto a groppo.* The early laces (*merletti a piombini,* "laces made with lead weights") were used for the edging of ruffs and later of collars. Styles followed a pattern similar to



Genoese lace, first half of the 17th century; in the Institut Royal du Patrimoine Artistique, Brussels

By courtesy of the Institut Royal du Patrimoine Artistique, Brussels; photograph, © A.C.L., Brussels

needle-made lace in Venice, taking the form of deeply pointed "vandykes" (V-shaped points seen on collars in many 17th-century portraits by Anthony Van Dyck). These points began to give way in about 1600 to round, scalloped edges. Genoa was famous also for its tape lace, made from flat but curving bobbin-made tape in a needle-made or bobbin-made net.

genotype, the genetic constitution of an organism. The genotype determines the hereditary potentials and limitations of an individual from embryonic formation through adulthood. Among organisms that reproduce sexually, an individual's genotype comprises the entire complex of genes inherited from both parents. It can be demonstrated mathematically that sexual reproduction virtually guarantees that each individual will have a unique genotype (except for those individuals, such as identical twins, who are derived from the same fertilized egg).

The actual appearance and behaviour of the individual—*i.e.,* the individual's phenotype (*q.v.*)—is determined by the dominance relationships of the alleles that make up the genotype, along with environmental influences.

Genova, Golfo di (Mediterranean Sea): *see* Genoa, Gulf of.

Genovefa, SAINT: *see* Geneviève, Saint.

Genovese, Vito, byname DON VITONE (b. Nov. 27, 1897, Rosiglino, Italy—d. Feb. 14, 1969, Springfield, Mo., U.S.), one of the most powerful of U.S. crime syndicate bosses from the 1930s to the 1950s and a major influence even from prison, 1959–69.

Genovese immigrated from a Neapolitan village to New York City in 1913, joined local gangs, and in the 1920s and '30s was Lucky Luciano's second-in-command in narcotics and other rackets. In 1937 he escaped to Italy to avoid prosecution on a murder charge and became a friend of Mussolini, financing several Fascist operations while engaged in narcotics smuggling to the U.S.

At war's end he befriended U.S. military occupation authorities and bossed the black market operations in Italy until federal agents returned him to the United States to face trial on the earlier murder charge. A key witness, Peter La Tempa, however, was murdered (poisoned) in 1945 while in protective custody, and Genovese was set free on June 11, 1946. He gradually reestablished his power in New York City, arranging the murder of several rivals (such as Willie Moretti in 1951 and Albert Anastasia in 1957), and commanded the gunmen-racketeers in the narcotics trade. He was effectively "boss of all the bosses" in the New York area.

Finally, in 1958, the federal government indicted him for smuggling and distributing narcotics, and in 1959 he was convicted and sentenced to federal prison for 15 years. From prison (first at Atlanta, then at Leavenworth) he continued to rule and to order the killing of rivals. He died of a heart attack at the Medical Center for Federal Prisoners, Springfield, Mo., in 1969.

Genovesi, Antonio (b. Nov. 1, 1712, Castiglione, Republic of Venice—d. Sept. 23, 1769, Naples), Italian philosopher and economist whose proposals for reforms in the Kingdom of Naples combined humanist ideas with a radical Christian metaphysical system.

Ordained a priest in 1737, Genovesi went to Naples in 1738 and in 1741 was appointed to teach metaphysics in the university there. Two years later he wrote the first volume of his *Disciplinarum Metaphysicarum Elementa,* 5 vol. (1743–52; "Elements of the Discipline of Metaphysics"). In 1745 his treatises on logic and on physics appeared. In 1748, however, charged with propagating heretical ideas in his *Elementa,* he decided not to publish his companion work on theology; it appeared after his death as *Universae Christianae Theologiae Elementa* (1771). His fortunes improved in 1753, when he dedicated a discourse on agriculture to Bartolomeo Intieri, who founded at Naples the first European chair of "commerce and mechanics" (*i.e.,* political economy) in 1754 and directed that Genovesi be its first occupant. There he wrote and lectured primarily

Genovesi, engraving by R. Aloja after a portrait by R. Pastena

By courtesy of the Biblioteca Nazionale, Naples

in Italian, publishing *Meditazioni filosofiche sulla religione e sulla morale* (1758; "Philosophical Meditations on Religion and Ethics"); *Lettere accademiche* (1764; "Academic Letters"); and the significant *Delle lezioni di commercio* (1765; "Lectures on Commerce"), the first Italian work on the subject. An empiricist, Genovesi borrowed much from the monad theory of Gottfried Wilhelm Leibniz, according to which the universe is composed of monads, or fundamental, indivisible units. Genovesi's mercantilist view of economics is distinguished by a brilliant analysis of demand, by his high valuation of labour, and by his efforts to reconcile free competition with protectionist policies. In political philosophy he held that ecclesiastical authority should not extend beyond strictly spiritual matters, and the increasingly humanist regime of Naples welcomed his view that the state should dis-

possess clerical and religious orders of their lands.

Genpachi: *see* Okumura Masanobu.

genre painting, painting of scenes from everyday life, of ordinary people in work or recreation, depicted in a generally realistic manner. Genre art contrasts with that of landscape, portraiture, still life, religious themes, historic events, or any kind of traditionally idealized or modernly impressionistic, expressionistic, or abstract styles. The term arose in 18th-century France to describe painters specializing in one kind (*genre*) of picture, such as flowers or animals or middle-class life, and was originally used derogatively by advocates of the ideal or grand manner in art. By the late 19th century, when the critic Jakob Burkhardt wrote *Netherland Genre Painting* (1874), the term was more approving and also restricted to its current sense. The term is still most popularly used to describe the works of such 17th-century Dutch and Flemish painters as Jan Steen, Gerard Terborch, Adriaen van Ostade, David Teniers the Younger, Pieter de Hooch, and Jan Vermeer. Later masters of genre art have included such various artists as Cornelis Troost in the Netherlands, William Hogarth and David Wilkie in Britain, Gustave Courbet in France, and George Caleb Bingham in the United States.

genro, Japanese GENRŌ ("principal elders"), extraconstitutional oligarchy that dominated the Japanese government from the promulgation of the Meiji Constitution (1889) to the early 1930s. The genro were men who had played a leading role in the 1868 Meiji Restoration (the overthrow of feudal rule) and in the organization of the new government that followed this revolution. After the constitution was promulgated, these men became personal counselors to the throne, a position that allowed them virtually to run the bureaucracy, though they rarely assumed overt power for themselves. Important figures in the group were Itō Hirobumi, framer of the constitution; Yamagata Aritomo, who modernized the army; and Saionji Kimmochi, the last survivor and most liberal of the group.

Between 1900 and 1920 the strength of the genro as a governing body was reduced by differences among its members and by the growing need of the Japanese government for public support. The institution ended with the death of Saionji in 1940.

Genroku period, in Japanese history, era from 1688 to 1704, characterized by a rapidly expanding commercial economy and the development of a vibrant urban culture centred in the cities of Kyōto, Ōsaka, and Edo (Tokyo). The growth of the cities was a natural outcome of a century of peaceful Tokugawa rule and its policies designed to concentrate samurai in castle towns. Whereas Edo became the administrative capital of the Tokugawa shogunate, Ōsaka served as the country's commercial hub, and rich Ōsaka merchants generally were the ones who defined Genroku culture. Free of the rigid codes that restricted samurai, townsmen could spend their leisure in the pursuit of pleasure, while their profits created a cultural explosion. The bunraku puppet theatre and kabuki developed into a high dramatic art with the works of the playwrights Chikamatsu Monzaemon and Takeda Izumo. The stories of Ihara Saikaku humorously depicted urban life, while haiku poetry was perfected by Matsuo Bashō. In art the wood-block prints (ukiyo-e) of Hishikawa Moronobu rank among the earliest masterpieces. Other notable pieces of wood-block art, including those of Suzuki Harunobu, who developed the multicolour technique, soon followed. The Genroku period set the standards for an urban culture that continued to flourish throughout the Tokugawa period.

gens, plural GENTES, ancient Roman kinship grouping whose members claimed descent from a common male ancestor. The descendants revered this ancestor and identified themselves by using his name as their second name (or *nomen*)—*e.g.,* Caius *Valerius* Catullus. The gens was exogamous—marriage with another member of the gens was discouraged.

The term gens was introduced into anthropology in 1877 by the American anthropologist Lewis Henry Morgan to refer to an exogamous body of blood relations descended from the same common male ancestor. Morgan intended gens to replace the term clan, which was held to describe matrilineal descent groups only. The American anthropologist Robert Harry Lowie proposed the single term sib to include both the gens and the clan; and some have suggested replacing the word gens with father-sib (or patrisib) and the term clan with mother-sib (or matrisib). These usages have become rare, although the words gens and sib are generally known. The word clan is increasingly used, except in the United States, as the general term for an exogamous unilineal descent group claiming common ancestry, and further distinctions are usually expressed by the words patrilineal clan, or patriclan, and matrilineal clan, or matriclan. *See also* clan.

Genscher, Hans-Dietrich (b. March 21, 1927, Reideburg, near Halle, Ger.), chairman (1974–85) of the West German Free Democratic Party (Freie Demokratische Partei; FDP) and foreign minister (from 1974) in both Social Democratic and Christian Democratic ministries.

After completing his elementary and secondary education in Halle in 1943, Genscher was drafted into the German armed services and was a prisoner of war at war's end. After his release he settled in what became East Germany, studying law and economics at the universities in Halle and Leipzig and becoming a junior barrister in 1949. In 1952 he fled to the West and soon joined the Free Democratic Party, rising quickly in its official ranks in Bremen. In 1965 he was elected to the Bundestag as a deputy for North Rhine-Westphalia. Beginning in 1969, the Free Democrats gave their support to the dominant Social Democrats in a coalition government, and Genscher became minister of the interior. Five years later he won the chairmanship of his party and the foreign ministry in the government. In 1982, the Free Democrats switched their coalitionist allegiance to the Christian Democrats, who took over the government; Genscher continued as foreign minister.

Genscher strongly favoured better relations with the Soviet Union and the old eastern bloc and, after Mikhail Gorbachev came to power, insisted that the West should take advantage of the historic opportunities for detente. In 1989–90 he worked vigorously for German reunification and became the first foreign minister of the unified Germany.

Genseric (king of the Vandals and the Alani): *see* Gaiseric.

Gent (Belgium): *see* Ghent.

gentian (genus *Gentiana*), any of about 400 species of annual or perennial (rarely biennial) flowering plants distributed worldwide in temperate and alpine regions, especially in Europe and Asia, North and South America, and New Zealand. They are especially a notable feature of mountain regions, where the moisture-loving plants have access to underground water in summer and snow cover in winter. Gentian flowers are typically blue (hence "gentian blue") or purplish blue but may be purple, violet, mauve, yellow, white, or even red; the four or five petals are usually united into a trumpet, funnel, or bell shape.

Pine-barren gentian (*Gentiana autumnalis*)

© John Bova—The National Audubon Society Collection/Photo Researchers

The flowers have been used in the making of dyes. The tough fibrous roots were once used herbally for putative alimentary cures, and the name gentian derives from Gentius, king of ancient Illyria and alleged discoverer of the plant's medicinal value.

The so-called climbing gentians, sometimes classified as *Gentiana,* are now more commonly included in the genus *Tripterospermum.* Other species, such as the fringed gentians, formerly included in *Gentiana,* are now referred to as *Gentianella* (about 150 to 200 species) and *Gentianopsis* (about 15 species). The gentian family, Gentianaceae, includes more than 80 genera and 900 species.

Gentianales, gentian order of flowering plants, belonging to the class called dicotyledon (characterized by two seed leaves). It is composed of as few as 6 and as many as 11 families, depending on the classification used, and approximately 12,000 species. Four large families account for most species and are important as the source of coffee, ornamental plants, drugs, and, to a lesser extent, fibres and rubber.

Trees, shrubs, and vines are more characteristic of this order than are annual or perennial plants. The majority of species are native to the tropics or warmer temperate regions; only the gentian family (Gentianaceae) is found mainly in the North Temperate Zone. Most members of the Gentianales inhabit forests where humidity is high and soil composition favourable for growth. A few species inhabit desert regions, and the buckbean family is aquatic.

The four largest families constitute a natural group that has these features in common: the leaf blade is a single unit (simple); leaves are opposite (two per node or joint); petals are alike in size and shape (regular); two carpels constitute a pistil (female); ovules possess one integument (early stage of seed coat); and the nucellus (the nutritive tissue beneath the integument) is one-layered.

The Loganiaceae, a largely tropical family, contains about 21 genera and at least 500 species. Seeds of the 40-foot (12-metre) tree of south Asia, *Strychnos nux-vomica,* yield the alkaloids strychnine and brucine. The former is a poison often used to kill rodents, and the latter is an additive in lubricants. Alkaloids produced by *S. ignatii,* the Saint-Ignatius'-bean of the Philippines, have been used to treat cholera. *S. spinosa* of southern Africa produces a yellow berry with edible pulp. *S. toxifera* is a source of curare. About 70 species of Loganiaceae are ornamentals.

Latex tubes in the stems of the dogbane family, Apocynaceae, produce a milky juice (a feature shared with the milkweed family, Asclepiadaceae). Up to 200 genera and 2,000

species have been attributed to the Apocynaceae, although one classification places the numbers closer to 155 genera and 1,000 species. Most are shrubs or trees of tropical or subtropical regions. At least 33 genera are under cultivation. Members of Apocynaceae include the common oleander, the periwinkle, and *Funtumia elastica* (grown specifically for its rubber-producing latex).

The milkweed family, Asclepiadaceae, is characterized by specialized, oblong pollen masses (the pollinia) and by latex in all vegetative parts. Its 280 genera and 2,000 species have a wide distribution, particularly in the tropics. The floss of the milkweed seed has been used as a low-grade substitute for kapok and is useful for insulation.

Many members of the Asclepiadaceae are ornamental. They include the butterfly weed (*Asclepias tuberosa*) and the waxplant (*Hoya carnosa*). Many cultivars of the cactuslike carrion flower *Stapelia,* an African succulent, are available. Petals of many species are foul-smelling and yellowish, with bands of darker colours.

Flowers of certain members of the gentian family, or Gentianaceae, display some of the purest blues in the plant kingdom. This family of 65 genera and 1,100 species is composed of herbs distributed chiefly in North Temperate regions. Many gentians favour wet woods and meadows as habitats; others favour rocky, alpine conditions. Their tubular corollas vary from wide-open to bell forms and to completely closed ones. *Gentiana lutea* of Asia Minor is prized for its yellow flowers; its root is locally considered medicinal and is used to flavour vermouth.

Rubiaceae, the madder family, consists of trees, shrubs, vines, and herbs. The 500 genera and 6,500 species are distributed chiefly in the tropics and subtropics, but some species are mainly North Temperate plants; the range of the weak-stemmed *Galiums,* for instance, extends from the tropics into the Arctic. From an economic standpoint, the most important shrub of the madder family is the coffee plant (*Coffea arabica*), native to Africa but also grown extensively in Latin America. Another important product of the madder family is quinine, an antimalarial drug extracted from the bark of several species of *Cinchona* trees. Although several antimalarial drugs are now produced synthetically, the natural product is the only antidote for certain types of malaria. *Gardenia* also belongs to Rubiaceae.

In all families of this order, seeds are produced in great profusion and are the most effective method of reproduction. The Indian hemp (*Apocynum*) and several milkweeds, however, form colonies by means of rhizomes, from which new plants arise to propagate the species vegetatively.

In most genera, clusters of flowers (inflorescences) are arranged on somewhat elongated stems. The eventual form depends on the amount of branching and the length of stalk of each flower. Nearly flat-topped clusters are the general rule, with the oldest flower at the top or toward the centre. A representative flower of the gentian order will have parts in fours or fives.

The flower of the milkweeds is highly specialized. Outgrowths from petal and stamen bases form a protective cover over the anthers (the top of stamens). Pollen masses (pollinia) of adjacent anthers are uniquely yoked by a slender thread to form a wishbonelike unit. Cross-pollination occurs when an insect seeking nectar pries apart the anther covers; the yoked pollen masses clip around the insect's leg and are carried to another flower.

Following pollination and fertilization, the ovule becomes the seed and the ovary the fruit. In some families, the fruit ripens dry—as a capsule in gentians or as a one-carpel unit (the follicle) in milkweeds. Fruits in the logania family ripen as either fleshy berries or drupes (with stony internal layer). Berries of coffee are representative of many madders.

Gentil, Émile (b. April 4, 1866, Volmunster, Fr.—d. March 30, 1914, Bordeaux), French colonial administrator who explored the areas of the present Congo, Central African Republic, and Chad and helped establish French rule in equatorial Africa.

A naval officer, Gentil led an expedition from the French Congo down the Shari (Chari) River to Lake Chad in 1895–97, establishing a French protectorate over the sultanate of Bagirmi. In 1900 he was made governor of the Shari region and was one of the leaders of the campaign against the Muslim leader Rābiḥ az-Zubayr, whose defeat he described in *La Chute de l'empire de Rabah* (1902; "The Fall of Rābiḥ's Empire"). From 1904 to 1908 Gentil served as governor of the French Congo.

Gentile, person who is not Jewish. The word stems from the Hebrew term *goy,* which means a "nation," and was applied both to the Hebrews and to any other nation. The plural, *goyim,* especially with the definite article, *hagoyim,* "the nations," meant nations of the world that were not Hebrew. The Latin versions of the Bible translated *goyim* as *gentes* (singular: *gens*), or *gentiles.* In modern usage, "Gentile" applies to a single individual, although occasionally (as in English translations of the Bible) "the Gentiles" means "the nations." In postbiblical Hebrew, *goy* came to mean an individual non-Jew rather than a "nation." Because most non-Jews in the Western world were Christians, Gentile came to be equated with Christian. Strictly speaking, however, any non-Jew is a Gentile.

In the Church of Jesus Christ of Latter-day Saints (Mormons), whose members regard themselves as the true Hebrews, "Gentile" denotes any person, including a Jew, who is not a Mormon.

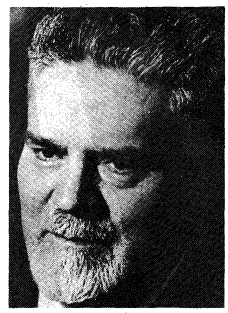
Gentile DA FABRIANO, original name NICCOLO DI GIOVANNI DI MASSIO (b. *c.* 1370, Fabriano, Papal States [Italy]—d. 1427, Rome), foremost painter of central Italy at the beginning of the 15th century, whose few surviving works are among the finest examples of the International Gothic style.

An early signed work by Gentile, formerly in the Church of San Niccolò in Fabriano (now in the Berlin-Dahlem Museum), has stylistic affinities with Lombard painting and suggests that he was trained in the Lombard school. In 1409 Gentile was commissioned to decorate the Doges' Palace in Venice with historical frescoes, which were later completed by Pisanello. In 1414–19 Gentile was in Brescia working for Pandolfo III Malatesta. His final important cycle of frescoes was begun in Rome in the Church of St. John Lateran shortly before his death. As with the frescoes in Venice, they were completed by Il Pisanello.

His surviving masterpiece, the "Adoration of the Magi," was completed in 1423 for the Church of Santa Trinità, in Florence. Its graceful figures are clothed in velvets and rich brocades, and the Magi are attended by Oriental retainers, who look after such exotic animals as lions and camels. Its delicate linearity and vibrant colours enhance the effect of rich exoticism. The decorativeness of its elegant, courtly style continued to influence Florentine artists throughout the century and presented a counterattraction to the austere realism introduced by Masaccio. Gentile also produced a number of Madonnas, such as the altarpiece known as the Quaratesi Polyptych (1425), which show the Mother and Child, regally clad, sitting on the ground in a garden.

Gentile, Giovanni (b. May 30, 1875, Castelvetrano, Italy—d. April 15, 1944, Florence), major figure in Italian idealist philosophy, politician, educator, and editor, sometimes called the "philosopher of Fascism." His "actual idealism" shows the strong influence of G.W.F. Hegel.

After a series of university appointments, in 1917 Gentile became professor of the history of philosophy at the University of Rome. While writing *La filosofia di Marx* (1899; "The Philosophy of Marx"), a Hegelian examination of Karl Marx's philosophy, he met Benedetto Croce, and from 1903 to 1922 the two men coedited the periodical *La Critica.* Gentile influenced Croce's philosophy and remained his friend until 1924, when a lasting disagreement arose over Gentile's embrace of Fascism.



Giovanni Gentile

By courtesy of the *Giornale critico della filosofia italiana*

As minister of education in the Fascist government of Italy from October 1922 to July 1924, Gentile carried out wide reforms. In 1925 he served as president of two commissions on constitutional reform, thus helping to lay the foundations of the Fascist corporate state. After acting as president of the Supreme Council of Public Education (1926–28) and as a member of the Fascist Grand Council (1925–29), he saw his political influence steadily decline. Perhaps his most important achievement was the *Enciclopedia Italiana* (first edition completed in 1936), which he began to plan in 1925 and edited until 1943. After the fall of Benito Mussolini in 1943, Gentile supported the Fascist Social Republic established by the Germans at Salò and was made the president of the Academy of Italy, in which post he served until his death at the hands of anti-Fascist communists.

Gentile's idealist philosophy denied the existence of individual minds and of any distinction between theory and practice, subject and object, past and present. According to him, all of these categories are merely mental constructs. Mind is the Absolute, and education is the process of revelation of the Absolute.

Gentile was highly esteemed by his students, whose views he helped to publicize through *Giornale critico della filosofia italiana* ("Critical Journal of Italian Philosophy").

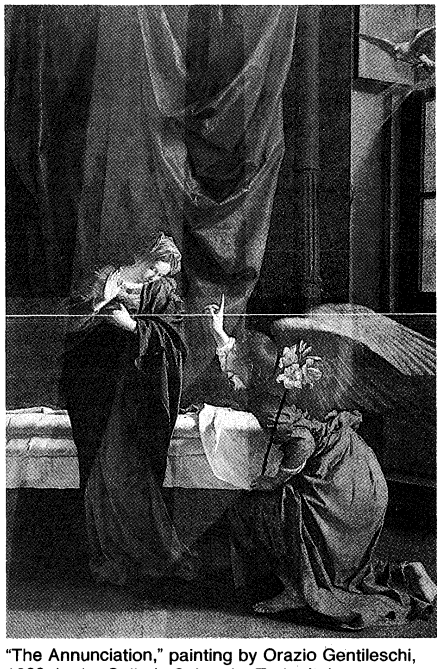
In addition to his editions of Italian philosophers (including Giordano Bruno, Tommaso Campanella, Giambattista Vico, and Vincenzo Cuoco), Gentile wrote prolifically in education and philosophy. Among his works are *Le origini della filosofia contemporanea in Italia,* 4 vol. (1917–23); *La riforma dell'educazione* (1920; *The Reform of Education*); *La filosofia dell'arte* (1931; *The Philosophy of Art*); and *La mia religione* (1943; "My Religion"). His "actual idealism" is the subject of *Teoria generale dello spirito come atto puro* (1916; *The Theory of Mind as Pure Act*).

Gentileschi, Artemisia (b. 1593, Rome, Papal States [Italy]—d. after 1651, Naples, Kingdom of Naples), Italian painter, daughter of Orazio Gentileschi, who was a major follower of the revolutionary Baroque painter Caravaggio. She was an important second-generation proponent of Caravaggio's dramatic realism.

A pupil of her father and of his friend, the

landscape painter Agostino Tassi, she painted at first in a style indistinguishable from her father's somewhat lyrical interpretation of Caravaggio's example. In 1621, leaving Rome with her father, who travelled to Genoa, she settled for a time in Florence, where she began to develop her own distinct style. Her colours are more brilliant than her father's, although she continued to use Caravaggio's extreme light and shadow contrasts after her father had abandoned tenebrism. Despite the grace of her compositions, she was perhaps the most ferociously violent of all the Caravaggisti; she delighted in illustrating such gruesome subjects as Judith and Holofernes, the story from the Apocrypha of the Jewish heroine who beheaded an invading general. In about 1630 she moved to Naples and in 1638–39 visited her father in London. There she painted many portraits and quickly surpassed her father's fame. Later she settled in Naples.

Gentileschi, Orazio, original name ORAZIO LOMI (b. 1562, Pisa—d. *c.* 1647, London), Italian Baroque painter, one of the more important painters who came under the influence of Caravaggio and perhaps the most successful interpreter of his style.



"The Annunciation," painting by Orazio Gentileschi, 1623; in the Galleria Sabauda, Turin, Italy
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Gentileschi first studied with his half brother Aurelio Lomi. At some time in the late 1570s or early 1580s he went to Rome, where, with the landscape painter Agostino Tassi, he painted frescoes in Sta. Maria Maggiore, in S. Giovanni Laterano, and in S. Nicola in Carcere from about 1590 to 1600, executing figures for Tassi's landscapes.

In the first years of the 17th century Gentileschi came under the influence of Caravaggio, also in Rome at the time. His paintings of this period (*e.g.,* "David and Goliath," National Gallery of Ireland, Dublin, 1610?, and "St. Cecilia and the Angel," Galleria Corsini, Rome, 1610?) employ Caravaggio's use of dramatic, unconventional gesture and monumental composition, his uncompromising realism and contemporary representation of figure types, and to some extent his strong chiaroscuro, or light-and-dark contrast. Shortly afterward he developed a Tuscan lyricism foreign to Caravaggio's almost brutal vitality, a lighter palette, and a more precise treatment reminiscent of his Mannerist beginnings. From 1621 to 1623 Gentileschi was in Genoa, where he painted his masterpiece, "The Annunciation" (1623; Galleria Sabauda, Turin), a work of consummate grace that shows a weakening of Caravaggio's influence. The composition still depends on dramatic gestures, here of the Virgin and the angel, and there is still a strong immediacy to the incident and an absence of idealization. The mood, however, is more restrained and lyrical than in his earlier works, the colours are light, and the earlier chiaroscuro is absent.

After a stay in France, Gentileschi travelled to England in 1626 at the invitation of King Charles I; he remained there as court painter for the rest of his life, his work becoming increasingly conventional and decorative. His last major work is an ambitious series of ceiling paintings for the Queen's House, Greenwich, painted probably after 1635, and now in Marlborough House, London.

Gentili, Alberico (b. Jan. 14, 1552, San Ginesio, Papal States—d. June 19, 1608, London), Italian jurist considered by many to be the founder of the science of international law and said to have been the first in western Europe to separate secular law from Roman Catholic theology and canon law.

A graduate of the University of Perugia, Italy (doctor of civil law, 1572), Gentili was exiled from Italy in 1579 because of his Protestantism. From 1581 until his death he taught at the University of Oxford, becoming well known for his lectures on Roman law and for his numerous writings.

In 1588 Gentili published *De jure belli commentatio prima* ("First Commentary on the Law of War"), the first of a three-volume series. A complete, revised edition appeared in 1598 as *De jure belli libri tres* ("Three Books on the Law of War"). In his view, international law should comprise the actual practices of civilized nations, tempered by moral (but not specifically religious) considerations. Although he rejected the authority of the church, he used the reasoning of the canon law as well as the civil law whenever it suited his purpose. The Dutch jurist Hugo Grotius, in writing the much better known *De Jure Belli ac Pacis* (1625; *On the Law of War and Peace,* 1925), drew extensively on Gentili's work.

Gentili, Luigi, in full ALOYSIUS BONAVENTURA FRANCESCO CAMILLUS GENTILI (b. July 14, 1801, Rome—d. Sept. 28, 1848, Dublin), Roman Catholic missionary who brought to England the Rosminians, members of the Institute of Charity, a congregation of priests dedicated to educational and charitable work.

After studying English at the Irish College, Rome, he joined (1830) Antonio Rosmini-Serbati, founder of the Institute of Charity. With the approval of Pope Gregory XVI, Gentili went to England in 1835 to assist in organizing a new Roman Catholic college and a mission in Leicestershire (1840), the centre of a Roman Catholic revival, where he was later burned in effigy by hostile Protestant ministers. Eventually, Gentili's reputation led to demands for his services all over England, particularly in the new industrial cities, which contained large numbers of Irish immigrants.

In 1846 Gentili was appointed an itinerant missionary to work in England and Ireland. On a mission to the Dublin slums in 1848 he contracted cholera and died. D.R. Gwynn's *Father Luigi Gentili and His Mission (1801–1848)* was published in 1951.

Gentle, Randir Singh (b. 1923), outstanding field hockey player for India who helped win three Olympic gold medals for India in hockey (1948, 1952, and 1956).

A superb fullback for the Independent (Delhi) and Tata (Bombay) clubs, Gentle was also a noted scorer, and in his last Olympic appearance at Melbourne in 1956, he made the only goal in the final match against Pakistan. During his career he played in the Indian national championships 20 times and toured with the Indian team to East Africa, New Zealand, Malaysia, and the Far East. After his retirement Gentle became an international umpire and a coach, occasionally preparing the Indian, Malaysian, and Spanish national teams.

Gentleman Jackson (boxer): *see* Jackson, John.

Gentleman Jim (boxer): *see* Corbett, James John.

Gentleman's Magazine (1731–1914), long-popular English periodical that gave the name "magazine" to its genre. It was the first general periodical in England, founded by Edward Cave in 1731. It originated as a storehouse, or magazine, of essays and articles culled from other publications, often from books and pamphlets. Its motto—"*E pluribus unum*"—took note of the numerous sources scoured to assemble one monthly issue. Dr. Samuel Johnson joined *Gentleman's Magazine* in 1738, and a short time later it began to publish parliamentary reports and original writing.

Gentlemen's Agreement (1907), U.S.–Japanese understanding, in which Japan agreed not to issue passports to emigrants to the United States, except to certain categories of business and professional men. In return, Pres. Theodore Roosevelt agreed to urge the city of San Francisco to rescind an order by which children of Japanese parents were segregated from white students in the schools.

The issue reflected the prejudices of Californians who feared that Japanese immigrants (a thousand arrivals monthly) would depress wages and gain control of most of the good farming land. The Japanese government carried out faithfully its part of the agreement and the San Francisco school board repealed the segregation order, but the bias and discrimination against Japanese in California continued.

Gentofte, northern residential suburb of Copenhagen, Den. It still maintains itself as a separate municipality (København *amtskommune* [county]), although it is now indistinguishable from the surrounding suburbs. It is the site of a horse-trotting course and the renowned Tuborg breweries. Most of the foreign embassies in Denmark are located in Gentofte. Pop. (1981) 66,782.

Gentry, Charter to the, also called CHARTER TO THE NOBILITY (1785), edict issued by the Russian empress Catherine II the Great that recognized the corps of nobles in each province as a legal corporate body and stated the rights and privileges bestowed upon its members. The charter accorded to the gentry of each province and county in Russia (excluding those of northern European Russia and Siberia) the right to meet every three years in a general assembly that could discuss and take action on the nobles' local affairs, elect a marshal of the nobility, and directly petition the autocrat on matters of importance to the gentry.

The charter also confirmed the nobles' exemption from compulsory service to the state and from payment of taxes. It granted them the rights of free speech and assembly, as well as the right to a trial by their peers. Members of the gentry exclusively were allowed to own estates populated by serfs; estates owned by nobles were made hereditary property, and the power to revoke title to an estate (as well as to revoke a nobleman's rank) was entrusted to the courts. The charter gave the gentry extensive power over its serfs; the nobles gained judicial authority over all crimes committed by serfs except robbery and murder and were empowered to sentence a serf to penal servitude in Siberia and also to recall him.

The charter, however, by accentuating distinctions among certain elements of the nobility, actually fostered enmity between the old aristocracy (descendants of princes and boyars) and the new gentry (which acquired its status as reward for service to the state). Nonetheless, by its recognition of the nobility as an elite class, the charter ensured that the gentry would support and maintain the autocratic form of government in Russia.

Gentz, Friedrich, also called FRIEDRICH VON GENTZ (b. May 2, 1764, Breslau, Silesia, Prussia—d. June 9, 1832, Vienna), German political journalist, famous for his writings against the principles of the French Revolution and

Gentz, detail of a portrait by Sir Thomas Lawrence; in Windsor Castle, Berkshire

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Napoleon and as a confidential adviser of Metternich. His works remain a rich source for the history of Europe in the Napoleonic and post-Napoleonic era. Though a commoner, he sometimes affected the *von* of nobility, having received a Swedish knighthood of the Order of the North Star in 1804.

Early life and career. Gentz's father was a Prussian civil servant; his mother came from the French Huguenot colony of Berlin, with which young Gentz liked to associate. Up to an advanced age, he wrote his diaries in French, displaying in that language the same limpid elegance that distinguished his German. Gentz studied under the great German philosopher Immanuel Kant in Königsberg. Although Gentz soon rejected the philosopher's republican idealism, radicalism, and pacifism, Kant was to have a lasting influence on his thought. Essentially self-taught, Gentz acquired his historical, juridical, and economic knowledge from books, chiefly English works.

In 1785 Gentz entered the Prussian civil service in Berlin, and in 1793 he became a secretary in the Generaldirektorium (War Office). Dissatisfied with his position, Gentz threw himself into the social life of the capital. For a brief period in the 1790s, Berlin—with its admixture of French émigrés; Russian, English, and Austrian aristocrats; writers; and bohemian artists from all over Germany—formed one of the intellectual centres of Europe. In this somewhat dissolute society Gentz gained a reputation as a brilliant conversationalist, ladies' man, gambler, and spendthrift. His marriage dissolved after a few years, and Gentz, who lacked the family man's temperament, did not marry again.

With the outbreak of the French Revolution, Gentz began his career as a political writer. As a pupil of Kant, he had at first hailed the Revolution as the "awakening of mankind." But he soon began to criticize the Revolution and ended by combatting it. In 1793 he published a German translation of Edmund Burke's *Reflections on the Revolution in France;* thereafter, Burke, the great English conservative, remained for Gentz the master whose ideas most closely reflected his own and whose style he admired and imitated. In two periodicals he acquired or founded anew, *Neue deutsche Monatsschrift* and *Historisches Journal,* as well as in brochures published at irregular intervals from 1800 on, Gentz continued to analyze the great drama that unfolded in France: internal affairs and foreign policy and their correlation; the imperialism of the Jacobin extremists; and the affairs of the Directory and Napoleon. Gentz's writings of 1795–1802 are still uncannily topical. His attitude, which would now be called that of a conservative liberal, made him advocate the preservation of civic liberties against autocratic egalitarianism, the defense of the rule of law throughout Europe against illegitimate imperialism, and the maintenance of the equilibrium of powers against the encroachments of the one universal state, which, in his view, all French governments after 1793 were bound to strive for. In particular, Gentz pointed out the differences between the American and the French revolutions, seeing in the former a defense of historical rights against British usurpation, in the latter an antihistorical, aggressive, ideology-laden undertaking. This view found expression in various articles, notably in Gentz's reflections on the death of George Washington, probably the soundest European comment on that event. These political investigations were complemented by economic research, as in the great essay *Über die britische Finanzverwaltung,* which, translated into English, aroused the admiration of the British statesman William Pitt the younger.

As a politician, Gentz strove for a coalition of "Free Europe" against French despotism, a new and a better coalition after the failure of the old one. But, since Prussia observed a policy of strict neutrality during the period 1795–1806, Gentz's position in Berlin became increasingly untenable. In 1803 he accordingly moved to Vienna, the centre, as he hoped, of the Continent's resistance to Napoleon. He had visited London the year before and had been warmly welcomed as an ally by the royal family, the Cabinet, the opposition, and the press. Henceforth, he received sizable financial support from England, as he later did from many European rulers and governments. His acceptance of subsidies, however, does not necessarily imply that he was corrupt. For, while it is true that he liked to live in grand style, he accepted money only from those whose views were more or less in harmony with his own. In return, he gave his supporters the benefit, orally or in writing, of his free and independent opinion; if they wanted anything else, he broke off his connection with them.

As an independent adviser to the foreign ministry in Vienna, Gentz continued to propagandize his idea of a great European alliance that would act as one body in war or peace: "If war breaks out anywhere in Europe, you may be assured that it was I who started it." The net result of his efforts, however, was a series of disappointments: the War of the Third Coalition (1805–07) ended with the allied defeat at the Battle of Austerlitz and a rapprochement between Russia and France, and the Fourth Coalition ended with a Franco-Austrian alliance cemented by Napoleon's marriage to a Habsburg archduchess. Napoleon's decree of 1806, excluding English goods from the Continent, had the effect of jeopardizing Gentz's contacts with England, so that funds and messages from that country reached him only rarely and in insufficient measure. Gentz found himself in a state of melancholy isolation; by 1810 his advocacy of European freedom had begun to weaken.

Association with Metternich. Gentz's friendship with the new Austrian foreign minister, Metternich, helped him gain access to the Vienna state chancery, this time with the regular title of *Hofrat* (privy councillor). Metternich, whom he admired as a skeptical, worldly-wise man of affairs and a pragmatic politician, became his mentor; Gentz, in turn, became the all-powerful minister's propagandist and confidential adviser.

The War of Liberation that began with Napoleon's catastrophe in Russia and ended with his overthrow evoked little enthusiasm in Gentz's tired spirit. He who had so long called Europe to arms against the French now wished to maintain Napoleon on his throne. He feared that Napoleon's fall would result in France in a new outbreak of radical Jacobinism and in Europe in the ascendancy of Russia—a state of affairs that he abhorred perhaps even more than French hegemony.

Gentz reached the peak of success at a time when his energies had already begun to flag. He was allowed to officiate as secretary general of the great congresses of the immediate post-Napoleonic era—those held at Vienna, Aachen (Aix-la-Chapelle), Troppau, Laibach, and Verona. It was a position that entailed many advantages by way of orders and decorations, influence, and money. As he had earlier formulated the Austrian and Prussian war manifestos against Napoleon, so he now wrote up, with the same untiring skill, the protocols of these European congresses. Yet these belated successes, unprecedented for a mere literary man, do not seem to have given him any lasting satisfaction; on the contrary, one often encounters in his diaries for this period a sense of bitterness and disillusionment, sometimes of outright cynicism. In measure as the "European System" (the post-Napoleonic alliances) weakened and finally broke down, Gentz's activities, which had at one time encompassed the Continent, were now restricted to Austria alone.

These activities were of a rigidly conservative and purely defensive nature. The idea of "European freedom" was replaced by the old order of the Continent, an idealized 18th century, which Gentz defended against the 19th. Whether it was a question of Greeks and Serbs rising up against the Turks, Spanish liberals against Bourbon absolutism, Latin Americans against Spain, German students against the German police state, or Italians fighting against the pope, the Austrians, and their own native rulers, Gentz, by lending his pen to Metternich's policy of intervention, would invariably be found on the side of the threatened old powers. He had, to be sure, demonstrated his courage in the struggle against Napoleon; but in his innermost heart he was a nervous and timid man, not without neurotic traits, who feared nothing so much as a repetition of the French Revolution. It is likely that he also felt that his own cultural background, let alone his way of life, was bound up with the old order of Europe. To his friends, he justified his attitude by arguing that, while the new—liberalism, democracy, nationalism—would surely prevail in the end, there also had to be those who did their best to retard and soften their impact. His own nature, he intimated, had predestined him for this historical service of fighting mere rearguard actions.

The last chapter in Gentz's life was a personal one: his liaison, at the age of 66, with young Fanny Elssler, a ballerina immortalized on a Vienna monument as "the smile of her century." It was his final triumph and his first complete happiness, and, when it paled, it was time for him to die (June 9, 1832). His possessions had to be auctioned off in order to satisfy the creditors. Metternich paid for the funeral.

In the eyes of a majority of his contemporaries, the mature Gentz was a shameless reactionary, a hireling of the kings, and a traitor to

his own youthful convictions. The publication of his collected works and of his astoundingly extensive correspondence mitigated this verdict in the opinion of those who had a feeling for quality. Gentz's most personal documents reveal him as a man of high integrity who scorned hyperbole and demagogic falsehood.

(G.Ma.)

BIBLIOGRAPHY. Two biographies of Gentz are Paul R. Sweet, *Friedrich von Gentz, Defender of the Old Order* (1941, reissued 1970); and Golo Mann, *Secretary of Europe: The Life of Friedrich Gentz, Enemy of Napoleon* (1946, reissued 1970).

genus, plural GENERA, biological classification ranking between family and species, consisting of structurally or phylogenetically related species or an isolated species exhibiting unusual differentiation (monotypic genus). Thus the species of roses collectively form the genus *Rosa,* of horses and zebras, the genus *Equus.* The genus name is the first word of a binomial scientific name (the species name is the second word) and is always capitalized. Thus the tea rose is *Rosa odorata;* the common horse is *Equus caballus. See also* species.

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Gény, François (b. Dec. 17, 1861, Baccarat, Meurthe-et-Moselle, Fr.—d. Dec. 16, 1959, Nancy), French law professor who originated the *libre recherche scientifique* ("free scientific research") movement in jurisprudence. His advocacy of this principle liberalized the interpretation of codified law in France and thus helped to increase popular confidence in the judiciary. His approach also influenced legal philosophy in other countries.

A university law teacher, Gény was appointed in 1901 professor of civil law and, in 1919, dean of the faculty of law at the University of Nancy; this office he occupied until 1925. In 1930 he became corresponding member of the Academy of Moral and Political Sciences.

Gény emphasized the element of judicial discretion in making law. He attacked the traditional assumption underlying the interpretation of the Napoleonic Code (French civil code)—that the code had solved all legal problems, even those that could not have been foreseen. In his view, courts are free to make their own rules when preexisting written or unwritten law fails to cover the situation. According to his philosophy, the law results from applying juristic techniques, or "constructions" (*construits*), to the given data (*donnés*) of the social sciences.

Geo-zoo (Munich, Ger.): *see* Hellabrunn Zoo.

geocentric system, any theory of the structure of the solar system (or the universe) in which Earth is assumed to be at the centre of all. The most highly developed geocentric system was that of Ptolemy of Alexandria (2nd century AD). It was generally accepted until the 16th century, after which it was superseded by heliocentric models such as that of Copernicus. *Compare* heliocentric system; Ptolemaic system; Tychonic system.

geochemical cycle, developmental path followed by individual elements or groups of elements in the crustal and subcrustal zones of the Earth and on its surface. The concept of a geochemical cycle encompasses geochemical differentiation (*i.e.,* the natural separation and concentration of elements by Earth processes) and heat-assisted, elemental recombination processes.

For the lithosphere (*i.e.,* the crust and upper mantle), the geochemical cycle begins with the crystallization of a magma at the surface or at depth. In turn, surface alteration and weathering break down the igneous rock, a process that is followed by the transportation and deposition of the resulting material as sediment. This sediment becomes lithified and eventually metamorphosed until melting occurs and new magma is generated. This ideal cycle can be interrupted at any point. Each element may be affected differently as the cycle progresses. During the weathering of an igneous rock, for example, minerals containing iron, magnesium, and calcium break down and are carried in solution, but silicon-rich quartz and feldspar are mainly transported as sediment. The resultant sedimentary rocks are dominated by quartz and feldspar, whereas others are dominated by calcium and magnesium owing to the precipitation of calcium or magnesium carbonates. Such elements as sodium remain in solution until precipitated under extreme conditions. As partial melting of sedimentary rocks begins, elements become separated according to melting properties; volatiles are released to the atmosphere, and physical movement of chemically separated bodies occurs. While the geochemical cycle over a short term is in a seemingly steady state, long-term, or secular, changes occur. Thus, for example, continents and oceans have evolved over geologic time.

geochemical facies, area or zone characterized by particular physiochemical conditions that influence the production and accumulation of sediment and usually distinguished by a characteristic element, minerals assemblage, or ratio of trace elements.

In sedimentary environments the concept of geochemical facies is best illustrated on an Eh-pH diagram, a diagram delineating the stability field of certain minerals in terms of the proton concentration (pH) and electron concentration (Eh). Certain related deposits exhibit contrasting mineralogies evidently owing to somewhat different depositional environments. For example, the sedimentary iron formations that formed in the Lake Superior region during Precambrian time (from 3.8 billion to 570 million years ago) have been classified according to dominant iron mineral into four principal facies: sulfide, carbonate, oxide, and silicate. This area may serve as an explanatory example of the geochemical facies concept in general and these four facies in particular.

Evidently, the iron formations were deposited in restricted basins more or less isolated from the open sea, thus allowing development of distinctive Eh and pH conditions in each. The sulfide facies consists of black slates that contain up to 40 percent pyrite (iron sulfide; FeS_2) and 5 to 15 percent carbon; an Eh-pH diagram shows that pyrite is stable near neutral pH (7) at a reducing Eh of about −200 millivolts. The carbonate facies consists of interbedded iron-rich carbonate and chert with no carbon; the Eh-pH diagram indicates simply that a shift upward in Eh sufficient to oxidize carbon but insufficient to oxidize iron could produce such an assemblage. The oxide facies, which contains primary magnetite and primary hematite, evidently was produced in weakly to strongly oxidizing—*i.e.,* high Eh—conditions. The silicate facies is dominated by one or more of the hydrous ferrous silicates; the Eh-pH diagram suggests this facies was deposited in strongly reducing, alkaline conditions.

geochemistry, scientific discipline that deals with the relative abundance, distribution, and migration of the Earth's chemical elements and their isotopes.

A brief treatment of geochemistry follows. For full treatment, see MACROPAEDIA: Earth Sciences.

Until the early 1940s, geochemistry was primarily concerned with defining elemental abundances in minerals and rocks. Since that time, investigators have broadened the scope of their research significantly, studying, for example, the continual recycling of the Earth's constituent materials through agencies of the hydrosphere and atmosphere coupled with seafloor spreading, mountain building, and other processes involving the terrestrial crust. Modern geochemical research also includes the study of chemical transformations of biological materials in rocks and the cyclic flow of individual elements (and their compounds) between living and nonliving systems. Since the 1960s, certain areas of geochemical research have become interlinked with cosmology—*e.g.,* the study of the origin and relative abundance of elements in the solar system, the Milky Way Galaxy, and the universe as a whole; the chemical composition of meteorites; and the ages of terrestrial and lunar rocks.

geochronology, scientific study concerned with the sequence of geologic events in the history of the Earth.

A brief treatment of geochronology follows. For full treatment, *see* MACROPAEDIA: Geochronology.

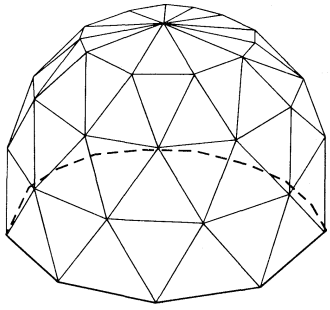
Geologic history provides a conceptual framework and overview of the evolution of the Earth. An early development of the subject (initiated in the early 1800s) was stratigraphy, the systematic study of order and sequence, including faunal succession, in bedded sedimentary rocks. Applying the general principle of stratigraphy that different sedimentary strata contain different and distinctive fossils, investigators of the 19th and early 20th centuries were able to correlate strata with similar fossils over large areas. More recently, specialists in biostratigraphy have employed fossil remains to characterize successive intervals of geologic time, but only as relatively precise time markers to about 570 million years ago. Since the mid-20th century, radiometric dating has provided absolute age data to supplement the relative dates obtained from the fossil record and made it possible to quantify the geologic time scale as far back as the oldest rocks more than 3.9 billion years ago. Radiometric-dating techniques are based on the principle that radioactive isotopes in geologic material decay at constant, known rates to daughter isotopes. Using such techniques, investigators have been able to calculate the ages for various rock-forming minerals and thereby date the rocks and strata that contain such minerals. These dates have furnished an absolute age framework for the stratigraphic time scale that had been developed by matching the evolutionary changes exhibited by fossil remains in successive rock beds.

geode, hollow mineral body found in limestones and some shales. The common form is a slightly flattened globe ranging in diameter from 2.5 to more than 30 cm (1 to 12 inches) and containing a chalcedony layer surrounding an inner lining of crystals. The hollow interior often is nearly filled with inward-projecting crystals, new layers growing on top of old. The crystals are of quartz, less often of calcite or dolomite, and sometimes of aragonite, ankerite, hematite, magnetite, pyrite, chalcopyrite, and sphalerite. Most often the metal sulfides are innermost, and a layer of calcite is next to the outer chalcedonic layer; a second layer of chalcedony sometimes is present.

Geodes form by expansion from an initial fluid-filled cavity, such as the opening in a bivalve. The initial deposit, chalcedony, forms from a silica gel that surrounds and isolates the salt solution. If the water surrounding the forming geode becomes less saline, osmosis begins to bring the salinity inside into equilibrium with that outside (water seeps in, diluting the trapped solution), and the internal pressure increases. The geode will expand in response to the pressure, either at the expense of the surrounding limestone, which dissolves at the limestone–silica interface, or, if the

limestone has not hardened, by pushing aside the lime mud. Expansion continues until the pressure difference becomes negligible. If the initial cavity is inside a fossil, the fossil is burst by the expanding geode. Ultimately, dehydration and crystallization of the silica gel occur, followed by shrinkage, cracking, and the entrance of water carrying dissolved minerals, which are deposited on the chalcedony wall.

geodesic dome, spherical form in which lightweight triangular or polygonal facets consisting of either skeletal struts or flat planes, largely in tension, replace the arch principle and distribute stresses within the structure itself. It was developed in the 20th century by R. Buckminster Fuller of the United States.



Geodesic dome construction by R. Buckminster Fuller, 20th century

A geodesic dome may be supported by light walls, but unlike other large domes it can also be set directly on the ground as a complete structure. A large geodesic dome was used to house the United States exhibit at Expo 67 in Montreal in 1967. Among many design applications are sports arenas, theatres, greenhouses, and exhibition halls.

geodesy, scientific discipline concerned with the precise figure of the Earth and its determination and significance. Until the advent of satellites, all geodesic work was based on land surveys made by triangulation methods employing a geodesic coordinate system (one used to study the geometry of curved surfaces). It is now possible to use satellites in conjunction with the land-based system to refine knowledge of the Earth's shape and dimensions; this endeavour is sometimes termed satellite geodesy.

geoduck (*Panopea generosa*), marine invertebrate of the class Bivalvia (phylum Mollusca) that inhabits the sandy muds of the intertidal and shallow sublittoral zones of the Pacific coast of North America, mainly around Washington and British Columbia. The geoduck is the largest known burrowing bivalve. Its smooth gaping shell reaches about 180 millimetres (7.2 inches) in length, but the siphons, which cannot be retracted into the shell, may extend up to 1.3 metres (about 4 feet). The body of the clam may weigh as much as 6 kilograms (2.7 pounds). The geoduck is highly prized for food, but inhabits deep burrows and is difficult to dig out. The name is probably derived from a Nisqually Indian phrase meaning "dig deep." Several species similar to the Pacific geoduck occur in other parts of the world. The *Panopea bitruncata,* for example, is found from the coast of North Carolina to the Gulf of Mexico.

Geoffrey (personal name): *see under* Godfrey, except as below.

Geoffrey, French GEOFFROI, or GEOFFROY, name of rulers grouped below by country and indicated by the symbol •.

ANJOU

• **Geoffrey II,** byname GEOFFREY MARTEL, French GEOFFROI MARTEL (b. Oct. 14, 1006—d. Nov. 14, 1060, Angers, Anjou), count of Anjou (1040–60), whose territorial ambitions, though making him troublesome to his father, Fulk III Nerra, resulted in the further expansion of Angevin lands after his father's death. (Geoffrey's byname, Martel, means "the Hammer.")

In 1032 Geoffrey married Agnes, widow of William V the Great, duke of Aquitaine. Claiming Aquitaine for Agnes' children by William the Great, Geoffrey attacked William's son by an earlier marriage, William the Fat, who had succeeded his father as duke. Fulk, who was William's vassal, sided with him against Geoffrey. Geoffrey in turn tried to seize his father's lands while the latter was on a pilgrimage to the Holy Land (1039); Fulk pardoned him only after forcing him to suffer great humiliation.

When Fulk died in 1040, Geoffrey embarked on a policy of expansion that at various times during the next 20 years brought him into conflict with Thibaut III, count of Blois and Champagne; Henry I, king of France; and William I, duke of Normandy; he extended his lands to include Touraine and a large part of Maine.

• **Geoffrey IV,** also called GEOFFREY PLANTAGENE, byname GEOFFREY THE FAIR, French GEOFFROI PLANTAGENET, or GEOFFROI LE BEL (b. Aug. 24, 1113—d. Sept. 7, 1151, Le Mans, Maine), count of Anjou (1131–51), Maine, and Touraine and ancestor of the Plantagenet kings of England through his marriage, in June 1128, to Matilda (*q.v.*), daughter of Henry I of England. On Henry's death (1135), Geoffrey claimed the duchy of Normandy; he finally conquered it in 1144 and ruled there as duke until he gave it to his son Henry (later King Henry II of England) in 1150.

Geoffrey was popular with the Normans, but he had to suppress a rebellion of malcontent Angevin nobles. After a short war with Louis VII of France, Geoffrey signed a treaty (August 1151) by which he surrendered the whole of Norman Vexin (the border area between Normandy and Île-de-France) to Louis.

BRITANNY

• **Geoffrey IV,** also called GEOFFREY PLANTAGENET, French GEOFFROI PLANTAGENET (b. Sept. 23, 1158—d. Aug. 19?, 1186, Paris), duke of Brittany and earl of Richmond, fourth, but third surviving, son of Henry II of England and Eleanor of Aquitaine.

In 1166, in furtherance of his father's policy of extending and consolidating Angevin power in France, Geoffrey was betrothed to Constance, daughter and heir of Conan IV, duke of Brittany. At the same time, Duke Conan was forced to surrender to Henry II for Geoffrey's use the whole duchy of Brittany except the county of Guingamp. Geoffrey received the homage of the Breton nobles in 1169, and in 1173 he joined the rebellion against Henry II led by his eldest brother, Henry, the "Young King," and supported by the rulers of France, Scotland, and Flanders. He submitted to his father at Michaelmas, 1174, and was sent back to Brittany, where he proceeded to recover lost ducal estates and subdue rebellious barons. He and Constance were married in 1181.

From then until his death he fought against both his brother Richard the Lion-Heart and his father (toward whom he behaved atrociously), largely for possession of Anjou. In 1185 he issued an "assize" at Rennes regularizing the succession to military fiefs in Brittany. He died at Paris, either of illness or in a tournament, leaving a daughter, Eleanor, and a posthumous son, Arthur I.

NORMANDY

• **Geoffrey:** *see* Geoffrey IV (Anjou).

Geoffrey OF MONMOUTH (d. 1155), medieval English chronicler and bishop of St. Asaph (1152), whose major work, the *Historia regum Britanniae,* brought the figure of Arthur into European literature.

In three passages of the *Historia* Geoffrey describes himself as "Galfridus Monemutensis," an indication that he probably came from Monmouth. Possibly of Breton descent, he appeared as witness to a number of documents in Oxford during the period 1129–51. Geoffrey alleges that the *Historia* was translated from a "very old book in the British tongue" brought by Walter, archdeacon of Oxford, from Brittany. This seems a pure fabrication, but it is clear that Geoffrey was for most of his life an Oxford cleric, closely connected with Walter and sharing with him a taste for letters. He may have been an Augustinian canon in the secular college of St. George, Oxford, of which Walter was provost.

The *Historia regum Britanniae,* published sometime between 1135 and 1139, was one of the most popular books of the Middle Ages, although its historical value is almost nil. The story begins with the settlement of Britain by Brutus the Trojan, great-grandson of Aeneas, and by the Trojan Corineus, the eponymous founder of Cornwall, who exterminate giants inhabiting Britain. Then follow the reigns of the early kings down to the Roman conquest; here are found such well-known episodes as those of Locrine and Sabrina, the founding of Bath by Bladud and of Leicester by Leir (Lear), and the division of Leir's kingdom between the two ungrateful daughters. The story of the Saxon infiltration during the reign of the wicked usurper Vortigern, of the successful resistance of the Saxons by Vortimer, and of the restoration of the rightful line, followed by the great reigns of Aurelius and his brother Uther Pendragon, leads up to the account of Arthur's conquests, the culminating point of the work. Chapters 106–111 introduce the enchanter Merlin, who predicts, in an obscure and apocalyptic manner, the future political history of Britain. These chapters were first published separately, before 1136, and dedicated to Alexander, bishop of Lincoln. They gave rise to the genre of political prophecies attributed to Merlin. Probably between 1148 and 1151, Geoffrey produced a poem in ornate Latin hexameters, the *Vita Merlini,* which portrays a Merlin whose adventures are based on genuine Celtic material about a madman with a gift for divination.

Denounced from the first by sober historians, Geoffrey's fictional history nevertheless had an enormous influence on later chroniclers. Romanticized versions in the vernacular, the so-called *Bruts,* were in circulation from *c.* 1150. Writers of the later Middle Ages gave the material a wide currency; and indeed Geoffrey's influence was at its greatest after the accession of the Tudors. The text, with an English translation, was published in 1929 by Acton Griscom and Robert Ellis Jones. J.J. Parry produced an edition of the *Vita Merlini* in 1925.

Geoffrey OF VILLEHARDOUIN, French GEOFFROI DE VILLEHARDOUIN: *see* Villehardouin, Geoffrey of.

Geoffrin, Marie-Thérèse Rodet (b. 1699, Paris—d. 1777, Paris), French hostess whose salon in the Hôtel de Rambouillet became an international meeting place of artists and men of letters from 1749 to 1777.

The daughter of a valet, she married a rich manufacturer, a member of the newly influential bourgeoisie, with whom she had no rapport. Although lacking formal education herself, Madame Geoffrin was sensitive, an excellent listener, and naturally intelligent; she inherited the salon of the more unconventional Madame de Tencin, gave it an added tone of respectability, and became a generous,

motherly patron to her guests and protégés, offering them criticism and advice. She ruled her domain with tact and strictness; neither religion nor politics as a subject of conversation was permitted. On Mondays such artists as François Boucher, Maurice La Tour, and Jean-Baptiste Greuze attended; on Wednesdays writers, including Horace Walpole, Pierre Marivaux, Bernard de Fontenelle, and Helvétius were present. Madame Geoffrin's salon was also a centre for the Encyclopédistes, whose vast project she subsidized.

Geoffroy, also spelled GEOFFROI (French personal name): *see under* Geoffrey, except as below.

Geoffroy, Étienne-François, also called GEOFFROY L'AÎNÉ, OR GEOFFROY THE ELDER (b. Feb. 13, 1672, Paris—d. Jan. 6, 1731, Paris), French chemist, the first chemist to speak of affinity in terms of fixed attractions between different bodies.

Étienne-François Geoffroy, engraving by Landon after a portrait by Nicolas de Largillière

H. Roger-Viollet

Assuming that one acid displaces another acid of weaker affinity for a specific base in the salt of that base, Geoffroy composed tables (1718) listing the relative affinities of different reagents for particular substances. Geoffroy's tables remained an authoritative reference throughout most of the 18th century, until they were invalidated by Claude-Louis Berthollet's demonstration that the thoroughness of chemical reactions depends upon the relative quantities of the starting materials and the physical conditions pertaining during the reaction.

Professor of chemistry at the Jardin du Roi, Paris, and of pharmacy and medicine at the Collège de France, Paris (1712–31), he considered the quest for the philosopher's stone (a substance capable of transforming base metals into gold) a delusion, but he believed that iron could be formed during the combustion of vegetable matter. Geoffroy's major works include *Table des différents rapports observés en chimie entre différentes substances* (1718) and *Tractatus de Materia Medica* (1699).

Geoffroy Saint-Hilaire, Étienne (b. April 15, 1772, Étampes, Fr.—d. June 19, 1844, Paris), French naturalist who established the principle of "unity of composition," postulating a single consistent structural plan basic to all animals as a major tenet of comparative anatomy, and who founded teratology, the study of animal malformation.

After taking a law degree (1790), Geoffroy studied medicine under Louis Daubenton and enrolled in science courses at the Collège du Cardinal Lemoine in Paris. At the height of the Revolution in 1792, he risked his life to save several of his teachers and fellows from execution. The following year, Daubenton arranged his appointment as superintendent of the cabinet of zoology at the Jardin des Plantes, and, when the gardens were converted to a national museum of natural history, Daubenton obtained for him one of its chairs of zoology.

In 1794, when the agronomist Alexandre-Henri Tessier wrote enthusiastically to the faculty about his young protégé, Georges Cuvier, Geoffroy immediately invited Cuvier to work with him, and the two began a collaboration that resulted in their joint publication of five works, one of which proposed a "subordination of characters"—a method for distinguishing only those animal features that allowed them to be separated into phyla and a basic principle of Cuvier's zoological system.

In 1798 Geoffroy was appointed a member of the scientific expedition accompanying Napoleon's invasion of Egypt. Three years later he succeeded, against the wishes of the British, in transporting the specimens collected there back to France. Following his election to the Académie des Sciences (1807), he was again called upon by Napoleon, this time to obtain the collections of Portuguese museums by any means. Exercising tact, he obtained the specimens by exchanging items from French museums.

Appointed professor of zoology at the University of Paris (1809), he began anatomical studies summarized in *Philosophie anatomique,* 2 vol. (1818–22). His studies on embryos supplied important evidence for a unity of organic composition among vertebrates, first mentioned by him in 1795, which he now defined in three parts: the law of development, whereby no organ arises or disappears suddenly, explaining vestiges; the law of compensation, stipulating that one organ can grow disproportionately only at the expense of another; and the law of relative position, stating that the parts of all animals maintain the same positions relative to each other.

When Geoffroy attempted to apply this philosophy to invertebrates in 1830, a major dispute arose with Cuvier, who had independently separated all animals into four immutable groups. The debate that followed divided the scientific world and compelled both men to elaborate their models of natural history. While Geoffroy believed that ancestral species historically gave rise to unchanging modern forms through the occasional evolutionary appearance of successful monstrosities, Cuvier denied evolution entirely. Geoffroy's evolutionary concepts did much to create a receptive scientific audience for Charles Darwin's arguments.

Geoffroy Saint-Hilaire, Isidore (b. Dec. 16, 1805, Paris—d. Nov. 10, 1861, Paris), French zoologist noted for his work on anatomical abnormalities in man and lower animals.

Entering the profession of his father, Étienne, he lectured in 1830 on the relationships of animals with their environment. In his *Histoire générale et particulière des anomalies de l'organisation chez l'homme et les animaux,* 4 vol. (1832–37; "General and Particular History of Structural Monstrosities in Man and Animals"), he introduced the term teratology for the study of congenital abnormalities.

Geoffroy succeeded his father in 1837 in Paris as professor of comparative anatomy at the Faculté des Sciences and, in 1841, at the Muséum National d'Histoire Naturelle. He organized the Faculté des Sciences at Bordeaux in 1838; served as inspector general of the University of Paris in 1844 and as a member of the royal council for public instruction the same year; founded in 1854 the Société d'Acclimatation to study how animals adjust to different climates; and in 1856 was elected president of the Académie des Sciences in Paris. In 1847 he published a scientific biography of his father, *Vie, travaux, et doctrine scientifique d'Étienne Geoffroy Saint-Hilaire* ("Life, Works, and Scientific Principles of Étienne Geoffroy Saint-Hilaire").

Geoffroy's cat (*Felis geoffroyi*), South American cat, family Felidae, found in mountainous regions, especially in Argentina. It is gray or brown with black markings and grows to a length of about 90 cm (36 inches) including a tail of about 40 cm.

Geoffroy's cat climbs well and preys on small mammals and birds. It breeds once a year; litters consist of two or three kittens.

geographic cycle: *see* geomorphic cycle.

Geographic Names, Board on (BGN), interdepartmental agency of the U.S. government created in 1890 and providing standardized geographic names of foreign and domestic places for use by the federal government. It was established in its present form by a public law enacted in 1947. Located in Washington, D.C., the BGN shares its responsibilities with the Secretary of the Interior and operates through several committees composed of members of various federal departments and agencies. The BGN publishes a series of gazetteers of foreign countries based on the work of geographers, linguists, and cartographers; gazetteers of Antarctica, undersea features, and most countries except the United States had been published by the early 1980s. Responsibility for producing and distributing the gazetteers lies with the Defense Mapping Agency, Department of the Interior.

Consult the INDEX *first*

geographic race, a collection of human populations, usually rather similar physically, delimited by some natural boundary, such as an ocean. Populations from different geographic races are usually rather distinct in heredity, since the geographic boundary serves as a barrier to mating with other peoples; but no geographic race is truly discrete, each blending with neighbouring races to some extent in spite of natural obstacles.

Thus, there is no single way of classifying mankind by biological race. In the past, physical characteristics such as skin colour and hair type were used to delineate three to five biological "races" (Caucasoid, Negroid, and Mongoloid, and later, Australoid and American Indian). More subtle techniques, taking into account blood types and hereditary diseases as well as terrain barriers, result in classifications that may include as many as eight or nine geographic races. Although authorities differ in terminology and in exact classification, the following divisions are generally acceptable: Caucasoid (European), Negroid (African; sometimes considered two distinct groups, Congoid and Capoid), Indic (Hindu), Mongoloid (Asiatic, or Oriental), Australoid (Australian), Polynesian, Melanesian, Micronesian (sometimes these three, or combinations of them, are classed as Oceanic), and American Indian.

geography (from the Greek *gēo,* "earth," and *graphein,* "to write"), the science of the Earth's surface. It describes and analyzes the spatial variations in physical, biological, and human phenomena that occur together on the surface of the globe and treats their interrelationships and their significant regional patterns. It is especially concerned with human utilization of natural resources and with the impact of human activities on the environment.

A brief treatment of the discipline of geography follows. For full treatment, *see* MACROPAEDIA: Geography. Related subjects are treated in a number of articles in the MACROPAEDIA. For historical and technical treatment, *see* Biological Sciences: *Ecology;* Conservation of Natural Resources; Earth Sciences, The; European Overseas Exploration and Empires, The History of; Mapping and Surveying; Social Sciences. For treatment of the various types of geographic features, *see* Atmosphere; Biosphere; Cities; Climate and Weather; Continental Landforms; Earth; Ecosystems; Hydrosphere; Lakes; Oceans;

Population; Rivers. For treatment of the various processes of change, *see* Geomorphic Processes; Modernization and Urbanization; Plate Tectonics; Volcanism. For treatment of particular geographic features, *see* articles on continents, regions (*e.g.,* Arctic, The; Mediterranean Sea), countries, and cities, as cited in the Index.

For a description of the place of geography in the circle of learning, *see* PROPAEDIA: Part Ten, Division III.

Geography is one of the oldest subjects of study, and it has been called the mother of sciences. In the classical world geography had close ties with history (as in Herodotus) in attempting to describe what other lands and peoples were like or with astronomy and philosophy (as in Eratosthenes and Ptolemy) in trying to ascertain the size of the Earth and to locate places on it. Alexander von Humboldt (1769–1859), a German naturalist and geographer, was a key figure in the rise of modern geography because of his exact measurements, his careful recording of observations, his mapping of significant areal patterns of human and natural features, his recognition of interrelationships among these elements, and his treatment of distinguishing characteristics in regional syntheses.

Once associated entirely with mapping and the exploration of the Earth, the discipline of geography is today a wide-ranging one. Any pattern of spatial variation of phenomena on the surface of the Earth may be influenced by many of the processes that animate the natural and human realms, requiring geographers to be conversant with the principles of the biological, social, and earth sciences.

Thus an understanding of the areal patterns of food production over the face of the globe involves consideration of the cultural inheritance, social organization, and technology of specific groups of people in particular locations, the biological characteristics of cultivated plants and domesticated animals, soils, the climatic elements of temperature and precipitation, the slope and drainage of the terrain, and a host of other factors, not excluding political policies, economic conditions, and competitive relationships. Desertification in Africa, for example, is often attributed to drought, but studies reveal that it has been accelerated by overgrazing, overexpansion of farming, and removal of trees and shrubs for firewood. Many of these phenomena are studied by other specialists, but it is the distinctive task of the geographer to investigate their distributional patterns, their regional complexes, the networks that link the elements, and the processes involved in the interaction among them.

The special subdisciplines of geography are divided into areas of physical, human, and regional geography. Physical geography is further subdivided into geomorphology, climatology, biogeography, and hydrology. In this category particular attention has been paid to coastal areas, to water and mineral resources (including energy), and to natural hazards. Human geography includes historical geography, cultural and social geography, population geography, political geography, economic geography (including the study of agriculture, industry, trade, and transportation), and urban geography. Medical geography, environmental management, and conservation of resources fall between these two large fields. The scale of study in regional geography may range from worldwide regionalization, to a continent, a major cultural area, a country, a subregion within a country, or a city.

Geography utilizes a battery of methods and techniques. Particularly important are direct field observations and mapping. Methods of observation have been enhanced by such means as aerial photography and electronic remote sensing from artificial Earth satellites. Statistical methods help in spatial analysis of quantitative data, particularly census and survey data. Maps, however, though their nature and complexity have developed, remain the distinctive tool for the geographer.

The discipline of geography has many uses. It enables individuals to know the basic features of the world in which they live, the great variety of lands and peoples, the complex associations and interrelations of man with resources and nature, and the problems faced by inhabitants of other countries and regions. Geographic research provides explanations of the distribution of physical, biological, and human features on Earth and of their complex chains of interconnection. Studies of the diffusion of innovations over time and space and of historical geography provide explanations for many cultural patterns. Analysis of the areal spread of infectious diseases helps to explain the timing and distribution of epidemics. Applied geographic analysis also has proved useful in managing resources, in understanding problems of the environment, in analyzing natural hazards (such as droughts or floods), and in measuring the distribution of environmental pollution or contamination by discharges of urban, agricultural, and industrial wastes. The analysis of unanticipated environmental effects caused by the construction of large dams and reservoirs has been particularly important. Geographers are engaged in planning land use and housing. They are also an important resource in national and international agencies that deal with the study, inventory, development, or administration of natural or human resources.

geoid, model of the figure of the Earth that coincides with mean sea level over the oceans and continues in continental areas as an imaginary sea level surface defined by spirit level. It is everywhere perpendicular to the pull of gravity and approximates the shape of a regular oblate spheroid. It is irregular, however, because of local buried mass concentrations (departures from lateral homogeneity at depth) and because of differences in elevation between continents and seafloors. Mathematically speaking, the geoid is an equipotential surface: that is, it is characterized by the fact that over its entire extent the potential function is constant; this potential function describes the combined effects of the gravitational attraction of the Earth's mass and the centrifugal repulsion caused by the rotation of the Earth about its axis.

geologic oceanography: *see* marine geology.

geology, scientific study of the Earth, including its composition, structure, physical properties, and history. The term geology is broadly inclusive and is often regarded as embracing all of the geologic sciences.

A brief treatment of geology follows. For full treatment, *see* MACROPAEDIA: Earth Sciences, The.

Geology is commonly divided into a number of subdisciplines: (1) those concerned with the chemical makeup of the solid Earth, which include the systematic study of minerals (mineralogy) and rocks (petrology); (2) those having to do with the structure of the solid Earth, as, for example, the study of the geometric relationships of rocks and geologic features in general (structural geology) and the science of volcanic phenomena (volcanology); (3) those concerned with landforms and the processes that produce them (geomorphology and glacial geology); (4) those dealing with geologic history, including the study of fossils and the fossil record (paleontology), the development of sedimentary strata (stratigraphy), and the evolution of planetary bodies and their satellites (astrogeology); and (5) economic geology and its various branches—*e.g.,* mining geology and petroleum geology. Some major fields closely allied to geology are geodesy, geophysics, and geochemistry.

The various subdisciplines of geology not only intergrade with one another but also with other branches of the Earth sciences and with such fields as physics, chemistry, biology, and mathematics. Paleontology, for instance, at times requires the use of organic chemistry, physical chemistry, and statistics. The statistical analysis of data also is an important facet of geomorphology and stratigraphy, as is the use of mathematical models.

Besides providing a better understanding of the Earth's evolution and its present features, geology serves society in a variety of practical ways. Exploration for deposits of commercially valuable minerals is broadly guided by geologic principles and conducted with geophysical and geochemical methods. The search for fossil fuels (coal, oil, and natural gas) is strongly influenced by those aspects of geology dealing with the deposition and deformation of sedimentary rocks and with the flow of underground fluids. Significant, too, is the contribution of seismological research, whose findings have enabled engineers to design structures that are better able to withstand earthquakes.

geology, marine: *see* marine geology.

geology, structural: *see* structural geology.

geomagnetic field, magnetic field associated with the Earth. It primarily is dipolar (*i.e.,* it has two poles, these being the north and south magnetic poles) on the Earth's surface. Away from the surface, the dipole becomes distorted.

In the 1830s, the German mathematician and astronomer Carl Friedrich Gauss studied the Earth's magnetic field and concluded that the main dipolar component had its origin inside the Earth instead of outside. He showed that the dipolar component was a decreasing function inversely proportional to the square of the Earth's radius, a conclusion that led scientists to speculate on the origin of the Earth's magnetic field in terms of ferromagnetism (as in a gigantic bar magnet), various rotation theories, and various dynamo theories. Ferromagnetism and rotation theories generally are discredited—ferromagnetism because the Curie point (the temperature at which ferromagnetism is destroyed) is reached only 20 or so kilometres (about 12 miles) beneath the surface, and rotation theories because apparently no fundamental relation exists between mass in motion and an associated magnetic field.

Most geomagneticians concern themselves with various dynamo theories, whereby a source of energy in the core of the Earth causes a self-sustaining magnetic field. In the dynamo mechanism, fluid motion at the Earth's core involves the movement of conducting material across an existing magnetic field, thus creating a current. The geomagnetic dynamo is by far the most important source, for without the field that it creates, other sources could not exist.

Other sources of the geomagnetic field include crustal magnetization (which occurs when the solid materials that form the Earth's crust become magnetized by the Earth's main field and cause detectable anomalies); ionospheric dynamo (the flow of charged particles across magnetic field lines that is caused by the Sun's heating of the ionosphere); the ring current (the current produced by the drift of charged particles far above the Earth's surface); magnetopause current (the sheetlike flow of particles that form a boundary between the Earth's magnetic fields and solar wind); tail current (similar to magnetopause current); field-aligned currents (caused by the circulation of magnetic field lines); and auroral electrojets (broad sheets of electric current

that flow in the northern and southern auroral ovals).

geomagnetic reversal, an alternation of the Earth's magnetic polarity in geologic time. *See* polar wandering.

geomagnetics, branch of geophysics concerned with all aspects of the Earth's magnetic field, including its origin, variation through time, and manifestations in the form of magnetic poles, the remanent magnetization of rocks, and local or regional magnetic anomalies. The latter reflect the difference between theoretical and observed magnetic intensities at points of measurement with a magnetometer, and, when plotted on a magnetic map (called an aeromagnetic map if the magnetometer was flown across the area), the anomalies provide the basis for inferences about probable subsurface structure and composition.

Geometres, John, also called JOHN KYRIOTES (fl. 10th century), Byzantine poet, official, and bishop, known for his short poems in classical metre. Geometres held the post of *protospatharios* (commander of the guards) at the Byzantine court and later was ordained priest, finally becoming metropolitan of Melitene in eastern Asia Minor. His poems, on both contemporary politics and religious subjects, are distinguished by considerable charm and appreciation of natural beauty. His prose works, most of which remained unpublished, include a life of the Virgin Mary, consisting of sermons for her feast days, and an encomium of Eve's apple.

Geometric style, style of ancient Greek art, primarily of vase painting, that began about 900 BC and represents the last purely Mycenaean-Greek art form that originated before the influx of foreign inspiration by about 800 BC. Athens was its centre, and the growing moneyed population of new Greek cities was its market.

Vases decorated in Geometric style exhibit painted horizontal bands filled with patterns, much like the vases of the preceding Proto-Geometric style. Geometric-style bands, however, are more numerous, covering the entire vase, with triple lines dividing patterned zones at regular intervals. The old Proto-Geometric design elements, the circle and arc, lost favour with the Geometric artist, while the zigzag and triangle remained and were incorporated along with some new elements, the meander and swastika. The overall visual effect of the regularly spaced horizontal bands filled with sharply angular patterns in dark paint upon light ground is one of undulating rhythm, closely akin to basketry.

Geometric-style dipylon vase with funeral scenes from Attica, Greece, 8th century BC; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, Rogers Fund, 1914

In addition to using abstract motifs, artists working in the Geometric style began using figures of humans and animals, seeing both as the sum of geometrized parts—bodies becoming triangles, legs and arms becoming line segments. First used just as patterns, they later developed into more complex groupings, usually narrative—funeral scenes, sea battles, dances, boxing matches, and exploits of popular heroes.

Representative objects of this period include vases, small bronze and clay figurines, elaborately decorated safety-pin-like clasps, or fibulae, and limestone seals. Artisans also made gold bands impressed with animal and human figures, which were put on the head of a deceased person, often in a way that would keep the mouth closed. Although the Geometric style gave way to the Classical style, its patterns remained popular and influenced much later Grecian art.

geometrid moth, any member of the large, cosmopolitan moth family Geometridae (order Lepidoptera), which includes the species commonly known as pug, wave, emerald, and carpet moths. The larvae of geometrid moths are called by a variety of common names—inchworm, cankerworm, looper, and measuring worm—and the moths themselves are sometimes called measuring worm moths.

Adult geometrids have slender bodies and broad wings. Many species resemble dried, dead leaves, but there are some brightly coloured types, especially in the tropics. When preparing to land they tend to select a background coloration into which they blend.

The distinctive coloration patterns of certain species warn predators of their foul taste. Some species have wingless females (*e.g.,* the European winter moth *Operophtera brumata*).

Research using the currant or magpie moth (*Abraxas grossulariata*) led to the discovery of sex-linked characters (*i.e.,* genetic characters determined by genes on the sex chromosomes). Dark forms of the peppered moth (*Biston betularia*) are used in studying industrial melanism.

geometry, branch of mathematics that deals with the properties of space and objects in space. It is one of the oldest branches of mathematics, having arisen in response to such practical problems as those found in surveying, and its name is derived from Greek words meaning "Earth measurement." Eventually it was realized that geometry need not be limited to the study of flat surfaces (plane geometry) and rigid three-dimensional objects (solid geometry) but that even the most abstract thoughts and images might be represented and developed in geometric terms.

A brief treatment of geometry follows. For full treatment, *see* MACROPAEDIA: Geometry; Mathematics, The History of.

In several ancient cultures, there developed a form of geometry suited to the relationships between lengths, areas, and volumes of physical objects. This geometry was codified in Euclid's *Elements* in about 300 BC on the basis of 10 axioms and postulates, from which several hundred theorems were proved by deductive logic. The *Elements* epitomized the axiomatic-deductive method for many centuries.

Analytic geometry, in which algebraic notation and procedures are used for the description of geometric objects, was introduced by René Descartes in 1637. Soon thereafter, Isaac Newton, Leonhard Euler, and others extended this idea to the study and classification of conic sections and other families of plane curves and the solution of problems involving them. These studies founded algebraic geometry, which reached its full development at the hands of Max Noether of Germany late in the 19th century and Corrado Segre and Federigo Enriques of Italy early in the 20th.

In the late 18th century, Gaspard Monge of France elaborated analytic geometry into descriptive geometry, a rational system for depicting three-dimensional objects such as buildings and machines by means of coordinated views from three perpendicular directions. The related problem of perspective in painting became the basis of a further extension, namely, projective geometry. This branch of mathematics, systematized by Victor Poncelet of France by 1822, deals with those properties of geometric figures that are not altered by projection. It provided the proper context for two celebrated theorems that had been proved by Girard Desargues and Blaise Pascal in about 1640.

The application of the concepts of mathematical analysis—continuity and limit—to the study of geometry was undertaken in about 1820 by Carl Friedrich Gauss in connection with practical problems of surveying and geodesy. Gauss initiated the field of differential geometry by providing analytic expressions for the length of arc and the curvature of plane curves and extending his results to the curvature of surfaces. From 1854 onward, his student Bernhard Riemann generalized these ideas to spaces of any number of dimensions; the resulting geometric concepts were adopted by Albert Einstein in the 20th century in framing his general theory of relativity.

Riemann's researches made him one of the principal founders of non-Euclidean geometry. Around 1830 Nikolay Lobachevsky and János Bolyai had published the results of their independent investigations of the consequences of replacing Euclid's parallel postulate with the stipulation that through a given point not on a given line, two parallels to the line can be drawn. (Gauss had examined this possibility but published nothing on it.) Riemann offered another alternative: there is no parallel. After 1870 non-Euclidean geometry was further generalized and unified with projective geometry by Felix Klein of Germany and Sophus Lie of Norway.

Topology, the youngest and most sophisticated branch of geometry, focuses on the properties of geometric objects that remain unchanged upon deformation: a doughnut and a teacup are topologically equivalent. The continuous development of topology dates from 1911, when the Dutch mathematician L.E.J. Brouwer introduced methods generally applicable to the topic.

geōmoroi, also called AGROIKOI, or GEŌRGOI, class of citizens in ancient Greek society. In 7th-century-BC Attic society, *geōmoroi* were freemen, generally peasant farm holders, lower on the social and political scale than the eupatridae, the aristocracy, but above the *dēmiourgoi,* the artisans. The *geōmoroi* were ineligible for any major political or religious post but had the right to attend sessions of the Assembly. In 580 BC, three *geōmoroi* shared the archonship (magistracy) with five eupatridae and two *dēmiourgoi.*

In Syracuse and in Samos, where society was divided into only two classes, the *geōmoroi* were the oligarchs, contrasted with the *dēmos,* the common people.

geomorphic cycle, also called GEOGRAPHIC CYCLE, or CYCLE OF EROSION, theory of the evolution of landforms. In this theory, first set forth by William M. Davis between 1884 and 1934, landforms were assumed to change through time from "youth" to "maturity" to "old age," each stage having specific characteristics. The initial, or youthful, stage of landform development began with uplift that produced fold or block mountains. Upon dissection by streams, the area would reach maturity and, ultimately, would be reduced to an old-age surface called a peneplain, with an elevation near sea level. The cycle could be

interrupted by uplift during any period of the life cycle and thus returned to the youthful stage; this return is called rejuvenation. The geomorphic cycle could be applied to all landforms such as hillslopes, valleys, mountains, and river drainage systems. It was assumed that, if the stage of a landform was known, its history followed directly according to a predetermined framework.

Though Davis acknowledged that rock type, structure, and the processes of erosion play a part in landform determination, he emphasized that time was the primary factor. It is now believed that time is no more important in landform development than the other factors. The cycle-of-erosion theory has long been accepted in the face of accumulating quantitative data that refutes it. It is generally held now that the initial conditions—or uplift—in a region do not necessarily predetermine the end products. Rather, there tends to be an eventual attainment of dynamic equilibrium between landforms and the processes that act upon them. When this happens, the physiographic history of a region is "erased."

geomorphology, scientific discipline concerned with the description and classification of the Earth's topographic features.

A brief treatment of geomorphology follows. For full treatment, *see* MACROPAEDIA: Earth Sciences, The. For treatment of the physical, chemical, and biological processes that affect the surface features of the Earth, *see* Geomorphic Processes.

Much geomorphological research has been devoted to the origin of landforms. Such studies focus on the forces that mold and alter the primary relief elements of the terrestrial surface. These forces include tectonic activity and surficial earth movements (*e.g.,* landslides and rockfalls). They also involve weathering and the erosion and deposition of the resulting rock debris by wind, glacial ice, and streams. In recent years, increasing attention has been given to the effects of human action on the physical environment as well.

Many systems of classifying landforms have been devised since the late 19th century. Some systems describe and group topographic features primarily according to the processes that shaped or modified them. Others take additional factors into consideration (*e.g.,* character of the surface rocks and climatic variations) and include the developmental stage of landforms as an aspect of their evolution over geologic time.

Geomorphology is closely allied with a number of other scientific disciplines that are concerned with natural processes. Fluvial and coastal geomorphology rely heavily on fluid mechanics and sedimentology; studies of mass movement, weathering, wind action, and soils draw on the atmospheric sciences, soil physics, soil chemistry, and soil mechanics; research on certain landform types entails the principles and methods of geophysics and volcanology; and the study of human impact upon landforms relies on the disciplines of geography and human ecology.

Geophone, trade name for an acoustic detector that responds to ground vibrations generated by seismic waves. Geophones—also called jugs, pickups, and tortugas—are placed on the ground surface in various patterns, or arrays, to record the vibrations generated by explosives in seismic reflection and refraction work. They also are used as military detection devices. *See also* seismic survey.

geophysics, major branch of the Earth sciences that applies the principles and methods of physics to the study of the Earth.

A brief treatment of geophysics follows. For full treatment, *see* MACROPAEDIA: Earth Sciences, The.

Geophysics deals with a wide array of geologic phenomena, including the temperature distribution of the Earth's interior; the source, configuration, and variations of the geomagnetic field; and the large-scale features of the terrestrial crust, such as rifts, continental sutures, and mid-oceanic ridges. Modern geophysical research extends to phenomena of the outer parts of the Earth's atmosphere (*e.g.,* the ionospheric dynamo, auroral electrojets, and magnetopause current system) and even to the physical properties of other planets and their satellites.

Many of the problems of geophysics are analogous to those of astronomy because the subject studied is rarely under direct observation, and conclusions must be drawn largely on the basis of mathematical interpretation of physical measurements. These include measurements of the Earth's gravitational field with gravimeters on land and sea and artificial satellites in space; magnetometric measurements of the planet's magnetic field; and seismological surveys of subsurface geologic structures using reflected and refracted elastic waves produced by earthquakes or by artificial means (*see* seismic survey).

Research conducted with geophysical techniques has proved extremely useful in providing evidence in support of the theory of plate tectonics (*g.v.*). Seismographic data, for instance, have demonstrated that the world's earthquake belts mark the boundaries of the enormous rigid plates that constitute the Earth's outer shell, while the findings of paleomagnetic studies have made it possible to trace the drift of the continents over geologic time.

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geophysics, marine: *see* marine geophysics.

geopolitics, the analysis of geographic influences on power relationships in international politics. Geopolitical theorists have sought to demonstrate the importance in the determination of national policy of such considerations as the acquisition of natural boundaries, access to important sea routes, and the control of strategically important land areas.

The term *geopolitics* was coined by the Swedish political scientist Rudolf Kjellén in his *Staten som Lifsform* (1916; "The State as an Organism"). The term spread throughout central Europe between World Wars I and II and came into worldwide use during the latter. Between the wars, geopolitical arguments came to be employed in special pleading to promote the interests of particular nations or ideologies. Thus, for example, Karl Haushofer sought in his monthly journal of geopolitics, *Zeitschrift für Geopolitik,* to give a geopolitical rationale to the international claims of Germany; later, the Nazis adopted his theories for their own purposes. A warning was sounded by Sir Halford Mackinder ("The Geographical Pivot of History," 1904, and *Democratic Ideals and Reality,* 1919) when he advanced a theory of a heartland in world politics. This heartland covered "Euro-Asia," and, according to Mackinder, it was vital that the democratic nations control that area.

In the past, a nation's sphere of influence has been determined primarily by geopolitical factors. Such factors have, however, become relatively less significant in the foreign policies of states because of the improvements in communications and transportation that have enabled states to overcome the limitations imposed on them by geographical location or barriers.

Georg (Danish, German, Norwegian, Swedish, etc., personal name): *see under* George.

Georg Wilhelm (elector of Brandenburg): *see* George William.

George, name of rulers grouped below by country and indicated by the symbol •.

Foreign-language equivalents:
Czech ..... Jiří
German ..... Georg
Greek ..... Geórgios

BOHEMIA

• George, byname GEORGE OF PODEBRADY, Czech JIŘÍ Z PODĚBRAD (b. April 23, 1420, Poděbrady, Bohemia [now in Czechoslovakia]—d. March 22, 1471, Prague), king of Bohemia from 1458; as head of the conservative Utraquist faction of Hussite Protestants, he established himself as a power when Bohemia was still under Habsburg rule and was thereafter unanimously elected king by the estates. A nationalist and Hussite king of a prosperous state, he incurred the enmity of the papacy and Bohemia's Roman Catholic neighbours, which finally destroyed his power.

George became the leader of the Utraquists in 1444. Opposing the Roman Catholic pro-Habsburg party, whose prospective Bohemian king Ladislav was still a minor, he captured Prague in 1448, thereafter defeating the Habsburg faction. Accepting the situation, Ladislav's guardian, the future emperor Frederick III, entrusted George with the administration of Bohemia in 1451, while the Bohemian Diet appointed him regent. When Ladislav began his rule in 1453, George's importance waned; but, after the king's sudden death in 1457, he was elected king (March 2, 1458) despite accusations, probably false, that he had poisoned Ladislav. Bohemia prospered under his rule, and he enhanced his prestige by trying to organize an anti-Turkish league of Christian states (1642). But he refused Pope Pius II's demand that he abolish the Compactata, which had legitimized the Utraquist party. Although Pius died (1464) before his planned crusade against Bohemia began, the new pope, Paul II, supported a confederacy of nobles against George (1465), and on Dec. 23, 1466, the pope excommunicated him, pronounced him deposed, and forbade Roman Catholics to continue allegiance to him. Emperor Frederick III and Matthias Corvinus of Hungary joined the alliance against Bohemia, and on May 3, 1469, Matthias established himself in Brno as a rival king of Bohemia. George, however, refused to abdicate, and the struggle continued until his death.

GREAT BRITAIN/UNITED KINGDOM

• George I, in full GEORGE LOUIS, German GEORG LUDWIG (b. May 28, 1660, Osnabrück, Hanover [Germany]—d. June 11, 1727, Osnabrück), elector of Hanover (1698–1727) and first Hanoverian king of Great Britain (1714–27).

George I, detail of an oil painting after Sir Godfrey Kneller, 1714; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

George Louis of Brunswick-Lüneburg was the son of Ernest Augustus, elector of Hanover, and Sophia of the Palatinate, a granddaughter of King James I of England. George married his cousin Sophia Dorothea of Celle in 1682, but in 1694, accusing her of infidelity, he divorced her and imprisoned her in the castle of Ahlden, where she died 32 years later. He succeeded his father as elector of Hanover in 1698. The English Parliament's Act of Settlement (1701), seeking to ensure a Protestant succession to the throne in opposition to the exiled Roman Catholic claimant (James Edward, the Old Pretender), made George third in line for the throne after Princess Anne (queen from 1702–14) and his mother.

During the War of the Spanish Succession (1701–14) George fought with distinction against the French. England's Whig politicians began to court his favour, but many Tories remained loyal to the Old Pretender. When George's mother died on June 8, 1714, he became heir to the throne, and on the death of Queen Anne (Aug. 1, 1714) the Whigs, who had just gained control of the government, ushered him into power.

Naturally, George formed a predominantly Whig ministry. Although the Jacobite rebellions of 1715 and 1719 were readily suppressed, he was far from popular in England. Ugly rumours concerning his treatment of his wife were widely disseminated, and the greed of his two German mistresses reflected badly on his court. He attempted diligently, however, to fulfill his obligations to his new kingdom. Since he could not speak English, he communicated with his ministers in French. Although he stopped attending Cabinet meetings, he met with key ministers in private—a step that led to the decline of the Cabinet, which had largely controlled the government during Queen Anne's reign. His shrewd diplomatic judgment enabled him to help forge an alliance with France in 1717–18. Nevertheless, he often found it difficult to get his way in domestic politics, in which he had to deal with such strong-willed ministers as Robert Walpole (later earl of Orford), James Stanhope, and Viscount Charles Townshend. In 1716–17 Townshend and Walpole left his government in protest over Stanhope's alleged efforts to mold English foreign policy to the needs of George's Hanoverian possessions. By joining with George's son, the Prince of Wales (later King George II), whom the King detested, these dissidents formed an effective opposition movement within the Whig Party.

Shortly after this faction was reconciled to George in 1720, the South Sea Company suffered a financial collapse. In the ensuing scandal it became apparent that George and his mistresses had taken part in South Sea Company transactions of questionable legality, but Walpole's skill in handling the House of Commons saved the King from disgrace. As a result, George was forced to give Walpole and Townshend a free hand in the ministry. They pushed several of the King's friends out of office, and by 1724 George had come to rely completely on their judgment. George died of a stroke on a trip to Hanover. In addition to his son and successor, George II, he had a daughter, Sophia Dorothea (1687–1757), wife of King Frederick William I of Prussia and mother of Frederick the Great. R. Hatton's *George I* was published in 1978.

• **George II,** in full GEORGE AUGUSTUS, German GEORG AUGUST, also called (1706–27) MARQUESS AND DUKE OF CAMBRIDGE (b. Nov. 10 [Oct. 30, old style], 1683, Herrenhausen Palace, Hanover—d. Oct. 25, 1760, London), king of Great Britain and elector of Hanover from 1727 to 1760. Although he possessed sound political judgment, his lack of self-confidence caused him to rely heavily on his ministers, most notable of whom was Sir Robert Walpole.

George Augustus was the only son of the German prince George Louis, elector of Hanover (King George I of Great Britain from 1714 to 1727), and Sophia Dorothea of Celle. He

George II, detail of an oil painting by Thomas Hudson, *c.* 1737; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

grew up in Hanover and married (1705) the beautiful and intelligent Caroline of Ansbach. Upon the accession of his father to the English throne he was designated prince of Wales. By 1717 George I and his son, who had for years detested each other, were quarrelling openly. The Prince's London residence, Leicester House, became the gathering place for a dissident Whig group headed by Walpole and Viscount Charles Townshend. The tepid reconciliation that took place between George I and the Prince in 1720 led to the inclusion of Walpole in George I's administration, and Walpole lost the Prince's favour when he became one of George I's leading ministers. The Prince, upon his accession as George II, would have dismissed Walpole from office had not Caroline intervened on the minister's behalf.

During the first two decades of his reign George II followed foreign and domestic developments closely. He supported Walpole's policy of peace and retrenchment and allowed the minister to use crown patronage to build up his majority in Parliament. Walpole won acknowledgment of George's legitimacy from many influential Tories who had been Jacobites—supporters of the exiled Stuart pretender to the English throne. Hence, no politician of prominence deserted George's cause during the abortive Jacobite Rebellion of 1745. Nevertheless, opposition to George and Walpole grew as the pattern of George I's reign repeated itself: George II and his son Frederick Louis, prince of Wales, quarrelled, and the Prince became a leader of an anti-administration faction. By 1742 these dissidents were strong enough to force Walpole to resign. George II quickly found another mentor in John Carteret (later Earl Granville), whose haughty ways proved unpopular in political circles. The two men brought England into the War of the Austrian Succession (1740–48), and in doing so they gave their opponents an opportunity to charge them with subordinating the interests of England to the needs of George's German possessions. In November 1744 George bowed to parliamentary pressure and accepted Carteret's resignation. Fifteen months later the King's ministers, by resigning (temporarily) en masse, forced George to accept into office Carteret's chief opponent, William Pitt (later earl of Chatham).

During the last decade of his life George II's interest in politics declined. He was little more than an observer of the events of the Seven Years' War (1756–63) against France, for it was Pitt who devised the brilliant strategy that eventually brought about a British victory. George died suddenly and was succeeded by his grandson (son of Frederick Louis) King George III.

Throughout his life George II maintained a passion for anything military. He displayed courage while fighting the French at the Battle of Dettingen in 1743—the last time a British king appeared on the battlefield—and he organized each day with the precision of a drill sergeant. His other major interest was music; he loved opera and was a patron of the German composer George Frideric Handel. Charles Trench's *George II* appeared in 1973.

• **George III,** in full GEORGE WILLIAM FREDERICK, German GEORG WILHELM FRIEDRICH (b. June 4 [May 24, old style], 1738, London—d. Jan. 29, 1820, Windsor Castle, near London), king of Great Britain and Ireland (1760–1820) and elector (1760–1814) and then king (1814–20) of Hanover, during a period when Britain won an empire in the Seven Years' War but lost its American colonies, and then, after the struggle against Revolutionary and Napoleonic France, emerged as a leading power in Europe. During the last years of his life (from 1811) he was intermittently mad—his son, the future George IV, acting as regent.

Early years. George III was the son of Frederick Louis, prince of Wales, and Princess Augusta of Saxe-Gotha. From his parents and their entourage, the young George imbibed an unreasonable dislike of his grandfather, King George II, and of all his policies. George was a child of strong feelings but of slow mental development. This unequal growth of brain and heart made him difficult to teach and too easy to command and produced in him

George III, painting by Peter Edward Stroehling, 1807

By gracious permission of H.M. Queen Elizabeth II

an appearance of apathy; he could not read properly until he was 11. His affection for his immediate family circle dominated his life.

George was 12 when his father died, leaving him heir to the throne. It is clear that, in beginning with his 18th birthday to prepare conscientiously for his future responsibilities, he tormented himself with thoughts of his inadequacy. The curious blend of obstinate determination with self-distrust, a feature of his maturity, was already evident. His method of screwing up his courage was to set himself an ideal of conduct. This ideal George thought he had found personified in John Stuart, 3rd earl of Bute, who became his inspiration, his teacher, and later his chief minister.

George was potentially a better politician than Bute, for he had tenacity, and, as experience matured him, he could use guile to achieve his ends. But at his accession in 1760 in the midst of the Seven Years' War (1756–

63), between Great Britain and Prussia on one side and France, Austria, and Russia on the other, George did not know his own capacity nor the incapacity of his hero. As king, in 1761, he asked Bute for a review of all eligible German Protestant princesses "to save a great deal of trouble," as "marriage must sooner or later come to pass." He chose Charlotte Sophia of Mecklenburg-Strelitz and married her on Sept. 8, 1761. Though the marriage was entered into in the spirit of public duty, it lasted for more than 50 years, due to the King's need for security and his wife's strength of character. Bute's only other useful contribution to his royal pupil was to encourage his interest in botany and to implant in the court more respect for the graces of life, including patronage of the arts, than had been usual for the past half century.

Political instability, 1760–70. Politically, Bute encouraged the most disastrous of George's delusions. The government of England at the time lacked effective executive machinery, and members of Parliament were always more ready to criticize than to cooperate with it. Moreover, the ministers were, for the most part, quarrelsome and difficult to drive as a team. The King's first responsibility was to hold coalitions of great peers together. But under Bute's influence he imagined that his duty was to purify public life and to substitute duty to himself for personal intrigue. The two great men in office at the accession were the elder Pitt and Thomas Pelham-Holles, duke of Newcastle. Bute and George III disliked both. Pitt was allowed to resign (October 1761) over the question of war against Spain. Newcastle followed into retirement when his control of treasury matters seemed to be challenged. The two former ministers were each dangerous as a focal point for criticism of the new government under the touchy captaincy of Bute. The government had two principal problems: to make peace and to restore peacetime finance.

Peace was made but in such a way as to isolate Britain in Europe, and for almost 30 years the country suffered from the new alignments of the European powers. Nor was George III happy in his attempt to express the agreed purposes of the country that to Bute had seemed so clear. George III might "glory in the name of Briton," but his attempts to speak out for his country were ill-received. In 1765 he was being vilified by the gutter press organized by the parliamentary radical John Wilkes, while "patriotic" gentlemen, moved by Pitt or Newcastle, suspected that the peace had been botched and that the King was conspiring with Bute against their liberties. For Bute the way out was easy—he resigned (April 1763).

George realized too late that his clumsiness had destroyed one political combination and made any other difficult to assemble. He turned to George Grenville, to his uncle, William Augustus, duke of Cumberland, to Pitt, and to the 3rd Duke of Grafton for help. All failed him. The first decade of the reign was one of such ministerial instability that little was done to solve the basic financial difficulties of the crown, made serious by the expense of the Seven Years' War. Overseas trade expanded, but the riches of the East India Company made no significant contribution to the state. The attempt to make the American colonists meet their own administrative costs only aroused them to resistance. Nor was there consistency in British colonial policy. The Stamp Act (1765) passed by Grenville was repealed by Lord Rockingham in 1766. Indirect taxes, in the form of the Townshend Acts (1767), were imposed without calculation of their probable yield and then repealed (except for that on tea) as a manoeuvre in home politics.

George III was personally blamed for this instability. According to the Whig statesman Edmund Burke and his friends, the King could not keep a ministry because he was faithless and intrigued with friends "behind the curtain." Burke's remedy was to urge that solidity should be given to a Cabinet by the building up of party loyalty: the King as a binding agent was to be replaced by the organization of groups upon agreed principles. Thus the early years of George III produced, inadvertently, the germ of modern party politics. In truth, however, the King was not guilty of causing chaos by intrigue. He had no political contact with Bute after 1766; the so-called king's friends were not his agents but rather those who looked to him for leadership such as his predecessors had given. The King's failure lay in his tactlessness and inexperience, and it was not his fault that no one group was strong enough to control the Commons.

By 1770, however, George III had learned a good deal. He was still as obstinate as ever and still felt an intense duty to guide the country, but now he reckoned with political reality. He no longer scorned to make use of executive power for winning elections nor did he withhold his official blessing from those of whose characters he disapproved.

North's ministry, 1770–82. In 1770 the King was lucky in finding a minister, Lord North, with the power to cajole the Commons. North's policy of letting sleeping dogs lie lulled the suspicions of independent rural members who were always ready to imagine that the executive was growing too strong. As a result, 12 years of stable government followed a decade of disturbance.

Unfortunately, issues and prejudices survived from the earlier period that North could only muffle. America was the greatest and the fatal issue, and North could not avoid it because the English squires in Parliament agreed with their king that America must pay for its own defense and for its share of the debt remaining from the war that had given it security. George III's personal responsibility for the loss of America lies not in any assertion of his royal prerogative. Americans, rather, were disposed to admit his personal supremacy. Their quarrel was with the assertion of the sovereignty of Parliament, and George III was eventually hated in America because he insisted upon linking himself with that Parliament. North would have had difficulty in ignoring the colonists' insults in any case; with the King and the House of Commons watching to see that he was not weak, he inevitably took the steps that led to war in 1775.

By 1779 the typical English squires in Parliament had sickened of the war, but the King argued that though the war was indefensible on economic grounds it still had to be fought, that if disobedience were seen to prosper, Ireland would follow suit. He argued also, after the French had joined the Americans in 1778, that French finances would collapse before those of Britain. So the King prolonged the war, possibly by two years, by his desperate determination. The period from 1779 to 1782 left a further black mark upon the King's reputation. By 1780 a majority in Parliament blamed North's government for the calamities that had befallen the country, yet there was no responsible or acceptable alternative, for the opposition was reputed to be both unpatriotic and divided. At the time people believed that corruption alone supported an administration that was equally incapable of waging war or ending it. This supposed increase in corruption was laid directly at the King's door, for North wearily repeated his wish to resign, thus appearing to be a mere puppet of George III. When North fell at last in 1782, George III's prestige was at a low ebb. The failure of Shelburne's ministry (1782–83) reduced George to the lowest point of all. North joined with the liberal Whig Charles James Fox to form a coalition government, and George even contemplated abdication.

George and the Younger Pitt, 1783–1806. Yet within a year the King had dramatically turned the tables, carrying out amid applause the most high-handed act of royal initiative in 18th-century England. When Fox and North produced a plan to reform the East India Company, which aroused fear that they intended to perpetuate their power by controlling Eastern patronage, the King reemerged as the guardian of the national interest. He let it be known that anyone who supported the plan in the House of Lords would be reckoned his enemy. The bill was defeated, and the ministers resigned. The King was ready with a new "patriotic" leader, William Pitt, the Younger. This initiative was dangerous. Pitt's government was in a minority in the Commons, and the discarded ministers were in a mood to threaten a constitutional upheaval. Everything depended on the verdict of a general election in March 1784. The country, moved by real feeling as well as by treasury influence, overwhelmingly endorsed the King's action. The King did not go on after his victory to further demonstrations of power. Though many of Pitt's ideas were unwelcome to him, he contented himself with criticism and a few grumbles. Pitt could not survive without the King, and the King, if he lost Pitt, would have been at the mercy of Fox. They compromised, but the compromise left most power, with the King's willing assent, in Pitt's capable young hands.

George loved his children possessively and with that hysterical force that he had always shown in relations with those close to him. He was depressed by the Prince of Wales's coming of age in 1783 as it meant emancipation from the family. The King's ruefulness was soon converted into rage. The Prince associated politically with Fox's Whigs and socially with Fox's gaming friends. In contrast to George III's rather straitlaced court, the Prince's circle was lively and dissolute. As his sons escaped him, one by one, George oscillated between excitement and despair. In the crises of his reign he frequently talked of abdication; but in 1788 it was announced that it was his reason that had fled its throne.

The stresses endured by this hard-working man seemed sufficient to account for his violent breakdown. Twentieth-century medical investigation, however, has suggested that the King had an inherited defect in his metabolism known as porphyria. An excess in purple-red pigments in the blood intoxicated all parts of the nervous system, producing the agonizing pain, excited overactivity, paralysis, and delirium that the King suffered in an acute form at least four times during his reign. The porphyria diagnosis, however, is not universally accepted by medical opinion.

The King's incapacity produced a political storm. But while Pitt and Fox battled over the powers that the Prince of Wales should enjoy as regent, the King suddenly recovered in 1789. He was left with the fear that he might again collapse into the nightmare of madness. For the last decade of the 18th century, he was bothered more about the details than about the main lines of policy. Pitt, whose policies contented him more and more, gradually absorbed in his own following most of North's old following and even some of Fox's. After the outbreak of war with Revolutionary France in 1793, all but the most radical Whigs joined the government, leaving Fox in hopeless, if eloquent, opposition.

The war with France seemed to most of the aristocracy and the upper middle class to be waged for national survival. The old king, an object of compassion in his collapse and obviously a well-meaning man, was soon a symbol of the old English order for which the country was fighting. Although his potential power in

politics was greatly increased, his will to wield it was enfeebled. George enjoyed himself in encouraging farmers to grow more food; or he talked for hours (ending his sentences rhetorically and fussily with the repeated words "what, what, what?") about past conflicts, or military tactics, or even of the shortcomings of Shakespeare; or he played to himself on his harpsichord; or he regulated the lives of his daughters, who found it so much less easy to escape than did his sons. From such quiet occupations he was aroused to activity by Pitt's Irish policy at the turn of the century.

The French war had made the issue of Roman Catholic emancipation urgent. Rebellion in Ireland, in Pitt's view, could not be cured simply by the union of the British and Irish Parliaments. Conciliation, by the political emancipation of the Roman Catholics, was a necessary concomitant of union. George III believed this proposal to be radical ruin and used all his personal prestige to have emancipation defeated. Pitt resigned (1801), and George persuaded Henry Addington (later 1st Viscount Sidmouth) to form a less adventurous Cabinet. The collapse of Addington's administration in 1804, after the short Peace of Amiens (1802–03), brought Pitt back into office (1804–06), but he returned at the cost of giving up his emancipation proposals. The King was decisive in this crisis only because it was an issue upon which he felt most deeply and upon which he instinctively expressed the feelings of the majority of the backbenchers in the House of Commons, though Pitt never pushed the matter to a real trial of strength.

Last years, 1806–20. On the death of Pitt (January 1806), the King accepted Fox as foreign secretary in a coalition "ministry of all the talents" (1806–07). He even came to feel affection for Fox and sincerely to lament his death in 1806. During this short period of Whig administration, the King allowed his ministers to discuss (abortively) peace with Napoleon and to abolish the slave trade; he asserted himself and forced their resignation only when they dared to propose some amelioration of the laws against Roman Catholics. This second break on the Roman Catholic issue came about in circumstances which witnessed to George's declining abilities. Still strong in body, he had become almost blind. He needed the help of a secretary in the task, which he would not reduce, of reading all the official papers. Lord Grenville thought the King had agreed to a paper that proposed the grant of higher rank in the army for papists. The King thought that his ministers were trying to trick him and that Sidmouth alone had explained to him the significance of the paper. He demanded from his ministers a promise not to bring up the subject again, for he feared he might be deceived into betraying his sworn duty to the Church of England. The perfectly proper refusal of ministers to pledge themselves for the future led to their supersession by the Tories, under Lord Portland (1807–09), Spencer Perceval (1809–12), and Lord Liverpool (1812–27), successively.

Much of the remainder of the King's lifetime was a living death. The death of his youngest child and frequent companion, Princess Amelia, in 1810, was a bitter blow; she had, in part, consoled him for his disappointment about his sons. Worse still was the return of the King's illness. In 1811 it was acknowledged that he was violently insane. The doctors continued to hope for recovery, but Parliament enacted the regency of the Prince of Wales (the future George IV) and decreed that the Queen should have the custody of her husband. He remained insane, with intervals of senile lucidity, until his death at Windsor Castle. George III's reign, on its personal side, was the tragedy of a well-intentioned man who was faced with problems too great for him to solve but from which his conscience prevented any attempt at escape. (J.S.W.)

BIBLIOGRAPHY. The best account of George III's character is John Brooke, *King George III* (1972). Romney Sedgwick's introduction to his edition of *The Letters from George III to Lord Bute, 1757–1766* (1939), vividly relates the character to the political situation. Two quite wide surveys are Richard Pares, *King George III and the Politicians* (1953); and J. Steven Watson, *The Reign of George III* (1960). There has been a great deal of scholarly controversy about the nature of politics in the early years of George III's reign, in which the work of Lewis B. Namier has been outstanding. The major works are *The Structure of Politics at the Accession of George III,* 2nd ed. (1957), and *England in the Age of the American Revolution,* 2nd ed. (1961). This approach to the political history of George III's reign has been sharply and pertinently criticized by Herbert Butterfield in *George III and the Historians* (1957). Less interest has been displayed in the latter part of George III's reign, but John Ehrmann, *The Younger Pitt,* 2 vol. (1969), deals very thoroughly with the relations of George III with his most successful prime minister, William Pitt, the Younger. The question of the nature of George III's illness has been raised by Ida Macalpine and Richard Hunter, *George III and the Mad Business* (1969), but their arguments for porphyria as against insanity are not fully accepted by medical opinion.

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• **George IV,** in full GEORGE AUGUSTUS FREDERICK, German GEORG AUGUST FRIEDRICH (b. Aug. 12, 1762, London, Eng.—d. June 26, 1830, Windsor, Berkshire), king of the United Kingdom of Great Britain and Ireland and king of Hanover from Jan. 29, 1820, previously the sovereign de facto from Feb. 5, 1811, when he became regent for his father, George III, who had become insane.

The eldest son of George III and Charlotte Sophia of Mecklenburg-Strelitz, he had become by age 17, as he said, "rather too fond of women and wine." His way of life and his close friendship with Charles James Fox and other loose-living Whig politicians caused his father to regard him with contempt. In 1784 the prince met the only woman whom he ever deeply loved, Maria Fitzherbert, whom he married secretly on Dec. 15, 1785. The marriage, however, was invalid: members of the royal family under the age of 25 were forbidden to marry without the king's consent.

On April 8, 1795, in order to induce Parliament to pay his debts, the prince contracted a loveless marriage with his cousin Caroline, daughter of the Duke of Brunswick and of George III's sister Augusta. A few weeks after the birth of their only child, Princess Charlotte (1796–1817), the couple separated. A few months after George IV's accession in 1820, Caroline, who had been living in Italy since 1814, returned to claim her rights as queen consort. A bill to deprive her of those rights and to dissolve the marriage on the ground of her adultery was introduced into the House of Lords but was never put to a vote in the Commons. The problem was solved by Caroline's death on Aug. 7, 1821.

In November 1810 George III became permanently insane, and shortly afterward the prince became regent under the terms of the Regency Act (1811). In February 1812, when the restrictions of that statute expired, George decided to retain his father's ministers rather than appoint survivors from among his old Whig friends (Fox had died in 1806). His decision benefited the nation, because the 2nd Earl Grey and other leading Whigs were prepared to abandon the war with France and leave Napoleon the master of the European continent. As it was, Great Britain and its allies finally triumphed over Napoleon in 1815. George IV's accession on the death of his father did not add to the powers that he had possessed as regent.

George IV as prince regent, detail of an unfinished portrait by Sir Thomas Lawrence, 1814; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

He insulted and intrigued against the 2nd Earl of Liverpool, prime minister from 1820 to 1827. George Canning, who became foreign secretary in 1822 and prime minister in 1827, won George's approval, partly by cultivating the friendship of Sir William Knighton, the king's physician and keeper of the privy purse, on whose advice George relied excessively. But after 1827 he ceased to have any personal weight with either of the two great parties.

George IV's character was in part redeemed by his linguistic and other intellectual abilities and especially by his astute judgment in the arts; he patronized the architect John Nash, who developed Regent Street (1811–*c.* 1825) and Regent's Park, London; and he sponsored Sir Jeffry Wyatville's restoration of Windsor Castle. George's most famous effort was the exotic Royal Pavilion at Brighton with its Mughal Indian and Chinese decorations, designed by Nash.

BIBLIOGRAPHY. Biographies include Doris Leslie, *The Great Corinthian,* new ed. (1967); Joanna Richardson, *George the Magnificent* (1966); and Christopher Hibbert, *George IV,* 2 vol. (1972–73), all concentrating on George's personality more than his politics.

• **George V,** in full GEORGE FREDERICK ERNEST ALBERT (b. June 3, 1865, London, Eng.—d. Jan. 20, 1936, Sandringham, Norfolk), king of the United Kingdom from 1910 to 1936, the second son of Prince Albert Edward, later King Edward VII.

George V

Camera Press

He served in the navy until the death (1892) of his elder brother, Prince Albert Victor, brought the need for more specialized training as eventual heir to the throne. Created Duke of York (May 1892), he married (July 1893) Princess Mary of Teck, who had been his brother's fiancée. Created Duke of Cornwall and Prince of Wales after his father's accession (1901), he succeeded his father on May 6, 1910, and was crowned on June 22, 1911.

Formidable difficulties faced the new king early in his reign. The constitutional struggle to curb the power of the House of Lords was unresolved, and the Liberal government secured an undertaking from the king that, should the lords not yield, he would create sufficient new peers to overcome the opposition. After the Liberal success in the election of December 1910, the House of Lords relented and passed the Parliament Act (1911), and the king did not have to fulfill his pledge. Respect for King George greatly increased during World War I, and he visited the front in France several times.

After World War I the king was confronted by an outbreak of serious industrial unrest. He was also faced with a difficult decision on the resignation of Andrew Bonar Law in 1923, when he had to find a new prime minister. Both Lord Curzon and Stanley Baldwin had supporters among the elder statesmen whom George consulted, but, believing Baldwin had more support in the Conservative Party and that the prime minister should be in the House of Commons, the king selected him.

King George was seriously ill at the end of 1928, and for the rest of his reign he had to be extremely careful of his health. In 1931 the collapse of the pound and the consequent financial crisis split the Labour administration. To secure strong government, he persuaded Ramsay MacDonald and a part of his Cabinet to remain in office and join with Conservative and Liberal ministers in the formation of a national coalition government. The celebration of George's silver jubilee (May 1935) enabled the public to express its affection and admiration for him.

King George had five sons—King Edward VIII (later Duke of Windsor); King George VI; Henry, Duke of Gloucester; George, Duke of Kent; and Prince John, who died young—and one daughter, Mary, princess royal, who married the 6th Earl of Harewood.

BIBLIOGRAPHY. Kenneth Rose, *King George V* (1983), studies both the monarch and the man.

• **George VI,** also called (1920–36) PRINCE ALBERT, DUKE OF YORK, in full ALBERT FREDERICK ARTHUR GEORGE (b. Dec. 14, 1895, Sandringham, Norfolk, Eng.—d. Feb. 6, 1952, Sandringham), king of the United Kingdom from Dec. 11, 1936.

The second son of the future king George V, the prince served in the Royal Navy (1913–17), the Royal Naval Air Service (1917–19), and the Royal Air Force (1919) and then attended Trinity College, Cambridge (1919–20). On June 3, 1920, he was created Duke of York. He sponsored the annual Duke of York's Camp (1921–39), at which equal numbers of public (private) school boys and boys from industrial areas spent a week together as his guests. On April 26, 1923, he was married to Lady Elizabeth Angela Marguerite Bowes-Lyon, youngest daughter of the 14th Earl of Strathmore and Kinghorne. They had two children: Princess Elizabeth (afterward Queen Elizabeth II) and Princess Margaret (afterward Countess of Snowdon).

The Duke of York was officially proclaimed king on Dec. 12, 1936, following the abdication of his brother Edward VIII. He took the name of George VI and was crowned on May 12, 1937. Before the outbreak of World War II, the king affirmed Anglo-French solidarity and formed a close friendship with U.S. President Franklin D. Roosevelt, but he supported Prime Minister Neville Chamberlain's "appeasement" policy toward Germany and Italy. In May 1940, when the House of Commons forced Chamberlain to resign, the king wished to appoint Edward Halifax (later 1st Earl of Halifax) to the premiership but was induced to select Winston Churchill, whose wartime leadership he then supported unreservedly. During the war he visited his armies on several battle fronts.

Although King George had ceased to be emperor of India when India and Pakistan became separate independent countries, he was formally recognized, on April 27, 1949, as

George VI
Keystone

head of the Commonwealth of Nations by the governments of its member states. From 1948 on, the king's health deteriorated, and he died a few months after undergoing an operation for lung cancer.

Although he was an important symbolic leader of the British people during World War II, his reign was perhaps most important for the accelerating evolution of the British Empire into the Commonwealth of Nations and the postwar transformation of Great Britain into a welfare state. He earned respect by scrupulously observing the responsibilities and limitations of a constitutional monarch and by overcoming the handicap of a severe stammer.

BIBLIOGRAPHY. Denis Judd, *King George VI, 1895–1952* (1982); and Patrick Howarth, *George VI* (1987), study his private life and political influence.

GREECE

• **George I,** original name PRINCE WILLIAM OF DENMARK, Danish PRINS VILHELM AF DANMARK (b. Dec. 24, 1845, Copenhagen, Den.—d. March 18, 1913, Salonika, Greece), king of Greece, whose long reign (1863–1913) was the formative period for the development of Greece as a modern European state. His descendants occupied the throne until the military coup d'état of 1967 and eventual restoration of the republic in 1973.

Born Prince William, the second son of King Christian IX of Denmark and the brother of Queen Alexandra of England, he was nominated to the Greek throne by Britain, France, and Russia after the first Greek king, Otto, was deposed in 1862. The National Assembly accepted William as king of the Hellenes in March 1863, and he ascended the throne as George (Georgios) I on October 31. Although the early years of his reign were dominated by his harsh and unpopular adviser Count Sponneck, who was obliged to return to Denmark in 1877, he refrained from transgressing the prerogatives of the National Assembly and became one of the most successful constitutional monarchs in Europe.

• **George II** (b. July 20, 1890, Tatoi, near Athens, Greece—d. April 1, 1947, Athens), king of Greece from September 1922 to March 1924 and from October 1935 until his death. His second reign was marked by the ascendancy of the military dictator Ioannis Metaxas.

The eldest son of King Constantine I, George was excluded from the succession during World War I for his allegedly pro-German sympathies, but he came to the throne when his father was deposed by General Nikólaos Plastíras in September 1922. Feeling ran high against the royal family, however, and, after a royalist coup d'état had been suppressed in October 1923, George felt compelled to leave Greece on December 19 with his queen, Elizabeth. In March 1924 the Greek National Assembly voted the end of the monarchy and proclaimed Greece a republic. The king remained in exile until the conservative Populist Party, with the support of the army, gained control of the Assembly and declared the restoration of the monarchy in October 1935; a plebiscite, which was most probably manipulated by the prime minister, General Geórgios Kondílis, was held in November in an effort to demonstrate that the great majority of the people favoured his return.

In 1936 General Ioannis Metaxas seized power after asserting that the nation was on the verge of being taken over by the communists. The king's support of Metaxas put the throne in a controversial position, particularly after Metaxas banned political parties, dissolved Parliament, suspended constitutional rights, and even decreed the censorship of Pericles' great funeral oration to the Athenians as recorded by Thucydides. The king was forced into exile after the German invasion

George II
Dimitri Papadimos, Athens

of Greece in April 1941, going first to Crete, then to Alexandria, and finally to London. After the war republican sentiments again threatened his throne, but he was restored by a plebiscite supervised by the Allies and returned to Greece in September 1946. Upon his death, he was succeeded by his brother Paul.

HANOVER

• **George I–IV:** *see* George I–IV (Great Britain/United Kingdom).

• **George V** (b. May 27, 1819, Berlin—d. June 12, 1878, Paris), last king of Hanover (1851–66), only son of Ernest Augustus, king of Hanover and Duke of Cumberland.

His youth was passed in England and in Berlin until 1837, when his father became king of Hanover. He lost sight in one eye during a childhood illness and in the other by an accident in 1833. Blindness debarred him from a knowledge of the world; he formed a fantastic conception of the dignity of the house of Welf and had ideas of founding a great Welf state in Europe. From his accession in November 1851 he was constantly disputing with the diet, contrary to whose wishes he refused Prussia's demand for the unarmed neutrality of Hanover during the Austro-Prussian War of 1866. This led to an immediate Prussian invasion, the surrender of George's army on June 29, 1866, and Prussia's formal annexation of Hanover in September. The king subsequently lived in Austria or in France. He died in Paris and was buried in St. George's Chapel, Windsor. His son, Ernest Augustus, Duke of Cumberland (1845–1943),

continued to maintain the claim of his house to the kingdom of Hanover.

SAXE-MEININGEN

• **George II** (b. April 2, 1826, Meiningen, Saxe-Meiningen—d. June 25, 1914, Bad Wildungen, Waldeck), duke (Herzog) of Saxe-Meiningen, theatrical director and designer who developed many of the fundamental principles of modern acting and stage design.

George II, 1900
Archiv fur Kunst und Geschichte, West Berlin

A wealthy aristocrat and head of a small German principality, Meiningen early studied art and in 1870 established his own court theatre group, which he served as producer, director, financial backer, and costume and scenery designer. Influenced by the contemporary English theatre, he insisted on realistic lighting, speech, and stage mechanics and historically accurate costumes and sets. He also replaced virtuoso solo performances on a flat stage with ensemble acting on a multilevel stage that greatly facilitated the handling of crowd scenes. When the group was disbanded in 1890, it had toured 36 European cities. The Meiningen troupe's methods had their effect upon the younger generation of European stage directors, particularly André Antoine, who founded the first theatre of naturalism (Théâtre-Libre, Paris, 1887), and Konstantin Stanislavsky, an influential proponent of realism in the Russian theatre.

George, town, Cape Province, South Africa, distantly east of Cape Town, immediately inland from the Indian Ocean. It was founded in 1811 as the first British settlement in the Cape Colony and named after King George III, as was George Peak nearby. Hops, not otherwise grown in South Africa, are cultivated in the area. Boats, shoes, and furniture are manufactured in the town. George serves as an educational and service centre for the surrounding rural area. It has a mild and equable climate and is a place of retirement for whites. The majority of the population are Coloureds (people of mixed race). Pop. (1978 est.) mun., 45,190.

George, BROTHER, also called FRIAR GEORGE: *see* Martinuzzi, György.

George, SAINT (fl. probably 3rd century; d. probably Diospolis, Palestine; feast day April 23), Christian martyr who became the patron saint of England. Though nothing of his life or deeds can be established, George's legends, dating from the 6th century, became popular and increasingly extravagant, as in Jacob de Voragine's *Legenda aurea* (1265–66; *Golden Legend,* 1483), which tells of his rescuing a maiden from a dragon—a theme much represented in art.

He has been revered in England at least since the 8th century, and no doubt returning crusaders popularized his cult (he was said to have been seen helping the Franks at the Battle of Antioch in 1098). He was probably not recognized as England's patron saint until King Edward III (ruled 1327–77) made him the patron of the newly founded Order of the Garter. Pope Benedict XIV made him protector of the kingdom. In 1969 his cult was reduced to a local one.

George OF CAPPADOCIA (b. Lydda?, Palestine—d. Dec. 24, 361, Alexandria, Egypt), opponent of and controversial successor (357) to Bishop Athanasius the Great of Alexandria, whom the Roman emperor Constantius II had exiled for attacking Arianism (*q.v.*). As an extreme Arian, George was detestable both to the orthodox and to the Semi-Arians (*see* Semi-Arianism). A violent and avaricious man, he insulted, persecuted, and plundered orthodox and pagan alike. The death on Nov. 3, 361, of his protector, Constantius, made him vulnerable to insurrection, and he was murdered by an Alexandrian mob.

George OF CYPRUS (Greek Orthodox leader): *see* Gregory II Cyprius.

George OF LAODICEA (b. Alexandria, Egypt—d. *c.* 361, Laodicea, Syria), bishop of Laodicea who was one of the principal champions of the Homoiousian theology (*see* Arianism). George was ordained in Alexandria by Bishop Alexander but was excommunicated on charges of immorality and for advocating Arianism. He failed to reconcile Arius with Alexander. Appointed bishop of Laodicea (*c.* 335), he attended numerous synods in the following decades, and, as an advocate of the Homoiousian theology, he opposed the orthodox bishop Athanasius the Great of Alexandria. He protected Bishop Eusebius of Emesa during his exile for being a Semi-Arian (*see* Semi-Arianism) and wrote a biography of him, of which fragments are extant. A defense of the doctrine, which he composed in conjunction with Bishop Basil of Ancyra (now Ankara, Tur.), and others, was preserved by Bishop St. Epiphanius of Salamis, Cyprus.

George OF PODEBRADY: *see* George *under* George (Bohemia).

George OF TREBIZOND (b. 1396, Candia, Crete—d. 1486, Rome), Byzantine Humanist, Greek scholar, and Aristotelian polemist. His academic influence in Italy and within the papacy, his theories on grammar and literary criticism, and his Latin translations from the Greek of Aristotle, Plato, and the 2nd-century-AD astronomer Ptolemy, although at times strongly criticized, contributed substantially to the cultural and literary enrichment of Italian Humanism and the Renaissance.

Named for his family's origin in Trebizond, on the Black Sea, George went to Italy as a youth and soon distinguished himself as a scholar, becoming professor of Greek at Vicenza in 1420 and at Venice in 1433, eventually succeeding to the literary primacy of the Humanist scholar Francesco Filelfo (1398–1481). Hearing of his reputation, Pope Eugenius IV (1431–47) invited him to Rome as his private secretary and to join the faculty of philosophy at the Sapienza academy. Functioning also as a theological consultant at the general Council of Ferrara–Florence (1438–45) that achieved a temporary union between the Greek and Latin churches, George later contributed writings critical of Eastern Orthodoxy. In the course of his criticism of the classical Latin rhetorician Quintilian (1st century AD), George incurred the wrath of the Roman Humanist Lorenzo Valla; harsh contention intensified over his hurried translations of Aristotle's *Rhetoric* and *The History of Animals,* Plato's *Laws,* Ptolemy's *Almagest,* or collected works on astronomy, and various tracts from the Greek Church Fathers, resulting in errors and linguistic deformities. Such lapses in scholarship cost him the patronage of Pope Nicholas V (1447–55) and forced him to leave Rome in 1453. On his final return in 1466, the ferocity of criticism mounted as the Platonists Gemistus Plethon and Cardinal Bessarion attacked George's assertions of the superiority of Aristotle's Realism over Plato's Idealist theory of Knowledge. Significant success, however, was achieved when George published, in 1471, a radically revised Latin grammar in which he abandoned the medieval method for the purer form of the 6th-century Latinist Priscian. An earlier work on rhetoric based largely on Aristotelian and later Greek principles attained lasting recognition, even from his critics, who admitted to the erudition and brilliance of his vast literary production.

George THE MONK, also called GEORGE THE SINNER, Greek GEORGIOS HAMARTOLOS (fl. 9th century), Byzantine historian, author of a world chronicle that constitutes the prime documentary source for mid-9th-century Byzantine history, particularly the Iconoclast (Greek: image destroyer) movement.

George's chronicle, with a theological naiveté characteristic of the age, records events from the creation to the reign of the emperor Michael III (842–867). Incorporating texts from earlier Byzantine historians, he integrated data of his own experience from 813 to 842 through an original monastic and theological perspective. Strongly opposed to Iconoclasm, George recounted in detail and with satisfaction the resolution of the controversy in favour of the orthodox use of religious images following the reign of the emperor Theophilus (829–842).

The chronicle, comprising also data on the growing Islāmic–Christian conflict, enjoyed widespread diffusion among the neighbouring Slavic peoples throughout the medieval period. Accordingly, its influence on Byzantine chronography, prompting a multiplicity of versions and translations, renders the reconstruction of the primitive text most difficult. George's chronicle assumes increased value in that many of the sources it excerpted are now lost to history. Some versions contain a "continuation" to the year 948 written by an anonymous author more politically oriented than George.

To make the best use of the Britannica, consult the INDEX *first*

George THE PISIDIAN, Greek GEORGIOS PISIDES (fl. early 7th century), Byzantine epic poet, historian, and cleric whose classically structured verse lyricizing the military, philosophical, and religious themes of his day was acclaimed as a model for medieval Greek poetry, but whose arid, bombastic tone manifested Hellenism's cultural decline.

A deacon and archivist of Constantinople's cathedral Hagia Sophia, George chronicled imperial events and the deeds of his ruler, the emperor Heraclius (610–641), whom he accompanied on his successful campaigns against the threatening Persian and Caucasian tribes. He thus eulogized the Byzantine resurgence in "The Expedition of Heraclius Against the Persians" (622) and "The Heracliad" (627), an ode commemorating the victory over the Parthians and the recovery of the "Holy Cross" that they had seized earlier in Jerusalem.

George's major work, the *Hexaëmeron* (Greek: "Of Six Days"), a rhapsody on the beauty of creation and the Creator's wisdom, was popularized through translations into Armenian and Slavic languages. Other writings included the moralistic elegy "De vanitate vitae" ("On the Vanity of Life"), in the manner of the Old Testament book of Ecclesiastes; a "Hymn to the Resurrection," celebrating Christ's triumph over life and death; and, to support Heraclius' religious politics, a metrical polemic, "Against Wicked Severus," attacking the patriarch of Antioch and leader of the independent Syrian Monophysite Church.

With his impeccable style and fluidity of expression, George was compared to the 5th-century-BC Greek tragedian Euripides. Although he enjoyed the reputation of being perhaps the outstanding Byzantine poet of the iambic form, his obvious imitation of classical Greek authors and his pretentious imagery evoked negative reactions from later critics.

George THE SYNCELLUS (fl. late 8th century—d. after 810), Byzantine historian and author of a world chronicle of events from the creation to the reign of the Roman emperor Diocletian (reigned 284–305). Together with the parallel work by Eusebius of Caesarea, George's work constitutes the prime instrument for interpreting Christian chronography concerning the primitive church.

Having first lived in the Holy Land of Palestine, George became private secretary to Tarasius, patriarch of Constantinople (reigned 784–806), thus acquiring the title Syncellus (Greek: Cellmate), an official Byzantine position of cleric confidant to a high ecclesiastic. After the death of Tarasius, George retired to a monastery and composed his "Chronicle," which treats extensively of Christ's birth and the New Testament period but gives scant attention to the post-apostolic age. Following George's death, his "Chronicle" was extended by Theophanes the Confessor to his own time (813); subsequent contributors carried it to the year 961.

George, Henry (b. Sept. 2, 1839, Philadelphia—d. Oct. 29, 1897, New York City), land reformer and economist who in *Progress and Poverty* (1879) proposed the single tax: that the state tax away all economic rent—the income from the use of the bare land, but not from improvements—and abolish all other taxes.

Leaving school before his 14th birthday, George worked for two years as a clerk in an importing house and then went to sea. Back in Philadelphia in 1856, he learned typesetting and in 1857 signed up as a steward on another ship, quitting it in San Francisco to join the gold rush in Canada, where, however, he arrived too late. In 1858 he returned to California, where he worked for newspapers and took part in Democratic Party politics until 1880. In 1871 he and two partners started the *San Francisco Daily Evening Post*, but credit difficulties forced them to close it in 1875. A political appointment as state gas-meter inspector enabled him to work on *Progress and Poverty*.

George's book caught the spirit of discontent that had arisen from the great depression of 1873–78. It had an enormous sale and was translated into many languages. Its vogue was enhanced by George's pamphlets, his frequent contributions to magazines, and his lecture tours in both the United States and the British Isles.

As a basis for his argument, George gave new meaning to the orthodox, or "Ricardian," doctrine of rent. He applied the law of diminishing returns and the concept of "margin of productivity" to land alone. He argued that since economic progress entailed a growing scarcity of land, the idle landowner reaped ever greater returns at the expense of the productive factors of labour and capital. This unearned economic rent, he held, should be taxed away by the state. George envisaged that the government's annual income from this "single tax" would be so large that there would be a surplus for expansion of public works. His economic argument was reinforced and dominated by humanitarian and religious appeal.

George's specific remedy had no significant practical result, and few economists of reputation supported it. Nevertheless, his forceful emphasis on "privilege," his demand for equality of opportunity, and his systematic economic analysis proved a stimulus to orderly reform.

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George, Lake, freshwater lake, southeastern New South Wales, Australia, located about 25 mi (40 km) northeast of Canberra, just east of the Lake George Range, a low ridge in the Great Dividing Range. Occupying a structural trough formed by faulting during the middle Miocene Epoch (about 16,000,000 years ago) or a little earlier, the lake drains a 380-sq-mi (984-sq-km) basin between the headstreams of the Yass and Shoalhaven rivers, although it has no external drainage itself. The lake, substantially larger during late Pleistocene times (about 10,000 years ago), maintains a particularly delicate balance among rainfall, evaporation, and streamflow, displaying wide fluctuations in surface elevation (about 2,208 ft [673 m]) and surface area (mean area about 31 sq mi). When full, the lake has a length of about 16 mi, a width of about 6 mi, and a depth of 20 to 26 ft. However, in some years (*e.g.*, 1838–39, 1846–50, 1930–34, 1936–47, and 1982), the lake is dry and its alluvial floor becomes rich pastureland. The Aboriginal name of the lake is Werriwa. The lake was first visited by a European, Joseph Wild, in 1820 and named for George IV.

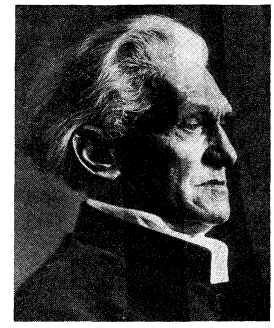
George, Lake, lake in northeastern New York, U.S.; it is 32 mi (51 km) long, 1 to 4 mi wide and extends northward from Lake George village to Ticonderoga, where it is connected to Lake Champlain through a narrow channel which descends 220 ft (67 m) in a series of cataracts and waterfalls. Located in the foothills of the Adirondacks at an elevation of 317 ft above sea level and surrounded by low mountains, including Mts. Prospect (1,705 ft) and Black (2,665 ft), the lake is of glacial origin, has a maximum depth of about 200 ft, and is fed by mountain streams and submerged springs. Dotted with islands, it is noted for its scenic beauty and is a popular resort area.

It was known to the Indians as Andiatarocte (meaning "place where the lake contracts"). The first Europeans to see the lake were probably Father Isaac Jogues, a French Jesuit missionary, and his companions, René Goupil and Guillaume Conture, who were being taken by their Indian captors to the town of the Mohawks in 1642. Father Jogues returned to the lake in 1646 and christened it Lac du Saint-Sacrement. In 1755 Gen. Sir William Johnson renamed it for King George II. James Fenimore Cooper refers to it in his novels as Lake Horicon.

Strategically located at the head of the valley extending northward to the St. Lawrence, the lake was the scene of numerous battles during the French and Indian War and the American Revolution. The Battle of Lake George (commemorated by a monument and state park) took place just south of the lake on Sept. 8, 1755, when Gen. William Johnson defeated a force of French Canadians and Indians led by Baron Ludwig August Dieskau. Following the battle, Johnson built Ft. William Henry (now restored), which was replaced (1759) by Ft. George (ruins remain). During the American Revolution, the Green Mountain Boys under Ethan Allen captured Ft. Ticonderoga at the falls on the lake's outlet (*see* Ticonderoga).

George, Stefan (b. July 12, 1868, Büdesheim, near Bingen, Hesse—d. Dec. 4, 1933, Minusio, near Locarno, Switz.), lyric poet chiefly responsible for the revival of German poetry at the close of the 19th century.

He studied philosophy and the history of art in Paris, Munich and Berlin and travelled widely, becoming associated with Mallarmé and the Symbolists in Paris and with the Pre-Raphaelites in London. Returning to Germany, where he divided his time between Berlin, Munich, and Heidelberg, he founded a literary school of his own, the George-Kreis, held together by the force of his authoritarian personality. Many well-known writers belonged to it or contributed to its journal, *Blätter für die Kunst*, published from 1892 to 1919. The chief aim of the journal was to revitalize the German literary language, felt to be in decline.



Stefan George, *c.* 1925–30
By courtesy of the Stadtarchiv, Munich

George aimed to impose a new classicism on German poetry, avoiding impure rhymes and metrical irregularities. Vowels and consonants were arranged with precision to achieve harmony. The resulting symbolic poem was intended to evoke a sense of intoxication. These poetic ideals were a protest not only against the debasement of the language but also against materialism and naturalism, to which George opposed an austerity of life and a standard of poetic excellence, preaching a humanism inspired by Greece, which he hoped would be realized in a new society. His ideas, and the affectations into which they led some of his disciples, his claim of superiority, and his obsession with power were ridiculed, attacked, and misused by those who misunderstood them. But George himself was strongly opposed to the political developments—above all, the rise of Nazism—which his ideas are sometimes thought to reflect. When the Nazi government offered him money and honours, he refused them and went into exile.

George's collected works fill 18 volumes (*Gesamtausgabe*, 1927–34), including five of translations and one of prose sketches. His collections of poetry, of which *Hymnen* (1890), *Pilgerfahrten* (1891), *Algabal* (1892), *Das Jahr der Seele* (1897), *Der Teppich des Lebens* (1899), *Der siebente Ring* (1907), *Der Stern des Bundes* (1914), and *Das neue Reich* (1928) are the most important, show his poetic and spiritual development from early doubts and searching self-examination to confidence in his role as a seer and as leader of the new society he projected.

Personally, and spiritually, he found the fulfillment of his striving for significance in "Maximin" (Maximilian Kronberger; 1888–1904), a beautiful and gifted youth whom he met in Munich in 1902. After the boy's death George claimed that he had been a god, glorifying him in his later poetry and explaining his attitude to him in *Maximin, ein Gedenkbuch* (privately published, 1906).

George Cross, a British civilian and military decoration, instituted in 1940 by King George VI for "acts of the greatest heroism or of the most conspicuous courage in circumstances of extreme danger." The award, which can be conferred posthumously, is usually given to civilians, although it can be bestowed on military personnel for acts for which military decorations are not usually awarded. The George Cross superseded the Medal of the Order of the British Empire for Gallantry (commonly known as the Empire Gallantry Medal).

The island of Malta received the George Cross in recognition of its inhabitants' gallantry in World War II. Recipients of this award may add G.C. after their names; the cross ranks second only to the Victoria Cross (*q.v.*; the highest British military decoration). The cross is silver, with one side depicting St. George slaying the dragon, with the inscription "For Gallantry;" the other side gives the recipient's name and the date of the award.

The George Medal, instituted at the same time as the George Cross, is analogous to it but is awarded for services not quite so outstanding as those which merit the George Cross. Recipients of this medal can add G.M. after their names. The medal is silver; one side has the effigy of the reigning British monarch, and the other side has St. George and the dragon with the inscription "The George Medal."

George River, French RIVIÈRE GEORGE, river in Nouveau-Québec (New Quebec) region, northeastern Quebec province, Canada. It rises near the Labrador (Newfoundland) border, flows northward parallel to the boundary for 350 miles (563 km), and empties into the eastern side of Ungava Bay. Named after King George III by Moravian missionaries in 1811, the river flows mostly through a treeless tundra in a course broken by numerous falls and rapids. At its mouth is Kangiqsualujjuaq, established in 1838 as a Hudson's Bay Company trading post.

George Town, also spelled GEORGETOWN, leading port of Malaysia, situated on a triangular promontory in the northeastern sector of the island of Penang (Pinang). Its sheltered harbour is separated from the west-coast Malayan mainland by a 3-mile (5-kilometre) channel through which international shipping approaches from the north to avoid the many shallows of the southern route.

The town was founded as Fort Cornwallis in 1786 by Captain Francis Light of the British East India Company and flourished as a port of call for shipping on the India–China run and became for a time the capital and commercial centre of the Straits Settlements. A restored Fort Cornwallis, St. George's Church (1817), and the Esplanade recall the town's colonial past. As a thriving entrepôt, George Town attracted Chinese (mainly Hokkien and Cantonese) and Indian traders. Although Chinese and European culture predominates, there is a sizable Malay minority.

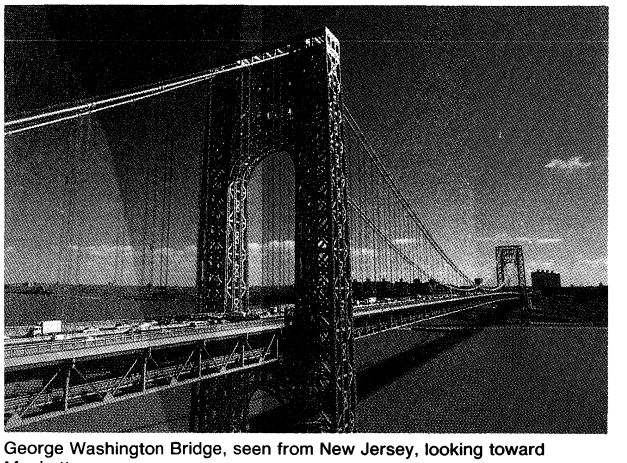
Industries in the southern suburbs include tin smelting, rice and coconut-oil milling, and the manufacture of soap and rattan and bamboo articles. Industrial estates at Bayan Lepas are the site of electronics assembly plants. Most of the mainland exports are ferried or brought by lighter from the smaller ports of Butterworth and Perai. By the late 20th century, the bulk of the Malay Peninsula's cargo, previously channeled through the east-coast ports, moved through George Town. Major exports include tin, rubber, and copra. The Science University of Malaysia is at Minden Barracks on the outskirts. Also on the outskirts is George Town's most spectacular temple, the Kek Lok Si Temple, or, as it sometimes called, the Million Buddhas Precious Pagoda, a complex of structures on three levels with thousands of gilded Buddhas. Pop. (1980) 248,241.

George Washington Birthplace National Monument, U.S. national monument consisting of 538 acres (218 hectares) of plantation land in Westmoreland county, eastern Virginia, U.S., on the Potomac River 38 miles (61 km) east-southeast of Fredericksburg. John Washington, great-great-grandfather of George, was the first family member to settle in the area, in about 1656. In 1731 Augustine, John's grandson, married his second wife, Mary Ball, and settled at Popes Creek, where his son George was born Feb. 22 (Feb. 11, Old Style), 1732. "Wakefield," the house where George spent the first three years of his life, was built (1722–26) by Augustine but destroyed by fire (1779) after the family had moved to Mount Vernon (*q.v.*) in 1735. The present Memorial Mansion, reconstructed (1931–32) near a stone marker set by the Washington family in 1815, represents a typical 18th-century Virginia plantation dwelling with a period garden. The nearby Colonial Living Farm also depicts the environment of Washington's infant years. Foundations of what is believed to be the birthplace house and other buildings have been unearthed.

The monument was established in 1930 through the efforts of the Wakefield National Memorial Association (organized in 1923 to recover the birthplace grounds) aided by John D. Rockefeller, Jr.

George Washington Bridge, vehicular suspension bridge crossing the Hudson River, U.S., between The Palisades park near Fort Lee, N.J., and Manhattan island, New York City (between 178th and 179th streets). The original structure was built (1927–31) by the Swiss-born engineer Othmar H. Ammann according to the modified designs of architect Cass Gilbert. It was constructed to carry eight lanes of traffic. A lower deck with six more traffic lanes was added in 1958–62, along with a modernistic bus terminal on the Manhattan side (the work of engineer-architect Pier Luigi Nervi).

When first built, the main span of 3,500 feet (1,067 m) doubled the record for suspension bridges. Overall, the bridge now extends 4,760 feet (1,450 m) between anchorages, with the decks 115 feet (35 m) and 212 feet (65 m) above mean high water and the lattice-steel towers rising 604 feet (184 m) high above the water. On the New York side the tower stands on land; on the New Jersey side the tower rises out of the river 76 feet (23 m) from shore. The bridge was built and is operated by the Port of New York Authority.



George Washington Bridge, seen from New Jersey, looking toward Manhattan

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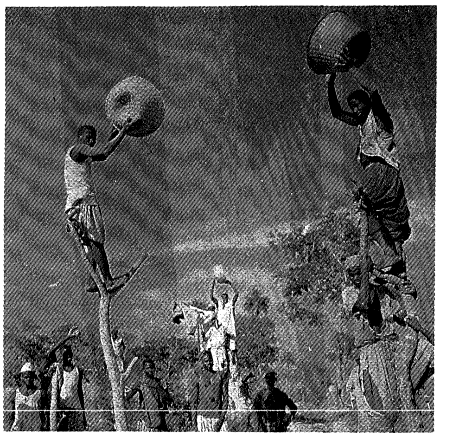
George William, German GEORG WILHELM (b. Nov. 13, 1595, Kölln an der Spree, Brandenburg [now in Berlin]—d. Dec. 1, 1640, Königsberg, Prussia [now Kaliningrad, Russian S.F.S.R.]), elector of Brandenburg (from 1619) through much of the Thirty Years' War.

Though a Calvinist, he was persuaded by his Roman Catholic adviser Adam von Schwarzenberg to stay out of the struggle between the Holy Roman emperor and the German Protestant princes. His neutrality earned him the hostility of both sides. In 1631 Gustavus II Adolphus of Sweden occupied Brandenburg, forcing the elector to join the Protestant faction, but, after the Swedish defeat by an imperial army at Nördlingen (1634), George William withdrew from the conflict.

Georgetown, town, port on MacCarthy Island in the Gambia River, central Gambia. It was founded in 1823 by Captain Alexander Grant as a settlement for freed slaves. Georgetown's Wesleyan Mission (1823) introduced the peanut (groundnut), a crop still exported downstream on vessels of up to 13-foot (4-metre) draft. A collecting centre for swamp rice and peanuts among the Muslim Malinke (Mandingo), Fulani (Fula), and Wolof peoples, Georgetown is also the site of the Armitage School, the oldest secondary school in the interior. Pop. (1983 prelim.) 3,001.

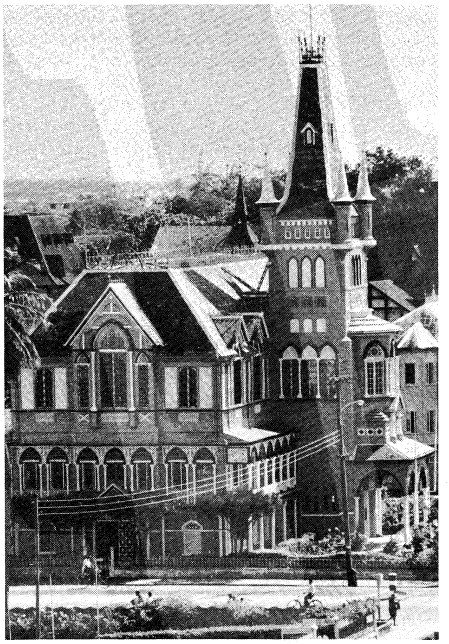


Sifting peanuts in baskets at Georgetown, The Gambia

Photo Research International

Georgetown, capital city of Guyana. The nation's chief port, Georgetown lies on the Atlantic Ocean at the mouth of the Demerara River. Although the settlement was founded by the British in 1781 and named after George III, it had been largely rebuilt by the French by 1784. Known during the Dutch occupation as Stabroek, it was established as the seat of government of the combined colonies of Essequibo and Demerara in 1784. When the British regained control in 1812, the name was changed back to Georgetown.

Many houses and public buildings in the city are constructed of wood, the former generally raised on brick pillars 4–10 feet (1–3 m) from the ground. As a consequence of great fires in 1945 and 1951, however, most buildings in the business sections were reconstructed of reinforced concrete. The public buildings in the centre of the city include the government offices, town hall, and cathedrals. The University of Guyana (1963) is in the suburb of Turkeyen. The city also has an extensive



City Hall, Georgetown, Guyana
EB Inc.

botanical garden, a zoo, a seaside promenade, and many outdoor recreational facilities.

Georgetown is the chief commercial and manufacturing centre of Guyana. It exports sugar, rice, and tropical fruits, as well as timber, balata, bauxite, gold, and diamonds from the Guyanan hinterland. Large sugar refineries are located in the city. Guyana's highway network is poor, although roads do lead along the coast and inland from Georgetown for a short distance. The city is served by various international steamship lines and airlines. Pop. (1985 est.) 200,000.

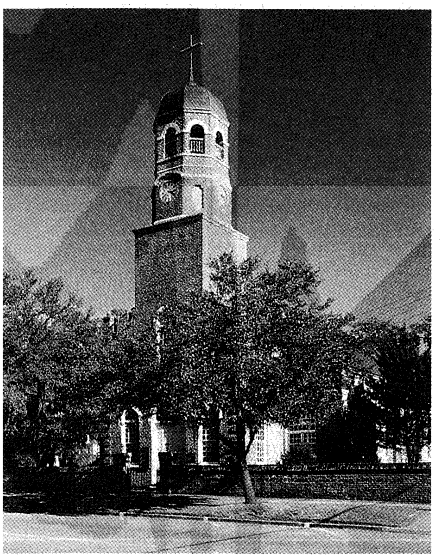
Georgetown, seat (1867) of Clear Creek county, north-central Colorado, U.S. It lies along the South Fork of Clear Creek, in the Front Range of the Rocky Mountains at an elevation of 8,540 feet (2,603 m), 40 miles (64 km) west of Denver. A historic mining town, it originated in 1864 when the Belmont (silver) Lode was discovered nearby, and by the time the Colorado Central Railroad arrived in 1877 it was producing vast amounts of silver. It was incorporated in 1885 and named for George Griffith, a local official. By the 1890s silver mining had declined and so had the town.

Unlike other Colorado mining towns, Georgetown escaped any major fire, and many original buildings have survived, notably Hamill House (1867) and the Hotel de Paris (1875). The latter was built and operated by an eccentric Frenchman, Louis du Puy, whose outlook and epicurean tastes were extreme; it was during its heyday one of the most elegant hostelries west of the Mississippi and is now owned by the Colonial Dames of America. Georgetown remains a tourist base for drives to surrounding ghost towns. The Georgetown Loop historic Mining Area is 2 miles (3 km) west, and the Loveland Basin and Valley Ski areas are nearby. The Eisenhower Memorial (road) Tunnel, penetrating 1.7 miles (2.7 km) through the Continental Divide, is a few miles west. Pop. (1984 est.) 851.

Georgetown, section of the city of Washington, D.C., U.S., at the confluence of the Potomac River and Rock Creek, about 2.5 miles (4 km) northwest of the national Capitol. Georgetown was settled late in the 17th century. It was laid out as a town in 1751, under the name of George. With construction of the Potomac Canal and the town's incorporation as the city of George Town in 1789, it became a bustling trade centre. In 1871 it was merged into the District of Columbia, and in 1878 it was annexed to the city of Washington. Georgetown in largely residential, and its streets are old-fashioned, well-shaded, and narrow. In the "Heights" section are Georgetown University (1789) and many fine homes with beautiful gardens. Legislation was passed by the U.S. Congress in 1950 to preserve the character of the section, to be known as Old Georgetown, which was later designated a national historic district.

Georgetown, city, port of entry, seat of Georgetown county, eastern South Carolina, U.S. It lies near the Atlantic Coast where the Pee Dee, Waccamaw, Black, and Sampit rivers enter Winyah Bay. An early Spanish settlement there (1526) was abandoned because of "fever." The first English settlement on the site made in about 1700, and the community, formally established in 1734, was named for George II.

As a shipping point for rice, indigo, lumber, and naval supplies, Georgetown influenced the development of coastal South Carolina and has many historic landmarks. The Marquis de Lafayette first landed on American soil (June 13, 1777) at nearby North Island. Occupied by the British during the American Revolution, the town was attacked several times by the American soldier Francis Marion, the "Swamp Fox." Colonial structures include Prince George Winyah Church and the Masonic Lodge. Georgetown's harbour, on the Intracoastal Waterway, has been developed as a deepwater port. Paper is the most important manufacture, and tourism (yachting, fishing) is an economic asset. Nearby is Hopsewee Plantation (*c.* 1740), a restored rice plantation. Also near Georgetown are the Brookgreen Gardens, with more than 380 pieces of sculpture mounted in the gardens of a former rice and indigo plantation that is also a game sanctuary. Horry Georgetown Technical Education Center is in Georgetown. Inc. town, 1805; city, 1892. Pop. (1984 est.) 10,862.



Prince George Winyah Church, Georgetown, S.C.
Milt and Joan Mann from CameraMann

Georgia, officially GEORGIAN SOVIET SOCIALIST REPUBLIC, Russian GRUZIYA, or GRUZINSKAYA SOVETSKAYA SOTSIALISTICHESKAYA RESPUBLIKA, Akademiya Nauk romanization GRUZIJA, or GRUZINSKAJA SOVETSKAJA SOCIALISTIČESKAJA RESPUBLIKA, Georgian SAKARTVELO, one of the 15 constituent union republics of the Soviet Union. It lies in the Caucasus Mountains on the southeastern shores of the Black Sea.

A brief treatment of Georgia follows. For full treatment, *see* MACROPAEDIA: Union of Soviet Socialist Republics.

Georgia is one of the smallest and southernmost of the constituent republics. It is bounded to the north by the Russian S.F.S.R. and to the south by Turkey, and the Azerbaijan S.S.R. and Armenian S.S.R. lie to the south and southeast. The capital is Tbilisi. Within Georgia are the Abkhaz and Adzhar autonomous soviet socialist republics.

Most of Georgia is mountainous; many peaks in the Caucasus Mountains are higher than 15,000 feet (4,600 m). It is the Caucasian mountain barrier that protects Georgia against cold air from the north, allowing the Black Sea to warm the region. Western Georgia has a humid, subtropical maritime climate, while in the east climates range from moderately humid to dry subtropical.

It is possible that the Georgians have always lived in this region of the Caucasus; they converted to Christianity in the 4th century. A number of feudal states developed in the region from the 6th century onward, but in the 13th century a population of 5,000,000 was reduced catastrophically by Mongol and other invasions. Russia annexed Georgia at the beginning of the 19th century. Not until the early 1980s did the region's population approach its 13th-century peak. Two-thirds of the people are Georgians; minorities include Armenians (about 10 percent), Russians, and Azerbaijanis.

Georgia has a well-developed industrial base, together with a diversified and mechanized agriculture. It stands out as a region of hydroelectric power, mineral extraction, and developing machinery production. Coal, manganese, and nonmetallic minerals are extracted, and steel has been produced since 1956. Georgia's industrial products range from electric railway locomotives, heavy motor vehicles, and earth-moving equipment to lathes and precision instruments. Specialized products include tea-gathering machines and anti-hail devices. The chemical industry produces mineral fertilizers, synthetic fibres, and pharmaceutical products. Georgia also produces cotton, wool, and silk fabrics and clothing. It leads the Soviet Union in labeled wines and produces tobacco, tea, and canned goods as well.

Agricultural land in Georgia is in short supply and difficult to farm; the production of labour-intensive crops such as tea and citrus fruits is necessary. Georgia has more than 1,000 collective farms (kolkhozy) and several hundred state farms (sovkhozy); considerable produce is raised on private garden plots as well. There is a well-developed transportation infrastructure.

Georgia's government functions like that of other union republics; the Communist Party of Georgia chooses members of a unicameral legislature, the Supreme Soviet. These nominees are ratified by voters on a single ticket every four years. The Supreme Soviet then, under party direction, names a Presidium to legislate while it is not sitting and a Council of Ministers to administer the government.

Georgia ranks high in medical services and is famed for its spas, which attract people from all parts of the Soviet Union. Education is free and compulsory through the secondary level, and attendance is high at every level. Most schools use Georgian as the language of instruction. Tbilisi State University was established in 1918.

Georgia has had a written language since the 5th century AD. Literature was traditionally honoured in Georgia, although during the ascendancy in the Soviet era of Joseph Stalin—himself a Georgian—a number of Georgian authors were put to death. Georgian painters, composers of music, and producers of ballet have been important in the development of the arts. Georgian theatre is influential in So-

viet and foreign circles. Great care has been taken by Soviet cultural authorities to preserve the Georgian cultural heritage.

The origins of human settlement in Georgia can be traced to Early Paleolithic times. There is evidence of tribes engaged in cattle raising and agriculture. The fabled wealth of the region known as Colchis (*q.v.*) was known to the ancient Greeks, and the area was part of the Roman Empire by 65 BC. Georgia embraced Christianity in AD 337, and it was involved in the conflicts between the Byzantine and Persian empires for the next three centuries. After 654, local authority was exercised by Arab caliphs, who established an emirate in Tiflis (Tbilisi; *q.v.*). The unification of the lands inhabited by peoples of Georgian and related Caucasian stock was led by the Bagratids, a dynasty prominent in the affairs of Armenia from the end of the 8th century to the beginning of the 12th. King Bagrat III (975–1014) united all the principalities of eastern and western Georgia into one state. The zenith of Georgia's power was reached in the reign (1184–1213) of Queen Tamara; her realm stretched from Azerbaijan on the east to Circassia to the northwest, forming a pan-Caucasian empire.

Invasions of the pan-Caucasian empire by the Mongols from 1220 onward brought Georgia's golden age to an end, and the onslaughts of Timur between 1386 and 1403 dealt blows to Georgia's economic and cultural life from which the kingdom never recovered. The fall of Constantinople to the Ottoman Turks in 1453 isolated Georgia from Western Christendom, and the next three centuries saw repeated invasions by the Turks and the Persians. A treaty with Russia was signed in 1783 (*see* Georgievsk, Treaty of) guaranteeing Georgia's independence in return for Russian suzerainty, but Russia deserted Georgia in the Persian invasion of 1795, and from 1801 to 1864 the Georgian kingdoms were successively annexed by the Russians, who did, however, ensure the survival of Georgia as an entity by successfully repelling attacks from all others.

Russian serfs were freed in 1861, and Georgian peasants were liberated just three years later. The second half of the 19th century saw the decline of old patriarchal ways, the spread of education, and the beginnings of industrialization and Western influences.

As a result of World War I and the Russian revolutions, the years 1917 to 1921 saw successively a Transcaucasian state ruled from Petrograd, an independent Transcaucasia, and independent Georgia (at first under German protection but subsequently under British occupation and then de facto independence in January 1920 and de jure, by the Allies, in January 1921). In February 1921 a Soviet regime, the Transcaucasian Soviet Federated Socialist Republic, was installed by the Red Army; it was replaced in 1936 by the Georgian Soviet Socialist Republic as a full-fledged member of the Soviet Union. Area 26,900 square miles (69,700 square km). Pop. (1988 est.) 5,297;000.

Georgia, one of the 13 original states of the United States of America, lying in the South Atlantic region, southeastern U.S. It is bounded on the north by Tennessee and North Carolina; on the east by South Carolina and the Atlantic Ocean; on the south by Florida; and on the west by Alabama. The capital is Atlanta.

A brief treatment of Georgia follows. For full treatment, *see* MACROPAEDIA: United States of America: *Georgia.*

The Creek and Cherokee Indians were Georgia's original inhabitants. The state was the last of the original 13 American Colonies to be settled by European colonists. A charter to settle Georgia was given to James Oglethorpe in 1732 by King George II of Great Britain. Oglethorpe's intention was to set up a colony where convicts, debtors, and other poor people could get a new start. He founded Savannah in 1733, but the colony did not grow immediately. After the American Revolution, settlement accelerated, especially in a westward direction from Augusta, through the future cotton counties of middle Georgia. This movement forced the removal of the Indians to areas beyond the Mississippi River. The American Civil War (1861–65) was particularly hard on Georgia. General William T. Sherman burned Atlanta and devastated the countryside during his famous march to the sea. Atlanta recovered, however, to become the premier city of the post-war South.

Northern Georgia is located within the southern end of the Blue Ridge Mountains (part of the Appalachian Mountain system). The state's highest point is in this range and reaches 4,784 feet (1,458 m) above sea level. South of these mountains is an area known as the Piedmont, a stretch of sandy hills extending from east to west the breadth of the state. South of the Piedmont is the rolling terrain of the coastal plain.

Maritime tropical air masses dominate the climate in summer, but in other seasons continental polar air masses are not uncommon. January temperatures average between 39° and 49° F (4° and 10° C); August, 79° to 82° F (26° to 28° C). In northern Georgia, rain usually averages about 50 inches (1,270 mm) annually. The east-central areas are drier, with about 44 inches (1,100 mm) annually.

In Georgia's earliest days, settlers included English, blacks, Austrian Salzburgers, Scottish Highlanders, New England Congregationalists, and Jews. Except for the increasing number of blacks (44 percent of the population by 1860), foreign immigration was insignificant after the earliest days. Though the state grew in population during the 20th century, its out-migration exceeded its in-migration until 1960. Black out-migration has been an important factor in the state's demographic makeup, but in the late 20th century blacks nevertheless accounted for almost 27 percent of the total population. As with other southern states, Georgia's growth rate is well above the national average.

Agriculture in Georgia has followed national trends: in recent decades farms have become fewer in number but larger in size. Cotton is still a major crop but so are peanuts (groundnuts) and tobacco. Poultry, cattle, and swine are also important.

Marble and granite are important natural resources, as is kaolin, a white clay used in ceramic and paper products. The state's forest cover is exceptionally important. Lumber, plywood, and paper are major products, as are naval stores, made from Georgia's extensive pine forests.

Cotton-textile production remains one of Georgia's major industries. Other important manufacturing activities are airplane and automobile assembly, mobile homes, chemicals, and food processing. The federal government represents a significant addition to Georgia's economy through its major military installations.

Navigation of Georgia's inland waterways has been revived, and Savannah and Brunswick are the state's two Atlantic ports. Atlanta has become an important air travel centre, ranking as one of the nation's busiest.

Communication is highlighted by the *Atlanta Constitution,* long recognized as among the nation's outstanding newspapers. Public institutions of higher learning are headed by the University of Georgia in Athens and by the Georgia Institute of Technology and Georgia State University, both located in Atlanta. Area 58,910 square miles (152,576 square km). Pop. (1990 est.) 6,663,000.

Georgia, Strait of, narrow passage of the eastern North Pacific between the central east coast of Vancouver Island and the southwest mainland of British Columbia, Canada. It averages 138 miles (222 km) in length and 17 miles (28 km) in width. To the north the strait ends in a jumble of islands separating it from Johnstone and Queen Charlotte straits farther north. The southern end is marked by the San Juan Islands of the U.S. state of Washington. Texada and Lasqueti islands are the largest within the strait, which has a midchannel depth of 900–1,200 feet (275–370 m). The mainland coast is cut by many inlets, one of which is the mouth of the Fraser River and the site of Vancouver. The Fraser's outflow aids a general counterclockwise movement of water in the strait, known locally as the Gulf. The strait forms a link in the scenic and sheltered Inside Passage sea route between Seattle, Wash., and Skagway, Alaska. Its name, honouring George III, was conferred by Captain George Vancouver in 1792.

Georgia Platform, statement of qualified support for the U.S. Union among Georgia conservatives following the Compromise of 1850.

Drawn up by Charles J. Jenkins and adopted by a state convention on Dec. 10, 1850, at Milledgeville, the Georgia Platform consisted of a set of resolutions accepting the Compromise of 1850. It was not an endorsement of the compromise, but it said that Georgia would abide by the compromise provisions "as a permanent adjustment of the sectional controversy."

The Georgia Platform warned that the state would and should resist any future congressional activity disrupting the interstate slave trade, weakening the fugitive slave laws, or abolishing slavery in the District of Columbia. Such activity could well prompt a dissolution of the Union, according to the Georgia Platform.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Georgian Bay, bay, northeastern arm of Lake Huron, south-central Ontario, Canada. It is sheltered from the lake by Manitoulin Island and the Bruce (or Saugeen) Peninsula. The bay is 120 miles (190 km) long and 50 miles (80 km) wide, and the depth (generally 100–300 feet [30–90 m]) reaches a maximum of 540 feet (165 m) near the Main Channel, which leads to Lake Huron. The principal rivers emptying into the bay are the French, draining Lake Nipissing; the Muskoka, draining the Muskoka chain of lakes; the Severn, draining Lake Simcoe; the Magnetawan; and the Nottawasaga. The Severn River is part of the Trent Canal, a series of navigable rivers and lakes joined by canals extending southeastward for 240 miles (390 km) to the Bay of Quinte on Lake Ontario. The coast of the bay is indented by Nottawasaga, Matchedash, and Colpoys bays and by Parry and Owen sounds.

The Georgian Bay Islands National Park, established in 1929, comprises some 40 islands in the southeastern and western parts of the bay. The largest is Beausoleil Island (4 square miles [10 square km]), once the home of Ojibwa (Chippewa) Indians. Another, Flowerpot Island, is named for two giant flowerpot-shaped pillars that were sculptured from limestone cliffs by the waves. The park's landscape is varied and includes glacier-scraped rocks and some dense forests. White-tailed deer, smaller mammals, and numerous songbirds thrive in the area. The Thirty Thousand Islands that lie along the bay's eastern shore constitute another popular summer resort area.

The surrounding region is well forested except for an apple-growing area along the south-

ern shore. The bay's important commercial shipping focuses on the ports of Parry Sound, Port McNicoll, Collingwood, Midland, and Owen Sound.

The French explorer Samuel de Champlain was the first European to record seeing part of the Great Lakes when he reached Georgian Bay from the north in 1615. The bay was named for George IV by Captain Henry Bayfield of the Royal Navy.

Georgian language, Georgian KARTULIS ENA, official language of the Georgian S.S.R., whose spoken form has many dialects, usually divided into East Georgian and West Georgian groups; these, together with the related Mingrelian (Megrelian), Laz (Chan), and Svan languages, make up the Kartvelian, or South Caucasian, language family. Georgian is also spoken in parts of the Azerbaijan S.S.R. and northeast Turkey and in 14 villages in the region of Eṣfahān in Iran.

The Georgian literary tradition, in the form of inscriptions, dates back to the 5th century. Many literary monuments remain from the Old Georgian period (5th–11th century), among them a translation of the Bible from Armenian. The New Georgian literary language is based on an East Georgian dialect and originated in the secular literature of the 12th century; it became fully established in the middle of the 19th century. Old Georgian was used for religious purposes until the beginning of the 19th century.

New Georgian has five vowels and 28 consonants; Old Georgian had five vowels but 30 consonants. Georgian has roughly the same parts of speech as do the Indo-European languages. The noun has seven cases, and the adjective, usually preceding the noun it modifies, agrees with the noun in case but not in number.

Historically, the Georgian language was written in two scripts: Khutsuri, an ecclesiastical script of 38 letters, including 6 vowels, is no longer in use; Mkhedruli, a lay alphabet originally of 40 letters (7 are now obsolete), 6 of them vowels, is the script commonly used at present in printing and handwriting. Both scripts are written from left to right.

According to tradition, St. Mesrob (*c.* 350–439/440), the inventor of the Armenian alphabet, created one of the Georgian scripts or perhaps both. Another tradition holds that the Mkhedruli script was invented by the first Georgian king, P'arnavaz, in about AD 300. In fact, little is known of the origin of the two scripts or of their relation to one another. The most likely theory is that both are descended from the Aramaic alphabet, with some Greek influence, and that Mkhedruli is the older of the two. The earliest Georgian inscriptions date from the 5th century, and the earliest literature from the 8th century.

Georgian literature, body of writings in the Georgian language.

Georgian literary history began with the area's conversion to Christianity in the 4th century and a need to invent an alphabet for the propagation of the Scriptures in the vernacular. The Gospels were translated in the 5th century into Georgian from Armenian, and the Acts of the Apostles and Psalms were translated soon afterward, as well as works of early Greek Fathers.

Original Georgian literature began with biographies of saints, the first one being that of St. Shushanik (*c.* 480), and other early works include an account of the conversion of Georgia by St. Nino and stories about King Vakhtang I Gorgasal, a 5th-century hero. The Georgians were the first to give a Christian colouring to a Buddhist legend of Barlaam and Josaphat, which reached them in the 9th century through an Arabic version.

Georgian ecclesiastical literature was rooted in Byzantine Greek culture, and Georgian romances and epics blended the civilization of Persia with original elements of Caucasian folklore. Important prose romances were the *Visramiani* ("Visramiani: The Story of the Loves of Vis and Ramin"), adapted from an Iranian romance going back to Parthian times, and *Amiran-Darejaniani,* a cycle of fantastic tales. Secular poetry started with Ioann Shavteli and Chakhrukhadze, who wrote odes in honour of King David II (d. 1125) and Queen Tamara (d. 1213). The supreme achievement of Georgia's golden age was Shota Rustaveli's epic *Vepkhis-tqaosani* ("Man in the Panther Skin") on the themes of ideal comradeship, courtly love, and heroic endeavour. His poetic tradition, broken by Mongol invasions, was renewed in the 17th century by the Georgian royal poets Teimuraz I and Archil II.

Belles lettres revived in Georgia during the 18th century with the lexicographer Sulkhan-Saba Orbeliani, who wrote a book of fables, *The Book of Wisdom and Lies.* The main poets of the period were David Guramishvili and Bissarion Gabashvili.

The Russian occupation of 1801 brought Georgia into the orbit of European intellectual life. Romantic poetry flourished with the work of Alexander Tchavtchavadze and the Byronic lyrics of the youthful bard Nicholas Baratashvili. Satirical comedy developed under the lead of Giorgi Eristavi, founder of the modern Georgian theatre. Exponents of the realistic novel were Lavrenti Ardaziani and Ilia Tchavtchavadze, the latter being Georgia's most distinguished man of letters of modern times, renowned as an essayist, publicist, and poet. The life of the Georgian mountaineers is brilliantly portrayed in the stories of Alexander Qazbegi and the ballads of Vazha Pshavela. Even more famous was the patriotic poet and man of letters Akaki Dsereteli (Tsereteli).

Under the tsarist regime Georgian literature often assumed a propagandistic, moralistic tone. Under the Soviet regime a number of leading writers, including the novelist Mikheil Javakhishvili and the poets Paolo Iashvili and Titsian Tabidze, perished in the Stalinist purge of 1937. However, poets of the stature of Ioseb Grishashvili, dramatists such as Shalva Dadiani, and novelists such as Konstantine Gamsakhurdia succeeded in maintaining a high standard of creative originality.

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Georgian Orthodox Church, autocephalous (independent) church of the Orthodox communion in Soviet Georgia. It is one of the most ancient Christian communities in the world. The Georgians adopted Christianity through the ministry of a woman, St. Nino, early in the 4th century. Thereafter, Georgia remained in the ecclesiastical sphere of Antioch and also under the influence of neighbouring Armenia. Its autocephaly was probably granted by the Eastern Roman emperor Zeno (474–491) with the consent of the patriarch of Antioch, Peter the Fuller. The heads of the Georgian Church have since borne the title catholicos.

Throughout the Middle Ages, Georgia experienced several periods of political expansion, during which the church developed remarkably rich traditions of art, architecture, and literature. Georgian monks settled in Jerusalem and Mount Athos (monastery of Ivezon).

In 1801, having been annexed by Russia, the country lost its political and ecclesiastical independence, and after 1817 the Georgian Church was governed by Russian exarchs. During the Russian Revolution of 1917, the church reestablished its autocephalous catholicate. It was severely persecuted during the 1920s, but under Joseph Stalin, a former Georgian seminarian, it seems to have enjoyed favourable treatment. After the election of Catholicos Elias II (1977), several vacant dioceses received new bishops, and a seminary, located in the historical seat of the catholicos in Mtskheta, was reorganized.

Georgian poetry, the work of an assortment of British poets writing in the first quarter of the 20th century, so called from *Georgian Poetry,* an anthology of contemporary verse first published in 1912 (at the beginning of the reign of George V) and of which five volumes in all appeared between 1912 and 1922. The anthology was edited by Sir Edward Marsh. Its contributors and other poets writing in a similar vein included Lascelles Abercrombie, Hilaire Belloc, Rupert Brooke, W.H. Davies, Ralph Hodgson, John Drinkwater, James Elroy Flecker, Robert Graves, Walter de la Mare, Harold Monro, Siegfried Sassoon, Sir John Squire, and Edward Thomas. With a few exceptions, they were minor poets writing conventional lyrical verse of late Romantic character.

Georgian Soviet Socialist Republic (Soviet Union): *see* Georgia.

Georgian style, the various styles in the architecture, interior design, and decorative arts of England during the reigns of the first four members of the House of Hanover, between the accession of George I in 1714 and the death of George IV in 1830. There was such diversification and oscillation in artistic style during this period that it is perhaps more accurate to speak of "Georgian styles."

For the first 50 years of the Hanoverian dynasty the same Whig aristocracy that controlled the government also dictated artistic thought. The splendid architectural achievements of Sir Christopher Wren and his followers during the reigns of the three preceding

Entrance hall of Syon House (1762–69), in the London borough of Hounslow, designed by Robert Adam in the Neoclassical Georgian style

A.F. Kersting

Stuart monarchs were in the extravagant and monumental Baroque style of continental Europe, which the Whig aristocrats eventually judged to be of questionable taste. Thus, the new generation of architects, theorists, and wealthy amateurs set out to reform architecture in accordance with the classical tenets of the Italian architect Andrea Palladio (*see* Palladianism). The second important Georgian architectural style, Neoclassicism, came into fashion about the mid-18th century. The models for the architecture of this period were no longer the buildings of the Italian Renaissance but those of Classical Greece and Rome. Neoclassicism's austere use of Doric and Ionic architectural elements increasingly dominated English architecture in the late 18th century. Toward the end of the century and during the reign of George IV, a number of other styles of building and interior decoration became popular, chief among them Gothic Revival and the Regency style (*q.v.*).

In addition to architecture and interior design, the Georgian era saw great achievements in the decorative arts. Technical as well as aesthetic advances were made in pottery by Josiah Wedgwood and Josiah Spode. Paul de Lamerie, working primarily in the Rococo style, was preeminent among English silversmiths of the early to mid-18th century, after which the Neoclassical designs of the Adam family dominated this craft. Furniture design encompassed a variety of distinct and memorable styles, ranging from the complicated curves of pieces by Thomas Chippendale (mid-18th century), to the classical influence of the Adams, to the straight, simple lines of the works of George Hepplewhite and Thomas Sheraton. It was also during the Georgian era that wallpaper came to supplant wood paneling as the preferred method of covering interior walls.

The Georgian era is notably remembered as marking the summit of house design in Britain. Its legacy can be seen in the entire city squares of uniform, symmetrical townhouses in London, their facades employing classical pilasters, pedimented doors and windows, and graceful moldings. These houses' interiors—with harmonious proportions, quiet colours, Roman-derived stucco ornamentation, and Chippendale and Sheraton furniture—once made elegant settings for the paintings of Reynolds and Gainsborough that adorned the walls.

Georgievsk, Treaty of (July 24, 1783), agreement concluded by Catherine II the Great of Russia and Erekle II of Kartalinia-Kakhetia (eastern Georgia) by which Russia guaranteed Georgia's territorial integrity and the continuation of the reigning Bagratid dynasty in return for prerogatives in the conduct of Georgian foreign affairs.

Under the terms of the treaty, Catherine and her heirs were to defend Georgia against enemies, and Erekle renounced dependence upon Iran or any other power. Though the treaty was to have permanent validity, Emperor Paul I's manifesto of Dec. 18, 1800, unilaterally declared the annexation of Kartalinia-Kakhetia to Russia, and on Sept. 12, 1801, his successor, Alexander I, formally reaffirmed this determination.

Geórgios (Greek personal name): *see under* George.

Georgiu-Dezh, city and administrative centre of Liski *rayon* (district), Voronezh *oblast* (administrative region), Russian Soviet Federated Socialist Republic, situated on the banks of the Don River. It is a main railway junction, with shops for servicing locomotives; its food industries include meatpacking and flour milling. It became a city in 1937 and was known as Svoboda until 1943 and as Liski until 1965, when it was renamed for the Romanian Communist leader Gheorghe Gheorghiu-Dej. Pop. (1984 est.) 54,000.

geōrgoi (ancient Greek social class): *see* geōmoroi.

geostrophic motion, fluid flow in a direction parallel, rather than perpendicular, to lines of equal pressure (isobars) in a rotating system, such as the Earth. Such flow is produced by interaction of the Coriolis force (*q.v.*; caused by the Earth's rotation) and the pressure-gradient force. The velocity of the flow is proportional to the gradient of the pressure. Although observed fluid motions are not strictly geostrophic, large-scale oceanic and atmospheric movements approach the ideal; that is, the geostrophic current usually represents the actual current within about 10 percent, provided the comparison is made over large areas.

On a nonrotating Earth, the pressure-gradient force would cause the wind to blow directly from a region of high to one of low pressure, across isobars. Because the Earth does rotate, however, the Coriolis force deflects the wind into parallelism with the isobars. The Coriolis force deflects the wind to the right in the Northern Hemisphere and to the left in the Southern Hemisphere.

Near the surface, friction between the air and the surface causes the wind to blow at less than a right angle to the pressure gradient. Near the Equator, where the Coriolis force is weak (because it is a function of latitude), the wind generally blows toward low pressure. The geostrophic-wind concept is useful in weather forecasting because it facilitates the mapping of wind streamlines in regions where wind observations are sparse, and of isobars where pressure data are scanty. *See also* gradient wind.

geosyncline, linear trough of subsidence of the Earth's crust within which vast amounts of sediment accumulate. The filling of a geosyncline with thousands or tens of thousands of feet of sediment is accompanied in the late stages of deposition by folding, crumpling, and faulting of the deposits. Intrusion of crystalline igneous rock and regional uplift along the axis of the trough generally complete the history of a particular geosyncline, which is thus transformed to a belt of folded mountains. The concept of the geosyncline was introduced by the American geologist James Hall in 1859 and is basic to the concept of mountain building.

Two segments of a geosyncline are recognizable in the rock strata of many of the world's mountain systems today. Thick volcanic sequences, together with graywackes (sandstones rich in rock fragments with a muddy matrix), cherts, and various sediments reflecting deep-water deposition or processes, were deposited in eugeosynclines, the outer, deepwater segment of geosynclines. The occurrence of limestones and well-sorted quartzose sandstones, on the other hand, is considered to be evidence of shallow-water formation, and such rocks form in the inner segment of a geosyncline, termed a miogeosyncline.

Aside from the parts or segments of a geosyncline, several types of mobile zones have been recognized and named. Among the more common of these are the taphrogeosyncline, a depressed block of the Earth's crust that is bounded by one or more high-angle faults and that serves as a site of sediment accumulation, and the paraliageosyncline, a deep geosyncline that passes into coastal plains along continental margins.

geothermal energy, power obtained by using heat from the Earth's interior. Most geothermal resources are in regions of active volcanism. Hot springs, geysers, pools of boiling mud, and fumaroles (vents of volcanic gases and heated groundwater) are the most easily exploited sources of such energy. The ancient Romans used hot springs to heat baths and homes, and similar uses are still found in some geothermal regions of the world, such as Iceland, Turkey, and Japan. The greatest potential for geothermal energy, however, lies in the generation of electricity. Geothermal energy was first used to produce electric power at Larderello, Italy, in 1904. By the late 20th century, geothermal power plants were in operation in Italy, New Zealand, Japan, Iceland, Mexico, the United States, and the Soviet Union, and others were under construction elsewhere.

The most useful geothermal resources are hot water and steam trapped in subsurface formations or reservoirs and having temperatures ranging from 176° to 662° F (80° to 350° C). Water and steam hotter than 356° F (180° C) are the most easily exploited for electric power generation and are utilized by most existing geothermal power plants. In these plants the hot water is flashed to steam, which is then used to drive a turbine whose mechanical energy is then converted to electricity by a generator. Hot, dry subsurface rocks may also become more widely used as a source of geothermal energy once the technical problems of circulating water through them for heating and conversion to steam are completely resolved. The development of geothermal resources has become increasingly attractive owing to the rising cost of petroleum and the nonpolluting character of geothermal energy production.

Geougen (Central Asian people): *see* Juanjuan.

Gepidae, a Germanic tribe that lived on the southern Baltic coast in the 1st century AD, having migrated there from southern Sweden some years earlier. The Gepidae again migrated during the 2nd century and were reported in the mountains north of Transylvania by the end of the 3rd century. They united with other tribes in an assault on the Roman Empire but were crushed in 269 in a battle near Naissus (Niš), in present Yugoslavia. In 454 they and other Germanic tribes decisively defeated the Huns on the unlocated Nedao (Nedad) River in Pannonia, a province south and west of the Danube.

Intermittent wars occurred between the Gepidae and the Lombards from 536 to about 567, when the Gepidae were finally crushed by a coalition of Lombards and Avars. Thereafter, the Gepidae became submerged in Avar domains.

ger (tentlike dwelling): *see* yurt.

Gera, until 1990 a *Bezirk* (district) of southern East Germany, formed in 1952 from parts of Thuringia, Saxony, and Saxony-Anhalt. With an area of 1,546 sq mi (4,004 sq km) and drained by the Weisse Elster and Saale rivers, the area slopes northward from the Vogtland region of the mid-German highlands, toward the central Thüringer Becken (Thuringian Basin). It is largely industrial, and textiles, chemicals, and metal products are important. The chief towns are Gera (the former capital), Jena (*q.v.*), Greiz, Saalfeld (*q.v.*), and Rudolstadt. Pop. (1989 est.) 741,168.

Gera, city, Thuringia *Land* (state), east-central Germany, on the Weisse Elster River, southwest of Leipzig. First mentioned in 995 and by 1237 referred to as a town, it became part of the principality of Meissen in 1547. Passing to the Reuss family in 1562, it became their residence and capital from 1564 to 1918. Although largely destroyed by fire in 1639, 1686, and 1780, the city was always rebuilt. It suffered heavy damage in World War II, after which a new city centre was built. The Osterstein Palace (1686–1735) was the seat of the Reuss princes. There are Baroque and Re-

naissance buildings around the market square. A rail junction, Gera manufactures textiles, metal products, machinery, fats, oils, and furniture. Nearby are mines producing uranium ore. Pop. (1989 est.) 134,834.

Gerald OF WALES, also called GERALD DE BARRI: *see* Giraldus Cambrensis.

Geraldton, town and Indian Ocean port, southwestern Western Australia, situated on Champion Bay, across Geelvinck Channel from the Houtman Abrolhos (islands). Surveyed in 1850, Geraldton originated as a military post for the nearby Murchinson goldfield and was declared a town in 1871. During World War II it was used as a U.S. amphibious air base. Linked to Perth (230 mi [370 km] southeast) by rail, air, and the Brand Highway and Midlands Road, it is now the state's second largest port, serving as the outlet for the northern Wheat Belt and a hinterland producing barley, oats, lupines, fruits, and tomatoes. Live sheep, mineral sands, gold, iron ore, and talc are also shipped, and natural gas is tapped. Geraldton has superphosphate plants and leads the state in catching and exporting crayfish. The town, which has Roman Catholic and Anglican cathedrals, is a winter resort. Pop. (1981) 20,895.

Geraniales, the diverse geranium order of flowering plants, belonging to the class known as dicotyledon (*q.v.*; characterized by two seed leaves). It consists of 20 families, 143 genera, and more than 4,000 species.

A brief treatment of Geraniales follows. For full treatment, *see* MACROPAEDIA: Angiosperms.

Many of the economically important families of Geraniales require rich, moist soil. Species of at least three smaller families persist in arid regions. Some members of the Zygophyllaceae (caltrop family) store water in fleshy leaves and stems for survival in dry habitats. One family thrives in marshes.

The wood-sorrel family (Oxalidaceae) is composed of 900 species readily recognized by their three cloverleaflike leaflets. Most of the Oxalidaceae are herbs found in tropical regions; some are weeds in temperate regions, and still others are grown as ornamentals.

The geranium family (Geraniaceae), consisting of 8 genera and 800 species, is mainly herbaceous and worldwide in distribution. The florist's geranium (*Pelargonium* × *domesticum*) is a favourite house plant and is available in many varieties. These cultivars (horticultural varieties) have originated from plants native to South Africa. Herb Robert (*Geranium robertianum*) is a well-known garden plant, as are some species of *Erodium.* The pin-clover (*E. cicutarium*), a Mediterranean species now naturalized in the United States, is a weed, but in California it is grown as a forage crop. Geranium oil, used in perfumes, is produced by *Pelargonium odoratissimum* and related species.

The flax family (Linaceae) consists of herbs or subshrubs. Of the 240 species, some perennials are garden plants. The flax plant (*Linum usitatissimum*) has been grown since the dawn of history for its fibres, which are processed into linen. Linseed oil, extracted from its seeds, is a major ingredient in paints.

The coca family (Erythroxylaceae) contains 200 species, distributed in the tropics. The densely branched shrub *Erythroxylum coca* forms ornamental hedges in western South America. Its dried leaves, mixed with lime, are chewed daily by Andean Indians as a nerve stimulant to improve their physical endurance. The active ingredient in the leaves is the drug cocaine.

The caltrop family (Zygophyllaceae) grows mainly in arid regions of the tropics and subtropics. Lignum-vitae, a very hard and durable wood produced by the 30-foot- (9-metre-) tall *Guaicum officinale,* is used in shipbuilding. A resin used in fabricating strong, heavy objects comes from *G. sanctum.* Both species are resistant to salt spray.

The remaining families of the Geraniales order are of lesser economic importance; some are, however, important locally for food and ornamental plantings, and many are of scientific interest. Nasturtiums of the Tropaeolaceae, which are garden plants suited to moist habitats, yield spicy buds containing mustard oil for seasoning. Of the nearly 100 species in this genus, *Tropaeolum tuberosum* of the high Andes is an important vegetable-tuber crop.

Many members of the *Oxalis* genus propagate vegetatively. Reproduction by seeds is, however, the universal method of perpetuating the species of this order. Inflorescences of the Geraniales range from those set closely on an elongated flowering stalk (spike) to branched clusters (panicles). A few flat-topped flower clusters (umbels) are produced in the wood-sorrel and balsam families. A representative flower of the Geraniales possesses five sepals and an equal number of petals of similar size and shape, 10 stamens in two whorls, and a pistil composed of five carpels. Sepals are joined basally to form a short funnel; petals are separate, and stamens are joined at their base. The ovary portion of the pistil consists of five chambers, each containing one ovule. Five separate styles end in pollen-receptive stigmas.

Insects are the almost universal agents of Geraniales pollination. The fragrant flowers of the garden geranium are visited by nocturnal insects. Some North American species of *Impatiens* are pollinated by hummingbirds. After pollination and fertilization, the ovule becomes the seed and the ovary the fruit. In some families, the fruit ripens dry and splits at maturity into segments (mericarps), or, in other species, the fruits open completely (capsule).

geranium, also called STORKSBILL, any of about 250 species of perennial herbs or shrubs belonging to the genus *Pelargonium,* in the family Geraniaceae, native mostly to subtropical southern Africa. Geraniums are among the most popular of bedding and greenhouse plants. *Geranium* is also the name of a closely related genus containing about 300 species of annual, biennial, and perennial herbaceous plants that are commonly called cranesbill.

Hybrid geranium (*Pelargonium* × *hortorum*)
John H. Gerard

The cultivated geraniums of the genus *Pelargonium* are herbaceous to woody, with thick fleshy leaves varying in shape from round to lobed to deeply cut; the flowers, borne in terminal clusters, vary in colour from white through shades of pink to deep red and violet. Most of the cultivated species are hybrids. Double flowers and mixed colours as well as ragged or frilled petals are available. While mostly propagated by stem cuttings, from which flowering plants can be produced in four or five months, geraniums are also grown from seed. Breeding and selection has resulted in a line of seed geraniums useful in bedding for their regular symmetry, elongated flower stalks, and habit of rapid and clean dropping of flower petals.

The show, or Martha Washington, geraniums (*P.* × *domesticum,* largely derived from *P. cucullatum, P. angulosum,* and *P. grandiflorum*) have large pansy-like flowers, few to the cluster. Zonal, house, or bedding geraniums (*P.* × *hortorum,* a complex hybrid largely derived from *P. inguinans* and *P. zonale*) are the familiar forms in garden culture and in pots indoors. Ivy, or hanging, geraniums (*P. peltatum*) are grown as basket plants indoors and out; they are also used as ground covers in warm areas. The aromatic, or scented-leaved, geraniums are found in several species, including *P. abrotanifolium, P. capitatum, P. citrosum, P. crispum, P. graveolens,* and *P. odoratissimum.* Minty, fruity, floral, and spicy fragrances are released readily when their leaves are rubbed or bruised.

Several African *Pelargonium* species are commercially important for geranium oil, an essential oil used in perfumery. Geranium oil, which is also called pelargonium oil, or rose-geranium oil, is colourless to pale yellow-brown or greenish and has an odour like that of roses. It is used chiefly in perfumes, soaps, ointments, and tooth and dusting powders.

Gerard OF BURGUNDY, French GÉRARD DE BOURGOGNE: *see* Nicholas II *under* Nicholas (Papacy).

Gerard OF CREMONA (b. *c.* 1114, Cremona, Lombardy—d. 1187, Toledo, Kingdom of Castile), European medieval scholar who translated the works of many major Greek and Arabic writers into Latin.

Gerard went to Toledo to learn Arabic in order to read the *Almagest* of the 2nd-century-AD Greek mathematician and astronomer Ptolemy, which was not then available in Latin; he remained there for the rest of his life. About 80 translations from the Arabic have been attributed to him, but it has been suggested that he was in charge of a school of translators that was responsible for some of the translations. Many early printed editions omit the name of the translator. Gerard's translation of the *Almagest* (printed in 1515) was finished in 1175. Among other Greek authors translated from Arabic versions by Gerard (according to tradition) are Aristotle, Euclid, and Galen. Translations of original Arabic texts attributed to him include works on medicine—notably the *Canon* of Avicenna—mathematics, astronomy, astrology, and alchemy.

Gérard, François(-Pascal-Simon), Baron (b. May 4, 1770, Rome—d. Jan. 11, 1837, Paris), Neoclassical painter best known for his portraits of celebrated European personalities, particularly the leading figures of the French First Empire and Restoration periods.

Gérard first studied under the sculptor Augustin Pajou and later with the painter Jacques-Louis David, whose assistant he became after 1791. In 1793, at David's request, he was named a member of the French Revolutionary Tribunal, although he took no part in its fatal decisions. Known for the charm of his manner and conversation, as well as for his skill with the brush, Gérard was always able to ingratiate himself with the political faction in power. A favourite of the revolutionaries, he also was acclaimed by Napoleon I and his circle, executing portraits (*e.g.*, "Josephine Bonaparte," 1799; Louvre, Paris) and histo-

rical pieces (*e.g.*, "Battle of Austerlitz," 1808; Versailles). After Napoleon's fall he became court painter to Louis XVIII, who made him a baron in 1819. He was later patronized by Charles X, during whose unstable reign he painted the contrived ceiling murals for the Panthéon in Paris (1830).

"Cupid and Psyche," oil on canvas by François Gérard, 1798; in the Louvre, Paris

By courtesy of the Musee du Louvre, Paris; photograph, Cliche Musees Nationaux

A portrait of his friend, the miniaturist J.-B. Isabey, and his daughter (1795; Louvre) and Gérard's famed salon entry "Cupid and Psyche" (1798; Louvre) were among the pictures that established a style that became widely imitated at the turn of the 18th century. Gérard's painting was closely related to David's in its intellectualism, cool classicism, highly finished surfaces, and sculptural definition of form. Gérard's works, especially his portraits, are generally considered to be more elegant than David's.

Gérard, Jean-Ignace-Isidore: *see* Grandville.

Gerard, John (b. 1545, Nantwich, Cheshire, Eng.—d. February 1612, London), English herbalist, author of *The Herball, or generall historie of plantes* (1597).

John Gerard, detail of an engraving, 1636

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

In 1562 Gerard went to London to become an apprentice to a barber-surgeon and, after seven years, was granted permission to establish his own practice. While studying in London, he became interested in plants and began a garden near his cottage in Holborn, London. Both the garden and its owner soon became popular, and Gerard was often presented not only with rare plants and seeds from different parts of the world but also with offers to supervise the gardens of noblemen. In 1596 he compiled a list of the plants growing in his garden. Published in 1597, his celebrated *Herball,* containing more than 1,000 species, became the first plant catalog. Although Gerard took almost complete credit for the work, it may actually have been based on a translation of *Stirpium historiae pemptades sex* (1583), by the Flemish botanist Rembertus Dodoens. Of the more than 1,800 woodcuts illustrating the book, only 16 were done by Gerard. The remainder came from Jacob Theodorus Tabernaemontanus' *Eicones plantarum seu stirpium* (1590).

The *Herball* was immensely popular. It provided in more than 800 chapters information on species as they were then understood, common and botanical names, descriptions of habitats, time of flowering, and the "virtues," or uses, of plants of the entire plant kingdom. It also contained a large amount of folklore. Substantial portions of the *Herball* were reprinted in 1927 and 1964.

Gerardus Magnus (Dutch religious leader): *see* Groote, Geert.

Gerbert OF AURILLAC (pope): *see* Sylvester II.

gerbil, also called SAND RAT, any of the numerous burrowing rodents forming the subfamily Gerbillinae of the family Cricetidae. There are about a dozen genera and almost 100 species. Gerbils are found in Africa and Asia, generally in dry, sandy areas, though some live in grasslands, cultivated fields, or forests. Mouselike or ratlike animals, they have large eyes and ears and soft, pale brown or grayish fur. Most gerbils are 10–15 centimetres (4–6 inches) long excluding the tail, which is usually long, hairy, and tufted at the tip. Many species have long hind legs and leap about like jerboas.

Gerbils feed primarily on seeds, roots, and other plant material. Some species are active by day, others by night. Burrow systems vary; some gerbils, such as those of the African and western Asian genus *Gerbillus,* dig short, relatively uncomplicated burrows, while others, such as the great gerbil (*Rhombomys opimus*) of the U.S.S.R., dig elaborate underground tunnel systems.

Meriones unguiculatus, one of the tamarisk gerbils, or jirds, is a gentle and hardy animal that became a popular pet in the United States in the mid-1960s. The great gerbil sometimes damages crops and embankments in the U.S.S.R.; members of the African genus *Tatera* are possible carriers of bubonic plague.

Gerbrandy, Pieter Sjoerds (b. April 13, 1885, Goengamieden, Neth.—d. Sept. 7, 1961, The Hague), Dutch statesman who as prime minister (1940–45) conducted The Netherlands' World War II government-in-exile and controlled its armed forces (1940–44).

As minister of justice from 1939, Gerbrandy fled to London with the royal family and the rest of the Cabinet (May 1, 1940) during the German invasion. However, the Cabinet-in-exile remained the legal government of the nation. Appointed prime minister in September 1940, he directed the war effort of all Dutch armed forces not in occupied territory. Even after the Japanese conquest of the Dutch East Indies (now Indonesia) and the destruction of the naval fleet stationed there (February 1942), he controlled the remainder of the navy, the large merchant marine, and the Caribbean colonies.

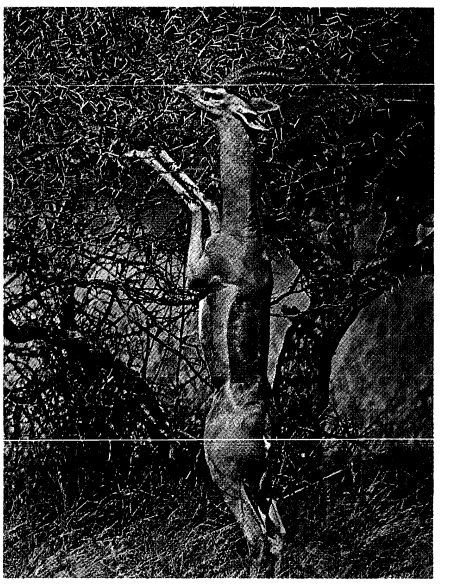
Gerbrandy maintained contact with Dutch resistance groups and handled relations with the British and other Allied governments. In April 1945 he was successful in persuading the Allies to air-drop large quantities of food to the starving population of western Holland, which was still occupied by the Germans. Resigning as prime minister after the country was liberated (June 1945), he served in the lower house of the Parliament from 1948 to 1958.

Gereformeerde Kerken in Nederland (Netherlands Reformed church): *see* Reformed Churches in The Netherlands.

Geren Gurun Be Ujire Genggiyen (ruler of China): *see* Nurhachi.

gerenuk, also called WALLER'S GAZELLE (*Litocranius walleri*), slender antelope, family Bovidae (order Artiodactyla), with an unusually long neck and long, slim legs.

The gerenuk, whose name comes from the Somali for "giraffe-necked," lives alone or in small groups in desert and bush country of eastern Africa. It feeds on the leaves and shoots of trees and tall bushes, reaching the foliage by standing on its hind legs with its forelegs propped against the tree. The gerenuk is about 1 metre (39 inches) at the shoulder and is reddish brown with a darker back and white underparts. The male bears relatively heavy horns that curve backward and then hook forward at the ends.



Gerenuk (*Litocranius walleri*)

Norman Myers—Bruce Coleman Inc.

Gereshk (Afghanistan): *see* Helmand.

Gereshk, largest town, Helmand *velāyat* (province), southwestern Afghanistan, on the Helmand River, 75 mi (120 km) west-northwest of Qandahār, with which it is linked by road. Gereshk is the centre of a rich agricultural area; Kajakī dam upriver diverts water to the Boghrā irrigation canal. The town was originally built around a fort on the right bank of the river and was later rebuilt on the left bank. During the First Anglo-Afghan War (1839–42), the fort, now in ruins, was held by the British; it was returned in 1879. Gereshk houses an engineering school (1957) and a hospital. About 20 mi south of the town, at the confluence of the Helmand and Arghandāb rivers, is the ruined city of Qal'eh-ye Best (Bust). Pop. (1982 est.) 5,305.

Gerez Mountains, Portuguese SERRA DO GEREZ, Spanish SIERRA DE JARÉS, short range of mountains, less than 20 mi (32 km) long, with a maximum width of about 11 mi, reaching an elevation of nearly 5,000 ft (1,507 m). They run east-northeast from Portugal's northwestern interior into Spanish Galicia.

The area is known for deer, boar, and partridge hunting, as well as for its Roman ruins, including the remains of a highway that led from Braga to Rome.

Gerhaert von Leyden, Nikolaus, also spelled NICOLAUS GERHARD VON LEYDEN (b. *c.* 1420, Leiden, Holland [now The Netherlands]—d. after 1472, Wiener Neustadt, Archduchy of Austria [now Austria]), master sculptor who was one of the most significant artists of his time in the Upper Rhine country. Gerhaert had myriad followers, and the expressive realism of his style influenced many of his contemporaries. Sandstone and limestone were his most frequent materials.

Gerhaert's portraits and religious figures, mostly male, are unusually sensitive and emotive for the period. He has been definitely credited with several fragments and busts found in Strasbourg, the tomb of Archbishop Jacob van Sierck (1462) in Trier, and the crucifix at Baden-Baden (1467). Among his most profound works are the "Strasbourg Self-Portrait" (1467), a sandstone masterpiece of timeless intensity, and his portrait busts of "Bärbel von Ottenheim" and "Count von Lichtenberg" (both 1464). Gerhaert was invited to Vienna by Emperor Frederick III, and one of his last works was the Emperor's tomb, begun in 1469.

Gerhard, Johann (b. Oct. 17, 1582, Quedlinburg, Halberstadt [Germany]—d. Aug. 17, 1637, Jena, Saxony [Germany]), leading German theologian of his era, biblical scholar, renowned polemicist, author of the standard treatise *Loci Theologici,* and chairman of every major Lutheran theological assembly of his time.

Gerhard was deeply influenced as a youth by the Lutheran theologian Johann Arndt and obtained training in theology and philosophy at the universities of Wittenberg, Marburg, and Jena. In 1606 he became superintendent of the churches in Heldburg in the Duchy of Coburg; this responsibility was later expanded to include all the churches in the duchy. He joined the faculty of theology at Jena in 1616 and remained there until his death.

Gerhard's strict interpretation of the Bible is evident in the theological system set forth in his nine-volume *Loci Theologici* (1610–22), the most significant dogmatic work of the era of Lutheran orthodoxy. Recognizing the Bible as the only guiding principle, the *Loci* argues for the infallibility of the Bible against the infallibility of the pope. Designed deliberately to be both catholic and evangelical, Gerhard's work represents the culmination of a tradition of Lutheran dogmatics that was begun with Philipp Melanchthon. Among Gerhard's other writings are the four-volume *Confessio Catholica* (1634–37) and *Meditationes Sacrae* (1606), a devotional manual.

Gerhardsen, Einar (Henry) (b. May 10, 1897, Asker, Nor.—d. Sept. 19, 1987, Lillehorg), four-time prime minister of Norway (1945, 1945–51, 1955–63, 1963–65) and leader of the Norwegian Labour Party, who led his nation's postwar economic recovery program.

The son of a Labour Party member, Gerhardsen joined the party during World War I and sided with its radical wing, which joined the Comintern (Third International) in 1919. After the party split from the Comintern in 1923, opposing central control from Moscow, he served as secretary of the Oslo Labour Party (1925–35) and as secretary of the national party (1934–45). A member of the Oslo Town Council from 1932 to 1945, he became mayor of the city in 1940.

After working with the Home Front resistance group, which opposed the Nazi occupation, Gerhardsen was arrested by the Germans in September 1941, sent to a concentration camp, and later imprisoned in Oslo. Resuming his post as mayor of Oslo upon the end of the war in 1945, he became leader of the Norwegian Labour Party and was asked by King Haakon VII to form a coalition government.

When the Labour Party scored a decisive victory in the fall elections of 1945, Gerhardsen continued as prime minister and won the support of all parties for his government's austerity and rebuilding program, which made substantial economic gains by 1949. Retirement pension (1956) and social welfare (1964) legislation was passed during his second and third administrations. He continued to serve in the Storting (parliament) after losing office in 1965. He retired from politics in 1972.

Gerhardt, Charles (-Frédéric) (b. Aug. 21, 1816, Strasbourg, Fr.—d. Aug. 19, 1856, Strasbourg), French chemist who, with Auguste Laurent, developed a classification of organic compounds. His idea that all organic compounds were based on four main types (*i.e.,* hydrogen, hydrogen chloride, ammonia, and water) was opposed by his contemporaries and was later abandoned, but it proved important in the subsequent rationalization of structural organic chemistry.

Gerhardt was one of the first to make a systematic and methodical use of equations in expressing chemical reactions. He also promoted Jean Dumas's concept of homology as an aid in organizing the reactions of series of compounds, and he favoured the definition of acids as substances containing replaceable hydrogen atoms. Among his noteworthy experimental efforts was the preparation of anhydrides of carboxylic acids (1852). He became professor at the Université de Montpellier (1844), and at Strasbourg (1855).

Charles Gerhardt, engraving
H. Roger-Viollet

Gerhardt, Elena (b. Nov. 11, 1883, Leipzig—d. Jan. 11, 1961, London), mezzo-soprano, one of the most accomplished singers of German lieder of her time.

Gerhardt studied at the Leipzig Conservatory and made her debut at Leipzig in 1903. Having early decided against an operatic career, she made an international reputation as an exponent of German song. Her interpretation of the songs of Hugo Wolf was considered unsurpassed in her day. In 1933 she settled in London, where she developed her career as a teacher. She gave her last recital at Liverpool in 1947.

geriatrics: *see* gerontology and geriatrics.

Géricault, (Jean-Louis-André-)Théodore (b. Sept. 26, 1791, Rouen, Fr.—d. Jan. 26, 1824, Paris), painter who exerted a seminal influence on the development of Romantic art in France. Géricault was a fashionable dandy and an avid horseman whose dramatic paintings reflect his colourful, energetic, and somewhat morbid personality.

As a student Géricault learned the traditions of English sporting art from the French painter Carle Vernet, and he developed a remarkable facility for capturing animal movement. He also mastered classicist figure construction and composition under the academician Pierre Guérin. Another student of Guérin, Eugène Delacroix, was profoundly influenced by Géricault, finding a major point of departure in his art.

As demonstrated by his earliest major work, "The Charging Chasseur" (1812; Louvre, Paris), which depicts an officer astride a rearing horse on a smoky battlefield, Géricault was drawn to the colourist style of the Baroque painter Peter Paul Rubens and to the use of contemporary subject matter in the manner of his older colleague, the painter Antoine-Jean Gros. At the Salon of 1814, Géricault's "Wounded Cuirassier" (Louvre) shocked critics with its ponderous forms and sombre colours. While at Florence and Rome (1816–17), he became fascinated with Michelangelo and Baroque art. His chief project at this time was an unfinished "Race of the Riderless Horse," a heroic frieze composition.

"A Mad Woman with a Mania of Envy," one of a series of five oil paintings of the insane by Théodore Géricault, 1822–23; in the Musée des Beaux-Arts, Lyon
By courtesy of the Musee des Beaux-Arts, Lyon

After returning to France, Géricault drew a group of lithographs on military subjects that are reckoned among the earliest masterworks in that medium. Géricault's masterpiece is the large painting entitled "The Raft of the Medusa" (1818–19; Louvre). This work depicted the aftermath of a contemporary French shipwreck, whose survivors embarked on a raft and were decimated by starvation before being rescued at sea. The shipwreck had scandalous political implications at home, and Géricault's picture of the raft and its inhabitants was greeted with hostility by the government. But the work's macabre realism, its treatment of the raft incident as epic-heroic tragedy, and the virtuosity of its drawing and tonalities combine to give the painting great dignity and monumentality and carry it far beyond mere contemporary reportage. The portrayal of the dead and dying, developed within a dramatic, carefully constructed composition, marked the beginning of the struggle between the Neoclassical and Romantic movements.

Disappointed by the reception of "The Raft of the Medusa," Géricault went to England (1820–22), where he produced a body of lithographs, watercolours, and oils of jockeys and horses. The foremost of the final works of his brief but stormy career are five perceptive and realistic portraits of the criminally insane, undertaken to illustrate varieties of mental illness. Géricault died after a fall from a horse.

Gérin-Lajoie, Antoine (b. Aug. 4, 1824, Yamachiche, Que., Lower Canada—d. Aug. 4, 1882, Ottawa), writer, librarian, and leader in the early literary movement of French Canada.

While a student at the Collège de Nicolet in Nicolet, Que., he wrote the first French-Canadian play, *Le Jeune Latour* (1884; "The Young Latour"). While on the staff of the

Montreal newspaper *La Minerve,* of which he soon became the editor, he studied law and, in 1848, was called to the Quebec bar. He later served as translator to the legislative assembly of Canada (1852–56) and as assistant librarian of Parliament (1856–80).

Gérin-Lajoie was one of the founders of the Institut Canadien of Montreal and of the literary magazines *Les Soirées Canadiennes* (1861–65; "Canadian Evenings") and *Le Foyer Canadien* (1863–66; "The Canadian Home"). He was the author of *Catechisme politique* (1851; "Political Catechism"); *Dix Ans au Canada, de 1840 à 1850* (1888; "Ten Years in Canada, from 1840 to 1850"), the history of the advent of responsible government in the colony; and of a novel in two parts, *Jean Rivard, le défricheur* (1862; "Jean Rivard, the Reclaimer") and *Jean Rivard, l'économiste* (1864; "Jean Rivard, the Economist"), a portrayal of rural life in French Canada in the mid-19th century.

Gerizim, Mount, Arabic JABAL AṬ-ṬŪR, Hebrew HAR GERIZIM, mountain in Samaria, central Palestine, just south of Nābulus and the site of biblical Shechem. In modern times, it was in mandated Palestine 1923–48, and subsequently in Jordan 1950–67. Since 1967, it has been part of the West Bank (Judaea and Samaria) territory under Israeli administration. Rising to 2,890 ft (881 m) above sea level, it is a twin of Mt. Ebal (Hebrew Har 'Eval, Arabic Jabal 'Aybāl; 3,084 ft [940 m]) just north. Separating the two is a valley, about 700 ft deep, through which passes one of the few east–west routes of the central Palestine hill country; the mountain was of strategic importance from remote antiquity. It is mentioned in the Old Testament as the site where God was to pronounce blessing on the Jewish people (the curse was placed on Mt. Ebal; Deuteronomy 11:29). The ceremony was solemnly performed in Joshua's time (Josh. 8). The mountain is referred to in the Talmud, the normative rabbinic compendium of law and tradition, and in the writings of the Roman-Jewish historian Flavius Josephus (1st century AD).

The Samaritans (*q.v.*), a small Jewish sect, built a shrine there during the early Second Temple period (4th century BC) and directed their prayers there, instead of to Jerusalem. This sect, which exists in very small numbers, has altered all references in its Bible (consisting only of the Five Books of Moses) pertaining to Jerusalem, Zion, etc., to refer instead to Mt. Gerizim. The members of the group, who live chiefly on the mountain slopes and in adjacent Nābulus, still perform the sacrifice of the paschal lamb on Passover according to literal biblical injunction; this ceremony attracts many tourists. Although the original Samaritan sanctuary was on the mountain's summit, it is now performed lower down on the slopes, because of an ancient Muslim cemetery at the peak, which "defiles" it to the Samaritans. The modern Arabic name is from the Samaritan Tura Berikha: Mount of Blessing.

Gerlach, Helmut (Georg) von (b. Feb. 2, 1866, Mönchmotschelnitz, Silesia—d. Aug. 2, 1935, Paris), German pacifist journalist and politician, a consistent opponent of German nationalism, whose writings exercised a significant influence on public opinion during the latter part of the reign of William II and during the Weimar Republic.

Originally a conservative, Gerlach became associated with the Christian Socialist movement during his studies at German and foreign universities. After a short interlude as a minor civil servant, he joined Adolf Stöcker's Christian Socialist and anti-Semitic newspaper, *Das Volk,* but was dismissed in 1896 as too radical. Gerlach founded the National-sozialer Verein (National Social Union) with the Protestant theologian and Socialist politician Friedrich Naumann that same year and wrote for his organization's paper *Die Zeit.* In 1901 he became an editor of the democratic Berlin weekly *Die Welt am Montag,* a position he was to hold for more than two decades. After espousing pacifist views during World War I, Gerlach, who had already gained governmental experience as a Reichstag member from 1903 to 1907, became an undersecretary in the ministry of the interior after the German revolution (November 1918). When his attempt to reunite the Social Democratic Party (SPD) failed, he resigned early in 1919.

During the Weimar period, Gerlach, now a renowned journalist, polemicized against such topical issues as the Kapp Putsch (1920), militarist propaganda, the paramilitary organization Der Stahlhelm, and anti-Semitism. Supported mainly by the left bourgeoisie and certain Socialist elements, he called for a German–French and German–Polish understanding and a genuinely democratic German government. Gerlach was a member of the pacifist Neues Vaterland (New Fatherland) organization and chairman of the Deutsche Liga für Menschenrechte (German League for Human Rights). In 1932 he became editor of the radical weekly *Die Weltbühne.* When Hitler came to power in 1933, Gerlach went first to Austria, then to Paris, where he aided German anti-Nazi refugees until his death.

Gerlach, (Ludwig Friedrich) Leopold von (b. Sept. 17, 1790, Berlin—d. Jan. 10, 1861, Potsdam, Prussia), the eldest of three brothers prominent in German conservatism during the first half of the 19th century. A Prussian general and adjutant and political adviser to King Frederick William IV, he consistently pursued a conservative policy defending the old order, especially after the abortive 1848 revolution.

Leopold von Gerlach, detail from a lithograph
Interfoto-Friedrich Rauch, Munich

Participating in the wars against Napoleon, Leopold became imbued with a conservative, romantic spirit that was to remain part of him. He counted the patriotic poets Achim von Arnim and Heinrich von Kleist among his friends as well as the Prussian crown prince, who later became Frederick William IV. Always strongly religious, Leopold practiced a pietism then popular in Germany. Politically, he followed the conservative position of the Swiss political scientist Karl Ludwig von Haller and the German philosopher and politician F.J. Stahl, which advocated the retention of the political status quo and championed Austria and Russia, Prussia's partners in the Holy Alliance. Leopold's influence on policy increased rapidly after the accession of Frederick William IV (1840). From 1848 to 1854 Gerlach was at the height of his power. Made adjutant general in 1850, he was the moving spirit of the court camarilla, which opposed the German revolution, persuaded the Prussian monarch to refuse the crown offered by the Frankfurt assembly, and attempted to channel the 1850 constitution into a more conservative direction. Despite his friendship with Russia, he advocated a policy of strict neutrality during the Crimean War (1854–56). Leopold died eight days after his sovereign.

Gerlach, (Ernst) Ludwig von (b. March 7, 1795, Berlin—d. Feb. 18, 1877, Berlin), Prussian judge, politician, and editor who helped found the conservative newspaper *Kreuzzeitung* (1848), which became the voice of the Conservative Party, and which opposed Bismarck's unification plans for Germany during the 1860s and '70s.

Ludwig von Gerlach, lithograph
Interfoto-Friedrich Rauch, Munich

Like his brother Leopold, Ludwig took part in the Napoleonic Wars and shared the same beliefs and circle of friends. After holding a number of judicial posts, he was appointed to work with the eminent jurist F.K. von Savigny on the law code reform (1842). From 1844 to 1874 he served as president of the Magdeburg appeals court.

The founding of the *Kreuzzeitung* gave him a platform from which to expound his conservative views. A strong Christian, Ludwig advocated freedom of the church from state interference and the formation of Protestants and Catholics into one conservative political bloc. He influenced practical politics chiefly through his brother. After serving as a conservative member in the post-1848 diets, Ludwig entered the Prussian diet (1873), and the Reichstag (1877), as a deputy of the Catholic Centre Party, though he was himself a lifelong Protestant. He sided with the church against Bismarck during the latter's persecution of Catholics, the Kulturkampf (1872–79). Defending Austria's position in Germany, Ludwig opposed Bismarck's manoeuvres to create a united Germany based on Prussian hegemony.

Gerlach, (Karl Friedrich) Otto von (b. April 12, 1801, Berlin—d. Oct. 24, 1849, Berlin), Prussian Lutheran theologian and educator, younger brother of Leopold and Ludwig von Gerlach.

Educated at Berlin, Heidelberg, and Göttingen, he began lecturing at the University of Berlin in 1828; in 1834 he became pastor at the new St. Elisabeth Church in Berlin's working-class district and brought a new kind of pastoral social work into the homes of the people. Eventually he became a court preacher and a regular professor at the university.

Gerlach, Walther (b. Aug. 1, 1889, Biebrich am Rhein, Ger.—d. Aug. 10, 1979, Munich), German physicist noted especially for his work with Otto Stern on the deflections of atoms in a nonhomogeneous magnetic field.

Educated at the University of Tübingen, he became a lecturer there in 1916; after periods at Göttingen and Frankfurt, he returned to Tübingen as professor of physics in 1925 and

from 1929 to 1957 was professor of physics at Munich. He was best known for his part in the Stern–Gerlach experiment (*q.v.*), but he also made contributions in the fields of radiation, spectroscopy, and quantum theory. His books include *Grundlagen der Quantentheorie* (1921), *Magnetismus* (1931), *Humaniora und Natur* (1950), and *Kepler und die Copernicanische Wende* (1973).

Gerlache, Étienne-Constantin, baron de (b. Dec. 26, 1785, Biourge, Luxembourg—d. Feb. 10, 1871, Brussels), Belgian Catholic statesman and historian and a parliamentary leader in the first years of the Belgian kingdom established in 1830. He helped Leopold of Saxe-Coburg become the first king of the Belgians as Leopold I in 1831.

After practicing law in Paris, Gerlache moved to Liège following the creation of the Kingdom of the United Netherlands in 1815, and became a member of the States General (later, the National Assembly). Although he favoured maintaining the union of the Dutch and Belgian provinces, his support for the coalition of the Belgian Catholic and Liberal parties (1828) helped pave the way for the Belgian Revolution of 1830. He subsequently supported the rebel government and, as president of the National Congress (1831), nominated Leopold of Saxe-Coburg for the Belgian monarchy. He resigned as president of the Chamber of Representatives in 1832 in keeping with Pope Gregory XVI's encyclical of that year opposing separation of church and state.

President of the Cour de Cassation (Supreme Court of Appeal; 1832–67) and a baron from 1844, Gerlache presided at the Catholic conferences at Mechelen (1863–67). The increasing Catholic, conservative, and anti-Dutch tendencies of his thought were reflected in his *Histoire de Pays-Bas,* 3 vol. (1839; "History of The Netherlands"), and his *Essai sur le mouvement des partis en Belgique* (1852; "Essay on the Party Movement in Belgium"). A complete edition of his works in six volumes appeared in 1874–75.

Gerlache de Gomery, Adrien-Victor-Joseph, baron de (b. Aug. 2, 1866, Hasselt, Belg.—d. Dec. 4, 1934, Brussels), Belgian naval officer who led the first Antarctic expedition concentrating on scientific observation (1897–99). Sailing with him as mate on the "Belgica" was Roald Amundsen, who on a subsequent expedition of his own was the first to reach the South Pole. After making discoveries north of Graham (Palmer) Land, de Gerlache navigated the "Belgica" into the pack ice, where it remained trapped for 13 months and thus became the first vessel to winter in the Antarctic.

He sailed to the Persian Gulf to collect zoological specimens (1901). He also conducted oceanographic studies—off the east coast of Greenland (1905), north of Scandinavia and Russia in the Barents and Kara seas (1907), and in the Barents and Greenland seas (1909). De Gerlache made an overland crossing of Greenland from west to east at 77° N in 1909. He assisted the English explorer Sir Ernest Shackleton in planning the British Imperial Trans-Antarctic Expedition of 1914 to 1917.

germ plasm, according to the theories of the 19th-century German biologist August Weismann, the germ cells (sex cells) and their precursors are bearers of the hereditary characters. Weismann considered the germ plasm to be fundamentally independent of all other body cells (the soma). In modern terms, "germ plasm" may be identified with DNA (*see* deoxyribonucleic acid).

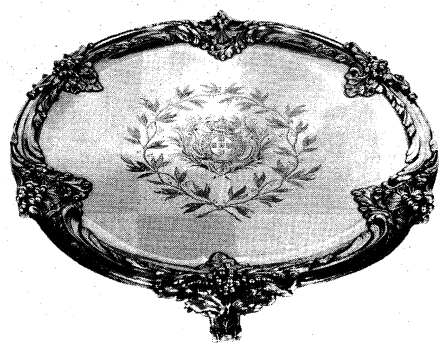
germ theory, in medicine, the theory that certain diseases are caused by the invasion of the body by microorganisms, organisms too small to be seen except through a microscope. The French chemist and microbiologist Louis Pasteur, the English surgeon Joseph Lister, and the German physician Robert Koch are given much of the credit for development and acceptance of the theory. In the mid-19th century Pasteur showed that fermentation and putrefaction are caused by organisms in the air; in the 1860s Lister revolutionized surgical practice by utilizing carbolic acid (phenol) to exclude atmospheric germs and thus prevent putrefaction in compound fractures of bones; and in the 1880s Koch identified the organisms that cause tuberculosis and cholera.

Although the germ theory has long been considered proved, its full implications were not immediately apparent; bloodstained frock coats were considered suitable operating-room attire even in the late 1870s, and surgeons operated without masks or head coverings as late as the 1890s.

Germain DE PARIS, SAINT: *see* Germanus of Paris, Saint.

Germain OF AUXERRE, SAINT: *see* Germanus of Auxerre, Saint.

Germain, François-Thomas (b. 1726, Paris—d. Jan. 24, 1791, Paris), last of the distinguished Germain family of Parisian silversmiths. He took over the family workshop on the death of his father, Thomas Germain (*q.v.*), in 1748. At the same time he was granted apartments in the Louvre and was made the royal silversmith. He continued the work of his father of supplying the court with such objects as tableware, chandeliers, inkstands, and altar vessels, all in ornate Rococo style. He also had important foreign commissions, particularly from the courts of Russia and Portugal.



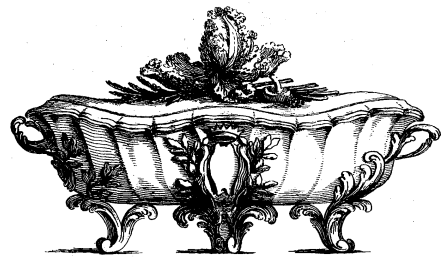
Silver-gilt salver by François-Thomas Germain, 1757; in the Stavros Niarchos Collection
Caisse Nationale des Monuments Historiques

Unlike his father, he lived extravagantly, and, despite his marriage to an heiress in 1763, he was declared bankrupt in 1765. He continued to produce outstanding work until about 1780, when he fell into obscurity.

Germain, Lord George: *see* Sackville, George Sackville Germain, 1st Viscount.

Germain, Pierre (b. 1645, Paris—d. 1684, Paris), first notable member of a distinguished family of Parisian silversmiths.

Germain was the son of a silversmith and at the age of 17 was presented to Louis XIV. He was admitted as a master in the guild in 1669. In 1677 he made an ornate frame for a portrait of the King, notable for its flattery of the monarch in its reliefs and inscription. He was given apartments in the Louvre in 1679. Among his more important works were a cross and six silver chandeliers for the chapel at Fontainebleau (1680), an eight-branched chandelier for Versailles (1683), and a large chandelier with movable branches attached to eight human heads in silver for the luxurious apartment of the Dauphin at Versailles (1684). As far as is known, none of Germain's work for the court survives.



Engraving by Pasquier after a design for terrine from *Elements d'orfèvrerie* by Pierre Germain
By courtesy of the Bibliotheque Nationale, Paris

Germain, Sophie (b. April 1, 1776, Paris—d. June 27, 1831, Paris), French mathematician who contributed notably to the study of acoustics, elasticity, and the theory of numbers. Her most fruitful contribution was the limited proof of Fermat's last theorem for the case in which x, y, z are not divisible by an odd prime, n; the theorem states that there is no solution for the equation $x^n + y^n = z^n$ if n is an integer greater than 2, and x, y, and z are nonzero integers. The theorem has not yet been proved or disproved for all cases.

Having mastered calculus by studying what books she could obtain, Germain took correspondence courses from the École Polytechnique, Paris, which did not allow women in the school itself. In 1811, 1813, and 1816 she presented three theoretical memoirs on the German physicist Ernst F.F. Chladni's experimental findings on vibrating plates. The last memoir was awarded a prize by the Institut de France.

Sophie Germain was a friend of the eminent mathematicians Joseph-Louis Lagrange of France and Carl Friedrich Gauss of Germany, with whom she corresponded under the pseudonym M. Leblanc before revealing her identity. She was so highly esteemed by Gauss that he recommended her for an honorary doctorate degree from the University of Göttingen. She died before the degree could be awarded.

Germain, Thomas (b. 1673, Paris—d. Aug. 14, 1748, Paris), French silversmith, perhaps the best known member of a distinguished family of silversmiths.

The son of Pierre Germain, he studied painting as a boy under Louis Boullogne the Younger. In about 1688 he was sent to Rome, where in 1691 he became apprenticed to an Italian silversmith. Soon he was employed as one of the artists on the altar of St. Ignatius for the Church of the Gesù. Other commissions followed, and from 1697 he was an independent silversmith. By 1706 he was back in France, where he was active until the 1720s on church commissions. Among such works was a silver-gilt monstrance (vessel to contain the Host) for Notre Dame in Paris, commissioned in 1716. He became a master in the guild in 1720, and in 1722 he made a silver-gilt sun (destroyed in 1790) for the coronation of Louis XV. Germain was granted apartments in the Louvre in 1723, when he was a royal goldsmith. From then until his death he was particularly active in making such objects as covered dishes, candlesticks, sconces, and plates for the King. He also produced numerous objects for special occasions, such as gold rattles on the birth of royal children. Although he is best known for flamboyantly elaborate objects in the Rococo style, some of his pieces were simple and elegant.

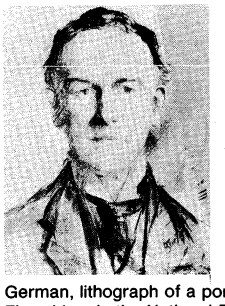
Germain also had foreign patrons, including the Elector of Cologne, the King of Portugal, the Queen of Spain, and the King and Queen of Naples. The Portuguese court was particularly important: during the 40-year period beginning in 1728 some 3,000 silver works are believed to have been made by the Germain workshop for the palace in Lisbon. For a wealthy Portuguese nobleman, the Duke of

Alveiro, he executed in 1730 an exceptionally fine *surtout de table* (table centrepiece), ornately decorated with cupids, hounds, and hunting horns.

Also active in the political life of Paris, Germain was elected a city councillor and alderman in 1738 and reelected in 1741. At his own expense he designed and built a small church, Saint-Louis du Louvre (consecrated 1744; destroyed in 1810), where he was buried.

German, Sir Edward, original name EDWARD GERMAN JONES (b. Feb. 17, 1862, Whitchurch, Shropshire, Eng.—d. Nov. 11, 1936, London), popular composer of light operas whose music was noted for its lyric quality and distinctly English character.

German began his career as an orchestral violinist and conductor in London and became known for his incidental music to the plays *Henry VIII* and *Nell Gwynn.* In 1901 he completed Sir Arthur Sullivan's *The Emerald Isle.* His light operas include *Merrie England, A*



German, lithograph of a portrait by Flora Lion; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Princess of Kensington, Tom Jones, and *Fallen Fairies,* on a libretto by Sir W.S. Gilbert. He also composed several orchestral works and songs. He was knighted in 1928.

German 88, versatile 88-millimetre (3.46-inch) multirole artillery piece, developed from 1917 by Germany. It was tested in the Spanish Civil War and was used extensively by the Germans in World War II as a field-artillery piece and as an antiaircraft and antitank gun. It was in fact the most effective antitank gun used by any side in that conflict. Many versions of the German 88 were developed. In the late 1970s there were reports that some were still in service in Czechoslovakia, Finland, Spain, and Yugoslavia.

German-American Bund, also called (1933–35) FRIENDS OF THE NEW GERMANY, American pro-Nazi, quasi-military organization that was most active in the years immediately preceding the United States' entry into World War II. The Bund's members were mostly American citizens of German ancestry. The organization received covert guidance and financial support from the German government. Military drill and related activities were provided for adults and youths at Bund-maintained camps: Camp Siegfried, Yaphank, N.Y.; Camp Nordland, Andover, N.J.; Deutschhorst Country Club, Sellersville, Pa.; and elsewhere.

Anti-Semitic and pro-Nazi elements in the United States generally supported the Bund. The Bund included self-designated storm troopers, who affected the uniforms of the German Nazi SA. Mass rallies were held at such sites as Madison Square Garden in New York City. In 1939 the Bund's total membership was about 20,000.

In 1939 the Bund's national leader, Fritz Julius Kuhn, was prosecuted for grand larceny (misappropriating Bund money) and forgery; in 1940 its national secretary, James Wheeler-Hill, was convicted of perjury. After the United States' entry into World War II, the Bund disintegrated.

German Christian, any of the Protestants who attempted to subordinate church policy to the political exigencies of Nazi Germany. The German Christians' Faith Movement, organized in 1932, was nationalistic and so anti-Semitic that extremists wished to repudiate the Old Testament and the Pauline Letters because of their Jewish authorship. In July 1933 the state territorial churches merged to form the German Evangelical Church, and in September the German Christian candidate, Ludwig Müller, became *Reichsbischof* ("imperial bishop"). Müller's efforts to make the church an instrument of Nazi policy were resisted by the Confessing Church, under the leadership of Martin Niemöller. After World War II the German Christian Church party was banned.

German Civil Code, German BÜRGERLICHES GESETZBUCH, the body of codified private law that went into effect in the German empire in 1900. Though it has been modified, it remains in effect. The code grew out of a desire for a truly national law that would override the often conflicting customs and codes of the various German territories.

The code is divided into five parts. The first is general, covering concepts of personal rights and legal personality. The subjects of the other four parts are: obligations, including concepts of sale and contract; things, including immovable and movable property; domestic relations; and succession.

The concept of law embodied in the code was the *gemeines Recht,* the common law based on the 6th-century codification of Roman law put in force by the emperor Justinian. In family law and to some extent in the law of property, some elements of Germanic tribal law also influenced the code. Although altered to some extent by feudal law, customary law again came under Roman influence in the 15th century, when Roman law was received into Germany in an effort to systematize customs and legal institutions. In some areas it superseded custom, particularly when there was no conflict between the two; in others, Roman and customary law existed side by side, with custom prevailing when there were insurmountable differences.

The movement for codification began in the 18th century with the Bavarian Code of 1756 and the Prussian Civil Code of 1794 and received its major impetus from the Napoleonic Code, which remained in operation in the 19th century throughout much of the western area of Germany, including Alsace and Westphalia. As had been the case at the time of the French codification (1804), there was a desire in Germany to reconcile the vast incongruities in the law among different towns and territories. Even within cities there were sometimes two distinct bodies of private law in operation. Some areas of Germany were under the Napoleonic Code, others under the Prussian Civil Code, others under local codes and customs, and still others under various combinations of all of these.

Throughout the 19th century, German legal scholars argued about the type of national code that should be written and, indeed, whether one should be written at all. The arguments were intense enough to have the effect of delaying codification. Only with the formation of the *Reich* ("empire") in 1871 was it possible to undertake a program of national codification. Commissions were established, and, when the first draft of the code was presented for critical appraisal in 1888, it was rejected as being too Roman. A second draft was promulgated in 1896 and went into effect in 1900.

The German Civil Code has had an important influence on the private law of other countries, particularly Japan, Switzerland, and Greece. It has influenced the law of Austria and, in conjunction with the Swiss Civil Code, that of the Soviet Union and the Scandinavian countries, among others. *Compare* Napoleonic Code; Prussian Civil Code.

German curling (game): *see* Eisstockschiessen.

German Democratic Republic, byname EAST GERMANY, German DEUTSCHE DEMOKRATISCHE REPUBLIK, or OSTDEUTSCHLAND, former country (1949–90) that constitutes the northeastern section of present-day Germany (*q.v.*).

To make the best use of the Britannica, consult the INDEX *first*

German East Africa, German DEUTSCH-OSTAFRIKA, former dependency of imperial Germany, corresponding to present-day Rwanda and Burundi, the continental portion of Tanzania, and a small section of Mozambique. Penetration of the area was begun in 1884 by German commercial agents, and German claims were recognized by the other European powers in the period 1885–94. In 1891 the German imperial government took over administration of the area from the German East Africa Company. Although its subjugation was not completed until 1907, the colony experienced considerable economic development before World War I. During the war, it was occupied by the British, who received a mandate to administer the greater part of it (Tanganyika Territory) by the Versailles Treaty (1919). A smaller portion (Ruanda-Urundi) was entrusted to Belgium.

German Federal Railway: *see* Deutsche Bundesbahn.

German language, German DEUTSCH, official language of both Germany and Austria and one of the three official languages of Switzerland. German belongs to the West Germanic group of the Indo-European language family, along with English, Frisian, and Netherlandic (Dutch, Flemish).

The recorded history of Germanic languages begins with their speakers' first contact with the Romans, in the 1st century BC. At that time and for several centuries thereafter, there was only a single "Germanic" language, with little more than minor dialect differences. Only after about the 6th century AD can one speak of a "German" (*i.e.,* High German) language.

German is an inflected language with four cases for nouns, pronouns, and adjectives (nominative, accusative, genitive, dative), three genders (masculine, feminine, neuter), and strong and weak verbs. Altogether German is the native language of more than 90 million speakers and thus probably ranks sixth in number of native speakers among the languages of the world (after Chinese, English, Hindi-Urdu, Spanish, and Russian). German is widely studied as a foreign language and is one of the main cultural languages of the Western world.

As a written language German is quite uniform; it differs in Germany, Austria, and Switzerland no more than written English does in the United States and the British Commonwealth. As a spoken language, however, German exists in many dialects, most of which belong to either the High German or Low German dialectal groups. The main difference between High and Low German is in the sound system, especially in the consonants. High German, the language of the southern highlands of Germany, is the official written language. *See also* Germanic languages.

High German (Hochdeutsch). Old High German, a group of dialects for which there was no standard literary language, was spoken until about 1100 in the highlands of southern Germany. During Middle High German

times (after 1100), a standard language based on the Upper German dialects (Alemannic and Bavarian) in the southernmost part of the German speech area began to arise. Middle High German was the language of an extensive literature that includes the early 13th-century epic *Nibelungenlied.*

Modern standard High German is descended from the Middle High German dialects and is spoken in the central and southern highlands of Germany, Austria, and Switzerland. It is used as the language of administration, higher education, literature, and the mass media in the Low German speech area as well. Standard High German is based on, but not identical with, the Middle German dialect used by Martin Luther in his 16th-century translation of the Bible. Within the modern High German speech area, Middle and Upper German dialect groups are differentiated, the latter group including Austro-Bavarian, Alemannic (Swiss German), and High Franconian.

Low German (Plattdeutsch, or Niederdeutsch). Low German, with no single modern literary standard, is the spoken language of the lowlands of northern Germany. It developed from Old Saxon and the Middle Low German speech of the citizens of the Hanseatic League. The language supplied the Scandinavian languages with many loanwords, but, with the decline of the league, Low German declined as well.

Although the numerous Low German dialects are still spoken in the homes of northern Germany and a small amount of literature is written in them, no standard Low German literary or administrative language exists.

Other major dialects. Alemannic dialects, which developed in the southwestern part of the Germanic speech area, differ considerably in sound system and grammar from standard High German. These dialects are spoken in Switzerland, western Austria, Swabia, and Liechtenstein and in the Alsace region of France. Yiddish, the language of the Ashkenazic Jews (Jews whose ancestors lived in Germany in the European Middle Ages), also developed from High German.

German literature, body of literary works written by the German-speaking peoples of Europe, including those inhabiting the nations of Germany, Austria, and Switzerland.

A brief treatment of German literature follows. For full treatment, see MACROPAEDIA: German Literature.

The first written records of the continental German tribes date back to the 8th century, but there is evidence of an earlier oral tradition. This tradition consisted of *Heldenlieder,* songs extolling the exploits of heroes, as well as pagan religious hymns and battle songs. The first significant texts in German, often translated from Latin, appeared in the 9th century as the result of efforts by clerics to promulgate Christian teachings.

A revival of vernacular literature occurred from about 1050. One of the principal genres of this new period, commonly called the Middle High German period, was the medieval court epic. Works of this type recounted traditional tales of courtly romance and the combats of feudal knights. The prestige of the German court epic rests on three poets: Hartmann von Aue, Wolfram von Eschenbach, and Gottfried von Strassburg. The *Nibelungenlied* is the most famous Middle High German epic poem. The other important genre of this period was the *Minnesang,* or love lyric, in which a poet expressed adoration of his beloved lady according to courtly conventions. The most accomplished of the minnesingers was Walther von der Vogelweide. From about 1450 there materialized a new bourgeois realism that embraced humanism and developed a literature of a decidedly satirical or didactic tone, perhaps best exemplified by Sebastian Brant's *Das Narrenschiff* (1494; "The Ship of Fools"), which ridiculed all the vices of the age.

The Reformation of the 16th century had several effects on German literature. The most lasting was the impact of Martin Luther's translation of the Bible into German. The dialect that he used (namely, the dialect of Meissen) was eventually adopted as the literary language of all Germany. Other important works were the witty verse anecdotes and *Fastnachtsspiele* (Shrovetide plays) of Hans Sachs.

German Baroque literature in the 17th century shared the themes popular in Europe at that time. Life was seen as ruled by the turns of fickle fortune, all earthly things were considered illusory, and man was regarded as an actor merely playing a role on the world's stage. The German novel consisted of long, rambling mixtures of morality and fantasy. Two writers stood out—Johann Beer and H.J.C. von Grimmelshausen. The latter's *Abenteuerliche Simplicissimus* (1669; *The Adventurous Simplicissimus*), which combined prevailing themes with religious and metaphysical insight, remains one of the finest of German novels. In lyric poetry, Andreas Gryphius, Angelus Silesius (Johann Scheffler), and Paul Fleming expressed with religious ardour the hopes and fears of the age. The same emotional intensity is found in the tragedies of Gryphius.

The Enlightenment emerged in Germany in about the mid-1700s. Literature associated with the movement, as, for example, the dramas of Gotthold Ephraim Lessing and the prose fiction of Christoph Martin Wieland, manifested a preoccupation with ethical issues and an optimistic belief in human perfectability. By the 1760s there arose a literary movement known as the Sturm und Drang ("Storm and Stress"), whose exponents, including Johann Wolfgang von Goethe and Friedrich Schiller, exalted nature, feeling, originality, and rebellion against authority. The later works of Goethe, such as *Iphigenie auf Tauris* (1787), and Schiller, including *Wallenstein* (1800), show an evolution toward Johann Gottfried von Herder's ideal of *Humanität* (a reconciliation of intellect and feeling) and epitomize German Neoclassicism.

The predominant literary movement of the early 1800s was Romanticism. A yearning for antiquity is particularly evident in the works of the poet Friedrich Hölderlin. The principal theorists of the first Romantic school were the brothers August Wilhelm and Friedrich von Schlegel; the second Romantic school revived interest in folk songs and medieval romances as sources of inspiration for poetry. Later Romantics focused on the darker aspects of life, such as those found in the dramas of Heinrich von Kleist. E.T.A. Hoffmann wrote numerous tales dealing with fantasy and the grotesque. Among the prominent writers of the post-Napoleonic era was the Austrian playwright Franz Grillparzer, who cultivated dramas in the Neoclassical tradition but at the same time introduced a new realism.

By the 1820s, Romanticism was the subject of severe criticism by such poets as Heinrich Heine. In the 1830s a movement called Junges Deutschland ("Young Germany") sought to utilize literature as a vehicle for political criticism. Of greater significance to German letters was the development of Poetic Realism, which aimed to point up the positive elements of ordinary life itself. Its major exponents included Adalbert Stifter of Austria, Gottfried Keller of Switzerland, and Friedrich Hebbel and Theodor Fontane of Germany. By the last decade of the 19th century, the naturalist movement depicted social reality and the ugly, sordid aspects of life with "scientific" objectivity. The leading representative of the movement was Gerhart Hauptmann, whose drama *Die Weber* (1892; *The Weavers*) portrayed the plight of the Silesian weavers.

During the early 1900s various writers, including the Viennese Hugo von Hofmannsthal and Arthur Schnitzler, embraced the Impressionist mode to evoke mood or a certain state of mind. Such prominent poets as Stefan George and Rainer Maria Rilke were indebted to Symbolism, as was Thomas Mann, who made use of symbol and myth in several novels, the most outstanding example of which was *Der Zauberberg* (1924; *The Magic Mountain*). Hermann Hesse, in his novels *Demian* (1919) and *Der Steppenwolf* (1927), exhibits a fascination with poetic symbol, fantasy, and psychoanalysis. Expressionism, foreshadowed in the dramas of Frank Wedekind, became an important trend during and immediately after World War I. Its proponents endeavoured to unmask the often ugly reality behind facades. Notable Expressionists in drama included Ernst Toller and Georg Kaiser; in poetry, Georg Trakl, Gottfried Benn, and Else Lasker-Schüler; and in prose, Alfred Döblin. In many of his novels and short stories, Franz Kafka dealt with themes reminiscent of the Expressionists, bringing into sharp relief the horror and uncertainty of human existence. After 1918, Social Realism, with its emphasis on objectivity, held sway until the Nazis took power. Notable works of this period include the social-documentary novels of Anna Seghers, perhaps best represented by *Das siebte Kreuz* (1942; *The Seventh Cross*), and *Streit um den Sergeanten Grischa* (1928; *The Case of Sergeant Grischa*) by Arnold Zweig, a seminal work of the interwar years.

The atmosphere and problems of the post-World War II years were captured in the prose fiction of Wolfgang Borchert, Ilse Aichinger, and Heinrich Böll. Günter Grass painted a more exuberant, albeit grotesque, picture of modern German history in a series of novels during the late 1950s and '60s. Dramatist Bertolt Brecht, whose sardonic humour and biting social commentary left their mark on readers of many lands, is the creator of what is known as epic theatre. The Swiss authors Max Frisch and Friedrich Dürrenmatt criticized the emotional sterility of modern life. Other significant 20th-century writers in German include Peter Handke, an Austrian, and Christa Wolf.

A development of an earlier form, the so-called New German Radio Play is a dramatic genre derived from concrete poetry in which meaning gives way to experimentation with form and sound. Two additional contemporary trends include a predilection for complex, esoteric verse, such as the intricate hermetic pieces of Paul Celan, and a preference for a simple, plain style, as in the case of the symbolic yet folklike poetry of Christine Lavant.

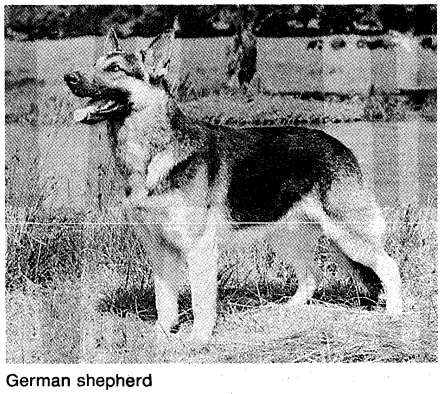
German measles: *see* rubella.

German National Assembly: *see* Frankfurt National Assembly.

German National People's Party, German DEUTSCHNATIONALE VOLKSPARTEI (DNVP), right-wing political party active in the Reichstag (assembly) of the Weimar Republic of Germany from 1919 to 1933. Representing chauvinistic opinion hostile to the republic and to the Allies' reparation demands following World War I, it supported the restoration of monarchy, a united Germany, and private enterprise. It gathered strength in the elections of 1920 (66 Reichstag seats) and was at its height in the two elections of 1924, with 106 and 111 seats, respectively. In 1923–28 representatives of the Nationalists' more moderate section were brought into cabinets but were later forced out by the opposition of the party's irreconcilables, led by Alfred Hugenberg. During the domestic controversy over war reparations to the Allies (1929–30), the Na-

tionalist Party, under Hugenberg, allied with the Nazi Party in organizing a plebiscite in favour of stopping payments. This led to the establishment of an important financial link between the Nazis and the wealthy industrialists who supported the Nationalists. The Nationalists were among those who opposed the government of Heinrich Brüning and helped paralyze the Weimar regime during its last days. When Adolf Hitler eventually became chancellor (Jan. 30, 1933) it was in a coalition that included the Nationalists. After the elections of March 5, 1933, the party's deputies helped give Hitler his narrow voting majority in the Reichstag. The Nationalist deputies, along with those of the Centre Party and the Nazis, voted for the Enabling Act of March 23, 1933, which enabled Hitler to assume dictatorial powers. The DNVP, along with all other German political parties except the Nazi Party, was dissolved in the summer of 1933, and Hugenberg was forced to resign from the Cabinet.

German shepherd, also called ALSATIAN, breed of working dog developed in Germany from traditional herding and farm dogs. A strongly built, relatively long-bodied dog, the German shepherd stands 58 to 64 cm (23 to 25 inches) and weighs 27 to 39 kg (60 to 85 pounds). Its coat is of coarse, medium-long outer hair and shorter, dense inner hair



German shepherd
Sally Anne Thompson—EB Inc.

and ranges from white or pale gray to black and is often gray and black or black and tan. Noted for intelligence, alertness, and loyalty, it is used as a guide for the blind and as a watchdog and also serves in police and military work.

German South West Africa, German DEUTSCH-SÜDWESTAFRIKA, the name of Namibia (*q.v.*), when it was a colony of the German Empire from 1884 to 1919.

German-Soviet Nonaggression Pact, also called NAZI-SOVIET NONAGGRESSION PACT, GERMAN-SOVIET TREATY OF NONAGGRESSION, HITLER-STALIN PACT, or MOLOTOV-RIBBENTROP PACT (Aug. 23, 1939), nonaggression pact between Germany and the Soviet Union that was concluded a few days before the beginning of World War II and which divided eastern Europe into German and Soviet spheres of influence.

The Soviet Union had been repeatedly ignored in its attempts to enter into a collective-security agreement with Britain and France against Nazi Germany, most notably at the time of the Munich Conference (September 1938). By early 1939 the Soviets faced the prospect of resisting German military expansion in eastern Europe virtually alone, and so they began searching about for a change of policy. On May 3, 1939, Soviet leader Joseph Stalin fired Foreign Minister Maksim Litvinov, a Jew and an advocate of collective security, and replaced him with V.M. Molotov, who soon began negotiations with the Nazi foreign minister, Joachim von Ribbentrop. The Soviets also kept negotiating with Britain and France, but in the end Stalin chose to reach an agreement with Germany. By doing so he hoped to keep the Soviet Union at peace with Germany and to gain time to build up the Soviet military establishment, which had been badly weakened by the purge of the Red Army officer corps in 1937. The Western democracies' hesitance in opposing Adolf Hitler, along with Stalin's own inexplicable personal preference for the Nazis, also played a part in Stalin's final choice. For his part, Hitler wanted a nonaggression pact with the Soviet Union so that his armies could invade Poland virtually unopposed by a major power, after which Germany could deal with the forces of France and Britain in the west without having to simultaneously fight the Soviet Union on a second front in the east. The end result of the German-Soviet negotiations was the Nonaggression Pact, which was dated August 23 and was signed by Ribbentrop and Molotov in the presence of Stalin, in Moscow.

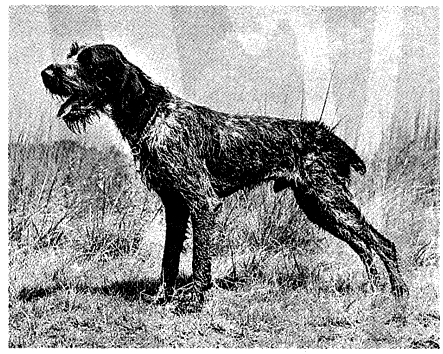
The terms of the pact were briefly as follows: the two countries agreed not to attack each other, either independently or in conjunction with other powers; not to support any third power that might attack the other party to the pact; to remain in consultation with each other upon questions touching their common interests; not to join any group of powers directly or indirectly threatening one of the two parties; to solve all differences between the two by negotiation or arbitration. The pact was to last for 10 years, with automatic extension for another 5 years unless either party gave notice to terminate it one year before its expiration.

To this public pact of nonaggression was appended a secret protocol (Aug. 23, 1939) dividing the whole of eastern Europe into German and Soviet spheres of influence. Poland east of the line formed by the Narew, Vistula, and San rivers would fall under the Soviet sphere of influence. The protocol also assigned Lithuania, Latvia, Estonia, and Finland to the Soviet sphere of influence and, further, broached the subject of the separation of Bessarabia from Romania. A secret supplementary protocol (signed Sept. 28, 1939) clarified the Lithuanian borders. The Polish-German border was also determined, and Bessarabia was assigned to the Soviet sphere of influence. In a third secret protocol (signed Jan. 10, 1941, by Count Friedrich Werner von Schulenberg and Molotov), Germany renounced its claims to portions of Lithuania in return for Soviet payment of a sum agreed upon by the two countries.

The public German-Soviet Nonaggression Pact caused consternation in the capitals of Britain and France. After Germany invaded Poland from the west on Sept. 1, 1939, Soviet troops invaded Poland from the east on September 17, meeting the advancing Germans near Brest-Litovsk two days later; the partition of Poland was effected on September 29. The Soviets soon afterward sought to consolidate their "sphere of influence" as a defensive barrier to renewed German aggression in the east. Accordingly, the Soviet Union attacked Finland on November 30 and forced it in March 1940 to yield the Isthmus of Karelia and make other concessions. The Baltic republics of Latvia, Lithuania, and Estonia were annexed by the Soviet Union and were organized as Soviet republics in August 1940. The Nonaggression Pact became a dead letter on June 22, 1941, when Nazi Germany, after having invaded much of western and central Europe, attacked the Soviet Union without warning in Operation Barbarossa.

Until 1989 the Soviet Union denied the existence of the secret protocols because they were considered evidence of involuntary annexation of the Baltic states. Despite eventual acknowledgment and condemnation of the protocols, leaders of the Soviet Union maintained that the secret documents had no bearing on the contemporary borders of the Soviet Union.

German wirehaired pointer, breed of sporting dog developed in mid-19th-century Germany as an all-purpose, all-weather hunting dog. It generally has a keen "nose" and a rugged constitution. It stands 56 to 66 cm (22 to 26 inches), weighs 23 to 32 kg (50 to 70



German wirehaired pointer
Walter Chandoha

pounds), and has a deep chest, a docked tail, and a short, strong back. Its straight, harsh, white and liver-coloured outer coat covers a dense undercoat, which is heavy in winter and very thin in summer.

germander, any of about 300 species of plants belonging to the genus *Teucrium,* which is a worldwide genus of the mint family (Lamiaceae), order Lamiales. American germander (*T. canadense*) of North America has slender spikes of purple to cream flowers on stems 90 cm (3 feet) tall. Native in Europe but naturalized in North America, wood sage (*T. scorodonia*) bears yellow flowers. Tree germander (*T. fruticans*), a shrub growing to 1.5 m (5 feet), has scattered pale blue to lilac flowers and lance-shaped leaves. It is native on hillsides of coastal Europe.

Germanic languages, languages of the Germanic branch of the Indo-European language family. Scholars often divide the Germanic languages into three groups: (1) West Germanic, including English, German, and Netherlandic, (2) North Germanic, including Danish, Swedish, Icelandic, and Norwegian, and (3) East Germanic, now extinct, comprising only Gothic and the languages of the Vandals, Burgundians, and a few other tribes.

A brief treatment of the Germanic languages follows. For full treatment, *see* MACROPAEDIA: Languages of the World.

The Germanic languages are grouped together because of strong similarities in phonology, grammar, and vocabulary, and all are thought to have derived from one ancient language. Though there are no records of this language, its structure can be surmised by comparing the several Germanic languages. Proto-Germanic kept the three genders of Proto-Indo-European but reduced the eight cases to six and added adjective declensions. It reduced the five moods of the parent language to three (indicative, imperative, and subjunctive) and simplified the four-tense system to a simple division between present and past, from which future and perfect tenses were derived.

Proto-Germanic is divided into branches. The East Germanic languages were spoken in the region centred on what is now Poland. All are extinct, though fragments remain of Gothic. The West Germanic languages developed around the North Sea and in overseas areas colonized by inhabitants of the area. This division includes six modern languages: English, Frisian, Netherlandic, Afrikaans, German, and Yiddish. English ranks second today among the world's languages in number

of native speakers (after Chinese) and is the world's most widely used second language. Frisian, which shares many of the sound shifts that distinguish English from the other Germanic languages, is spoken today in northern Netherlands and northwestern Germany. Netherlandic is the name given to the Dutch spoken in The Netherlands and the Flemish spoken in Belgium, which are structurally the same standard language, though dialectical differences are more prominent in Belgium. The derivative of Netherlandic spoken in South Africa, Afrikaans, shows influences of the various local Bantu languages.

German is the national language of Germany and Austria and one of the official languages of Switzerland. After English, German and French are the world's most widely used second languages. High German is believed to have separated from the Low German-Netherlandic languages about the 6th century, the result of what is traditionally called the "High German consonant shift." Early German was heavily influenced by Latin, since writing was chiefly restricted to the monasteries. As trade increased during the late European Middle Ages, German borrowed heavily from French. In the modern period, written German has become increasingly standardized, though the spoken language still shows more dialectical differences than English.

Yiddish was for centuries the language of the Jews of central and eastern Europe. Though Germanic, it includes elements from Romance, Hebrew-Aramaic, and Slavic languages and thus is of great interest to scholars. There were about 11 million speakers of Yiddish before World War II, but large numbers were killed during the Nazi Holocaust.

The third main branch of the Germanic languages is the North Germanic, or Scandinavian, languages, which were spread as far east as Greenland and as far west as Russia during the Viking expansion of the early Middle Ages. The establishment of the Christian church in the region in the 11th and 12th centuries brought the introduction of Latin letters to replace the old runic alphabet. The Scandinavian languages were later influenced by High German through Martin Luther's translation of the Bible.

Danish was the first modern Scandinavian language to emerge. After the Swedes separated from Denmark in the 16th century, Swedish was standardized and spread with the country's expansion in the next century. Today it not only is spoken in Sweden but is one of the official languages of Finland. Icelandic is one of the most distinct of the modern Scandinavian languages, the only one to preserve Old Scandinavian grammar basically intact and the one most resistant to adopting foreign words. Norway has two official languages; Nynorsk, or New Norwegian, was standardized in the mid-1800s by the linguist Ivar Aasen, who wanted it to replace Danish as the official national language. Bokmål, or Dano-Norwegian, is more widely used today and represents a compromise between standard Danish and local dialects.

Germanic law, the law of the various Germanic peoples from the time of their initial contact with the Romans until the change from tribal law to national territorial law, sometime in the European Middle Ages.

A brief treatment of Germanic law follows. For full treatment, *see* MACROPAEDIA: Legal Systems, The Evolution of Modern Western.

Germanic law is the law of peoples of ancient Germanic stock in what is now Germany, Scandinavia, northern France, and northern Italy. It covers the period from the rise of the earliest Germanic tribes that moved into former Roman provinces after the fall of the Roman Empire to the period when the oral laws of individual Germanic tribes developed into national and codified territorial laws. This development occurred at different periods in different tribes.

Germanic law, unlike Roman law, was essentially tribal custom and not legal codes promulgated by a central government. The custom of a particular tribe or nation evolved from popular practices, was unwritten, and was applicable only to the individuals belonging to that particular tribe. The law was not attached to the territory but rather to the tribe, and so when a nomadic tribe moved it took its laws with it rather than subjecting itself to the laws of the territory to which it moved.

Germanic peoples were divided into tribes, which were made up of clans, with a king at the head of the government. The king was assisted by the tribal assembly and by his council. Property law did not clearly distinguish between legal title and physical control. Land originally belonged to each family collectively, but gradually family ownership developed into private ownership by the family head, although for a long time he could sell or part with land only with the consent of the heirs. Property descended on his death to the nearest descendants, usually male.

Later, as the importance of Christianity grew, ecclesiastical law, derived from Roman law, gained in importance. The church sought to legislate matters such as marriage and succession, which had previously been the subject only of secular tribal law. Also, by the 12th century a mercantile law had developed to meet the needs of traders; this was general and not dependent on nationality or domicile. Gradually local law began to decline in importance.

In France, Germanic law predominated in the north, while the south remained predominantly subject to Roman law. A central form of government was imposed by the Normans after their conquest of England in 1066, and the common law that developed there was largely similar to Germanic law, being based on custom. The Scandinavian countries and Iceland, more isolated from Roman tradition, developed their own distinctive form of law based on custom passed down by word of mouth until the 12th century, when they began to be put into writing. The codified laws were more progressive, abolishing private vengeance and vesting the power to prosecute for criminal offenses in the monarch rather than in the individual.

Germanic peoples, also called TEUTONIC PEOPLES, any of the Indo-European speakers of Germanic languages.

The origins of the Germanic peoples are obscure. During the late Bronze Age, they are believed to have inhabited southern Sweden, the Danish peninsula, and northern Germany between the Ems and Oder rivers and the Harz Mountains. The Vandals, Gepidae, and Goths migrated from southern Sweden in the closing centuries BC and occupied the area of the southern Baltic coast roughly between the Oder and the Vistula. At an early date there was also migration toward the south and west at the expense of the Celtic peoples who then inhabited much of western Germany: the Helvetii, for example, who were confined to the area that is now Switzerland in the 1st century BC, had once extended as far as the Main River.

By the time of Julius Caesar, Germans were established west of the Rhine and toward the south had reached the Danube. Their first great clash with Romans came at the end of the 2nd century BC, when the Cimbri and Teutoni (Teutones) invaded southern Gaul and northern Italy and were annihilated by Marius in 102 and 101. Although individual travelers from the time of Pytheas onward had visited Teutonic countries in the north, it was not until the 1st century BC was well advanced that the Romans learned to distinguish precisely between the Germans and the Celts, a distinction that is made with great clarity by Julius Caesar. It was Caesar who incorporated within the frontiers of the Roman Empire those Germans who had penetrated west of the Rhine, and it is he who gave the earliest extant description of Germanic culture. In 9 BC the Romans pushed their frontier eastward from the Rhine to the Elbe, but in AD 9 a revolt of their subject Germans headed by Arminius ended in the withdrawal of the Roman frontier to the Rhine. In this period of occupation and during the numerous wars fought between Rome and the Germans in the 1st century AD, enormous quantities of information about the Germans reached Rome, and, when Tacitus published in AD 98 the book now known as the *Germania,* he had reliable sources of information on which to draw. The book is one of the most valuable ethnographic works in existence; archaeology has in many ways supplemented the information Tacitus gives, but in general it has tended only to confirm his accuracy and to illustrate his insight into his subject.

Tacitus relates that according to their ancient songs the Germans were descended from the three sons of Mannus, the son of the god Tuisto, the son of Earth. Hence they were divided into three groups—the Ingaevones, the Herminones, and the Istaevones—but the basis for this grouping is unknown. Tacitus records a variant form of the genealogy according to which Mannus had a larger number of sons, who were regarded as the ancestors of the Suebi, the Vandals, and others. At any rate, the currency of these songs suggests that in Tacitus' time the various Germanic peoples were conscious of their relationship with one another. While individual Germans in Roman service would sometimes refer to themselves as Germani, the free Germans beyond the Rhine had no collective name for themselves until the 11th century AD, when the adjective *diutisc* (modern German *deutsch,* "of the people"), came into fashion. The meaning of the word *Germani* and the language to which it belongs are unknown.

The principal Germanic peoples were distributed as follows in the time of Tacitus. The Chatti lived in what is now Hesse. The Frisii inhabited the coastlands between the Rhine and the Ems. The Chauci were at the mouth of the Weser, and south of them lived the Cherusci, the people of Arminius. The Suebi, who have given their name to Schwaben, were a group of peoples inhabiting Mecklenburg, Brandenburg, Saxony, and Thuringia; the Semnones, living around the Havel and the Spree rivers, were a Suebic people, as were the Langobardi (Lombards), who lived northwest of the Semnones. Among the seven peoples who worshiped the goddess Nerthus were the Angli (Angles), centred on the peninsula of Angeln in eastern Schleswig. As for the Danubian frontier of the Roman Empire, the Hermunduri extended from the neighbourhood of Regensburg northward through Franconia to Thuringia. The Marcomanni, who had previously lived in the Main valley, migrated during the last decade BC to Bohemia (which had hitherto been occupied by a Celtic people called the Boii), where their eastern neighbours were the Quadi in Moravia. On the lower Danube were a people called the Bastarnae, who are usually thought to have been Germans. The Goths, Gepidae, and Vandals were on the southern Baltic coast. Tacitus mentions the Suiones and the Sitones as living in Sweden. He also speaks of several other peoples of less historical importance, but he knows nothing of the Saxons, the Burgundians, and others who became prominent after his time.

By the end of the 3rd century AD important changes had taken place. East of the Rhine

there were three great confederacies of peoples unknown to Tacitus. The Roman frontier on the lower Rhine faced the Franks. The Main valley was occupied from about 260 by the Burgundians, while the Agri Decumates (of the Black Forest region) were held by the Alemanni. The Burgundians appear to have been immigrants from eastern Germany. The Franks and the Alemanni may have been confederacies of peoples who had lived in these respective areas in Tacitus' day, though perhaps with an admixture of immigrants from the east. The peoples whom Tacitus mentions as living on the Baltic coast had moved southeastward in the second half of the 2nd century. The Goths controlled the Ukraine and much of what is now Romania; the Gepidae were in the mountains north of Transylvania with the Vandals as their western neighbours.

By the year 500, the Angles and Saxons were in England and the Franks controlled northeastern Gaul. The Burgundians were in the Rhône valley with the Visigoths as their western neighbours. The Ostrogoths were established in Italy and the Vandals in Africa. In 507 the Franks expelled the Visigoths from most of the Gallic possessions, which had stretched from the Pyrenees to the Loire River, and the Visigoths thereafter lived in Spain until their extinction by the Muslims in 711. In 568 the Lombards entered Italy and lived there in an independent kingdom until they were overthrown by Charlemagne (774). The areas of eastern Germany vacated by the Goths and others were filled up by the Slavs, who extended westward as far as Bohemia and the basin of the Elbe. After the 8th century the Germans recovered eastern Germany, lower Austria, and much of Styria and Carinthia from the Slavs.

Material culture. According to Julius Caesar, the Germans were pastoralists, and the bulk of their foodstuffs—milk, cheese, and meat—came from their flocks and herds. Some farming was also carried out, the main crops being grain, root crops, and vegetables. Both the cattle and the horses of the Germans were of poor quality by Roman standards.

The Iron Age had begun in Germany about four centuries before the days of Caesar, but even in his time metal appears to have been a luxury material for domestic utensils, most of which were made of wood, leather, or clay. Of the larger metal objects used by them, most were still made of bronze, though this was not the case with weapons. Pottery was for the most part still made by hand, and pots turned on the wheel were relatively rare.

The degree to which trade was developed in early Germany is obscure. There was certainly a slave trade, and many slaves were sold to the Romans. Such potters as used the wheel—and these were very few—and smiths and miners no doubt sold their products. But in general the average Germanic village is unlikely to have used many objects that had not been made at home. Foreign merchants dealing in Italian as well as Celtic wares were active in Germany in Caesar's time and supplied prosperous warriors with such goods as wine and bronze vessels. But from the reign of Augustus onward, there was a huge increase in German imports from the Roman Empire. The German leaders were now able to buy whole categories of goods—glass vessels, red tableware, Roman weapons, brooches, statuettes, ornaments of various kinds and other objects—that had not reached them before. These Roman products brought their owners much prestige, but how the Germans paid for them is not fully known.

Warfare. In the period of the early Roman Empire, German weapons, both offensive and defensive, were characterized by shortage of metal. Their chief weapon was a long lance, and few carried swords. Helmets and breastplates were almost unknown. A light wooden or wicker shield, sometimes fitted with an iron rim and sometimes strengthened with leather, was the only defensive weapon. This lack of adequate equipment explains the swift, fierce rush with which the Germans would charge the ranks of the heavily armed Romans. If they became entangled in a prolonged, hand-to-hand grapple, where their light shields and thrusting spears were confronted with Roman arms and armour, they had little hope of success. Even by the 6th century, few of the Germanic peoples had adequate military equipment. None evolved a force adequate to deal with the heavily armed mounted archers of Justinian I.

Form of government. No trace of autocracy can be found among the Germans whom Caesar describes. The leading men of the *pagi* (kindred groups) would try to patch up such disputes as they arose, but they acted only in those disputes that broke out between members of their own *pagus*. There appears to have been no mediatory body at this date. In fact, in peacetime there appears to have been no central authority that could issue orders to, or exercise influence over, all the *pagi* of which any one people was composed. In wartime, according to Caesar, a number of confederate chieftains were elected, but they were joint leaders and held office only in time of war.

By Tacitus' time a new type of military chieftainship had come into being. For this office only the members of a recognized "royal clan," such as is known to have existed among the 1st-century Cherusci and Batavians, the 6th-century Heruli, and others, were eligible. Any member of this royal clan was eligible for election, and the chieftainship was in no way hereditary. A chief of this type held office for life and had religious as well as military duties. He could be overruled by the council of the leading men, and his proposals to the general assembly of the warriors might be rejected by them. The degree of his influence depended largely on his own personal qualities.

A rudimentary judicial apparatus had come into existence by Tacitus' time. The general assembly elected a number of the leading men to act as judges, and these judges traveled through the villages to hear private suits. Each of them was accompanied by 100 attendants to lend authority to his decisions. A person who was found guilty by these judges had to pay a number of horses or cattle proportionate to the gravity of his offense. But many disputes (*e.g.,* those arising from homicide, wounding, or theft) continued to be settled by the kindreds themselves, and the blood feuds to which they gave rise might continue from generation to generation. Long after the conversion to Christianity the German rulers found it difficult to stamp out the blood feud.

Only one Germanic chieftain is known to have set up a personal tyranny over his people: Maroboduus, who led the Marcomanni from their homes in the Main valley about 9 BC and settled them in Bohemia. From there he conquered a considerable number of other Germanic peoples between the Elbe and the Vistula, including the Semnones, the Lombards, and the Lugii. But the Cherusci, joined by some of the king's subjects, attacked him in AD 17, overthrew him, and drove him into the Roman Empire. All other chiefs who attempted in this period to establish monarchies were, so far as is known, defeated.

The monarchy did not become fully established in the Germanic world until German peoples had settled as federates inside the Roman Empire, and the leaders of the Ostrogoths in Italy, the Visigoths in Gaul and Spain, the Vandals in Africa and so on are the first Germanic kings. Other famous German chieftains in this period, such as Athanaric and Alaric, who either lived outside the Roman frontier or whose peoples were not federates settled in the provinces under a treaty (*foedus*) to defend the frontier, seem to have had little more personal authority than the leaders described by Tacitus.

Germanic religion and mythology, the complex of stories, lore, and beliefs about the gods and the nature of the cosmos developed by the Germanic-speaking peoples before their conversion to Christianity.

A brief treatment of Germanic religion and mythology follows. For full treatment, *see* MACROPAEDIA: European Religions, Ancient.

Germanic culture at various times extended from the Black Sea across central Europe and Scandinavia to Iceland and Greenland. The conversion to Christianity in continental Europe in the early 4th century was so thorough that practically all indigenous religious tradition was eradicated. However, the conversion of the Scandinavian countries in the late 10th century allowed a significant amount of information concerning the religion and mythology of the pre-Christian Germanic peoples to survive. Of particular importance are the writings in Old Norse of medieval Iceland, where there seems to have been an antiquarian revival. The literary sources of this isolated outpost of Germanic culture provide much of what is now known about Germanic religion.

Old Norse verse forms, both Eddic and skaldic, are considered to be especially valuable because the conservative nature of their poetic structures facilitated the survival of ancient elements of Germanic myth and legend. The *Poetic Edda* (*c.* 1270) contains two classes of archaic materials: the mythological poems, which give a splendid picture of the ancient gods, wisdom, and lore, and the lays of the traditional Germanic heroes. Skaldic poetry, known for its complicated alliterative structure and numerous allusions to myth in the form of complex metaphors known as kennings, is an extremely reliable source, albeit very difficult to interpret. The *Prose Edda* (*c.* 1220), written by Snorri Sturluson, gives a rendition of the cosmogony and numerous tales of the adventures of the gods in their struggle against the race of the giants and the powers of chaos. However, any interpretation of the work must take into account obvious Christian influence as well as the author's further manipulation and distortion of his source materials.

Because of the variety of surviving source materials on Germanic mythology, accounts of the myths are frequently conflicting. The cosmology of the *Poetic Edda* tells of the time of a mighty void known as Ginnungagap. Elements of heat from the south merged with northern forces of cold to produce a mighty primeval giant, Ymir. In Snorri's version of the cosmology, a cow, Audumla, nourished Ymir. As Audumla licked a block of salt, a man emerged, Buri, who became the ancestor of the first gods, Odin and his two brothers. These gods killed Ymir and constructed the universe from his body. The gods then created the first man and woman from pieces of wood. The heavenly Asgard was the home of the new race of gods, while mankind inhabited Midgard. Both of these worlds were surrounded by a mighty ocean in which lived the evil world serpent. Yggdrasil, the world tree, stood at the central point of this world of gods and men.

The Germanic pantheon can be divided into two groups—the Aesir, heroic gods who reflect the culture of a warrior aristocracy, and the Vanir, gods involved in the concerns of a settled agricultural society. Chief among the Aesir was Odin. Odin was the god of poetry, having stolen the sacred mead of poetic inspiration from the world of the giants. Odin was also a god of the sacred runes and occult wisdom, as well as of battle and warrior heroes. He loved battle for its own sake, arbitrarily sponsoring and then abandoning his chosen heroes. To die in battle was a desirable fate,

assuring the warriors rebirth in Odin's heaven, Valhalla, where they would fight, die, and rise again until the time of Ragnarök, when they would fall finally along with their patron god.

Next to Odin in importance in the Germanic pantheon stood Thor. Thor's cult was extensive. He emerges in the literature as the chief defender of the gods and of humans against the evil forces of the giants and chaos. The image of his hammer became a common talisman in the northern world. Thor was associated with thunder and lightning and, by extension, with rain and fertility. Loki is a baffling god who was continually present among the Aesir, although not really one of them. He played tricks on them but aided them as well. Loki was responsible for the death of Balder, Odin's beautiful and innocent son, and Loki was the adversary of Heimdall, another beautiful and noble but obscure deity, who is depicted as the watchman of the gods. In the eschatological mythology of Ragnarök, Loki and his monstrous children are placed on the side of the forces of destruction of the world of gods and human beings.

The Vanir gods, subordinate to the Aesir, were responsible for ensuring fertility and prosperity. Njörd, seen by many scholars as a masculinization of the older fertility goddess, Nerthus, is depicted as a god of the sea and of riches and prosperity. His son, Freyr, was also a god of fertility who is described in several sources as the ancestor of the line of Swedish kings. His sister, Freyja, was a goddess not only of love and fertility but also of a primitive form of magic, *seiyr,* which she is said to have taught to Odin and the Aesir.

Although the medieval literary sources provide a wealth of mythological materials, truly reliable information concerning actual religious practices and beliefs is meagre. From the little information that has survived, it seems that, during the later stages of its development, the nature of Germanic religion was twofold. For the most part it was clan-oriented and directed toward concerns of luck and prosperity. In addition, it was characterized by a close personal relationship between the individual and his personal god or guardian spirit. The guardian spirits of Germanic religion were often as important as the deities. The *dísir,* for example, were clan-oriented female ancestral guardians who brought prosperity to their worshipers and who were propitiated at elaborate, private sacrificial banquets held at the beginning of the winter season.

Germanicus Caesar (b. 15 BC—d. AD 19, Antioch, Syria), nephew and adopted son of the Roman emperor Tiberius (AD 14–37). He was a successful and immensely popular general who, had it not been for his premature death, would have become emperor.

The details of Germanicus' career are known from the Roman historian Tacitus, who portrayed him as a champion of republican principles and played him off in his historical chronicles against Tiberius, whom he depicted as an autocratic villain. Through his mother, Antonia, Germanicus was grandnephew of the emperor Augustus. His father was Tiberius' brother, Nero Claudius Drusus. Germanicus' "Julian blood" induced Augustus to have him adopted by Tiberius in AD 4, even though Tiberius had a son of his own. At about the same time, Germanicus married Augustus' granddaughter, Agrippina the Elder.

Quaestor at the age of 21, Germanicus served under Tiberius in Illyricum (AD 7–9) and then on the Rhine (AD 11). As consul in the year 12, he was appointed to command Gaul and the two Rhine armies. His personal popularity enabled him to quell the mutiny that broke out in his legions after Augustus' death (14). Although pressed to claim the empire for himself, Germanicus remained firmly loyal to Tiberius. In three successive campaigns (14–16), he crossed the Rhine to engage the German tribes, inflicting several defeats in an ultimately inconclusive struggle. Finally, having aroused the jealousy and fears of Tiberius, he was recalled to Rome.

Germanicus celebrated a triumph in Rome in May 17, and the next year he became consul for the second time. Before taking office, however, he received supreme command over all the eastern provinces. While on this tour of duty he came into conflict with Gnaeus Calpurnius Piso, whom Tiberius had installed as governor of Syria. Although Piso criticized and sometimes frustrated his decisions, Germanicus managed to settle the Armenian succession, organize Cappadocia and Commagene into provinces, and negotiate successfully with Artabanus III of Parthia.

Early in 19, Germanicus visited Egypt, incurring strong censure from Tiberius, because the latter's predecessor, Augustus, had strictly forbidden Romans of senatorial rank to enter Egypt—Rome's breadbasket—without permission. On Germanicus' return to Syria, the differences with Piso became intolerable; finally Piso left the province. Shortly afterward Germanicus died, convinced that Piso, through his wife Plancina, had poisoned him. Piso's subsequent suicide (when he was prosecuted before the Senate) prevented substantiation of the poisoning charge. Tiberius never escaped suspicion, if not of instigating Germanicus' murder, at least of prompting the enmity that ended in tragedy.

Germanicus and Agrippina had nine children. Included among the six (three sons and three daughters) who survived their father were the emperor Gaius Caligula (37–41) and Agrippina the Younger, mother of the emperor Nero. The emperor Claudius (41–54) was Germanicus' brother.

germanium (Ge), a chemical element between silicon and tin in Group IVa of the periodic table, a silvery-gray metalloid, intermediate in properties between the metals and the nonmetals. Although germanium was not discovered until 1886 by Clemens Winkler, a German chemist, its existence, properties, and position in the periodic system had been predicted in 1871 by the Russian chemist Dmitry Ivanovich Mendeleyev, who called the hypothetical element ekasilicon. Germanium did not become economically significant until after 1945, when its properties as a semiconductor were recognized as being of value in electronics. Many other substances now also are used as semiconductors, but germanium remains of primary importance in the manufacture of transistors and of components for devices such as rectifiers and photocells.

A rare element never found free in nature, germanium occurs mainly as a constituent of such uncommon minerals as argyrodite (from which it was first isolated), germanite, and renierite. The occurrence of germanium in the Earth's crust is low—about 1.5 parts per million. In refining germanium, the low-grade residues obtained from its ores are treated with strong hydrochloric acid, and the resulting germanium tetrachloride is distilled, purified by repeated redistillation, and hydrolyzed to form germanium dioxide, which is then reduced by hydrogen to a powdery form of the metal that is melted at a temperature of about 1,100° C (2,000° F [in an inert atmosphere]) and cast into ingots or billets.

The element is brittle rather than ductile; the arrangement of the atoms in its crystals is the same as that of the carbon atoms in diamond. It is not attacked by air at room temperature but is oxidized at 600°–700° C (1,100°–1,300° F) and reacts quickly with the halogens to form tetrahalides. Among the acids, only concentrated nitric or sulfuric acid or aqua regia (a mixture of nitric and hydrochloric acids) attack germanium appreciably. Although aqueous caustic solutions produce little effect on the element, germanium dissolves rapidly in molten sodium hydroxide or potassium hydroxide, thereby forming the respective germanates.

Germanium forms stable oxidation states of +2 and +4, the compounds of the latter being more stable and numerous. The two most important compounds of germanium are the dioxide (GeO_2) and the tetrachloride ($GeCl_4$). Germanates, formed by heating the dioxide with basic oxides, include zinc germanate (Zn_2GeO_4), used as a phosphor (a substance that emits light when energized by radiation). The tetrachloride, already mentioned as an intermediate in obtaining germanium from its natural sources, is a volatile, colourless liquid that freezes at about −50° C (−58° F) and boils at 84° C (183.2° F).

For use in electronic devices, germanium ingots or billets require further purification, which usually is effected by the technique of zone refining. The highly pure germanium is then melted and "doped" to produce desired electronic characteristics by adding minute amounts of arsenic, gallium, or other elements. Finally, single crystals are generated from the melt at carefully controlled temperatures, using a seed crystal as a nucleus.

In addition to its applications in electronic devices, germanium is used as a component of alloys and in phosphors for fluorescent lamps. Because germanium is transparent to infrared radiation, it is useful in equipment used for detecting and measuring such radiation, such as windows and lenses. The high index of refraction of germanium dioxide renders it valuable as a component of glasses used in optical devices, such as wide-angle lenses for cameras and microscope objectives.

The five stable isotopes of germanium occur in the following relative amounts: germanium-70, 20.5 percent; germanium-72, 27.4 percent; germanium-73, 7.8 percent; germanium-74, 36.5 percent; and germanium-76, 7.8 percent. Nine radioactive isotopes have been reported.

atomic number	32
atomic weight	72.59
melting point	937.4° C (1,719.3° F)
boiling point	2,830° C (5,130° F)
density	5.323 g/ml
oxidation states	+2, +4
electron config.	2-8-18-4 or $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^2$

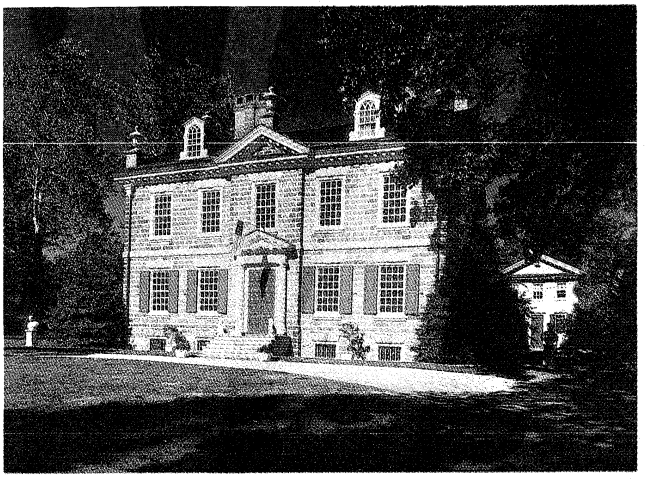
Germanos, original name LOUKAS STRENAPOULOS (b. Sept. 27, 1872, Silivri, Eastern Thrace, Ottoman Empire [Turkey]—d. Jan. 23, 1951, London, Eng.), Greek Orthodox archbishop of Thyatira (modern Akhisar, Turkey) and head of the Orthodox church in Western and Central Europe from 1922 to 1951.

After studying at the seminary on the island of Halki near Istanbul, Germanos attended the universities of Leipzig, Strasbourg, and Lausanne, subsequently returning to Halki as professor of theology. In 1922 he was appointed to the newly created office of archbishop of Thyatira; later that year he visited London as a representative of the ecumenical patriarch of Constantinople to the Anglican church.

Germanos wrote several theological and historical books and received honorary doctorates of divinity from the University of Oxford, New York University, and the University of Athens. For his work in promoting understanding between the Orthodox and Anglican churches, the archbishop of Canterbury awarded Germanos the Lambeth Cross in 1942. He was elected president of the World Council of Churches in 1948.

Germantown, historic residential section of Philadelphia, Pennsylvania, U.S., extending for more than a mile along Germantown Avenue (formerly High Street). The site was

first settled by German Pietists led by Francis Daniel Pastorius in 1683, and the development of handicraft industries (weaving, tanning, and wagon building) led to prosperity. There William Rittenhouse built (1690) the first paper mill in the British colonies; Christopher Sower and his son established one of the colonies' largest printing presses (1738) and printed America's first European-language Bible (1743); Jacob Bey, an employee of Sower, was the first colonial manufacturer of printed type. On Oct. 4, 1777, George Washington's Continental Army unsuccessfully fought the Battle of Germantown in an effort to break the defenses of British-occupied Philadelphia. Much of Germantown's rich architectural heritage has been preserved. Noteworthy houses include Cliveden (1763), planned by Benjamin Chew; Grumblethorpe



Cliveden (1763–67), summer home of Benjamin Chew, Germantown, Philadelphia, Pa.

Courtesy Cliveden; photograph, John Chew, Jr.

(1744); Morris House (1772), home of President George Washington in the summers of 1793 and 1794; Wyck (1690); and Upsala (1798). Incorporated in 1689, Germantown was a separate borough before being annexed by Philadelphia in 1854.

Germantown, Battle of (Oct. 4, 1777), in the U.S. War of Independence, abortive attack by 11,000 American troops upon 9,000 British regulars stationed at Germantown (now part of Philadelphia) under General Sir William Howe. Not discouraged by his recent defeat at Brandywine Creek, Continental general George Washington conceived a daring and imaginative plan to attack the city simultaneously from four different directions. The surprise raid at dawn failed partly because it was too complicated and partly because of a dense fog that confused the Americans into firing on one of their own columns. British losses were set at 535, American at about twice that number. Combined with the American victory at Saratoga (September-October 1777), the Germantown engagement, by impressing the French with Washington's strategic ability, was credited with influencing the French to come to America's aid in the war.

Germanus I, SAINT (b. *c.* 634, Constantinople [Istanbul, Tur.]—d. *c.* 732, Platonium, near Athens [Greece]; feast day May 12), Byzantine patriarch of Constantinople and theologian who led the orthodox opposition during the Iconoclastic Controversy (*q.v.*). His writings also fostered the doctrine and devotion to the Virgin Mary.

When Germanus rebelled against the execution of his patrician father by the emperor Constantine IV in 668, he was made a eunuch and pressed into the ranks of the clergy at the cathedral of Hagia Sophia. Later recognized as a theological consultant, Germanus influenced the emperor in convoking the third Council of Constantinople (680–681), which condemned the errors of the Monothelites, Christians who held that Christ had only one will. Made bishop of Cyzicus, about 705, he was pressured by the emperor Philippicus Bardanes to sign a decree in 712 rehabilitating Monothelite teaching. Elevated to the patriarchate of Constantinople in August 715, under the orthodox emperor Anastasius II, Germanus pronounced the orthodox creed and once again repudiated Monothelitism at a local council that same year. He later composed a tract delineating the orthodox teaching of the two natures (human and divine) in Christ and directed it to the Armenian church in order to convert it from the errors of the Monophysites, who held that Christ had only one nature. Unsuccessful in this endeavour, he then instituted a liturgical service of thanksgiving to the Virgin Mary for the deliverance of Constantinople from the Persian siege of 626 and the Arab Muslim attack of 718. Heading the resistance to the Iconoclastic movement initiated in 727 by the emperor Leo III the Isaurian, Germanus resigned his office in 730 and retired to his estates in Greece rather than subscribe to Leo's unorthodox decree. He probably wrote his historical treatise *De haeresibus et synodis* ("On Heresies and Synods") while in retirement. Condemned by the Iconoclasts in 754, he was vindicated at the seventh Council of Constantinople in 787.

Because his writings were ordered burned by Leo III, only a few of Germanus' works survive, published in *Patrologia Graeca,* ed. J.-P. Migne (1857–66; reprinted 1965), vol. 98. In addition to *Ad Armenos* ("Letter to the Armenians"), he is credited with three tracts controverting Iconoclasm and seven conferences on the doctrinal history of the cult of the Virgin Mary. A strong advocate of Marian devotion, Germanus in his works is a source for the theological development of her role as mediator of supernatural blessings.

Germanus OF AUXERRE, SAINT, French GERMAIN (b. *c.* 378, Autissiodurum, Gaul [now Auxerre, Fr.]—d. July 31, 448, Ravenna [Italy]; feast day: Wales, August 3; elsewhere, July 31), Gallic prelate who was twice sent on crucial missions to England that helped effect the consolidation of the British church.

After practicing law at Rome, Germanus was made a provincial governor in Armorica (ancient region in France) by the West Roman emperor Flavius Honorius. In 418 he was chosen successor to Bishop St. Amator of Auxerre, after which his life dramatically changed to that of an ascetic. Near Auxerre he founded the monastery of SS. Cosmas and Damian. Concurrently, Pelagianism, a heresy that stressed the essential goodness of human nature and the freedom of the human will, was spreading through Britain, causing an ecclesiastical upheaval there. In 429, in reply to an appeal for help by the British bishops, Pope St. Celestine I deputed Germanus, with the assistance of Bishop St. Lupus of Troyes, to combat the Pelagian heresy in Britain. Their fervent campaign was successful: according to tradition, they victoriously debated Pelagianism at Verulamium (later St. Albans in Hertfordshire). It was probably during this trip that he assisted the Britons against a joint attack by the Saxons and the Picts. He reportedly led the Britons, having them shout "Alleluia!"; the sound was so ominous that it frightened off the marauders and thus lead to what was called the Alleluia Victory.

Later Germanus returned to Auxerre, where he built St. Alban's Church. Through his appeal in 431, St. Palladius was sent to Scotland by Celestine as the first bishop of the Scots. According to tradition, while he was there he answered an appeal from St. Patrick, patron of Ireland, for assistance by sending to Ireland bishops who helped evangelize the country and establish Irish monasticism. Meanwhile, Pelagianism persisted in Britain, and in 447 Germanus was asked to return there and exterminate the heresy. With the aid of Bishop Severus of Trèves, his second mission succeeded in ending Pelagianism in England and banishing its advocates.

Returning to Gaul, Germanus found his diocese in turmoil, for the Armoricans were rebelling against the Huns. On behalf of the rebels, he at once met the enemy's chief, Goar, whom he persuaded to postpone an initial attack on the province. Germanus immediately went to Ravenna to plead his people's cause. There he was received by Bishop St. Peter Chrysologus and the Western emperor Valentinian III but died amidst the negotiations. His remains were triumphantly returned to Auxerre, where they remained enshrined until desecrated by the Huguenots in 1567.

BIBLIOGRAPHY. An early important life of Germanus, written about 480 by the presbyter Constantius, appears in a modern translation in F.R. Hoare (ed. and trans.), *The Western Fathers* (1954, reissued 1980).

Germanus OF GRANFEL, SAINT (b. *c.* 610, Augusta Treverorum, Gaul [Trier, Ger.]—d. Feb. 21, 675?, near Munster, Austrasia [Münster, Ger.]; feast day February 21), abbot who was martyred for remonstrating against ducal oppression of the poor.

The son of a senator, Germanus was reared and ordained priest by Bishop St. Modoald of Trier and became a disciple of Bishop St. Arnulf of Metz at the Benedictine monastery of Remiremont in the Vosges Mountains. With a group of monks, including his young brother Numerian, Germanus later moved, at Arnulf's bidding, to the Abbey of Luxeuilles-Bains under Abbot St. Waldebert. When Duke Gondo founded his Monastery of Granfel, high in the Vosges Mountains, he made Germanus abbot, and he ruled for 35 years, during which time he was charged with two other abbeys, St. Ursitz and St. Paul Zu-Werd.

Gondo's brother and successor, Cathic, launched an aggressive policy against monasticism while concurrently extorting the peasants. Germanus bravely opposed the duke, pleading on behalf of the oppressed poor. Cathic killed him and his prior Randoald in the midst of a mass plundering.

Germanus OF PARIS, SAINT, French SAINT GERMAIN DE PARIS (b. *c.* 496, near Augustodunum, Gaul [now Autun, France]—d. May 28, 576, Paris; feast day May 28), abbot, bishop, one of France's most revered saints, who was an important, though unsuccessful,

mediator in the fratricidal conflicts among several Merovingian kings.

Ordained priest in 530, Germanus was made abbot of the Monastery of Saint-Symphorien. Between 554 and 556 he was nominated by the Frankish king Childebert I as bishop of Paris, where he exercised considerable moral influence on the king's court and induced Childebert to found a Parisian church, which after his death was renamed Saint-Germain-des-Prés and became one of the royal burial places.

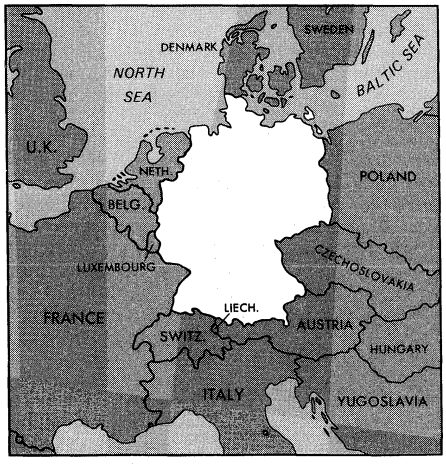
Germanus was eventually enmeshed in the civil strife caused by rivalry between Childebert's nephews, Guntram, Sigebert I, Chilperic I, and Charibert I, whom he excommunicated for personal wickedness and for animosity toward his authority. He protected Queen Radegunda against the abuses of her husband, the Frankish king Chlotar I, Childebert's brother. Among the numerous conciliatory councils that Germanus attended were those of Paris (557), Tours (566), and Paris (573).

Germany, officially FEDERAL REPUBLIC OF GERMANY, German DEUTSCHLAND, or BUNDESREPUBLIK DEUTSCHLAND, major industrial country of north-central Europe, covering an area of 137,855 square miles (357,042 square km). The official capital is Berlin. Germany is bordered by nine neighbouring countries: Denmark to the north, Czechoslovakia and Poland to the east, Switzerland and Austria to the south, and France, Luxembourg, Belgium, and The Netherlands to the west. It has two northern coastal boundaries: one eastward from Denmark on the Baltic Sea and a second westward from Denmark along the North Sea. The population was estimated to be 78,160,000 in 1990.

A brief treatment of Germany follows. For full treatment, *see* MACROPAEDIA: Germany.

For current history and for statistics on society and economy, *see* BRITANNICA WORLD DATA ANNUAL.

The land. Germany comprises three major physiographic regions from north to south: the North German Plain, the Central German Uplands (Mittelgebirge), and the Southern German Highlands. The lowland region of the North German Plain extends from the northern coasts southward to the Ore Mountains in central Germany and includes the Ruhr River valley and Lower Rhineland in the west and Upper Lusatia (Oberlausitz) in the east. The region, which consists mainly of a wide, flat, and rolling plain, was formed by the continent's retreating glaciers during its last glacial period. It exhibits a lake-strewn relief with terminal moraine ridges marking the limit of glacier-carried debris. A belt of fertile, windblown loess soil lies southward of the glacial limit. The plain averages less than 330 feet (100 m) above sea level in elevation.



Germany

The Central German Uplands to the south of the plain are composed of a west-east belt of highland blocks crossed from south to north by rivers, either in gorges like that of the Rhine or in lowland troughs like those of the Weser and Leine rivers. To the east the uplands extend from the Harz Mountains and the mountains of Thuringer Forest through the Vogtland and Ore Mountains (Erzgebirge) of the Czech border.

The Southern German Highlands, situated south of the Main River, stretch across western Germany from the Vosges massif of eastern France; the Bavarian Plateau rises to the northernmost ridges of the Alps along Germany's southern frontier with Austria. The Bavarian Alps reach 9,718 feet (2,962 m) at the Zugspitze, Germany's highest peak. Germany's major rivers include the Danube, draining the Bavarian Alps eastward into Austria; the Oder, which, together with its tributary the Neisse, forms much of the country's eastern border with Poland; and the Elbe, Weser, and Rhine rivers, draining the southern regions northward into the North Sea. The Elbe River and its tributaries (most importantly the Saale and Havel rivers) drain most of eastern Germany, while the Oder drains the country's extreme eastern section. The Rhine River basin dominates the central and western landscape of the country.

Germany has a generally temperate climate. Prolonged periods of extreme temperatures are rare during both the summer and winter months. Adequate precipitation throughout the year and moderate temperatures offer ideal climatic conditions for crop production. A large proportion of the country receives between 25 and 30 inches (625 and 750 mm) of precipitation annually. Some upland areas receive more than 40 inches (1,000 mm), while nowhere in the country does the annual average fall to less than 15 inches (400 mm). With the exception of the high Alps, summer (July) and winter (January) temperatures average between 60° and 66° F (16° and 19° C) and 27° and 34° F (−3° and 1° C), respectively, throughout the country.

Reforestation with such fast-growing conifers as spruce, fir, and pine has replaced much of the primeval deciduous forest once found in ancient Germany. More than one-third of Germany's total land area is arable, of which virtually all is intensely cultivated; comparatively few areas are highly fertile, however. Vast tracts of sparsely populated forested and mountainous terrain support a surprising variety of wildlife. Among the game animals that abound in most regions are deer, wild pig, fox, quail, hare, and pheasant.

Germany has large deposits of coal; estimated recoverable reserves of lignite constitute one-fifth of the world's total. Reserves of petroleum and natural gas are relatively small but locally significant. There are also some reserves of tin, copper, lead, and zinc.

The people. Historically, Germany was settled by six major German-speaking ethnic groups prior to the time of the Roman occupation, and linguistic dialects persist even today in spite of such standardizing influences as mass education and communication and internal migration. The official language of Germany is High German.

The numbers of Protestants and Roman Catholics in the population are almost equal. Predominantly Roman Catholic districts are found in the Rhineland and Bavaria. Northern Germany is largely Protestant. The country also has small minorities of Jews and Muslims.

Almost 85 percent of the population in Germany lives in urban areas. The greatest concentration of people is found in the highly industrialized Ruhr valley. During the immediate post-World War II years, West Germany experienced rapid population growth as nearly 3 million ethnic Germans migrated there from East Germany. The erection of the Berlin Wall in 1961 brought this population shift to a halt. In addition, nearly 7 million people of German origin were evacuated from eastern Europe to Germany following the war; approximately 4 million of them settled in West Germany. West Germany's rapid economic growth after World War II stimulated a great demand for labour, which was filled by immigrants from Turkey, Yugoslavia, Italy, Greece, and Spain. These foreigners now constitute about 5 percent of Germany's population.

Germany has a negative annual population growth rate, with one of the world's lowest birth rates and a long life expectancy that is comparable with those of other advanced industrial nations in western Europe. Only a relatively small proportion (16 percent) of the total population is younger than 15 years of age. The country has a relatively high ratio of females to males, owing to two wars within 30 years' time. This ratio began to decline in the late 1960s.

The economy. Germany has a developed free-market economy that is largely based on industry and services. The gross national product (GNP) of West Germany and the net material product of East Germany both grew steadily in the 1980s, though at reduced rates compared with the growth rates of the 1960s and '70s. Germany's GNP per capita is among the highest in the world. The agricultural sector produces only about 2 percent of the GNP but employs about 6 percent of the labour force. The principal crops grown include sugar beets, barley, wheat, potatoes, oats, and rye. Cabbage, carrots, and cauliflower are the chief vegetable crops, and fruits include apples, pears, currants, strawberries, plums, cherries, and raspberries. Germany is a major world producer of hops, which supply the country's world-renowned beer industry. Grape production supports a notable wine industry in the Rhine and Moselle valleys, and refined sugar is a major agricultural product.

Pastures cover one-sixth of the land area, and the principal livestock include pigs, cattle, and sheep. Two-fifths of all cattle are dairy cattle; milk, cheese, and butter production is adequate for domestic needs and some exports. Cattle-hide production supports the leather-shoe industry.

Forests cover almost 30 percent of the land area, supporting a well-developed timber industry. Sawn wood, particleboard, plywood, wood pulp, and paper are the chief products and supply most of the nation's needs. The fishing industry operates in the Atlantic and Pacific oceans and the North and Baltic seas. Atlantic cod, sea salmon, redfish, mackerel, and herring are major species caught.

The principal minerals mined are brown (lignite), bituminous, and anthracite coal; potash; salt; quartz and glass sand; refractory and kaolin clays; and iron ore. Peat is also extracted. Limited amounts of natural gas and petroleum are produced, but overall the country must import most energy and raw-material minerals. Two-thirds of the country's electricity is produced by thermal-power plants, more than one-fourth by nuclear-power plants, and the remainder by hydroelectric plants.

Manufacturing is widely diversified, is (together with mining) the largest component (about two-fifths) of the GNP, and employs almost one-third of the labour force. The Ruhr valley in the west is the main industrial concentration. Principal products include refined petroleum products; steel ingots, castings, and rolled steel; pig iron; cement; coal and petroleum gas; chemicals, resins, and plastics; cement; fertilizers; automotive vehicles, railway locomotives and rolling stock, and ships; consumer appliances; synthetic, cotton, and woolen fibres and textiles; machine and hand tools, textile machinery, agricultural machin-

ery, construction equipment, and elevators; and clocks, watches, cameras, and electronics wares. Construction accounts for about 6 percent of the GNP and an equal percentage of the labour force.

Tourism is well developed and centres on winter sports in Bavaria, numerous historical sites, art galleries, museums, and cultural events. Europeans account for most of the visitors, followed by North Americans. Germans abroad, however, spend much more money than the nation's tourist trade earns domestically.

Labour is fully unionized, and there are special courts for settling employer-employee and interunion disputes. A pioneer national program retrains and places workers whose jobs are phased out through automation.

Income, corporate, turnover (joint state-federal), crude-oil, and trade taxes raise most of the nation's revenue. Increased spending on social programs by West Germany created budgetary deficits in the late 1970s and '80s, but stringent monetary regulation kept inflation and unemployment low. The strength of the Deutsche Mark has resulted in several upward revaluations against other European currencies. The German Federal Bank (Deutsche Bundesbank) is the central bank, overseeing all banking, insurance, and credit institutions and operations.

The federal railway network is organized into several principal lines and provides the major cities with high-speed service. Almost 90 percent of the road network is paved, and about 3 percent of it is high-speed, limited-access highway (autobahn). More than 4,100 miles (6,650 km) of inland waterways comprising rivers and canals were designed to ultimately link Baltic, North, and Black Sea navigation. Bremen, Hamburg, Bremerhaven, Lübeck, and Rostock are the principal ports. Major international airports are located in Berlin, Bonn-Cologne, Düsseldorf, Frankfurt am Main, Dresden, Erfurt, Hamburg, Leipzig, and Munich.

Germany maintains a positive trade balance. The principal exports are motor vehicles and parts, industrial machinery and equipment, electrical and electronic products, chemicals, and iron and steel products, sent mainly to France, the United States, the United Kingdom, The Netherlands, and Italy. The principal imports, obtained mainly from France, The Netherlands, Italy, and the United Kingdom, include machinery and transport equipment, food and beverages, chemicals and related products, mineral fuels, and clothing.

Government and social conditions. Germany is a parliamentary democracy. The country's Basic Law (constitution) of 1949 divides political authority between the federal (central) government and the governments of the constituent states (*Länder*). Each state (*Land*) has legislative responsibility over such matters as education, police, broadcasting, culture, and environmental protection. The federal government maintains authority over foreign affairs, defense, finance, citizenship, migration, customs, and telecommunications. The two levels of government share responsibility in economic, social, and health policy, with the federal government establishing general guidelines.

Federal power is centred in the bicameral Parliament, consisting of the Federal Assembly (Bundesrat) and the National Assembly (Bundestag). The members of the Bundesrat are appointed by the state and Berlin governments. The Bundestag, Germany's principal legislative body, is composed of deputies elected to four-year terms by popular vote. This body elects the federal chancellor to direct the country's executive affairs. A special Federal Convention, which consists of the Bundestag's deputies and an equal number of members selected by state parliaments, elects a president to assume ceremonial duties as Germany's titular head of state. The president appoints cabinet-level ministers on the advice of the chancellor. Two political parties dominate Germany's electoral politics: the Social Democratic Party of Germany, a group stressing a strong central government and social-welfare programs; and the Christian Democratic Union (and its Bavarian affiliate, the Christian Socialist Union), a centre-right party advocating free enterprise.

Germany's comprehensive social-welfare system covers almost the entire population, providing benefits for old age, disability, widowhood, sickness, maternity, work injury, and unemployment. Sickness benefits pay for all medical attention.

Germany's health and sanitary conditions are among the best in the world. The country's rate of doctors per person is higher than that found in either France or the United Kingdom. The infant mortality rate is low, and the life expectancy rate stands at 75 years.

Education is free and compulsory for all Germans from 6 to 18 years old. About half the students graduating from four years of primary school (*Grundschule*) attend the secondary modern school (*Hauptschule*) for five years, after which they take part-time vocational classes in conjunction with practical apprenticeship. Other primary-school graduates attend either a six-year intermediate school (*Realschule*) or a nine-year grammar school (*Gymnasium*). The latter awards the *Abitur* degree, a prerequisite of admission to a university. Germany has numerous universities, the oldest being Heidelberg (1386) and Cologne (1388).

The German press is privately owned and free of government control. The broadcasting media consist of a dual system of public and commercial stations and are also relatively independent and free, receiving revenue mainly from the state and private enterprises.

Cultural life. The German literary tradition predates the 8th century. Among the more influential early narratives are the *Nibelungenlied* (*c.* 1200–10) and Wolfram von Eschenbach's *Parzival* (*c.* 1200–10). The greatest period of German literature is generally considered to be the age of Johann Wolfgang von Goethe, a period of Neoclassicism and Romanticism. Johann Gottfried von Herder, Goethe, and Friedrich Schiller were among the significant writers of the 18th century. Later writers such as Rainer Maria Rilke, Arthur Schnitzler, Thomas Mann, and Hermann Hesse also profoundly affected world literature. Post-World War II literature in a divided Germany was also notable. Among the internationally known German writers can be counted Heinrich Böll, Günter Grass, Jakov Lind, Uwe Johnson, Siegfried Lenz, Bertolt Brecht, Anna Seghers, Arnold Zweig, and Christa Wolf.

Germany also produced a number of world-renowned musicians and composers. These include the Bach family, Ludwig van Beethoven, Johannes Brahms, and Richard Wagner. Its exceptional visual artists range from Albrecht Dürer, Lucas Cranach the Elder, and the Holbein family in the late 15th–early 16th century to the painters of German Expressionism (such as Max Beckmann and George Grosz) and the contemporary works of such artists as Joseph Beuys and Anselm Kiefer. The Bauhaus school of design was a major influence on many areas of design, particularly architecture. Mention should also be made of the German cinema, which, too, has gained a high degree of international renown. The German film studio Universum Film-Aktiengesellschaft (Ufa) produced most of the motion pictures of the "golden age" of German cinema during the Weimar Republic (1919–33). These included the highly influential *The Cabinet of Dr. Caligari* (1919) and the works of such men as F.W. Murnau, Fritz Lang, and G.W. Pabst. After a long period of relative quiescence, an intensely introspective "New German Cinema" appeared on the scene in the late 1960s, flowering in the works of such gifted young directors as Volker Schlöndorff, Margarethe von Trotta, Werner Herzog, and Rainer Werner Fassbinder.

History. The origin of the Germanic peoples is obscure. Scholars believe that in the late Bronze Age (*c.* 500 BC) they inhabited southern Sweden, the Danish peninsula, and northern Germany. At that time Celts inhabited most of the territory that is now occupied by the German people. By the end of the 2nd century BC, however, Germanic tribes had advanced into southern and central Germany, displacing the Celts and coming into contact with the Romans in Gaul.

Solid historical information about the Germans begins with Julius Caesar's campaigns in Gaul between 58 and 50 BC. By this time Germanic tribes were established west of the Rhine River and had reached the Danube River in the south. After Caesar's defeat of the Suebi, the Germans were confined to the region east of the Rhine. Between 12 and 9 BC the Romans penetrated as far east as the Elbe River, but the victory of the German leader Arminius over a Roman army in the Battle of the Teutoburg Forest in AD 9 halted Roman colonial expansion in north-central Europe and freed the greater part of Germany from Roman domination.

In about 370 AD nomadic Hunnic horsemen began to move westward, driving the Germanic peoples before them into the Roman Empire in several waves that continued into the 5th century. A number of independent Germanic kingdoms appeared, and by 476 their invasions and emigrations had brought the western half of the Roman Empire to an end.

The Franks were one of the principal Germanic peoples at this time. In the late 5th century the Merovingian king Clovis established a Frankish kingdom in Gaul and western Germany and accepted Christianity. In the 730s the Carolingians replaced the Merovingians as the Franks' ruling dynasty, although they did not acquire the royal title until the coronation of Pepin III in 751. Pepin's son Charlemagne conquered the Saxons and extended the Frankish kingdom eastward to the Elbe River. The old Roman imperial title, which had lapsed in western Europe in the 5th century, was revived and conferred by Pope Leo III on Charlemagne, who thus became the founder and first emperor of the Holy Roman Empire. When Charlemagne's empire was divided by the Treaty of Verdun in 843, his grandson Louis the German became king of the East Franks; he came to rule over most of the area that later became Germany.

In the 9th century the German kingdom began to disintegrate. Raids by Danes, Saracens, and Magyars contributed to the increasing feudalization of society. Because the Carolingian rulers were themselves unable to defend the entire kingdom, military command and the political and economic power necessary to support it increasingly devolved upon the nobles. Five stem, or tribal, duchies emerged in Bavaria, Franconia, Swabia, Lorraine, and Saxony, each representing a separate feudal state within the German kingdom. When the last of the East Frankish Carolingians, Louis IV, died in 911, the dukes elected Conrad, the duke of Franconia, as his successor. Conrad was succeeded in 918 by Henry, the duke of Saxony, beginning more than a century of Saxon rule. Henry and his successors repulsed the Magyars, extended the German kingdom to the east, and restored the authority of the monarchy. Henry's son Otto I was crowned Holy Roman emperor in 962.

The dynasties that followed the Saxons—

the Salian (1024–1125) and the Hohenstaufen (1125–1250)—attempted to extend the Holy Roman Empire's control southward into Italy. The Italian campaigns weakened the central German state, and consequently the local dukes and their vassals grew more powerful. The imperial authority was further weakened by conflict between the emperors and the popes. The conflict reached a crisis in the Investiture Controversy that began in 1075 between Pope Gregory VII and the emperor Henry IV. Succeeding Holy Roman emperors continued to struggle with the papacy for control of the Roman Catholic church.

The Hohenstaufen emperor Frederick I (reigned as emperor 1152–90) restored stability within Germany and renewed the conflict with the papacy. Under Frederick and his successors, the boundaries of the empire were extended eastward.

The death in 1250 of the last Hohenstaufen emperor, Frederick II, was followed by the Great Interregnum, a period of internal confusion and political disorder. It was ended in 1273 by the election of Rudolf I, count of Habsburg. After Rudolf's death in 1291, various members of the houses of Habsburg, Wittelsbach, and Luxembourg were successively elected Holy Roman emperor.

None of the postinterregnum emperors was able to create a centralized German monarchy, and so the Holy Roman Empire by this time was little more than a loose federation of German princes. In 1356 the Luxembourg emperor Charles IV promulgated the Golden Bull, a constitutional document that regulated the election of the Holy Roman emperor and consolidated the power and privileges of the electors (*i.e.,* those German princes entitled to take part in choosing the Holy Roman emperor). In 1438 Albert of Habsburg became emperor; thereafter the Habsburgs held the throne almost continuously until the dissolution of the Holy Roman Empire in 1806.

In 1517 Martin Luther, a professor of theology at Wittenberg University, began calling for the reform of the Roman Catholic church. Luther's criticisms found widespread support among all classes in Germany and resulted in far-reaching social changes. The greatest upheaval was caused by the Peasants' War of 1524–25. Citing Luther's plea for the "liberty of Christian men," the peasants called for an elective priesthood and the abolition of various oppressive feudal dues.

The Roman Catholic emperor Charles V (reigned 1519–56) was unable to enforce his religious policies or to restore the unity of the empire. In 1546 he declared war on the Schmalkaldic League, which was an alliance of German Protestant princes. Hostilities continued until a compromise was reached in the Peace of Augsburg (1555), which recognized the coexistence of Roman Catholicism and Lutheranism in Germany and granted each German prince the right to determine the religion to be practiced within his territories.

Continuing religious struggles and rising nationalist movements throughout the empire brought about the Thirty Years' War (1618–48). Germany was devastated and lost a large part of its population, and the empire's borders were greatly reduced. Under the terms of the Peace of Westphalia (1648), Germany's numerous feudal princes gained virtually sovereign rights under the nominal suzerainty of the emperor.

The decades after the Thirty Years' War saw the beginnings of Brandenburg-Prussia's rise to preeminence among the German states. In 1701 Frederick I took the title of king of Prussia. His grandson Frederick II (Frederick the Great; reigned 1740–86) greatly enlarged Prussia's territories and made Prussia the second most powerful German kingdom after Austria.

The Napoleonic wars brought an end to the Holy Roman Empire in 1806 and forced the German states to implement social, political, and administrative reforms. As a result of the Congress of Vienna (1814–15), the map of Europe and of Germany in particular was redrawn. The 39 resulting German states were united in the German Confederation, a loose political association in which most of the rights of sovereignty remained in the hands of the member governments. The confederation was dominated by Austria. Under the conservative leadership of Klemens von Metternich, Austria opposed the movement for German national unification.

In 1862 Otto von Bismarck became prime minister of Prussia. Bismarck believed that the political unification of the various German states was necessary to preserve Prussia's position as a great power. In 1866 Prussia defeated Austria in the Seven Weeks' War, and, as a result, Prussia was able to annex most of the other north German states and, with 17 smaller German states (excluding Austria), form a federal union called the North German Confederation. Prussia's leadership in the German states' victory over France in the Franco-German War of 1870–71 realized Bismarck's ambitions. The governments of the southern German states (excluding Austria) joined with the North German Confederation to form a united German nation called the German Empire, of which William I of Prussia was proclaimed emperor. By the early 20th century the unified Germany had become Europe's leading industrial nation.

World War I (1914–18) brought disaster to the German Empire. Germany and its allies, Austria-Hungary and Turkey, became involved in a war of attrition against Britain, France, Russia, Italy, and the United States. By late 1918 the war was lost. In November 1918 a left-wing revolution broke out in Germany, and William II abdicated. Germany was forced to accept the Allied peace terms. Under the Treaty of Versailles, Germany lost its overseas colonies and some of its European territory, and the Rhineland was demilitarized and occupied by Allied forces until 1930.

The postwar German government known as the Weimar Republic never had much popular or political support, and the economic dislocations caused by the war and the Treaty of Versailles left the country desperate. A mild recovery after 1923 was arrested by the Great Depression that began in 1929. The resulting massive unemployment and social discontent enabled Adolf Hitler, leader of the Nazi Party, to become in 1933 chancellor and, one year later, president of what he called the Third Reich. Hitler's fanatical pan-Germanism and expansionist policies plunged the world into another devastating war that became known as World War II. In this conflict Germany was allied with Italy and Japan against Great Britain, the Soviet Union, and the United States. After some dazzling initial successes in 1939–42, Germany was overrun and occupied by the Allied Powers in 1945. U.S., British, and French forces attacking from the west occupied the western two-thirds of Germany, while Soviet armies advancing from the east occupied the remaining eastern portion of the country.

The victorious Allies divided the area of what was formerly known as Germany and the area of its capital, Berlin (located wholly within the eastern Soviet-occupied part of the country) into four zones of occupation. Disagreement with the Soviet Union over the reunification of these zones (a dispute marked especially by the Berlin blockade and airlift of 1948–49) led the United States, Britain, and France to consolidate their zones in 1949 into the Federal Republic of Germany (West Germany). Under Soviet auspices, the German Democratic Republic (East Germany) was officially formed from the Soviet occupation zone in that same year with a communist government. From 1948, the United States actively promoted the economic recovery of West Germany in order for that nation to serve as a bulwark against the further expansion of the Soviet Union's influence in Europe. West Germany's economic recovery proved miraculously swift and was complemented by the emergence of a stable parliamentary democracy.

In 1953 East German citizens, exasperated by persecution of the churches, food shortages, collectivization, and rising production quotas, staged an anticommunist uprising. Soviet troops intervened and suppressed the uprising. The collection of reparations by the Soviet Union ceased in 1954, and on March 25 of that year the Soviet Union granted nominally complete sovereignty to East Germany. In 1955 the Federal Republic of Germany became a sovereign state and a full member of the North Atlantic Treaty Organization (NATO); that same year the German Democratic Republic became a founding member of the Warsaw Treaty Organization (better known as the Warsaw Pact), the unified military command established by the Soviet Union and its eastern European allies.

As early as 1952 East Germany took steps to isolate its territory from West Germany, creating a police-guarded cordon of land along the frontier. This action left Berlin as the most accessible exit point for dissatisfied East Germans, and a mass exodus of 3.5 million people, many of whom were trained technical specialists, professionals, and intellectuals, between 1945 and 1961 severely damaged the East German economy. Konrad Adenauer, West Germany's chancellor and foreign minister in 1949–63, was committed to the reunification of Germany and refused to acknowledge the legal existence of the East German republic. Another crisis developed over Berlin in 1958 when the Soviets demanded the withdrawal of Western troops, and in 1961 the Soviets authorized the building of the Berlin Wall, separating the eastern and western sectors of that city and cutting off the only remaining escape route to West Germany. The building of the Berlin Wall marked the beginning of an economic revival for East Germany, and many war-torn cities in that country were subsequently rebuilt.

The West German government later sought a détente with the East and exchanged ambassadors with the Soviet Union in 1967. Chancellor Willy Brandt (1969–74) finally came to terms with West Germany's communist neighbours to the east, signing treaties with Poland and the Soviet Union in 1970 that confirmed existing frontiers and pledged the renunciation of force to achieve political ends. In 1972 the two Germanys signed a pact that made possible formal relations and cooperation between them. Other Western countries established diplomatic relations with East Germany, which was admitted to the United Nations, along with West Germany, in 1973. Relations continued to improve during the 1980s. With the extraordinary events set in motion by the rise to power of Mikhail Gorbachev in the Soviet Union, the influence of the Soviet Union on East Germany waned, and the East German populace overthrew the communist government. The Berlin Wall fell in 1989, and, under the provisions of Article 23 of the West German constitution, the country was reunited on Oct. 3, 1990.

Germer, Lester Halbert (b. Oct. 10, 1896, Chicago, Ill., U.S.—d. Oct. 3, 1971, Gardiner, N.Y.), physicist who, with his colleague Clinton Joseph Davisson, conducted an experiment (1927) that first demonstrated the wave properties of the electron. This experiment confirmed the hypothesis of Louis-Victor de Broglie, a founder of wave mechanics, that the electron should show the properties of an

electromagnetic wave as well as those of a particle.

Germer was a graduate student at Columbia University, working under Davisson's supervision at the Bell Telephone Laboratories in New York City, when they bombarded a single crystal of nickel with an electron beam and observed that the distribution of the scattered electrons conformed closely to the prediction of de Broglie's hypothesis.

germfree life, biological condition characterized by the complete absence of living microorganisms. Gnotobiology comprises the study of germfree plants and animals, as well as living things in which specific microorganisms, added by experimental methods, are known to be present. When one or more known species of microorganisms are added experimentally to a germfree plant or animal, the host, of course, is no longer germfree; both the host and the introduced species are gnotobiotic, however, since all added species are known to the investigator. Precise comparisons between germfree and conventional animals cannot be made unless both are isolated from the environment and fed the same sterile diet.

Gnotobiotic research seeks to explore the effects of microorganisms in aging and in physiological diseases, to identify the specific causative agents in infectious diseases, and to explore the role of bacteria in protozoan and viral infections. Germfree research currently is directed toward studying the reactions of germfree animals after they have been inoculated with specific known microorganisms.

The first attempts to grow germfree animals were undertaken in 1895, with guinea pigs at the Hygiene Institute of Berlin; experiments were continued with chicks for more than a decade with no success. The first successful germfree vertebrate experiments (with chicks) were begun around 1912. Shortly thereafter, germfree goats were kept alive for two months. Subsequent advances in methodology during the 1920s and '30s led to the routine raising of germfree animals.

Applications of gnotobiotic research. The addition of one or two specific microorganisms to germfree animals can clarify cause-and-effect relationships that are important in human disease. The complex interactions of pathogenic (disease-causing) microorganisms with the bacteria that normally inhabit the body can be partially elucidated by infecting germfree laboratory animals with such organisms.

Gnotobiotic research involving the simultaneous introduction of more than two microorganisms may ultimately allow man to control his microflora (*i.e.,* the types of microorganisms in his body). Experiments in which some germfree animals are inoculated with a pathogen and others are inoculated with both a pathogen and another microorganism reveal that the apparent strength of the pathogen changes in the presence of different microfloral environments. Such results provide direct evidence for an increasingly popular concept: that the microflora in the alimentary tract of a conventional animal are important in defending that animal from many potentially pathogenic microorganisms frequently found in various parts of the tract.

The techniques of gnotobiology have been used to clarify the causes of certain common human health problems. Gnotobiotic studies have shown, for example, that tooth decay is caused only by certain infectious bacteria.

Germfree animals are used in toxicology, pollution control, and vaccine tests. The effects of an external force (*e.g.,* radiation or a noxious gas) on a germfree animal are easy to distinguish because there is no interference from infection. Patients with underdeveloped or suppressed immunological defenses against bacteria can be placed in complete biological isolation using gnotobiotic techniques. Babies suspected of lacking the ability to synthesize gammaglobulins (blood proteins that include antibodies) have been delivered into germfree isolators and maintained there until laboratory tests have shown that they could synthesize gammaglobulins. Hospital precautions that precede heart transplants may include elaborate gnotobiotic rooms and procedures to prevent an immune-suppressed patient from coming into contact with pathogenic microorganisms.

Methodology. Germfree chicks, turkeys, and Japanese quail can be obtained by passing surface-sterilized eggs through a germicidal trap into a sterile isolator where they are allowed to hatch. The eggs must be obtained from flocks free from microorganisms that invade the egg in the oviduct. Germfree plants can be obtained from seeds that have been surface-sterilized. The fetus of mammals is normally bacteriologically sterile, and germfree young can be obtained by Caesarian operation, under germfree conditions, with transfer of the mature embryo into a sterile isolator. These young must be fed by hand to avoid contamination by the mother. Subsequent reproduction of hand-reared germfree mammals allows routine production of germfree colonies. Germfree rats or mice can be purchased from breeding companies and simply transferred aseptically from the colony isolator into a shipping isolator; after shipment, the animals are transferred from the shipping container into the experimental isolator.

The isolator is a physical barrier through which no living microorganisms can pass. It may be a small or large container, usually made of glass and steel or plastic, with plastic or rubber gloves. A sterile room may also serve as an isolator. The laboratory isolator has an entry for the organism, food, and utensils; a source of air with exhaust; and, usually, arm-length gloves. Food and utensils are sterilized and taken into the isolator through an adjoining area called the sterile lock. Special attachments may be a liquid dip tank, a shipping cage, a bacterial filter for liquids, or a second isolator. The most widely used isolator is a soft plastic sacklike container that comes in many shapes and sizes.

Sterilization of metal isolators and most utensils is accomplished with steam under pressure. Germicidal vapour sterilization (2% peracetic acid) is used for plastic isolators, which cannot endure the heat of steam sterilization. Air for the isolated organism is sterilized by mechanical filtration through fine glass wool. Eggs are surface treated with mercuric chloride, and seeds with peracetic acid or formalin. Food and water are sterilized by steam, irradiation, or filtration, depending upon the requirements of the investigation. Diets fed to germfree animals are comparable to those fed to conventional animals.

germicide, any of several substances or physical agents used to destroy infectious microorganisms. *See* antimicrobial agent.

germinal mutation, alteration in the genetic constitution of the reproductive cells, occurring in the cell divisions that result in sperm and eggs. A germinal mutation affects the progeny of the individual in whose reproductive cells the mutation arose and subsequent generations of that progeny. Unlike somatic mutations, which occur in the body cells and are not passed on to later generations, germinal mutations are important sources of genetic variation in natural populations that lead to evolutionary change through natural selection.

germination, the sprouting of a seed or other reproductive body, usually after a period of dormancy (*see* afterripening). Absorption of water, passage of time, chilling, warming, oxygen availability, and light exposure may all operate in initiating the process. Germination sometimes occurs early in the development process; the mangrove (*Rhizophora*) embryo develops within the ovule, pushing out a swollen rudimentary root through the still-attached flower. The embryo of the monkey puzzle tree germinates while the seed is still in the cone, forms a tuber from its embryonic stem (hypocotyl), and then rests for several months. In peas and corn (maize), the cotyledons (seed leaves) remain underground; in other species (beans, sunflowers, etc.), the hypocotyl grows several inches above the ground, carrying the cotyledons into the light, in which they become green and often leaflike. The carefully controlled mass germination of cereal seeds supplies enzymes for the making of alcoholic beverages and for other industries as well.

Germiston, city, Transvaal, South Africa, lying 5,550 ft (1,690 m) above sea level and situated in the Witwatersrand directly southeast of Johannesburg. It is the largest railway junction of South Africa and has substantial rail repair shops. Germiston, in the heart of the Rand goldfields, was founded in 1886 after the local discovery of gold. It officially became a town in 1903 and a city in 1950. It is part of one of South Africa's most heavily industrialized areas. Gold bullion from nearly all the country's mines is recovered at the Rand Refinery Limited (established 1921), the largest in the world. Other industries include smelting, cotton-ginning, and varied manufactures. Pop. (1984 est.) mun., 283,937.

Gernreich, Rudi (b. Aug. 8, 1922, Vienna—d. April 21, 1985, Los Angeles), Austrian-born American avant-garde fashion designer of the 1960s.

Gernreich, 1967

By courtesy of Rudi Gernreich Inc.; photograph, Julian Wasser

Gernreich emigrated to the United States in 1938 and, from 1942 to 1948, was a dancer and costume designer for the Lester Horton Modern Dance Troupe. He did free-lance clothing design from 1948 and from 1951 to 1959 worked as a designer for a Los Angeles boutique. In 1960 Rudi Gernreich Inc. was formed, but he continued to design knitwear and swimsuits for other manufacturers.

As his ideas of clothing design evolved, Gernreich became interested in developing nonrestrictive and contemporary clothing for women. His innovative designs were intended as an alternative to the conservative styles of the then-dominant Parisian fashion houses. In 1964 he designed a topless swimsuit ("monokini") that gained him worldwide notoriety. The unisex look, invisible undergarments, transparent tops, miniskirts, knit tank suits, and brightly coloured stockings were his trademarks.

Gernsback, Hugo (b. Aug. 16, 1884, Luxembourg, Luxembourg—d. Aug. 19, 1967, New

York City), American inventor and publisher who was largely responsible for the establishment of science fiction as an independent literary form.

After receiving a technical education in Luxembourg and Germany, Gernsback traveled to the United States in 1904 to market an improved dry battery that he had invented. He formed a radio supply house, and in 1908 he founded *Modern Electrics* (later absorbed by *Popular Science*), a pioneer magazine for radio enthusiasts.

In 1926 Gernsback began publishing *Amazing Stories,* one of the first magazines devoted exclusively to what he referred to as "scientifiction." The stories were often crudely written, but the very existence of the magazine and its successors, including *Wonder Stories,* encouraged the development and refinement of the genre. His contribution was later recognized with the establishment of the annual Hugo Award for the best science fiction novel.

Gérome, Jean-Léon (b. May 11, 1824, Vesoul, Fr.—d. Jan. 10, 1904, Paris), painter, sculptor, and teacher, one of the most prominent late 19th-century academic artists in France.

"The Cockfight," painting by Jean-Léon Gérome, 1847; in the Louvre, Paris

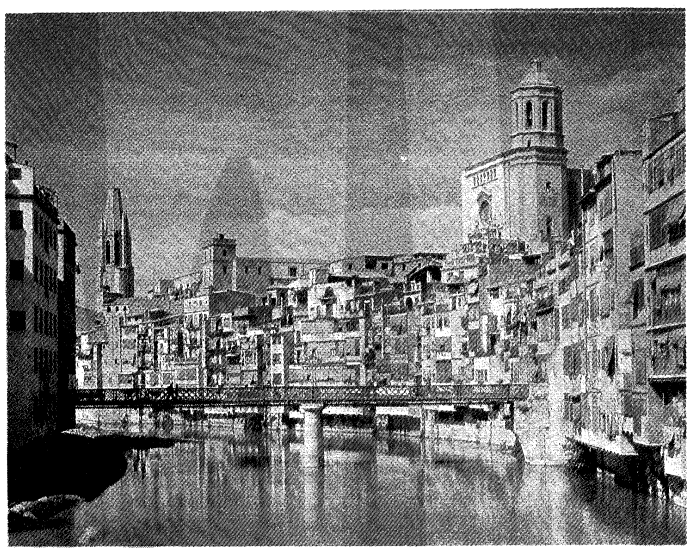
Cliche Musees Nationaux

Gérome, whose father was a goldsmith, studied with J.-H. Delaroche. His historical and mythological compositions, such as "Pygmalion and Galatea" (Metropolitan Museum of Art, New York City), were anecdotal, painstaking, often melodramatic, and frequently erotic. The surfaces of his paintings were highly finished, and he was fascinated with technical virtuosity. He was a good draftsman in the tight linear style of Jean-Auguste-Dominique Ingres and an inventive illustrator in the manner of Delaroche. A trip to Egypt in 1856 introduced an exotic element into his painting—*e.g.*, "Prayer in the Mosque of 'Amr, Old Cairo" (*c.* 1860; Metropolitan Museum of Art). During the last 25 years of his life he concentrated on sculpture. As a teacher at the École des Beaux-Arts, he counted among his many pupils Odilon Redon and the American artists Thomas Eakins and J. Alden Weir. A highly successful artist, Gérome exerted great influence in the Paris art world. He was exceedingly hostile to the Impressionists and, as late as 1893, urged the government to refuse a bequest of 65 of their works.

Gerona, *provincia,* in the Catalonia *comunidad autónoma* ("autonomous community"), Spain. Gerona is the northeasternmost *provincia* of the *comunidad autónoma* and of Spain. It is bounded on the north by France and the Pyrenees, on the east and southeast by the Mediterranean Sea, and on the west by Barcelona and Lérida *provincias.* Formed in 1883 from parts of Catalonia (Catalunya), it has an area of 2,273 square miles (5,886 square km). Historically, the region acted as the guardian of the passes through the eastern end of the Pyrenees.

The *provincia*'s colder northern sector has a well-developed forest industry (oak, pine, chestnut); its eastern and southern fertile coastal plain of El Ampurdán, drained by the Ter, Muga (French Mouge), and Fluviá rivers, produces cotton; fishing also is economically important. Textile manufactures (linen and cotton) are concentrated in Gerona, the capital of the *provincia,* and the cork industry flourishes at San Feliu de Guixols. Tourism is of increasing importance along the coast, which is known as the Costa Brava. Cape Creus, a marked feature of the coastline, is the most easterly point of the Iberian Peninsula. Pop. (1986 est.) 474,882.

Gerona, city, capital of Gerona *provincia,* in the Catalonia *comunidad autónoma* ("autonomous community"), northeastern Spain. It lies on the Oñar River in the foothills of the Los Ángeles Mountains, a short distance inland from a Mediterranean coastal resort area known as Costa Brava. The city comprises three zones: the interior (which includes the old quarter), the modern section, and a residential area. Because of its position on the coastal route from Gaul to the Iberian Peninsula, Gerona was a fortified site of the Iberians (whose ruined walls dating from the 4th and 5th centuries BC remain) and of the Romans, who knew the city as Oppidum Gerunda. It passed to the Visigoths and was conquered in 714 by the Muslims, who called it Jerunda. Retaken in 785 by the Franks under Charlemagne, the city was lost again in 793 and recaptured by Louis of Aquitaine in 797. It was later incorporated into the kingdom of Aragon. Gerona took an active part in the 17th–18th-century wars between Spain and France and was besieged several times by both sides.



Gerona, Spain, on the Oñar River with the towers (left) of the church of San Feliu and (right) the cathedral

C.I.R.I.—EDISTUDIO

Historic landmarks include the Gothic cathedral (begun *c.* 1292), with one of the world's widest (74 feet [23 m]) aisle-less naves. Gerona is the site of a Provincial Archaeological Museum and of a university founded by Alfonso V in 1446.

Industrially, the city is important. Milk pasteurization, filtering, freezing, and preserving are based at the municipal central dairy; there are flour mills, distilleries, and biscuit, confectionery, and soft drink factories. Textile production is considerable. The city also has a paper mill, publishing house, several chemical factories, and soapworks. Heavy machinery is also manufactured. Pop. (1986 est.) 92,590.

Geronimo, Indian name GOYATHLAY ("One Who Yawns") (b. June 1829, No-Doyohn Canyon, Mex.—d. Feb. 17, 1909, Fort Sill, Okla., U.S.), Bedonkohe Apache leader of the Chiricahua Apache, who led his people's defense of their homeland against the military might of the United States.

For generations the Apaches had resisted white colonization of their homeland in the Southwest by both Spaniards and North Americans. Geronimo continued the tradition of his ancestors from the day he was admitted to the warriors' council in 1846, participating in raids into Sonora and Chihuahua in Mexico. He was further embittered by the death of his mother, wife, and children at the hands of Mexicans in 1858. He then rose to the leadership of a band of warriors by exhibiting extraordinary courage, determination, and skill in successive raids of vengeance upon Mexicans. In 1874 some 4,000 Apaches were forcibly moved by U.S. authorities to a reservation at San Carlos, a barren wasteland in east-central Arizona. Deprived of traditional tribal rights, short on rations, and homesick, they turned to Geronimo and others who led them in the depredations that plunged the region into turmoil and bloodshed.

In the early 1870s Lieutenant Colonel George F. Crook, commander of the Department of Arizona, had succeeded in establishing relative peace in the territory. The management of his successors, however, was disastrous, and spurred by Geronimo, hundreds of Apaches left the reservation to resume their war against the whites. In 1882 Crook was recalled to Arizona to conduct a campaign against the Indians. Geronimo surrendered in January 1884, only to take flight from the San Carlos reservation in May 1885, accompanied by 35 men, 8 boys, and 101 women. Crook threw his best men into the campaign, and 10 months later, on March 27, 1886, Geronimo surrendered at Cañón de Los Embudos in Sonora. Near the border, however, fearing that they would be murdered once they crossed into U.S. territory, Geronimo and a small band bolted. As a result, Brigadier General Nelson A. Miles replaced Crook as commander on April 2.

During this final campaign no fewer than 5,000 white soldiers and 500 Indian auxiliaries were employed at various times in the apprehension of Geronimo's small band. Five months and 1,645 miles later, Geronimo was tracked to his camp in the Sonora mountains. At a conference (Sept. 3, 1886) at Skeleton Canyon in Arizona, Miles induced Geronimo to surrender once again, promising him that, after an indefinite exile in Florida, he and his followers would be permitted to return to Arizona. The promise was not kept. Geronimo and his fellow prisoners were put at hard

labour, and it was May 1887 before he saw his family. Moved to Fort Sill, in Oklahoma Territory, in 1894, he at first attempted to "take the white man's road." He farmed and

Geronimo, 1886

By courtesy of the Smithsonian Institution National Anthropological Archives, Bureau of American Ethnology Collection, Washington, D.C.

joined the Dutch Reformed Church, which expelled him because of his inability to resist gambling. He never saw Arizona again, but, by special permission of the War Department, he was allowed to sell photographs of himself and his handiwork at expositions. Before he died, he dictated to S.S. Barrett his autobiography, *Geronimo: His Own Story.*

BIBLIOGRAPHY. Among useful recent biographies are Odie B. Faulk, *The Geronimo Campaign* (1969); Alexander B. Adams, *Geronimo* (1971, reprinted 1990); and Angie Debo, *Geronimo* (1976).

gerontology and geriatrics, scientific and medical disciplines, respectively, that are concerned with all aspects of health and disease in the elderly, and with the normal aging process. Gerontology is the scientific study of the phenomena of aging, by which is meant the progressive changes that take place in a cell, a tissue, an organ system, a total organism, or a group of organisms with the passage of time. Aging is part of the development sequence of the entire life span, from prenatal growth to senescence. Gerontology, however, is concerned primarily with the changes that occur between the attainment of maturity and the death of the individual and with the factors that influence these changes.

The problems of gerontology fall into four major categories: (1) social and economic problems precipitated by the increasing number of elderly people in the population, (2) psychological aspects of aging, which include intellectual performance and personal adjustment, (3) physiological bases of aging, along with pathological deviations and disease processes, and (4) general biological aspects of aging in all animal species.

Gerontology utilizes the methodologies of many other scientific and medical disciplines. The goal of research in geronotology is to learn more about the aging process—not for the purpose of extending the life span but for the purpose of possibly minimizing the disabilities and handicaps of old age. Geriatrics is the branch of medical science concerned with the prevention and treatment of diseases in older people; it is thus a part of the broader field of gerontology.

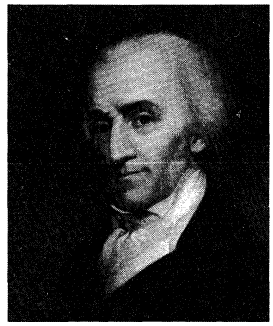
Before the 19th century, when most people died before reaching old age, there was little demand for physicians to specialize in the care of the elderly; declining health was regarded as an inevitable accompaniment to old age. The first to stress the importance of special studies of disease in old age was the French physician Jean-Martin Charcot in 1881, but few physicians undertook those studies until the early 20th century. It was then observed that a large number of pathological changes occurred among older people and that an understanding of the aging process might lead to less disease in the elderly. Thus was the study of gerontology begun.

Marjory Warren in Britain in the 1930s demonstrated that specific care plans for chronically ill older patients, previously considered to have "irremediable" conditions, could prevent many of the worst consequences of aging. As people older than 65 came to constitute an increasing proportion of the population in developed nations in the 20th century, it became apparent that specialized physicians dedicated to treating the diseases associated with old age were needed; this need was recognized by the British government after World War II, resulting in improved training in geriatric medicine in that country. In the United States, the specialty is less organized than in Europe, and much of the impetus for improved training in geriatric medicine has come from internists with a personal interest in treating geriatric patients; nevertheless, an increasing number of physicians with geriatric expertise have been trained.

gerousia, in ancient Sparta, council of elders, one of the two chief organs of the Spartan state, the other being the *apella* (assembly). The functions of both were likely delineated at the time of the reforms of Lycurgus, probably in the 7th century BC. The *gerousia* prepared business to be submitted to the *apella* and had extensive judicial powers, being the only Spartan court that could pronounce sentence of death or exile. Its members, the *gerontes* ("elders"), whose number was fixed at 30, including the two kings, were chosen for life by acclamation of the citizens from among candidates who had reached age 60.

Gerry, Elbridge (b. July 17, 1744, Marblehead, Mass. [U.S.]—d. Nov. 23, 1814, Washington, D.C.), signer of the U.S. Declaration of Independence, governor of Massachusetts, and vice president of the United States (1813–14). From his name the term *gerrymander* later was derived.

Gerry graduated from Harvard in 1762 and entered his father's mercantile business. He was a member of the Massachusetts legislature and General Court (1772–73), served on a Committee of Correspondence, was a member of the Massachusetts Provincial Congress (1774–75), and was a delegate to the Continental Congress in Philadelphia (1776–81), where he early advocated independence. He was also a member of Congress under the Articles of Confederation (1783–85) and a delegate to the Constitutional Convention in Philadelphia. He opposed adoption of the proposed new constitution, but after it was ratified he gave it his support and was a representative to the U.S. Congress for two terms (1789–93).



Gerry, detail of an oil painting by James Bogle, 1861, after a portrait by John Vanderlyn; in Independence National Historical Park, Philadelphia

By courtesy of the Independence National Historical Park Collection, Philadelphia

In 1797 President John Adams sent him with John Marshall and Charles Cotesworth Pinckney to France, on the mission that resulted in the XYZ Affair (*q.v.*). The mission was an unsuccessful attempt to negotiate a treaty that would settle several long-standing disputes. The underhand treatment of the U.S. negotiators by Charles-Maurice de Talleyrand and his subordinates resulted in the speedy departure from Paris of Marshall and Pinckney. Gerry remained in Paris in the vain hope that Talleyrand might offer him, a known friend of France, terms that had been refused to Marshall and Pinckney. This action brought down upon Gerry from Federalist partisans a storm of abuse and censure from which he never fully cleared himself.

After four attempts in 1800–03 to win election as governor of Massachusetts, Gerry succeeded in 1810 and was reelected in 1811. His administration was notable for its use of what became known as gerrymandering, the division of election districts so as to give one political party an advantage. In 1812 Gerry, an ardent advocate of the war with Great Britain, was elected vice president of the United States on the Jeffersonian Republican ticket with James Madison. He died in office.

gerrymandering, in U.S. politics, drawing the boundaries of electoral districts in a way that gives one party an unfair advantage over its rivals. The term is derived from the name of Governor Elbridge Gerry of Massachusetts, whose state administration enacted a law in 1812 dividing the state into new senatorial districts. The law consolidated the Federalist Party vote in a few districts and thus gave disproportionate representation to Democratic-Republicans. The outline of one of these districts, which was thought to resemble a salamander, gave rise, through a popular application of the governor's name, to the term *gerrymander.*

Gerrymandering has been condemned because it violates two basic tenets of electoral apportionment—compactness and equality of size of constituencies. A U.S. Supreme Court ruling of 1964 stated that districts should be drawn to reflect substantial equality of population. However, using studies of regional voting behaviour, the majority parties in certain state legislatures continue to set district boundaries along partisan lines without regard for local boundaries or even contiguity. For example, in some states, representatives from rural and small town districts seek to limit the representation of more densely populated urban centres.

Sometimes gerrymandering is defended as the only means of securing any representation for minority groups. It is argued that violating local boundaries in drawing districts is preferable to denying a politically cohesive group any voice in state government.

Gers, *département,* Midi-Pyrénées *région,* southwestern France, established from part of the historic province of Gascony. Occupying 2,416 square miles (6,257 square km), it comprises a vast plateau (highest point 1,200 feet [400 m]) formed by deposits from the great Pyrenean chain that dominates them; the plateau slopes gradually from the base of the Pyrenees northward toward the Garonne River, which receives the waters of numerous tributaries of Pyrenean origin flowing across Gers. Among these is the Gers River, which bisects the *département* from south to north, passing through Auch, its capital. Other streams feed the Adour River, flowing through Gers in the southwest. The climate is temperate but unstable, with frequent hailstorms. Gers is among the richest agricultural areas of France, with mixed farming, cattle raising, cereals, orchards, and vineyards. Industry, apart from the distillation of Armagnac brandy, is unimportant. One of the features of the *département* is the line of 14th-century castles

built by English and French kings along the frontier established in the late 13th century. The *département* has three *arrondissements*—Auch, Condom, and Mirande—and is in the educational division of Toulouse. Pop. (1982) 174,154.

Gershom ben Judah (b. *c.* 960, Metz, Lorraine [now in France]—d. 1028/40, Mainz, Franconia [Germany]), eminent rabbinical scholar who proposed a far-reaching series of legal enactments (*taqqanot*) that profoundly molded the social institutions of medieval European Jewry.

He was called the light of the exile and also Rabbenu ("Our Teacher," a title of reverence). As head of the rabbinic academy at Mainz, he was a pioneer in bringing the learning of the Talmudic academies at Babylon and Palestine to western European schools. At synods of community leaders he proposed his *taqqanot,* which included the prohibition of polygamy (permitted by biblical and Talmudic law but already mostly unpracticed), interdiction of the husband's right to divorce without the wife's consent, prohibition of reading another's mail without his consent (mail then was usually carried by travelers), and prohibition against taunting Jews who had been forcibly converted to another religion and had then returned to Judaism.

He wrote many responsa (authoritative answers in response to questions about Jewish law), worked on a critical text of the Talmud and the Masora, and transmitted to his students an extensive oral commentary on the Talmud. All subsequent rabbinic students in western Europe considered themselves, in the words of the renowned medieval French Jewish commentator Rashi (1040–1105), "students of his students."

Gershon Loans, Joseph ben: *see* Josel of Rosheim.

Gershwin, George, original name JACOB GERSHVIN (b. Sept. 26, 1898, East New York [now in Brooklyn], N.Y., U.S.—d. July 11, 1937, Hollywood, Calif.), one of the most significant and popular of American composers. His primary field was the Broadway musical theatre, but important as well are his compositions in which the techniques and forms of art music are blended in varying degrees with the stylistic nuances and techniques of popular music and jazz.

Gershwin, the son of Russian-Jewish immigrants whose original name had been Gershovitz, first heard jazz performed live at

George Gershwin
Pictorial Parade—EB Inc.

about the age of six. He was exposed as a child to occasional concerts of art music and began studying piano at 12. Long after becoming a successful composer, he continued to broaden his compositional technique, studying for a time with two idiosyncratic and advanced American composers, Henry Cowell and Wallingford Riegger, and later with Joseph Schillinger, a composer and theorist known for his mathematically grounded approach to composition.

In 1914 Gershwin began his professional career, as a piano-playing song plugger for the Jerome Remick music-publishing company. Two years later he produced his first published song, "When You Want 'Em You Can't Get 'Em." Although it was not a success, he began to attract the attention of some well-known Broadway composers; the operetta composer Sigmund Romberg included one of Gershwin's songs in *The Passing Show of 1916.* During these years he continued his studies of piano, harmony, and orchestration and was employed as a rehearsal pianist.

In 1918–19 several of Gershwin's songs were included in Broadway productions; the song "Swanee," performed by the singer Al Jolson in *Sinbad,* achieved extraordinary success. The first musical for which he wrote the entire score was *La, La Lucille* (1919). From 1920 to 1924 he supplied several dozen songs for the annual productions of *George White's Scandals;* in 1920 he wrote the entire score. For the 1922 *Scandals* he composed a short opera, *Blue Monday.* Later retitled *135th Street,* it attracted the attention of the *Scandals'* conductor, bandleader Paul Whiteman, who commissioned from him a symphonic, jazz-style work. In fulfilling this commission, Gershwin composed one of his most acclaimed works, *Rhapsody in Blue* (1924), scored originally for two pianos and orchestrated by Whiteman's arranger, Ferde Grofé, for a piano and jazz band; Grofé later devised a piano and full orchestra version.

The year 1924 also saw Gershwin's first major Broadway success, *Lady, Be Good!,* which contained the songs "Fascinating Rhythm," "Oh, Lady, Be Good!," and (written for the production but not included in it) "The Man I Love." This musical also marked the first full-scale collaboration between Gershwin and his lyricist brother, Ira Gershwin. In the next decade they established themselves as one of the major song-writing teams in the history of the Broadway theatre. Together they created, among other shows, *Tip-Toes* (1925), *Oh, Kay!* (1926), *Strike Up the Band* (1927; revised 1930), *Funny Face* (1927), and *Girl Crazy* (1930). The most successful of their shows, and in some ways the most daring because of its satire of the U.S. political system, was *Of Thee I Sing* (1931), the first musical to win a Pulitzer Prize in drama; it had an unsuccessful sequel, *Let 'em Eat Cake* (1933). Gershwin's songs were also used in several motion pictures, including *Delicious* (1931), *Shall We Dance* (1937), *A Damsel in Distress* (1937), and *The Goldwyn Follies* (1938). The semibiographical film *Rhapsody in Blue* (1945) contained a rich compilation of his works.

His biggest and most ambitious work was the opera *Porgy and Bess* (1935), based on the novel *Porgy* by DuBose Heyward (who wrote the opera's libretto and collaborated with Ira Gershwin on lyrics). Before Gershwin started work on the score and orchestration, he spent a summer on Folly Island near Charleston, S.C., becoming familiar with the music and customs of the blacks of the area. For this "folk opera," as Gershwin was first to call it (though it contains no folk tunes aside from a few street cries), he molded the operatic idiom to reflect his characters and setting, using popular-song style, jazz rhythms, the operatic aria, his special orchestration, and other resources to achieve his dramatic goal.

Gershwin's other classical compositions include *Lullaby,* for string quartet (*c.* 1919–20); *Concerto in F,* for piano (1925); *Preludes,* for piano (1926); the tone poem *An American in Paris* (1928); *Second Rhapsody,* for orchestra and piano (1931); *Cuban Overture* (1932); and *I Got Rhythm Variations* (1934).

Gershwin died about two months short of his 39th birthday, following unsuccessful surgery that revealed a brain tumor.

Gershwin, Ira, original name ISRAEL GERSHVIN (b. Dec. 6, 1896, Manhattan, New York, N.Y., U.S.—d. Aug. 17, 1983, Beverly Hills, Calif.), American lyricist who collaborated with his younger brother, George Gershwin, on more than 20 Broadway musicals and motion pictures until George's death (1937) and who later collaborated on films and plays with others—Moss Hart, Kurt Weill, Jerome Kern, Harry Warren, and Harold Arlen—and contributed to Gershwin revivals.

Gershwin was born on New York's Lower East Side of Russian-Jewish immigrant parents. He early showed literary talent and attended City College of New York for two years (1914–16). Thereafter, he did odd jobs until his brother, already becoming known as a composer and musician, asked him to write lyrics; their first song of collaboration was "The Real American Folk Song," which appeared in *Ladies First* (1918). During the early years, Ira Gershwin used a pseudonym, Arthur Francis, in order not to capitalize on his brother's reputation.

Over the years he wrote many brilliant lyrics for such Gershwin songs as "The Man I Love," "'S Wonderful," "I Got Rhythm," "Embraceable You," "A Foggy Day," and "Fascinating Rhythm" and prepared the lyrics for *Porgy and Bess* (1935), with such songs as "Summertime," "I Got Plenty o' Nuttin'," and "It Ain't Necessarily So." His later credits include "My Ship" with Kurt Weill (1940), "Long Ago and Far Away" with Jerome Kern (1944), and "The Man That Got Away" with Harold Arlen (1954), written for Judy Garland. He collected all the lyrics of his best-known songs and wrote commentaries on each in *Lyrics on Several Occasions* (1959). Ira Gershwin continued writing until the last year of his life, rewriting lyrics for Gershwin tunes used in the musical *My One and Only* (1983).

Gerson, Jean de, original name JEAN CHARLIER, also called JOHANNES ARNAUDI DE GERSONII (b. Dec. 13, 1363, Gerson, Fr.—d. July 12, 1429, Lyon), theologian and Christian mystic, leader of the conciliar movement for

Gerson, engraving
J.E. Bulloz

church reform that ended the Great Schism (between the popes of Rome and Avignon).

Gerson studied at the University of Paris under the noted theologian Pierre d'Ailly, later his colleague at the Council of Constance, and was elected to succeed d'Ailly as chancellor of the university in 1395.

The major theological controversy of the times, the role of the papacy in the church, was a result of the Great Schism (begun 1378), in which two rival candidates disputed the papal throne. At first, Gerson's attitude was moderate; he favoured limited reforms, opposed the convocation of a church council to depose the competing popes, and, in 1398, disapproved of the withdrawal of obedience from Bene-

dict XIII, an antipope. He was gradually won over to the need for action, however, advocating and participating in the Council of Pisa (1409), at which both reigning popes, Benedict XIII and Gregory XII, were deposed and Alexander V was elected to the papacy. Since neither Benedict nor Gregory acknowledged the council's authority, there were, in effect, three popes simultaneously attempting to run the church.

In 1414 Gerson and d'Ailly led the reformers into a second council, at Constance. Under their direction, the council removed Pope John XXIII, who had succeeded Alexander V. Under pressure, Gregory XII also resigned and, finally, in 1417, Benedict XIII acceded to the council. The church was then united under Martin V. The Council of Constance also condemned the Bohemian reformer Jan Hus for heresy. Gerson opposed the theologian Jean Petit—who defended as justifiable tyrannicide the assassination (Nov. 23, 1407) of Louis, duc d'Orléans, by partisans of John the Fearless of Burgundy—but the council refused to condemn him explicitly. When Gerson left Constance (1418), he was prevented from returning to France by John and went into exile in Germany. On John's death (1419), he returned to France and settled at Lyon.

In his writings, Gerson defended the council's actions, putting forth the position that Christ had instituted the primacy of the church as the collection of the faithful, with the pope as its deputy. As such, the pope could be removed without his consent by a council of the faithful. His treatise *On Ecclesiastical Power,* written after the Council of Constance, pictured the pope as a constitutional monarch and contended that the council had merely restored the papacy to its proper role.

As a religious educator, Gerson established a curriculum based on older mystical theologies, using the teachings of St. Bonaventura as a model. To Gerson, the soul did not merely attain a union with God in prayer; soul and God became identical. In his study *On Mystical Theology,* he contrasted the mystical approach to God and religion with that of scholasticism, which emphasized study of the Bible and church history, relying on reason to achieve faith. Christian mystics should find the evidence of God in their hearts, Gerson argued, believing that love would reach further than reason and that the mystic approach was intrinsically more self-fulfilling. *The Imitation of Christ,* a celebrated devotional work traditionally ascribed to Thomas à Kempis, has been considered by some scholars to be the work of Gerson, although no conclusive evidence has been found to substantiate this belief.

Gersonides: *see* Levi ben Gershom.

Gersoppa Falls (India): *see* Jog Falls.

Gerstenberg, Heinrich Wilhelm von (b. Jan. 3, 1737, Tondern, Den.—d. Nov. 1, 1823, Altona, near Hamburg), German poet, critic, and theorist of the Sturm und Drang ("Storm and Stress") literary movement, whose *Briefe über die Merkwürdigkeiten der Literatur* (1866–67; "Letters About the Peculiarities of Literature") contained the first definite formulation of the critical principles of this movement: its enthusiasm for Shakespeare, preoccupation with youthful genius, and its emphasis on the importance of unbridled emotion.

After studying law, Gerstenberg entered the Danish military service and took part in the war with Russia in 1762. He left the service and spent the next 12 years in Copenhagen, where he became a friend of Friedrich Gottlieb Klopstock, the leading writer of the German Enlightenment. During that time he

Gerstenberg, engraving
By courtesy of the Staatsbibliothek, Berlin

wrote *Gedicht eines Skalden* (1766; "Poems of an Old Norse Bard"), in which he introduced bardic poetry into German literature with the use of material and themes from Norse antiquity. His powerful and gruesome tragedy *Ugolino* (1768) ranges in its expression from the heroic to the macabre. During his Copenhagen years he also wrote the text of a cantata, *Ariadne auf Naxos* (1767), that was set to music by Johann Adolph Scheibe and Johann Christian Bach and later adapted for a well-known duodrama by Jiří Antonín Benda.

Gerstenberg also was a musician; he had been a pupil of Scheibe. Gerstenberg formulated theories of instrumental and dramatic music that opposed those of Jean-Jacques Rousseau. From 1775 to 1783 he was the official Danish representative at Lübeck, and in 1789 he received a judicial appointment at Altona.

Gertsen, Aleksandr (Ivanovich) (author): *see* Herzen, Aleksandr (Ivanovich).

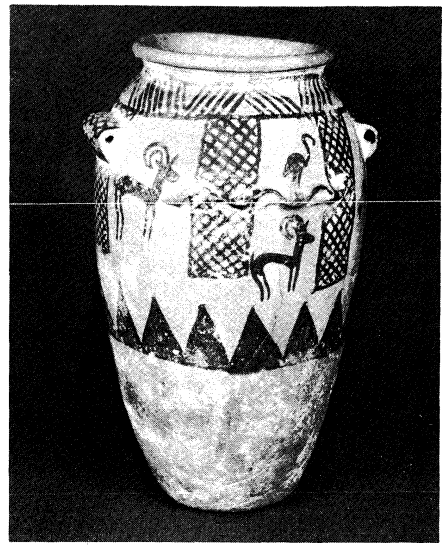
Gervais, (François-Louis-) Paul (b. Sept. 26, 1816, Paris—d. Feb. 10, 1879, Paris), paleontologist and zoologist who succeeded Georges Cuvier and Henri de Blainville as principal French contributor to vertebrate paleontology.

Gervais was a student of Blainville, who was Cuvier's successor as professor of comparative anatomy at the Muséum National d'Histoire Naturelle, Paris. Gervais eventually followed his teacher in the coveted chair (1868). At Montpellier, he served as professor of zoology and comparative anatomy (1845–65) and became dean of the faculty of sciences (1856). During this period, he published a supplement to the paleontological works of Cuvier and Blainville, *Zoologie et paléontologie françaises* (1848–52). Both this study and *Zoologie et paléontologie générales* (1867–75) were his principal works.

Gervase OF CANTERBURY, Latin GERVASIUS DOROBORNENSIS (b. *c.* 1141, Maidstone, Kent, Eng.?—d. *c.* 1210, Canterbury, Kent?), monk at Christ Church, Canterbury, from 1163, compiler of chronicles having considerable value for the reign of Richard I (1189–99) and the first decade of King John's reign (from 1199).

Ordained by Thomas Becket, Gervase was sacristan of the Christ Church monastery for several years in the 1190s. About 1188 he began to compile his *Chronica,* starting with the reign of King Stephen (1135–54). A second history, the *Gesta regum,* traces in less detail the political and military fortunes of Britain from the 1st century BC to 1209 or 1210. The earlier portions of both works are derivative, but Gervase is an independent authority for events from 1188 or 1189.

Gerzean culture, also called NAGĀDAH II CULTURE, predynastic Egyptian cultural phase given the sequence dates 40–65 by Sir Flinders Petrie and later dated *c.* 3400–*c.* 3100 BC. Evidence indicates that the Gerzean culture was not brought by invaders but was rather a further development of the culture of the Amratian period, which immediately preceded the Gerzean. Centred primarily at Naqādah and Hierakonpolis in Upper Egypt, and Sayala in Nubia, Gerzean culture was contemporary with that of Maadi in the north and was characterized by a buff-coloured pottery with pictorial decorations in dark red paint; the use of a tubular drill with abrasive for stone-cutting; pear-shaped mace-heads; ripple-flaked flint knives; and an advanced metallurgy. Toward the end of the period pictographic writing on pottery, slate palettes, and stone appeared, first at Sayala and Qustul, slightly later at Hierakonpolis, under kings employing pharaonic iconography. Contact with western Asia during this time may have inspired the building of mud-brick niched architecture, the use of cylinder seals, and the adoption of certain ornamental motifs and pottery forms.



Painted clay vessel with flamingos and ibexes, Gerzean culture; in the Roemer-Pelizaeus Museum, Hildesheim, Ger.
Holle Bildarchiv, Baden-Baden

The Dynastic culture, which immediately followed the Gerzean, developed directly out of the Gerzean and the other Upper Egyptian cultures that preceded it; gradually, during the last part of the Gerzean, the rulers in Hierakonpolis were able to create not only a cultural but also a political unification of all of Egypt, overpowering Lower Egypt and the rival kings at Sayala.

Gesell, Arnold (Lucius) (b. June 21, 1880, Alma, Wis., U.S.—d. May 29, 1961, New Haven, Conn.), U.S. psychologist and pediatrician who pioneered the use of motion-picture cameras to study the physical and mental development of normal infants and children; his books influenced child rearing in the United States. As director of the Clinic of Child Development at Yale University (1911–48), he collected and published a vast quantity of data and amassed a large collection of films on child development.

Gesell studied psychology at Clark University, Worchester, Mass., where he came under the influence of G. Stanley Hall, one of the earliest psychologists to study child development. In 1906 Gesell received his doctorate from Clark and in 1911 went to New Haven to head the Yale Psycho-Clinic (later the Clinic of Child Development). Convinced that medical training was essential for his studies in child development, he studied medicine and in 1915 received his M.D. from Yale.

Initially concerned with retarded development, Gesell came to the conclusion that an understanding of normal infant and child development was indispensable to understanding childhood abnormality. He then began his studies of the mental growth of babies, and

by 1919 he was addressing himself chiefly to the development of normal infant mentality. He found new methods for observing and measuring behaviour by using controlled environments and precise stimuli. From 1926 the movie camera became his principal tool of investigation. About 12,000 children of various ages and levels of development were filmed candidly through a one-way mirror, and eventually, records of children from birth through the late teens were compiled. From these observations, Gesell concluded that children must reach specific maturational stages in development before their learning influences their behaviour; there appeared to be a hereditary scheme for development in the four areas of motor skills, adaptive behaviour, language development, and personal and social skills. In *Infancy and Human Growth* (1928), he presented a developmental schedule based on this theory, using 195 items of behaviour to evaluate infants of between 3 and 30 months. In 1938 Gesell and Helen Thompson produced a revised developmental schedule for evaluating infants as early as four weeks after birth. Although his schedules were criticized by some experts, they were widely used. He proposed that a discerning guidance, rather than excessive permissiveness or rigid rules, provided the best approach to bringing up children.

Gesell's first book appeared in 1912. One of the most comprehensive of his many works is *An Atlas of Infant Behavior* (1934); other influential works include *Child Development: An Introduction to the Study of Human Growth* (1949), with Frances L. Ilg; *The Child from Five to Ten* (1946); and *Youth: The Years from Ten to Sixteen* (1956). In addition to his studies of normal development, Gesell also considered such questions as the psychological factors in child adoption and the effect of premature birth on mental development. He served as a research consultant for the Gesell Institute of Child Development in New Haven, which continued the work of the Yale clinic, from 1948 until his death.

Gesellschaft: *see* Gemeinschaft and Gesellschaft.

Gesenius, (Heinrich Friedrich) Wilhelm (b. Feb. 3, 1786, Nordhausen, Hanover—d. Oct. 23, 1842, Halle, Prussia), German biblical critic and an important figure in Hebrew and other Semitic language studies.

Educated at Helmstedt and at Göttingen, in 1811 Gesenius became professor of theology at Halle. Though accused of rationalism, he was never dismissed from his post. He published little that was controversial; his chief theological publication was a commentary on Isaiah (1821–29). Gesenius inaugurated in Semitic language studies a modern philological approach such as had been developed in Indo-Germanic linguistics. His Hebrew grammar (1813; edited and enlarged by E. Kautzsch; 2nd English edition revised according to the 28th German edition by A.E. Cowley, 1910) and his Hebrew and Chaldee (*i.e.,* Aramaic) dictionary (1810–13; Eng. trans., 1959) taught generations of scholars, and have been kept alive into the second half of the 20th century in various editions and translations. Gesenius also laid the basis for Semitic epigraphy, collecting and deciphering the Phoenician inscriptions known in his time.

Geshov, Ivan Evstatiev (b. Feb. 20, 1849, Plovdiv, Rumelia—d. March 24, 1924, Sofia, Bulg.), Bulgarian statesman and founder of the Bulgarian National Bank. He was prime minister from March 1911 to July 1913.

After studies in England, Geshov took an active part in the Bulgarian struggle for national liberation from the Ottoman Empire—especially prior to the 1877 war and upon the 1885 unification of Bulgaria with Eastern Rumelia. Twice minister of finance (1886, 1894–99), he became the leader of the Populist Party (1901) and in 1911–13 presided over a coalition government that promoted the policy of the Balkan Alliance and waged the war with the Turks in 1912. In 1923 he joined the Democratic Party after the fall of Aleksandŭr Stamboliyski.

Gesner, Conrad, Conrad also spelled KONRAD (b. March 26, 1516, Zürich—d. Dec. 13, 1565, Zürich), Swiss physician and naturalist, best known for his systematic compilations of information on animals and plants.

Education and career. Noting his learning ability at an early age, his father, an impecunious furrier, placed him for schooling in the household of a great-uncle, who augmented

Gesner, portrait by an unknown artist, second half of the 16th century; in the Schweizerisches Landesmuseum, Zürich
By courtesy of the Schweizerisches Landesmuseum, Zürich

his income by growing and collecting medicinal herbs. There young Conrad acquired a basic knowledge of plants and their medicinal uses that led to a lifelong interest in natural history.

At school Gesner's aptitude, especially for reading the classic works of Latin and Greek authors, so impressed his teachers that a number of them sponsored his continued education. One acted as his foster father after his own father had been killed in 1531 during one of the many religious conflicts of the times; another fed and sheltered him for three years; and a third saw him through upper school at Strassburg. Together they promoted a scholarship for him to study at Bourges and Paris. Even when Gesner committed what his sponsors considered the fatal mistake at the age of 19 of marrying a young lady who had no dowry, his sponsors did not forsake him but rather found a teaching position for him in Zürich and then managed to persuade the authorities to grant him a leave of absence with pay so that he could undertake formal study of medicine in the city of Basel.

The first fruits of such faith was a Greek–Latin dictionary Gesner published in 1537, having prepared it in his spare time at Basel. At the age of 21, he was appointed professor of Greek at the Lausanne Academy. Three years of teaching brought him enough money for another year of studying medicine, and in 1541 he received his doctoral degree. Gesner spent the rest of his life practicing medicine in Zürich, serving also as a lecturer in Aristotelian physics at the Collegium Carolinum and, after 1554, as city physician.

During these years in Zürich, he continued to read prodigiously. At the same time, despite his many professional duties and recurring illnesses, he made field trips, started a museum, organized medical instruction, and published the 70 or so books that he had either written or edited.

Publications. In an early work, a medical tract on the virtues of milk, *Libellus de lacte et operibus lactariis* (1545), he included a letter to a friend in which he extolled mountains as one of the greatest wonders of nature. This reference and a later account of his scaling of Mt. Pilatus (1555) provide one of the first records of mountain climbing.

In 1545 Gesner published his *Bibliotheca universalis,* the first bibliography of its kind, listing about 1,800 authors alphabetically with the titles of their works, annotations, evaluations, and comments on the nature and merit of each entry. This monumental reference was followed in 1548 by the encyclopaedic work *Pandectarum sive Partitionum universalium Conradi Gesneri . . . libri xxi,* in which Gesner attempted to survey the recorded knowledge of the world under 21 headings. The first 19 books were published in 1548; the last, devoted to theological thought, was published in 1549, while the 20th, on medicine, was never completed.

Gesner's next monumental achievement was a compendium of recorded knowledge concerning animal life, the *Historiae animalium,* in which he sought to distinguish observed facts from myths and popular errors. The first volume (1551), a generously illustrated work of 1,100 folio pages, was concerned with viviparous quadrupeds (four-footed animals that bear living young). Later volumes devoted to oviparous quadrupeds (those that hatch the young from eggs), birds, and fishes and other aquatic animals followed in 1554, 1555, and 1556; the partially completed fifth volume, on serpents, was published posthumously in 1587.

Gesner never completed a similarly comprehensive survey of plant life, but his notes and about 1,500 wood engravings of plants and their important flowers and seeds were used by other authors for two centuries after his death. Although in his own lifetime, he was best known for his botanical works, Gesner also published *Mithridates: De differentis linguis* (1555), an account of about 130 then-known languages, and an edition (1556) of the works of the 3rd-century Roman miscellaneous writer Claudius Aelian.

Assessment. By the standards of his time Gesner as a scientist showed good judgment and industry. His use of woodcuts was significant in fixing the accuracy of his data and made possible the eventual emergence of a scientific zoology and botany. His writings about his mountain excursions further helped to emphasize the importance of the empirical study of nature. (G.A.P.)

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Gesneriaceae, one of 18 families in the flowering plant order Scrophulariales, consisting of about 140 genera and more than 1,800 species of mostly tropical and subtropical herbaceous or slightly woody plants. None is of economic importance except in the area of horticultural ornamentals. Among these are the African

violets (*Saintpaulia*) and gloxinias (*Sinningia speciosa*).

The family is characterized by bilaterally symmetrical, bisexual flowers, each of which

Ramonda myconi
H.R. Allen from the Natural History Photographic Agency—EB Inc.

has a two-lipped corolla of five fused petals; five-lobed calyx (sepals); two or four, rarely five, anthers; and a superior or partly inferior ovary (*i.e.,* positioned above the attachment point of the other flower parts, or slightly below them) with a single chamber in which numerous small seeds are produced.

Gessi, Romolo, also called GESSI PASHA (b. April 30, 1831, Constantinople—d. May 30, 1881, Suez, Egypt), Italian soldier and explorer who served in the Egyptian Sudan under Gen. Charles George Gordon (governor general of the Sudan) and participated in the final stages of the exploration of the Nile River. By becoming the first person to circumnavigate and map Lake Albert Nyanza (in Uganda), one of the key stages of the sources of the Nile, Gessi concluded the geographical study of the course of the Nile that had begun in 1856.

Gessi fought with the British forces in the Crimean War (1854–55), where he first met Gordon, who in 1873 asked Gessi to accompany him to the Sudan. In 1875 Gessi conducted explorations of the interior of the Sudan and completed the mapping of Lake Albert in 1876. He later quelled a revolt of Arab slave traders in the southern Sudan, for which he was named Pasha (the highest rank in the Egyptian court) by the Khedive of Egypt.

Gessler, Otto (Karl) (b. Feb. 6, 1875, Ludwigsburg, Ger.—d. March 24, 1955, Lindenberg, W.Ger.), German minister of war during the Weimar Republic who was instrumental in rebuilding the country's armed forces after World War I.

A student of law, Gessler became mayor of Regensburg (1910–11) and Nürnberg (1913–19). After the German revolution of November 1918, he helped found the bourgeois-liberal German Democratic Party (DDP) and served as minister of reconstruction (1919–20). In March 1920 he was appointed minister of war, a position he held through changing coalition governments for the next eight years. In the autumn of 1923 he was briefly granted supreme power to restore order against extremist elements of both the left and the right. As war minister, he allowed the Reichswehr (army) to increase its size beyond the provisions of the Versailles Treaty. Increasingly unpopular with the left opposition in parliament, he was finally forced to resign in January 1928 over a financial scandal involving the army. During World War II he was arrested for complicity in the July 20, 1944, attempt on Adolf Hitler's life and spent seven months in a concentration camp. After the war he served until his death as head of the Bavarian and German Red Cross organizations.

Gessler, detail from an oil painting after a photograph, 1916
By courtesy of the Staatliche Graphische Sammlung, Munich

Gessner, Salomon (b. April 1, 1730, Zürich—d. March 2, 1788, Zürich), Swiss writer, translator, painter, and etcher, known throughout Europe for literary works of pastoral themes and rococo style.

Gessner was a town councillor and a forestry superintendent who also ran an important publishing house, from which he published his books with his own excellent etchings. His pastoral prose *Idyllen* (1756–72) and his epic poem *Der Tod Abels* (1758; "The Death of Abel") were his most renowned works, making him the most successful and typical representative of a literary rococo movement. His pastorals were translated into 20 languages,

Gessner, engraving by J. Elias Haid, 1774
By courtesy of the Bibliotheque Nationale Suisse, Bern

including Welsh, Latin, and Hebrew. The English translation ran through many editions and was admired by the Romantic writers Sir Walter Scott, Lord Byron, and Wordsworth. Gessner also translated some of the English poet Alexander Pope's "Pastorals" and two tales of the French writer Denis Diderot. The final collection of his works was published at Zürich in 1841.

gesso (Italian: "gypsum," or "chalk"), fluid, white coating composed of plaster of paris, chalk, gypsum, or other whiting mixed with glue, applied to smooth surfaces such as wood panels, plaster, stone, or canvas to provide the ground for tempera and oil painting or for gilding and painting carved furniture and picture frames. In Medieval and Renaissance tempera painting, the surface was covered first with a layer of *gesso grosso* (rough gesso) made with coarse, unslaked plaster, then with a series of layers of *gesso sottile* (finishing gesso) made with fine plaster slaked in water, which produced an opaque, white, reflective surface.

In the 14th century, Giotto, the notable Italian painter, used a finishing gesso of parchment glue and slaked plaster of paris. In medieval tempera painting, background areas intended for gilding were built up into low relief with *gesso duro* (hard gesso), a less absorbent composition also used for frame moldings, with patterns often pressed into the gesso with small carved woodblocks. Modern gesso is made of chalk mixed with glue obtained from the skins of rabbits or calves.

Gesta Romanorum, English DEEDS OF THE ROMANS, Latin collection of anecdotes and tales, probably compiled early in the 14th century. It was one of the most popular books of the time and the source, directly or indirectly, of much later literature, including that of Chaucer, John Gower, Thomas Hoccleve, Shakespeare, and many others. Of its authorship nothing certain is known, but its didactic nature and the allegorical explanations attached to the stories in the early versions suggest that it was intended as a manual for preachers. It is likely that it was compiled in England.

The title is only partially appropriate because it contains, in addition to stories from classical history and legend, many others from a variety of sources, Oriental and European in particular. The compiler's style is uneven; he apparently aimed to please and to edify. The collection is full of the sort of stories popular in the Middle Ages—tales of magicians and monsters, ladies in distress, escapes from perilous situations—all unified by their moral purpose and made real by details drawn from observation of nature and everyday life. Among its variety of material are found the germ of the romance of Guy of Warwick; the story of Darius and his three sons, versified by Hoccleve; part of Chaucer's *Man of Law's Tale;* and a tale of the emperor Theodosius, the same in its main features as that of King Lear. Shakespeare's *Pericles* probably was based on John Gower's version of a story about Apollonius of Tyre, derived from the collection, and the three-caskets plot in *The Merchant of Venice* is also thought to be based on a tale from the Gesta Romanorum. The tales formed part of the reading of children until the 18th century. The loose structure of the book made it possible for a transcriber to insert additional stories into his own copy, and therefore the manuscripts show considerable variety. The earliest printed editions were produced at Utrecht and Cologne, late in the 15th century; but their exact dates are unknown.

Three English manuscript versions were made during the 15th century, two of them about 1440, the third later. This last, probably based directly on Harleian manuscript 5369 (British Museum), was published by Wynkyn de Worde about 1524; the only known copy is in the library of St. John's College, Cambridge. In 1577 Richard Robinson published a revised edition of de Worde, which proved extremely popular. The first volume, an English translation by B.P. (probably Bartholomew Pratt) "from the Latin edition of 1514" appeared in 1703.

Gestalt psychology, 20th-century school of psychology that provided the foundation for the modern study of perception. Its precepts, formulated as a reaction against the atomistic orientation of previous theories, emphasized that the whole of anything is greater than its parts. The attributes of the whole of anything are not deducible from analysis of the parts in isolation. The word Gestalt is used in modern German to mean the way a thing has been *gestellt*; *i.e.,* "placed," or "put together." There is no exact equivalent in English. "Form" and "shape" are the usual translations; in psychology the word is often rendered "pattern" or "configuration."

Gestalt theory began toward the close of the 19th century in Austria and south Germany as a protest against the associationist and structural schools' piecemeal analyses of experience into atomistic elements. Gestalt studies made use instead of the methods of phenomenology. This method, with a tradition going back to Goethe, involves nothing more than the

description of direct psychological experience, with no restrictions on what is permissible in the description. Gestalt psychology was in part an attempt to add a humanistic dimension to what was considered a barren approach to the scientific study of mental life. Gestalt psychology sought to encompass the qualities of form, meaning, and value that prevailing psychologists had either ignored or thought to fall outside the confines of science.

Max Wertheimer (*q.v.*) in 1912 published the paper considered to mark the founding of the Gestalt school. In it he reported the result of an experimental study done at Frankfurt with two colleagues, Wolfgang Köhler and Kurt Koffka (*qq.v.*); these three formed the core of the Gestalt school for the next decades. The earliest Gestalt work concerned the area of perception, particularly visual perceptual organization as illuminated by the phenomenon of illusion. A perceptual illusion that provided strong support for Gestalt principles was the phi-phenomenon, an illusion of apparent motion named and described in 1912 by Wertheimer. The phi-phenomenon is a visual illusion in which stationary objects shown in rapid succession appear to move by transcending the threshold at which they can be perceived separately (the phenomenon is experienced in viewing motion pictures).

The effect of the phi-phenomenon was apparently inexplicable on the old assumption that the sensations of perceptual experience stand in a one-to-one relation to the physical stimuli. The perceived motion is an emergent experience, not present in the stimuli in isolation but dependent upon the relational characteristics of the stimuli. The nervous system of the observer and the observer's experience do not passively register the physical input in a piecemeal way. Rather, the neural organization as well as the perceptual experience springs immediately into existence as an entire field with differentiated parts. In later writings this principle was stated as the law of *Prägnanz:* The neural and perceptual organization of any set of impinging stimuli forms as good a Gestalt, or whole, as the prevailing conditions allow.

Major elaborations of the new formulation occurred within the next decades. Wertheimer, Köhler, Koffka, and their students extended the Gestalt approach to problems in other areas of perception, problem solving, learning, and thinking. The Gestalt principles were later applied to motivation, social psychology, and personality, particularly by Kurt Lewin (*q.v.*), and to aesthetics and economic behaviour. Wertheimer demonstrated that Gestalt concepts could also be used to shed light on problems in ethics, political behaviour, and the nature of truth. Gestalt psychology's traditions have continued in the perceptual investigations undertaken by Rudolf Arnheim and Hans Wallach in the United States.

Gestapo, abbreviation of GEHEIME STAATSPOLIZEI (German: Secret State Police), the political police of Nazi Germany. The Gestapo ruthlessly eliminated opposition to the Nazis within Germany and its occupied territories and was responsible for the roundup of Jews throughout Europe for deportation to the extermination camps.

When the Nazis seized power in 1933, Hermann Göring, then Prussian minister of the interior, detached the political and espionage units from the regular Prussian police, filled their ranks with thousands of Nazis, and, on April 26, 1933, reorganized them under his personal command as the Gestapo. Simultaneously, Heinrich Himmler, head of the SS (*q.v.*), together with his aide Reinhard Heydrich, similarly reorganized the police of Bavaria and the remaining German states. Himmler was given command over Göring's Gestapo in April 1934 and on June 17, 1936, was made German chief of police with the title of *Reichsführer.* Nominally under the Ministry of the Interior, Germany's police forces now were unified under Himmler as head of both the SS and the Gestapo.

In 1936, the Gestapo (led by Himmler's subordinate, *Gruppenführer* Heinrich Müller) was joined with the Kriminalpolizei (Kripo; Criminal Police) under the umbrella of a new organization, the Sicherheitspolizei (Sipo; Security Police). Under a 1939 SS reorganization, the Sipo was joined with the Sicherheitsdienst (SD; Security Service), an SS intelligence department, to form the Reichssicherheitshauptamt (RHSA; Reich Security Central Office) under Heydrich. In this bureaucratic maze, the functions of the Gestapo often overlapped with those of other security departments, with which the Gestapo had both to cooperate and compete.

The Gestapo operated without civil restraints; it had the authority of "preventative arrest," and its actions were not subject to judicial appeal. Thousands of leftists, intellectuals, Jews, trade unionists, political clergy, and homosexuals simply disappeared into concentration camps after being arrested by the Gestapo. During World War II the Gestapo supressed partisan activities in the occupied territories and carried out reprisals against civilians. Gestapo members were included in the Einsatzgruppen (Task Forces), which were mobile death squads that followed the German regular army into Poland and Russia for the purpose of killing Jews and other "undesirables" there. Section (*Amt*) IV.b. of the Gestapo, under Adolf Eichmann, organized the deportation of Jews from other occupied countries to the extermination camps in Poland.

gestation, in mammals, the time between conception and birth, during which the embryo or fetus is developing in the uterus. This definition raises occasional difficulties because in some species (*e.g.,* monkeys and man) the exact time of conception may not be known. In these cases the beginning of gestation is usually dated from some well-defined point in the reproductive cycle (*e.g.,* the beginning of the previous menstrual period).

The length of gestation varies from species to species. The shortest known gestation is that of the Virginian opossum, about 12 days, and the longest that of the Indian elephant, about 22 months. In the course of evolution the duration of gestation has become adapted to the needs of the species. The degree of ultimate growth is a factor, smaller animals usually having shorter periods of gestation than larger ones. Exceptions are the guinea pig and related South American rodents, in which gestation is prolonged (averaging 68 days for the guinea pig and 111 days for the chinchilla). The young of these species are born in a state of greater maturity than are those of the rat with its period of 22 days. Another factor is that, in many species with restricted breeding seasons, gestation is adjusted so that birth coincides with the period when food is most abundant. Thus the horse, a spring breeder with 11 months' gestation, has its young the following spring, as does the sheep, a fall breeder with a five months' gestation. Animals that live in the open tend to have longer gestations and to bear young that have reached a state of greater maturity than do animals that can conceal their young in underground burrows or in caves. Marsupials generally have short gestations—*e.g.,* 40 days for the largest kangaroos. The young, born in an extremely immature state, transfer to the pouch in which gestation may be said to continue.

Embryos of some species experience an arrest in development that greatly prolongs gestation. This is especially true of the fur-bearing carnivores the martens and weasels. Embryos of the European badger and American marten, which breed in July and August, develop for a few days, then lie dormant in the uterus, being implanted in January. Birth occurs in March. Of the total gestation period of 250 days, growth occurs during only 50. Delayed implantation also occurs in mice and other small rodents that become pregnant while they are still suckling a litter.

Either a single factor or a great number of minor factors, all culminating at or near one date, determine the length of gestation. Several minor variations are known: in man, gestation for males is three to four days longer than that for females; and in cattle, bulls are carried about one day longer than heifers. In both species gestation of twins is five to six days less than for singlets. In animals such as the rabbit or pig, which bear many young at a time, gestation is shorter for larger litters than for smaller ones. Heredity also influences gestation; in cattle the mean gestation period for Holstein-Friesians is 279 days; for Brown Swiss, 290 days; other breeds fall between these extremes. When hybrids are produced by crossing two species with different gestation periods, the hybrid is carried for a period lying somewhere between those of the two parents and tending toward the mother's species. Thus a mare carries a mule foal (fathered by a jackass) about 10 days longer than the normal period for the horse (about 337 days). For human gestation, *see* pregnancy.

Gestation periods
(in days)

animal	average	variation
ape, Barbary	210	
ass	365	
baboon, sacred	183	
bat, common European	50	
bear, American black	215	
buffalo (bison)	275	
camel	406	370–440
cat	63	55–69
cattle	284	260–300
chimpanzee	237	216–261
chipmunk	31	
coyote	60–65	
deer, Virginia	215	
dog	61	58–63
dolphin	276	
elephant, Asiatic	645	520–730
ferret	42	
fisher	338–358	
fox	52	49–55
giraffe	395–425	
goat	151	145–157
ground squirrel	28	
guinea pig	68	
hamster	16.5	
hedgehog, European	35–40	
horse	337	320–355
hyena	110	
kangaroo, giant	38–40	
lion	108	105–113
man	267	250–285
marten, pine	220–265	
mink	50	39–76
monkey, capuchin	185	
monkey, grivet	215	
monkey, rhesus	164	146–180
mouse	19	18–20
opossum, Virginian	12.5	
otter, Canada	62	
orangutan	245–275	
pig, domestic	113	110–120
rabbit	31	30–32
raccoon	63	
rat	22	21.5–22
rat, cotton	27	
reindeer	215–245	
seal, northern fur	350	
sheep	148	143–159
skunk	62	
squirrel, gray	44	
tiger	105–109	
whale	365	
woodchuck	28	

geste, chanson de (epic): *see* chanson de geste.

Gesù, mother church in Rome of the Jesuit order, designed by Giacomo da Vignola in 1568. The facade, which was the work of Giacomo della Porta, was added in 1575.

The Gesù—a single-aisle, Latin-cross-plan church with side chapels and a dome over the crossing of the nave and the transepts—became the archetype of many Catholic churches built in the Baroque period and was the source of the so-called Jesuit style of architecture. On the nave ceiling is a fresco—"The Triumph of the Name of Jesus," executed in 1672–85 by Giovanni Battista Gaulli, also known as Baciccia—that is one of the masterpieces of Baroque decorative painting.

Gesualdo, Don Carlo, PRINCIPE (prince) DI VENOSA (b. *c.* 1560, Naples [Italy]—d. Sept. 8, 1613, Naples), Italian composer and lutenist whose fame rests on his highly individual madrigals. Gesualdo lived most of his life in Naples. After ordering the murder of his unfaithful first wife and her lover (in 1590), he married Donna Eleonora d'Este in 1594. His six books of madrigals were published between 1594 and 1611 in part-books and in 1613 in score—one of the first instances of vocal music printed in score. The madrigals in the first four books are conventional pieces of competent workmanship. Those in the last two books are unusual for their dramatic exclamations, discontinuous texture, and harmonic license.

Consult the INDEX *first*

get, also spelled GETT, Hebrew GET ("bill of divorce"), plural GITTIN, Jewish document of divorce written in Aramaic according to a prescribed formula. Orthodox and Conservative Jews recognize it as the only valid instrument for severing a marriage bond. Rabbinic courts outside Israel, recognizing the need to comply with civil laws regulating divorce and settlements, require a civil divorce before a get is issued. Reform Jews disregard Talmudic divorce laws and hence require no get but simply accept the ruling of a civil divorce court as sufficient in itself.

A religious divorce becomes effective when the husband, having obtained a get from a rabbinic court, drops the document into the cupped hands of his willing wife in the presence of two witnesses and the three members of the court. The court officials are present to ensure that religious law has been properly observed. They then record the divorce and issue documents to the man and woman.

Though, strictly speaking, Jewish religious law permits a man to divorce his wife at any time for any reason, women have long been granted equal rights with men. Their rights are protected by stipulations written into the marriage contract (ketubah), and, since the 11th century, divorce has not been granted in the Ashkenazi (German) rite without the wife's consent. In practice, therefore, the only basic requirement for divorce is the mutual consent of husband and wife.

Under certain special circumstances, such as apostasy, impotence, insanity, or refusal to cohabit, Jewish law entitles one party to compel the other to agree to a divorce.

Geta, Publius Septimius (b. 189, Mediolanum [now Milan, Italy]—d. February 212, Rome), Roman emperor from 209 to 212, jointly with his father, Septimius Severus (reigned 193–211), and his brother, Caracalla (reigned 198–217). The younger son of Septimius Severus and Julia Domna, he was given the title caesar in 198, when his elder brother Caracalla became joint emperor (as augustus) with their father. In 209 Geta was himself made an augustus. The furious rivalry that developed between the brothers remained concealed from public view as long as their father lived, but, after Severus' death at Eboracum (modern York, Eng.) in February 211, the brothers formed separate military factions. Civil war threatened until February 212, when

Geta, marble bust; in the Capitoline Museum, Rome
Alinari—Art Resource/EB Inc.

Caracalla had Geta murdered in their mother's arms in her apartment in the imperial palace.

Getae, an ancient people of Thracian origin, inhabiting the banks of the lower Danube region and nearby plains. First appearing in the 6th century BC, the Getae were subjected to Scythian influence and were known as expert mounted archers and devotees of the deity Zalmoxis. Although the daughter of their king became the wife of Philip II of Macedon in 342 BC, the Macedonians under Philip II's son Alexander crossed the Danube and burned the Getic capital seven years later. Getic technology was influenced by that of the invading Celts in the 4th and 3rd centuries BC. Under Burebistas (fl. lst century BC), the Getae and nearby Dacians formed a powerful but short-lived state. By the middle of the following century, when the Romans had gained control over the lower Danube region, thousands of Getae were displaced, and, not long thereafter, references to the Getae disappeared from history. Later writers wrongly gave the name Getae to the Goths.

The Getae and Dacians were closely related; some historians even suggest that these were names applied to a single people by different observers or at different times. Their culture is sometimes called Geto-Dacian.

Getafe, town, Madrid *provincia,* Madrid *comunidad autónoma* ("autonomous community"), central Spain, south of Madrid city. Notable buildings include a large Piarist seminary and the 16th-Century Church of Santa María Magdalena, built in the austere style of Juan de Herrera. In the vicinity, the Hill of Los Angeles, with its Sacred Heart monument (1924), is considered the geographic centre of Spain. Getafe is a military aviation centre and manufactures aircraft, radios, and electrical equipment. Pop. (1981) 127,060.

Gethsemane, garden across the Kidron Valley on the Mount of Olives (Hebrew *Har ha-Zetim*), a mile-long ridge paralleling the eastern part of Jerusalem, where Jesus is said to have prayed on the night of his arrest before his Crucifixion. The name Gethsemane (Hebrew *gat shemanim,* "oil press") suggests that the garden was a grove of olive trees in which was located an oil press.

Though the exact location of Gethsemane cannot be determined with certainty, Armenian, Greek, Latin, and Russian churches have accepted an olive grove on the western slope of the Mount of Olives as the authentic site, which was so regarded by the empress Helena, mother of Constantine (the first Christian emperor, early 4th century AD). An ancient tradition also locates the scene of the Gethsemane prayer and betrayal of Jesus at a place now called the Grotto of the Agony, near a bridge that crosses the Kidron Valley. At another possible location, south of this site in a garden containing old olive trees, is a Latin church erected by Franciscan monks on the ruins of a 4th-century church.

Garden of Gethsemane with the Church of All Nations in the foreground and the Russian Church of St. Mary Magdalene in the centre background
Ewing Galloway

Getty, J(ean) Paul (b. Dec. 15, 1892, Minneapolis, Minn., U.S.—d. June 6, 1976, Sutton Place, Surrey, Eng.), American oil billionaire reputed to be the richest man in the world at the time of his death. He owned a controlling interest in Getty Oil Company and in nearly 200 other concerns.

After graduating from the University of Oxford in 1913, Getty bought and sold oil leases near Tulsa, Okla., with the help of his father, George F. Getty, himself an oil millionaire. Young Getty proved to be a gifted entrepreneur and by 1916 had made his first million, at which point he moved his base of operations to California. During the 1920s, having accumulated several million dollars, he set about gaining control of several large independent oil companies and began building an immense financial empire, a task that was to occupy the remainder of his life. His most lucrative venture was a 60-year oil concession that he obtained in Saudi Arabia in 1949, the profits from which vaulted him into the billionaire class during the mid-1950s.

A man of eccentric personal habits, Getty was married and divorced five times. After World War II he spent little time in the United States and eventually settled down at Sutton Place, a large estate near Surrey, England. In 1953 he founded the J. Paul Getty Museum, sited on an estate near Malibu, west of Los Angeles, where he displayed many of the art objects that he had accumulated during his life.

Getty Trust, in full THE J. PAUL GETTY TRUST, private operating foundation established in 1982, with seven operating programs and a grant program dedicated to the visual arts and related humanities. The trust grew out of the J. Paul Getty Museum, founded in 1953. The trust is headquartered in Los Angeles, Calif.

The J. Paul Getty Museum contains collections of Greek and Roman antiquities; European paintings, sculpture, drawings, and decorative arts from before 1900; illuminated manuscripts; and photographs. They are currently housed in a near-replica of the Villa dei

Papiri, an ancient Roman country house near Herculaneum, Italy. In 1996 all the collections except the Greco-Roman art are scheduled to move to a museum in a newly built campus-like complex of buildings of the Getty Center in Los Angeles.

The Getty Center for the History of Art and the Humanities, which contains a library and archives, supports interdisciplinary research in art history and the related humanities; it sponsors visiting scholars and organizes conferences, seminars, and workshops. The Getty Conservation Institute conducts and supports scientific research, training, and documentation activities related to the conservation of art, architecture, and archaeological sites. The Getty Art History Information Program develops computerized data bases of art historical information, including bibliographic indexes, vocabulary standardization, and data collection projects. The Getty Center for Education in the Arts promotes art education in schools, through teacher training, school-district programs, curriculum development, and other educational programs. The Museum Management Institute offers management training for professionals from all types of museums. The Program for Art on Film, in a joint venture with the Metropolitan Museum of Art in New York City, compiles bibliographic data on films and videotapes in the visual arts and supports experimental film and video productions on art.

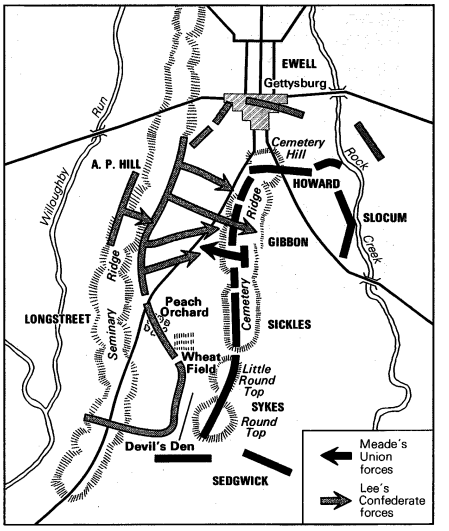
The Getty Grant Program supports projects around the world involving research in the history and understanding of art and its conservation.

Gettysburg, borough, Adams county, southern Pennsylvania, U.S., 38 miles (61 km) southwest of Harrisburg, just north of the Maryland border. Laid out in the 1780s by James Gettys and called Gettys-town, it was renamed in 1800 when it became the county seat and was incorporated in 1806. Lutheran Theological Seminary was founded there in 1826 and Pennsylvania College (now Gettysburg College) in 1832—both colleges felt the brunt of the momentous American Civil War battle (July 1–3, 1863). The borough with its surrounding area is now virtually a museum focusing on Gettysburg National Military Park (3,865 acres [1,564 hectares]), site of the hallowed battlefield. The Soldiers' Monument in Gettysburg National Cemetery marks the spot where President Abraham Lincoln delivered his Gettysburg Address (Nov. 19, 1863). There are more than 1,200 Civil War monuments, markers, and tablets; these include the cannon that fired the first shot, General Lee's Headquarters, the National Gettysburg (observation) Battlefield Tower, the National Civil War Wax Museum, the Dobbin House (used as a hospital, now a museum), and the Wills House (where Lincoln completed the writing of his Address). More recently established places of interest include the Eisenhower Farm (now a national historic site, which adjoins the battlefield), the Gettysburg Miniature Horse Farm, and the Hall of Presidents and First Ladies (displaying life-size wax models).

Education, tourism, light manufacturing (furniture, shoes, and textiles), and mixed farming (fruit growing, dairying, and stock raising) are the borough's economic mainstays. Pop. (1986 est.) 8,180.

Gettysburg, Battle of (July 1–3, 1863), major engagement in the American Civil War fought 35 miles (56 km) southwest of Harrisburg, Pa., generally regarded as the turning point of the war. After defeating the Union forces of General Joseph Hooker at Chancellorsville, Va., in May, Confederate General Robert E. Lee decided to invade the North in hopes of further discouraging the enemy and possibly inducing European countries to recognize the Confederacy. His invasion army numbered 75,000 troops. When he learned that the Union Army of the Potomac had a new commander, General George G. Meade, Lee ordered General R.S. Ewell to move to Cashtown or Gettysburg. However, the commander of Meade's advance cavalry, General John Buford, recognized the strategic importance of Gettysburg as a road centre and was prepared to hold this site until reinforcements arrived.

The first day of battle saw considerable fighting in the area, Union use of newly issued Spencer repeating carbines, heavy casualties on each side, and the simultaneous conclusion by both commanders that Gettysburg was the place to fight. On the second day there were a great number of desperate attacks and counterattacks in an attempt to gain control of such locations as Little Round Top, Cemetery Hill, Devil's Den, the Wheatfield, and the Peach Orchard. There were again heavy losses on both sides. On the third day Lee was determined to attack. Some 15,000 Confederate troops assaulted Cemetery Ridge, held by about 10,000 Federal infantrymen. The



The third day of the Battle of Gettysburg, July 3, 1863

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Southern spearhead broke through and penetrated the ridge, but there it could do no more. Critically weakened by artillery during their approach, formations hopelessly tangled, lacking reinforcement, and under savage attack from three sides, the Southerners retreated, leaving 19 battle flags and hundreds of prisoners. On July 4 Lee waited to meet an attack that never came. That night, taking advantage of a heavy rain, he started retreating toward Virginia. His defeat stemmed from overconfidence in his troops, Ewell's inability to fill the boots of General "Stonewall" Jackson, and faulty reconnaissance. Though Meade has been criticized for not destroying the enemy by a vigorous pursuit, he had stopped the Confederate invasion and won a critical three-day battle.

Losses were among the war's heaviest: of 88,000 Northern troops, casualties numbered about 23,000; out of 75,000 Southerners, more than 20,000. Dedication of the National Cemetery at the site in November 1863 was the occasion of President Abraham Lincoln's Gettysburg Address. The battlefield became a national military park in 1895, and jurisdiction passed to the National Park Service in 1933.

Gettysburg Address, world-famous speech delivered by President Abraham Lincoln at the dedication (Nov. 19, 1863) of the National Cemetery at Gettysburg, Pa., the site of one of the decisive battles of the American Civil War (July 1–3, 1863).

The main address at the dedication ceremony was one of two hours, delivered by Edward Everett, the best-known orator of the time. In the wake of such a performance, Lincoln's brief speech would hardly seem to have drawn notice. However, despite some criticism from his opposition, it was widely quoted and praised and soon came to be recognized as one of the classic utterances of all time, a masterpiece of prose poetry. On the day following the ceremony. Everett himself wrote to Lincoln, "I wish that I could flatter myself that I had come as near to the central idea of the occasion in two hours as you did in two minutes."

The text quoted in full below represents the fifth of five extant copies of the address in Lincoln's handwriting; it differs slightly from earlier versions and may reflect, in addition to afterthought, interpolations made during the delivery.

> Four score and seven years ago our fathers brought forth on this continent a new nation, conceived in Liberty, and dedicated to the proposition that all men are created equal.
>
> Now we are engaged in a great civil war, testing whether that nation or any nation so conceived and so dedicated, can long endure. We are met on a great battle-field of that war. We have come to dedicate a portion of that field, as a final resting place for those who here gave their lives that that nation might live. It is altogether fitting and proper that we should do this.
>
> But, in a larger sense, we can not dedicate—we can not consecrate—we can not hallow—this ground. The brave men, living and dead, who struggled here, have consecrated it, far above our poor power to add or detract. The world will little note, nor long remember what we say here, but it can never forget what they did here. It is for us the living, rather, to be dedicated here to the unfinished work which they who fought here have thus far so nobly advanced. It is rather for us to be here dedicated to the great task remaining before us—that from these honored dead we take increased devotion to that cause for which they gave the last full measure of devotion—that we here highly resolve that these dead shall not have died in vain—that this nation, under God, shall have a new birth of freedom—and that government of the people, by the people, for the people, shall not perish from the earth.

Getz, Stan, byname of STANLEY GAYETZBY (b. Feb. 2, 1927, Philadelphia, Pa., U.S.), American jazz tenor saxophonist known for his mellow, "cool" style of playing.

After making his professional debut at the age of 15 in a swing band, Getz was awarded a scholarship to the Juilliard School of Music, New York City. He left Juilliard after one year, however, in order to work with jazz groups that included those of Jack Teagarden, Stan Kenton, and Benny Goodman. In 1947 he joined Woody Herman's Herd and gained renown as part of the "Four Brothers" saxophone section and as the soloist for "Early Autumn," which ushered in the vibratoless "cool" sound.

Getz subsequently led his own combos for awhile. Then, after suffering from drug addiction, he settled in Scandinavia in the mid-1950s but continued to record and tour to critical and popular acclaim. Returning to the United States in the early 1960s, Getz introduced the bossa-nova sound of Brazil to jazz and popular-music audiences, "The Girl from Ipanema" being the most popular example.

Geulincx, Arnold, pseudonym PHILARETUS (b. Jan. 31, 1624, Antwerp, Spanish Netherlands [now in Belgium]—d. November 1669, Leiden, Neth.), Flemish metaphysician, logician, and leading exponent of a philosophical doctrine known as occasionalism based on the work of René Descartes, as extended to include a comprehensive ethical theory.

Geulincx studied philosophy and theology at the University of Louvain, where he became a professor in 1646. In 1658 he was dismissed, probably because of his sympathy with Jansenism, the Roman Catholic movement emphasizing man's sinful nature and dependency on God's grace for salvation. Taking refuge at Leiden, in Holland, he adopted the strict, Jansen-like theology of John Calvin. In September 1658 he became a medical doctor and, in the following year, was authorized to lecture privately in philosophy for a few months. He lived in poverty until 1662, when he obtained a lectureship in logic at the University of Leiden, where in 1665 he became professor extraordinary of philosophy and ethics.

Geulincx's major works include *Quaestiones Quodlibeticae* (1653; "Miscellaneous Questions"), reedited by him at Leiden as *Saturnalia* (1665); *Logica . . . Restituta* (1662; "Logic Restated"); and the ethical dissertation *De Virtute* (1665; "On Virtute"). After his death, his pupil C. Bontekoe published, under Geulincx's pseudonym, Philaretus, his six treatises on ethics, *Gnothi Seauton* (1675; "Know Thyself"). As Philaretus, Geulincx accepted the progression in Cartesian metaphysics from doubt to knowledge and from knowledge to God and affirmed the dominant role of the will in forming judgments. Geulincx, however, aimed to submit the will to the authority of reason. This "ethics of humility" reflects the author's Jansenism and Calvinism. In his *Metaphysica Vera* (1691; "True Metaphysics"), he disappointed Cartesian expectations that a scientific mastery of matter, life, and mind will develop and instead emphasized man's impotence before the transcendent Creator.

The inspiration for Geulincx's attempt to complete Descartes's system came primarily from the writings of St. Augustine. The opposition between the incomprehensible Deity and his creation also formed the basis for Geulincx's doctrine of occasionalism: God uses the "occasion" of the body to produce various human attitudes. Though people may believe that they act unaided, God actually works within them to make their will effective.

Geulincx's works have been collected as *Arnoldi Geulinex Antverpiensis Opera Philosophica,* 3 vol. (1891–93; "The Philosophical Works of Arnold Geulincx of Antwerp").

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Geuzen (Dutch), French GUEUX, the largely Calvinist Dutch guerrilla and privateering forces whose military actions initiated the Netherlands' revolt against Spanish rule (1568–1609). The term was first applied derisively to the lesser nobility who, together with some of the great Netherlands magnates, in 1566 petitioned Margaret of Austria, duchess of Parma, governor-general of the Netherlands, to relax the religious persecution against Protestants. Receiving partial satisfaction of their grievances, the nobles, led by Hendrik, count of Brederode, gladly accepted the title of Geuzen ("Beggars").

Symbol of the Geuzen, engraving, 1566
By courtesy of the Rijksmuseum, Amsterdam

In 1567, however, Margaret's Spanish successor, the duke of Alba, entered the Netherlands to restore the total power of King Philip II, and many dissidents fled abroad. Large numbers of these exiles returned in the next few years and formed land and naval contingents and, by the end of 1573, had secured the maritime provinces of Holland and Zeeland against Spanish attack.

Composed of common Calvinist troops led by noble commanders, the Geuzen, who were drawn from all of the Netherlands' provinces, were centred in Holland and Zeeland. They were the revolt's primary military force until 1576, when the other provinces joined in resistance to Spain and more regular military contingents were formed.

Gévaudan, ancient region of France, formerly located in the southern province of Languedoc and corresponding to most of the modern *département* of Lozère. A Roman community called Civitas Gabalitana, or Gabalitanus Pagus, it was occupied by the Visigoths in 472 and later became part of the Frankish kingdom. By the 9th century its master had become the powerful count-bishops of Mende. Louis IX (Saint Louis) inherited their rights in the 13th century, and in 1306 Gévaudan was absorbed into Languedoc.

Gévaudan gained notoriety in the 18th century as the roaming ground of a mysterious Beast of Gévaudan (*Bête du Gévaudan*), which inspired much popular literature and contemporary excitement. It appeared suddenly in 1765 and, in three years, allegedly attacked and devoured some 50 persons before it was killed by a peasant named Castel. The beast was doubtfully identified as a wolf or, later, as a lynx.

Gevelsberg, city, North Rhine-Westphalia *Land* (state), western Germany. It lies along the Ennepe River just northeast of Wuppertal. First mentioned in 1225, the city developed around a Cistercian abbey founded in 1230 and was chartered in 1887. Some ancient buildings survive in the "village" in the old quarter of the city. The moated Rochholz Castle is a historic landmark. Situated on the edge of the Sauerland, only a few miles from the Ruhr, Gevelsberg is an active commercial centre, with a variety of manufactures including metals, machinery, and automobile parts. Gevelsberg is surrounded by the wooded hills of the Ennepe River valley, and despite the industrialization of the city, the setting retains its natural beauty. Pop. (1989 est.) 32,492.

Gevers, Marie, original name MARIA THERESIA CAROLINA FANNY GEVERS (b. Dec. 30, 1883, Edegem, Belg.—d. March 9, 1975, Edegem), Franco-Belgian novelist and poet whose work, almost without exception, evokes the Kempenland, a rural area where she spent most of her life at her family estate, Missembourg, near Antwerp.

Gevers' first works were lyrical poems constructed out of the most everyday incidents of her tranquil life; many celebrate the joys of motherhood. Her volumes of verse include *Les Arbres et le vent* (1923; "The Trees and the Wind") and *Antoinette* (1925). Gevers' novels are notable for the descriptions of the Kempenland region and the reworkings of local myths and legends. Among her most successful novels are *La Comtesse des digues* (1931; "The Countess of the Dikes"), *Madame Orpha* (1933), and *La Ligne de vie* (1937; "Lifeline"). Gevers also wrote numerous nature and travel books. Her best known work was *Vie et mort d'un étang* (1961; "Life and Death of a Pond").

geyi (Chinese Buddhism): *see* ke-yi.

Geyl, Pieter (b. Dec. 15, 1887, Dort, Neth.—d. Dec. 31, 1966, Utrecht), Dutch historian whose works on The Netherlands are highly respected both for their wealth of information and for their scholarly, incisive critical analysis.

Geyl became interested in history after entering the University of Leiden, where, during his last year there (1911), he became involved with the Flemish movement. After receiving his doctorate in 1913, he worked as London correspondent for the Dutch daily *Nieuwe Rotterdamse Courant.*

In 1919 he was appointed professor of Dutch history and institutions at the University of London, where he remained until 1935, when he became professor of history at the University of Utrecht. In October 1940 he was arrested by the Nazis, placed in Buchenwald until 1941, and then transferred to The Netherlands for internment. He was released in 1944 and, after liberation (1945), began teaching again.

Geyl's first published work (1913) was his dissertation on Christofforo Suriano, the Venetian resident in The Hague during the early 17th century. His next book, *Willem IV en Engeland tot 1748* (1924), discussed the struggle between the party of Orange and the republican States Party and its effects on the Dutch Republic's foreign policy, themes that were to become dominant in many of his later works. A collection of articles, *De Groot-Nederlandsche gedachte,* appeared in 1925 (a second volume was added in 1930), dealing with the concept of unity in the history of Holland and Flanders and generally sympathetic to the development of the nation-state. His greatest contribution, *Geschiedenis van de Nederlandse stam,* 6 vol. (1930–37; "History of the Dutch People"), covered Dutch history from its beginning to 1798. Another volume on the schism between the House of Orange and the populace, *Revolutiedagen te Amsterdam, Augustus-September 1748,* appeared in 1936. *Oranje en Stuart, 1641–1672* (1939), considered his best monograph, recounted, analyzed, and evaluated the conflict between Orange and national interests.

In 1947 Geyl initiated a long and often bitter debate with the English historian Arnold Toynbee, criticizing Toynbee's work for what he called its artificiality, nonempirical basis, and theological assumptions. Throughout the 1950s he continued to produce essays, including (in English) *Debates with Historians* (1955), *Use and Abuse of History* (1955), and *Encounters in History* (1961).

Geyl's work is noted for its emphasis on foreign policy in contrast to constitutional questions, careful analysis of the geographic and military factors behind the religious schism of The Netherlands, and scrupulous and conscientious standards of historical scholarship.

geyser, any of a class of hot springs that discharges jets of steam and water intermittently. The term is derived from the Icelandic word *geysir,* meaning "to rush forth."

Geysers are generally associated with recent volcanic activity and are produced by the heating of underground waters that have come into contact with, or very close to, magma (molten rock). The water is ultimately of surface origin, having percolated into the ground through cracks and fissures.

Geysers often make a most spectacular display as they discharge a roaring column of steam and boiling water high above the surface. Discharges as high as 500 m (1,640 feet) have been recorded, but 50 m (164 feet) is much more common (*e.g.,* Old Faithful in

Yellowstone Park, United States). Water at a high temperature is able to dissolve many of the chemical constituents of the rocks with which it comes into contact. In many cases the geyser waters are saturated with silica, which is precipitated in the immediate vicinity of the geyser discharge, commonly building a small mound around the geyser neck.

The activity of geysers varies somewhat with time, and on geological timescales most of them have an extremely ephemeral existence of tens to hundreds of years. Within its life span a geyser can display markedly different kinds of behaviour. Some may discharge continuously, whereas others may erupt violently for a few minutes and then remain quiescent for a period of hours or days. Occasionally, a geyser will adopt an extremely regular and predictable pattern of intermittent activity and discharge for a few minutes every hour or so (*e.g.,* Old Faithful).

The physical explanation of geyser activity depends on a knowledge of the boiling behaviour of water. At the Earth's surface close to sea level, fresh water boils at about 100° C (212° F). If the pressure is increased, however, the temperature of boiling rises. It seems that the neck of a geyser can be considered a vertical pipe at least tens and probably several hundreds of metres long. When it is full of water the pressure at the bottom of the column of water is sufficiently high to prevent the water at that depth from boiling, even though its temperature may be higher than about 150° C (302° F). If the upper part of the water column is removed in some way, the effect is immediately felt as a pressure reduction at the base of the column. Boiling occurs the instant pressure is reduced; this process, known as "flashing," is violent and explosive. It is believed that violent geyser-steam discharges are generated by the flashing of groundwater at some depth below the surface (100 m [328 feet] or more). The flashing process, however, demands that a release of pressure take place by removal of the upper part of the water column. The "plumbing system" associated with each geyser is different. In some cases the water in the upper part of the hole is simply warmed by the conduction of heat from below and begins to boil (at about 100° C). As it boils, the water spills out and thus slightly reduces the pressure beneath it, which in turn allows slightly deeper water to boil. In this way the boiling level propagates rapidly down the throat, changing in character from a passive boiling at the surface to a violent flashing in the lower parts.

Geysers are nearly everywhere associated with various other, less violent manifestations of the interaction of magmatic heat and groundwater—*e.g.,* bubbling hot pools and fumaroles (steam vents). In many areas it has proved possible to tap and control the steam discharged from geysers and to use it in turbines for generating electricity (*e.g.,* the geysers near San Francisco). The main drawback of such operations is that frequently the site on which a power station must be located to exploit this steam is vulnerable to damage either by volcanic activity or by earthquakes. Further, the highly corrosive nature of the impure steam that is discharged can cause severe maintenance problems in the surface plant. There may also be precipitation of dissolved material as the steam passes through surface pipework, which may "fur-up" the pipes. Nevertheless, in certain parts of the world this method of power generation is economically competitive with and, in some cases, more attractive than conventional fossil-fuel power plants.

Geysir, also called GREAT GEYSIR, geyser in Árnes, southwestern Iceland, near the settlement of Haukadalur. The spouting hot spring gave its name (in use since 1647) to similar phenomena around the world. It spouted boiling water at least as early as the 13th century, but since 1916 it has been relatively inactive, perhaps because of refuse that people have thrown into it. Its circular pool is 60 feet (18 m) in diameter and 4 feet (1.2 m) deep. Although it now spouts much less often than some other geysers in the vicinity, its height occasionally reaches nearly 200 feet (61 m).

Geyzing (India): *see* Gezing.

Gezelle, Guido (b. May 1, 1830, Bruges—d. Nov. 27, 1899, Bruges), Flemish priest and poet who was one of the masters of 19th-century European lyric poetry.

Gezelle was ordained in 1854 while already a teacher at Roulers, where he remained until 1860. He worked to inspire his students with his religious, poetic, and Flemish-nationalist idealism. His romantic views clashed with the opinions of the higher clergy, however, and in 1860 he was transferred to Bruges, where he became professor of philosophy and vice principal of the Anglo-Belgian seminary (1861–65) and curate (1865–72).

Meanwhile he revealed himself as a lively, sometimes reckless political journalist, writing with startling facility in his weekly, *'t Jaer 30,* and other papers. He founded and edited a cultural weekly, *Rond den Heerd* (1865). On the verge of a nervous breakdown, he was transferred in 1872 as curate to Courtrai, where he recovered his balance and again began to write poetry. In 1881 he founded and edited *Loquela,* a philological review, and in 1886 published a masterly translation of Henry Wadsworth Longfellow's poem *The Song of Hiawatha.* From about 1877 until his death his output of poetry continued to be constant. In March 1899 he became chaplain of the English convent at Bruges, where he died.

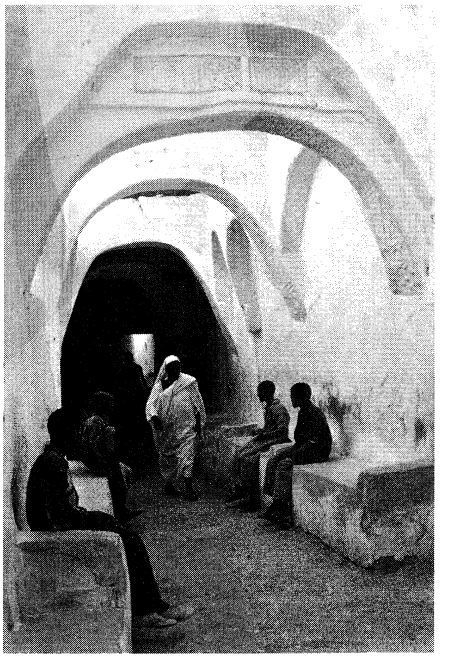
During his first period (1850–70), Gezelle's poetry (*Kerkhofblommen* and *Dichtoefeningen,* 1858; *Kleengedichtjes,* 1860; *Gedichten, gezangen en gebeden,* 1862) was the expression of a sensitive, passionate, and versatile personality who was ill-adjusted to life yet who delighted in the beauty of nature and found spiritual exaltation in the love of God. The poetry of his second period (1877–99), collected in *Tijdkrans* (1893), *Rijmsnoer* (1897), and *Laatste verzen* (1901), was more mature and controlled in construction, and, although he still expressed longing for liberation from earthly bonds, he attained greater harmony with the outer world. Gezelle showed great technical originality in his use of language and imagery, yet his natural, personal poetic style remained linguistically rooted in the west Flemish dialect. Of great lyrical purity and intensity, his poetry helped pave the way for the poetry of the next generation. He also worked as a philologist and folklorist, and he greatly influenced 19th-century Flemish intellectual life.

Gezer, modern TEL GEZER, ancient royal Canaanite city, near present-day Ramla, Israel. Gezer is often mentioned in the Old Testament and in the Egyptian records of the New Kingdom, from Thutmose III (1479–26 BC) to Merneptah (1213–04 BC). Gezer was abandoned about 900 BC and was little occupied thereafter.

The excavations at Gezer sponsored by the Palestine Exploration Fund during 1902–05 and 1907–09 disclosed strata covering most periods from the Neolithic Period to the time of the Maccabees. Excavations were resumed in 1923 and have continued intermittently. In 1957 Yigael Yadin identified a Solomonic wall and gateway; these fortifications are identical in construction with the corresponding Solomonic remains excavated at Megiddo and Hazor.

Gezing, also spelled GEYZING, or GYALZING, town, southwestern Sikkim state, northern India. Gezing lies just west of the Rangit River on the Rathong–Kalet interfluve. The town has a hospital, a rest house, a higher secondary school, and a small hydroelectric project. Pop. (1981) 745.

Ghadāmis, also spelled GHUDĀMIS, GHADAMES, or GADAMES, oasis, northwestern Libya, near the Tunisian and Algerian borders. It lies at the bottom of a wadi (seasonal river) bordered by the steep slopes of the stony al-Ḥamrā' Plateau. Located at the junction of ancient Saharan caravan routes, the town was



A covered street in Ghadāmis, Libya
James Holland—Stock, Boston

the Roman stronghold Cydamus (whose ruins remain). It was an episcopal see under the Byzantines, and columns of the Christian church still remain in the Sīdī Badrī Mosque. A centre for the Arab slave trade through the 19th century, it is now a caravan depot linked by sand tract to Dirj, 60 miles (97 km) east, and thence northward to the Mediterranean coast. Surrounded by sand and an ancient cemetery, Ghadāmis's walls enclose a crowded network of whitewashed houses and covered streets. Ethnic groups live in separate quarters, the Berbers being located outside the walls. Water is supplied by two artesian wells and a spring. Unlike many oases, the palms, orchards, and gardens are within the walls, providing dates, fruits, vegetables, and grains for market. Various handicrafts and tourism, supported by a modern hotel and air services, augment the economy. Pop. (1981 est.) 30,000.

Ghadr (Urdu: "Revolution"), an early 20th-century movement among Indians, principally Sikhs living in North America, to end British rule in their homeland of India. The movement originated with an organization of immigrants in California called the Hindustani Workers of the Pacific Coast. Shortly after the outbreak of World War I, many of the Ghadrites returned to India and for several months during 1915 carried on terrorist activities in central Punjab. Attempted uprisings were quickly crushed by the British. After the war, the party in America split into Communist and anti-Communist factions. The party was dissolved in 1948, after India had achieved independence.

Ghaffar Khan, (Khan) Abdul (b. 1890, Utmānzai, India—d. Jan. 20, 1988, Peshawar, Pak.), the foremost 20th-century leader of the

Pashtuns (or Pathans; a Muslim ethnic group of Pakistan and Afghanistan), who became a follower of Mahatma Gandhi and was called "the Frontier Gandhi."

Ghaffar Khan met Gandhi and entered politics in 1919 during agitation over the Rowlatt Acts, which allowed the internment of political dissidents without trial. In the following year he joined the Khilafat movement, which sought to strengthen the spiritual ties of Indian Muslims to the Turkish sultan, and in 1921 he was elected president of a district Khilafat committee in his native North-West Frontier Province.

Soon after attending a Congress Party gathering in 1929, Ghaffar Khan founded the Khudai Khitmatgar ("Servants of God"), called the Red Shirt Movement (*q.v.*), among the Pashtuns. It espoused nonviolent, nationalist agitation in support of Indian independence and sought to awaken the Pashtuns' political consciousness. By the late 1930s Ghaffar Khan had become a member of Gandhi's inner circle of advisers, and the Khudai Khitmatgar actively aided the Congress Party cause up to the partition of India in 1947.

Ghaffar Khan, who had opposed the partition, chose to live in Pakistan, where he continued to fight for the rights of the Pashtun minority and for an autonomous Pakhtunistan (or Pathanistan) within Pakistan. He paid dearly for his principles, spending many years in jail and afterward residing in Afghanistan. He returned to Pakistan in 1972. His memoirs, *My Life and Struggle,* appeared in 1969.

Ghaggar River, river, northern India. The Ghaggar rises in the Siwālik Range, northwestern Himāchal Pradesh state, and flows about 200 miles (320 km) southwest through Haryāna state, where it receives the Saraswati River. It eventually loses itself in the sands of the Thar Desert. Just southwest of Sirsa it feeds two irrigation canals that extend into Rājasthān. The Ghaggar was probably once an affluent of the Indus River. Its seasonal flow is dependent on monsoon rainfall.

Ghāghara River, also spelled GOGRA, GHĀGHRĀ, or GHĀGRĀ, Nepali KAURIĀLĀ, major left-bank tributary of the Ganges River, rising as the Karnāli River (Chinese: K'ungch'iao Ho) in the Tibetan Himalayas and flowing southeast into Nepal. Cutting southward across the Siwālik Hills, it splits into two branches, to rejoin south of the Indian border and form the Ghāghara proper. It flows southeast through Uttar Pradesh and Bihār states to enter the Ganges below Chāpra after a 600-mile (970-kilometre) course. The major tributaries—the Kuwānā, the Rāpti, and the Little Gandak rivers—all flow into the Ghāghara from the mountains to the north. Together with the Ganges and its tributaries, it has helped form the vast alluvial plain of northern Bihār. Along its lower course it is also called the Sarju River (the Sarabos of the 2nd-century-AD Greek geographer Ptolemy) and the Deoha.

Ghālib, Mīrzā Asadullāh Khān (b. Dec. 27, 1797, Āgra, India—d. Feb. 15, 1869, Delhi), the preeminent Indian poet of his time writing in Persian, equally renowned for poems, letters, and prose pieces in Urdu.

Born into an aristocratic family, Ghālib passed his youth in luxury. Subsequently, he was granted a small pension by the British government but had to struggle against penury and hardships. Recognition finally came in 1850, when he was appointed poet laureate to the last Mughal emperor, Bahādur Shāh II.

Ghālib's best poems were written in three forms: ghazel (love lyric), *masnavi* (moralistic or mystical parable), and qasida (panegyric). His critics accused him of writing in an obscure and ornamental style of Persian incomprehensible to the common man. His verses affirm God's omnipotence while questioning the misery of the phenomenal world.

Ghana, first of the great medieval trading empires of western Africa (fl. 7th–13th century). It was situated between the Sahara (Desert) and the headwaters of the Sénégal and Niger rivers, in an area that now comprises southeastern Mauritania and part of Mali. Ghana was populated by Soninke clans of Mande-speaking people who acted as intermediaries between the Arab and Berber salt traders to the north and the producers of gold and ivory to the south. (The empire should not be confused with the modern Republic of Ghana.)

An unconfirmed tradition dates the origins of the kingdom to the 4th century AD. Nothing is known of the political history of Ghana under its early kings. The first written references to the empire are those of Arabic geographers and historians from the 8th century, and it seems certain that, by 800, Ghana had become rich and powerful. Called Wagadu by its rulers, it derived its more familiar name from the king's title of *ghāna.* The king was able to enforce obedience from lesser tribes and to exact tribute from them. Much of the empire was ruled through tributary princes who were probably the traditional chiefs of these subject clans. The Ghanaian king also imposed an import–export tax on traders and a production tax on gold, which was the country's most valuable commodity.

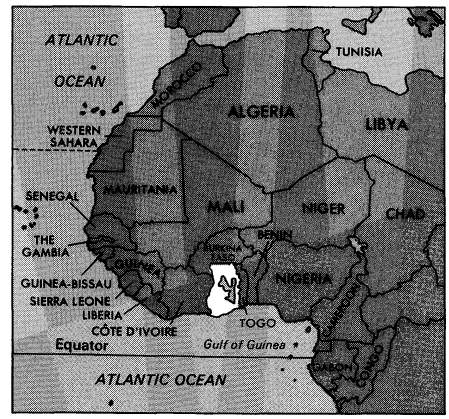
According to the 11th-century Spanish-Arab chronicler Abū 'Ubayd al-Bakrī, the king welcomed to his capital many of the northern African traders of the Sahara, who, after the Arab conquest in the 8th century, had been converted to Islām. In the course of Ghana's history the capital was moved from one place to another: that of the 11th century has been tentatively identified by archaeologists as Kumbi (or Koumbi Saleh), 200 miles (322 km) north of modern Bamako, Mali.

The principal raison d'etre of the empire was the desire to control the trade in alluvial gold, which had led the nomadic Berber tribes of the desert to develop the western trans-Saharan caravan road. Gold was secured, often by mute barter, from blacks at the southern limits of the empire and was conveyed to the empire's capital, where a Muslim commercial town developed alongside the native city. There the gold was exchanged for commodities, the most important of which was salt, that had been transported southward by northern African caravans.

As Ghana grew richer it extended its political control, strengthening its position as an entrepôt by absorbing lesser states. It also incorporated some of the gold-producing lands to its south and such south-Saharan cities to the north as Audaghost, a famous market that has since disappeared.

Ghana began to decline in the 11th century with the emergence of the Muslim Almoravids, a militant confederation of the Ṣanhajah and other Berber tribes of the Sahara who combined in a holy war to convert their neighbours. Abū Bakr, the leader of this movement's southern wing, took Audaghost in 1054 and, after many battles, seized Kumbi in 1076. The Almoravids' domination of Ghana lasted only a few years, but their activities upset the trade on which the empire depended, and the introduction of their flocks into an arid agricultural terrain initiated a disastrous process of desertification. The subject peoples of the empire began to break away, and in 1203, one of these, the Susu, occupied the capital. In 1240 the city was destroyed by the Mande emperor Sundiata, and what was left of the empire of Ghana was incorporated into his new empire of Mali.

Ghana, officially REPUBLIC OF GHANA, coastal country of western Africa, covering an area of



Ghana

92,098 square miles (238,533 square km). The capital is Accra. Facing the Gulf of Guinea of the Atlantic Ocean on the south, Ghana is bordered by Côte d'Ivoire (Ivory Coast) on the west, Burkina Faso (formerly Upper Volta) on the northwest and north, and Togo on the east. The population in 1987 was estimated to be 13,482,000.

A brief treatment of Ghana follows. For full treatment, *see* MACROPAEDIA: Western Africa.

For current history and for statistics on society and economy, *see* BRITANNICA WORLD DATA ANNUAL.

The land. Ghana's landscape is generally low, with elevations nowhere exceeding 3,000 feet (900 m). The southwestern, northwestern, and extreme northern parts of the country consist of a dissected peneplain. Most of the remainder of the country occupies a large area known as the Voltaian Basin. Along the north and south and to some extent along the west, the uplifted edges of the basin give rise to narrow plateaus between 1,000 and 2,000 feet (300 and 600 m) high and bordered by impressive scarps. The southern coastal plain, which is commonly called the Gold Coast, extends inland for 30 to 50 miles (50 to 80 km); along the coast near the mouth of the southward-flowing Volta River are numerous lagoons and marshes. The country's drainage system is dominated by the Volta River basin, which occupies more than 60 percent of the country's total land area and includes the artificially created Lake Volta. Other rivers, such as the Pra, Ankobra, and Tano, also flow southward into the sea.

Ghana's climate is influenced by the hot, dry, dust-laden air mass that moves from the northeast across the Sahara and by the tropical maritime air mass that moves from the southwest across the southern Atlantic. Except in the north, there are two rainy seasons, from April to June and from September to November. The mean annual rainfall ranges between 45 and 50 inches (1,143 and 1,270 mm). The annual mean temperature varies from 78° F (26° C) along the Atlantic coast to a very warm 84° F (29° C) inland. A dry, northeasterly wind, the harmattan, blows in January and February.

There are three principal types of vegetation from south to north: the coastal savanna in the southeastern plains consists of a mixture of scrub and tall grass; in the southern forest zone the predominent vegetation is evergreen and tropical semideciduous forest; and the northern savanna consists mostly of tall Guinea grass, together with scattered low trees, such as various species of acacia. The country's varied wildlife includes lion, leopard, hyena, antelope, elephant, buffalo, chimpanzee, monkey, and hippopotamus.

About one-third of the country's total land area is covered by forests, and about one-eighth of the total land area is considered suitable for agriculture. Ghana has substantial deposits of gold; other important reserves

include diamonds, manganese, iron, bauxite, and petroleum.

The people. Ghana has a large variety of African tribal, or subethnic, units. On the basis of language it is possible to distinguish at least 75 different tribes; the most numerous are the Akan, Mole-Dagbani, Ewe, Ga-Adangme (Ga-Adangbe), and Gurma. English has been adopted as the country's official language. The main religions in Ghana are Christianity (both Protestants and Roman Catholics), the indigenous religions of the various tribes, and Islām.

The birth and death rates are high compared with world averages, and the annual rate of population growth is one of the highest in the world (though about average for Sub-Saharan Africa). Ghana has a relatively young population, with almost one-half of the total population less than 15 years of age. More than two-thirds of the population is rural.

Economy. Ghana has a developing mixed economy based largely on agriculture and mining. Despite economic difficulties, it is still one of the most developed countries in tropical Africa. The gross national product (GNP) is not growing as rapidly as the population. The GNP per capita is among the lowest in the world, though it is above average for western Africa.

Agriculture accounts for nearly half of the GNP and employs more than half of the work force. Cacao is the mainstay of the economy, with its export providing more than two-fifths of the country's total export revenue. The price paid by the government to the cacao producers is considerably lower than prices on the world market, and illegal exporting is a serious problem. Old and diseased trees and shortages of vital pesticides have also hurt the industry, and large-scale replanting is necessary. Coffee, palm products, copra, and bananas are exported in small quantities. Staples include cassava, yams, and taro in the north and millet, corn (maize), sorghum, and rice in the south. Goats and sheep are the principal livestock reared; cattle farming is restricted to northern Ghana and the Accra plains.

Timber is an important export, but expansion of the industry hinges on the improvement of roads and facilities and the acquisition of modern machinery. Fishing is important to the domestic market. Mineral exports, chiefly gold, diamonds, manganese, and bauxite, account for a considerable part of the country's earnings. Petroleum is extracted in small quantities offshore between Saltpond and Cape Coast, and exploration in other areas is under way.

Industry, mining, and construction, accounting for about one-sixth of the GNP and employing about one-tenth of the work force, expanded considerably during the 1970s but were sluggish during the 1980s because of shortages of raw materials and imported machinery. Manufacturing is dominated by import-substitution industries producing food products, beverages, tobacco, textiles, timber and wood products, refined petroleum, vehicles, chemicals and pharmaceuticals, and metals. Electricity is generated almost entirely from hydroelectric plants, mainly the Akosombo Dam on the Volta River.

Trade, transportation, finances, public administration, and services account for nearly one-half of the GNP and employ more than one-quarter of the work force. Roads and railways are concentrated in the south. Both domestic and international flights are available at the Kotoka International Airport in Accra.

Rising budget deficits are financed largely by the banking system. The balance of trade fluctuates with world cocoa prices. Petroleum products, machinery and transport equipment, and chemicals are the main imports. Ghana's main trading partners are Japan, the United Kingdom, Germany, the United States, and The Netherlands.

Government and social conditions. A 1981 coup installed a government headed by a former military flight lieutenant, Jerry Rawlings, presiding over the Provisional National Defence Council (consisting of both military men and civilians), which rules by decree. The 1979 constitution, which provided for a strong executive branch of government, a unicameral Parliament, and an independent judiciary headed by a supreme court, was suspended. All political parties were banned, the Ghanaian Parliament dissolved, and the president arrested. People's defense committees were set up in villages and workplaces and charged with defending democratic rights and fighting corruption.

Health conditions in Ghana are poor. Population growth tends to outpace food production, and malnutrition is common. The government has continued its efforts to increase the number of health centres in rural areas; most of the Ghanaians living in rural areas do not have access to any health facility. Investments have been made to improve water supply and sewage systems in cities in an attempt to combat prevalent communicable diseases. Many people die from such preventable diseases as measles, malaria, hepatitis, and whooping cough. Life expectancy, nonetheless, has improved considerably since 1960 and, at nearly 55 years, is among the highest in western Africa.

Ghana has one of the best-developed educational systems in tropical Africa. Education is compulsory and free for six years of primary school and three years of junior secondary education. The main institutions of higher education are the University of Ghana, the University of Science and Technology at Kumasi, and the University of Cape Coast.

Cultural life. Ghana has a rich indigenous culture marked by great regional variety. Festivals and rites centred on chieftaincy and the family are occasioned by such events as harvest, marriage, birth, puberty, and death. Arts include dance and music, pottery, wood carving, gold and silver work, and textiles, most notably the richly coloured, handwoven kente cloth of the Akan and Ewe peoples. Established cultural institutions include the National Cultural Centre, based in Kumasi, and the Arts Council of Ghana, based in Accra with branches throughout the country.

History. The modern state of Ghana is named after the ancient Ghana empire that flourished until the 13th century AD in the western Sudan. The centre of ancient Ghana lay about 500 miles (800 km) northwest of the modern state. The Akan peoples, who inhabited most of the forest and coastland, founded their first states in about the 13th century. The northern borders of what is now Ghana were reached by gold-seeking Mande traders by the 14th century and by Hausa merchants, seeking kola nuts, by the 16th. During the 15th century the Mande moved southwestward into the northern half of modern Ghana, and there they founded the states of Dagomba and Mamprussi. In the 17th century a different group of Mande speakers, who had settled in the early Akan kingdoms, moved farther to the north to establish the kingdom of Gonja. At approximately the same time, the founders of the Ga and Ewe states of the southeast arrived from Nigeria. Perhaps one of the most powerful peoples in the history of Ghana are the Ashanti, members of the Twi-speaking branch of the Akan peoples. The Ashanti originated in the central forest region and formed a strongly centralized empire that, at its height in the 18th and 19th centuries, extended from the Komoe River in the west to the Togo Mountains in the east.

European exploration of what is now Ghana began early in the 15th century, when the Portuguese landed on the Gold Coast. Later in the century they established a settlement at Elmina as headquarters for the slave trade. By the 17th century the Portuguese slave monopoly had given way to traders from the Netherlands, England, Denmark, Sweden, and Prussia. By the mid-18th century the Gold Coast was dominated by numerous forts controlled by Dutch, British, or Danish merchants. Britain made the Gold Coast a crown colony in 1874, and British protectorates over the Ashanti and the northern territories were established in 1901.

In 1957 the Gold Coast became the independent state of Ghana, with Kwame Nkrumah as its first prime minister. In 1960 Ghana became a republic and Nkrumah its first president, but he was ousted by the army in a 1966 coup. A president was elected again in 1969 and dislodged in 1972 by another coup, which abolished the presidency and dissolved the National Assembly. The ensuing military regime fell to still another coup in 1978, and the sequence was repeated in 1979 and 1981, the latter under the leadership of Jerry Rawlings, who seized the reins of government himself.

ghanīmah, in the early Islāmic community (7th century AD), booty taken in battle in the form of weapons, horses, prisoners, and movable goods. In pre-Islāmic Bedouin society, where the *ghazw* (razzia, or raid) was a way of life and a point of honour, *ghanīmah* helped provide the material means of existence. After the leader of the *ghazw* received a fourth or a fifth of the booty, the rest was divided among the raiders according to tribal precedents.

Under Muḥammad and his immediate successors, the sheer size of the raids and the *ghanīmah* demanded a more precise distribution of spoils. Accordingly, the commander of the raid or battle received one-fifth of the total *ghanīmah;* every man who was responsible for victory, whether he participated in battle or not, received one share of the remaining *ghanīmah;* the cavalry received one or two extra shares for each horse. A man was always entitled to the equipment of anyone he personally killed; those who distinguished themselves in battle were also eligible for bonus shares, *anfāl,* though it is not clear how these were taken out of the general *ghanīmah.* Prisoners taken in battle, including women and children, were treated as movable property and distributed as slaves among the soldiers.

Of the leader's share, one-fifth was earmarked for community needs and originally was managed at his discretion. Eventually this fifth was distributed, in accordance with the Qur'ānic injunction, among five classes: the Prophet, his close relatives, orphans, the poor, and travelers.

Ghanzi, village, west-central Botswana, southern Africa. The village is located at the northern rim of the Kalahari (Desert) and is the starting point of a 500-mile- (800-kilometre-) long cattle trek—one of the longest such routes remaining active in the world; cattle are driven across the Kalahari southeastward to slaughterhouses at Lobatse.

The surrounding area comprises state-owned land and several thousand square miles of European-owned freehold farms, given as land grants in 1898 to some farmers from South Africa; their descendants still occupy the farms. The economy of the region is based on cattle ranching and the seasonal farming of sorghum, millet, and corn (maize). The Central Kalahari Game Reserve, the largest of Botswana's wildlife reserves, is inhabited by Bushmen and has black-backed jackals, elephants, foxes, ostriches, springboks, and zebras. Besides Ghanzi, other important villages in the region are Kalkfontein, Matapa, and Ncojane. Pop. (1981) village, 3,281.

Gharb (Morocco): *see* Rharb.

Gharbī, Jabal al- (Lebanon): *see* Lebanon Mountains.

Gharbīyah, al-, *muḥāfaẓah* (governorate) in the middle Nile Delta, Lower Egypt, bounded on the east and west by the Damietta and the Rosetta branches of the Nile, on the north by Kafr ash-Shaykh *muḥāfaẓah,* and by al-Minūfīyah *muḥāfaẓah* to the south. Its area is 750 square miles (1,942 square km); the *muḥāfaẓah*'s capital has been at the cultural centre and transportation node of Ṭanṭā (*q.v.*) since 1836. An administrative unit named al-Gharbīyah has existed since the early Muslim period. It formerly included the entire central delta north to the Mediterranean, but in 1949 Fu'ādīyah *mudīrīyah* (province), named for former king Fu'ād I, was created out of the northern part of al-Gharbīyah. Renamed in 1955, after the overthrow of the monarchy (1952), it is now the *muḥāfaẓah* of Kafr ash-Shaykh. Southern al-Gharbīyah has a population density exceeding 2,000 persons per square mile (775 persons per square km).

The fertile, flat land of the governate has a network of irrigation canals and is a cotton-growing centre. Rice, grains, and fruit are also grown. A barrage at Ziftā raises the level of the Damietta Branch to supply irrigation canals within the area and to the north and east. Important market towns with industries largely based on agriculture are Ziftā, Basyūn, and Ṭanṭā; al-Maḥallah al-Kubrā is a major textile centre. Kafr az-Zayyāt on the right bank of the Rosetta Branch has one of the country's largest cotton ginneries as well as soap and chemical works. In the governorate's northwestern section, on the right bank of the Rosetta and north of the village of Ṣā al-Ḥajar, is ancient Sais. The railway from Cairo splits at Ṭanṭā, with the western branch going to Alexandria and the eastern to Damietta; branches off the main lines serve towns in the governorate. Pop. (1985 est.) 2,847,000.

Ghardaïa, chief town of the M'zab (*q.v.*) Oasis, north-central Algeria. It lies along the left bank of the Oued (wadi) Mzab in the northern Sahara (Desert). Founded in the 11th century, it was built around the cave (*ghār*) reputedly inhabited by the female saint Daïa (the cave is still venerated by M'zabite women). Ghardaïa is a fortified town with white and red clay houses that rise in terraces and arcades toward the pyramid-style mosque at its centre. Ghardaïa is divided into three walled sectors. At the core is the M'zabite section, built around the mosque and an arcaded square. The traditional Jewish quarter, with its many wells and craft shops, lies to the east, and the Medabian quarter lies to the northwest. The military compound and hospital are to the south, and the town also has an airport. Pop. (1977) mun., 71,483.

gharial (reptile): *see* gavial.

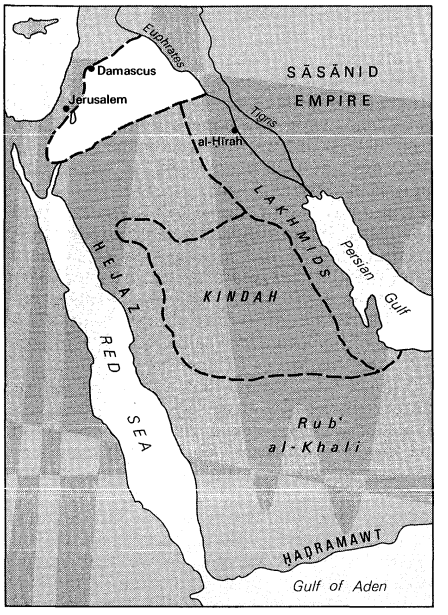
Gharnāṭa (Spanish kingdom): *see* Granada.

Gharyān, also spelled GARYĀN, or GARIAN, town, in the Tripolitania region of northwestern Libya. It lies at the foot of the plateau Jabal Nafūsah, 50 miles (80 km) south of Tripoli, and was a major centre of Italian colonization in the early 1910s. After the Turko-Italian war (1911–12) and the defeat of Turkey, the Gebel, Berber, and Fezzanese peoples in Libya continued to fight but could not stem the Italian advance. Gharyān fell to the Italians in December 1912 but was recaptured in a counterattack by local peoples in July 1913. Olive-oil processing, flour milling, carpet weaving, and pottery making are the main occupations. It is linked by road with Tripoli and Mizdah. Pop. (1972 est.) 2,181.

Ghassān, Arabian kingdom prominent as a Byzantine ally (*symmachos*) in the 6th century AD. From its strategic location in portions of modern Syria, Jordan, and Israel, it protected the spice trade route from the south of the Arabian Peninsula and acted as a buffer against the desert Bedouin.

The Ghassānid king al-Ḥārith ibn Jabalah (reigned 529–569) supported the Byzantines against Sāsānian Persia and was given the title *patricius* in 529 by the emperor Justinian. Al-Ḥārith was a Monophysite Christian; he helped to revive the Syrian Monophysite Church and supported Monophysite development despite the disapproval of Orthodox Byzantium. Subsequent Byzantine distrust of such religious unorthodoxy brought down his successors, al-Mundhir (reigned 569–582) and Nuʿmān.

The Ghassānids, who had successfully opposed the Persian-oriented Lakhmids of al-Ḥīrah, prospered economically and engaged in much religious and public building; they also patronized the arts and at one time entertained the poets Nābighah adh-Dhubyānī



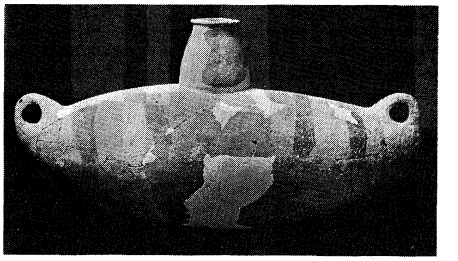
Ghassān in the 6th century AD
From C. Brockelmann, *A History of the Islamic Peoples*

and Ḥassān ibn Thābit at their courts. Ghassān remained a Byzantine vassal state until its rulers were overthrown by the Muslims in the 7th century.

Ghassaniy, Muyaka bin Haji al- (b. 1776—d. 1840), Kenyan poet who was the first Swahili-language secular poet known by name.

Ghassaniy is known particularly as an outstanding composer of quatrains (the most popular Swahili verse form for both philosophical and topical themes). Although he experimented little with prosody, his work ranged widely in type from didactic verse to love poems and from poems on domestic life (his shrewish second wife was a source of poetic inspiration) to political satire. His concern with the early 19th-century political situation is shown in poems that encourage the Mazrui rulers of the fort at Mombasa to oppose the overlordship of the sultan of Muscat, then rulers of the settlements along the Indian Ocean coast. The preface to his collected poems, *Diwani ya Muyaka* ("Collected Poems of Muyaka"), edited in 1940 by W. Hitchens, gives insight into his dual role as a commentator on his times and a voice of contemporary opinion.

Ghassulian culture, archaeological stage dating to the Middle Chalcolithic Period in southern Palestine (*c.* 3800–*c.* 3350 BC). Its type-site, Tulaylāt al-Ghassūl, is located in the Jordan Valley near the Dead Sea in modern Jordan and was excavated (1929–38) by the Jesuits. The Ghassulian stage was characterized by small settlements of farming peoples, immigrants from the north, who built mud-brick, trapezoid-shaped houses or underground dwellings and created remarkable polychrome wall paintings. Their pottery was elaborate in style, and included footed bowls and horn-shaped goblets. Several samples display the use of sculptural decoration or of a reserved slip (a clay and water coating partially wiped away while still wet). The Ghassulians also smelted copper. Evidence indicates that they buried their dead in stone dolmens.



Churn from Beersheba, Chalcolithic Age, 4th millennium
By courtesy of the Israel Department of Antiquities and Museums; exhibited in the Israel Museum, Jerusalem

Ghassulian culture has been identified at numerous other places in southern Palestine, especially in the region of Beersheba. The Ghassulian culture correlates closely with the Amratian of Egypt and also seems to have affinities (*e.g.,* the distinctive churns, or "bird vases") with early Minoan materials in Crete.

Ghāt, also spelled GAT, oasis, southwestern Libya, near the Algerian border. Located on an ancient Saharan caravan route, it was a slave-trading centre and the object of European exploration in the 19th century. Ghat lies west of the Wādī (watercourse) Tanezzuft in hilly sandstone country, near the Jibāl Akākus (mountains) and the Tadrārt plateau. A nearby offshoot of the mountains, Idinen, is a legendary fortress of ghosts. The town is walled and compact, with white houses, narrow alleyways, and covered arcades. It is inhabited by Tuaregs. Water, supplied by springs, is strictly controlled by customary law. Palm groves and gardens yielding cereals and vegetables lie outside the walls; livestock are grazed along the nearby wadis; and artisan industries produce rugs, baskets, and leather goods. Pop. (1972 est.) 3,470.

ghaṭa-pallava, in Indian art, important decorative motif consisting of a pot filled with flowers and leaves. In Vedic literature it is the symbol of life, the source of vegetation, a meaning that is still retained. The motif oc-

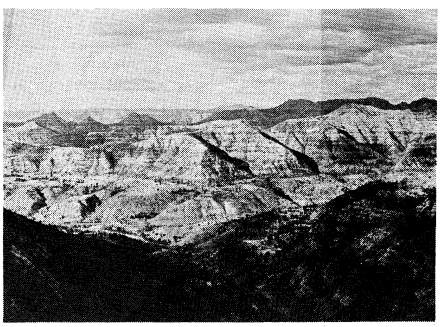
Detail of a sandstone pilaster with *ghaṭa-pallava* motif, from the Sās temple, Nāgda, Rājasthān, India, 10th century
P. Chandra

curred in Indian art almost from its inception and has been used prominently in all periods. From the 5th century the *ghaṭa-pallava* began to be used in architecture, particularly in northern India, both as the base and capital of a pillar, and it continued in such use until the 15th century.

The "full vessel" (*pūrṇa-ghaṭa, pūrṇa-kalaśa*) is also employed in the rituals of Buddhist, Hindu, and Jain sects as a ceremonial offering to the deity or to an honoured guest and as an auspicious symbol used to decorate shrines and buildings. The vessel is filled with water and vegetation, often a coconut, and is encircled with a ritual cord. As a symbol of abundance and the source of life, the full vessel—both as ceremonial object and as decorative motif—may be considered in a Hindu context to be symbolic also of Śrī, or Lakṣmī, the Hindu goddess of wealth and good fortune.

Ghāts, two mountain ranges forming the eastern and western edges, respectively, of the Deccan Plateau (*q.v.*) of peninsular India. In Hindi *ghāṭ* means "river landing stairs" or "mountain pass" and has been extended in its Anglicized plural form (formerly "ghauts") to include the mountains themselves. The word refers as well to riverbanks that have been artificially terraced for bathing for religious purposes and also to ferry landings.

The two mountain ranges, respectively, run roughly parallel to the Bay of Bengal and Arabian Sea coasts, from which they are separated by strips of fairly level coastal land. The East-



Western Ghāts in Mahārāshtra state, India
David Channer—Nancy Palmer Agency

ern Ghāts include several unconnected and dissimilar hill masses, with an average height of about 2,000 feet (600 m) and peaks reaching 4,000 feet (1,200 m) and higher. There is a gap in the chain 100 miles (160 km) wide through which the Krishna and Godāvari rivers reach the coast. The mountains' slopes have sparse forests containing valuable timber.

The Western Ghāts, which are possibly a fault scarp, are the crest of the western edge of the Deccan Plateau. Their steep seaward slopes are deeply dissected by streams and canyonlike valleys, but on the landward side their slopes are gentle and give way to wide, mature valleys. The range extends northward to the Tāpti River and southward almost to Cape Comorin at India's southern tip. The mountains reach elevations of between 3,000 and 5,000 feet in the north, less than 3,000 feet in the area south of Goa, and are higher again in the far south, reaching 8,652 feet at Doda Betta mountain. The Pālghāt Gap separates the Western Ghāts proper from their southward extension, known as the Southern Ghāts. The Western Ghāts, because they receive extremely heavy rainfall from the southwest monsoon, comprise peninsular India's principal watershed; rainfall is much lighter inland on the plateau. The high rainfall has produced dense forests on the seaward slopes, with bamboo, teak, and other valuable trees. Some rivers among the Western Ghāts have been dammed to produce electric power. A number of hill resorts are also located in the mountains.

Ghaudex (Malta): *see* Gozo.

ghaybah (Arabic: "absence," or "concealment"), Islāmic doctrine, especially among such Shīʿite sects as the Ithnā ʿAsharīyah, or "Twelvers." The term refers to the disappearance from view of the 12th and last imam (leader), Muḥammad al-Mahdī al-Ḥujjah, in 878.

Ghaybah is applied loosely to anyone whom God has withdrawn from the world and kept invisible to the eyes of ordinary men. The life of such a blessed person is thought to be miraculously prolonged by God through many generations and even centuries. The Shīʿites maintained that their imams, even though invisible, still live and return to human society from time to time to maintain order and to guide their followers along the right path. The *ghaybah* of the mahdi ("divinely guided one") will end, according to the Shīʿites, when the mahdi finally appears in the last days of the world.

The Ṣūfīs (Muslim mystics), unlike the Shīʿites, understood *ghaybah* to mean the absence in the heart of all thoughts except those of God. It is the *fanāʾ* ("passing away") of the carnal self. For Ṣūfīs, *ghaybah* is not a goal in itself but rather a stage that leads naturally to *ḥuḍūr* (presence) in God.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

ghazal, also spelled GHAZEL, GASAL, or GAZEL, in Islāmic literature, genre of lyric poem, generally short and graceful in form and typically dealing with themes of love. As a genre the ghazal developed in Arabia in the late 7th century from the *nasib,* which itself was the often amorous prelude to the qasida (ode). Two main types of ghazal can be identified, one native to Hejaz, the other to Iraq.

The ghazals by ʿUmar ibn Abī Rabīʿah (died *c.* 712/19) of the Quraysh tribe of Mecca are some of the oldest. Umar's poems, based largely on his own life and experiences, are realistic, lively, and urbane in character. They continue to be popular with modern readers.

What became a classic theme of the ghazal was introduced by Jamīl (died 701), a member of the ʿUdhrah tribe from Hejaz. Jamīl's lyrics tell of hopeless, idealistic lovers pining for each other unto death. These enormously popular works were imitated not only in Arabic but also in Persian, Turkish, and Urdu poetry until the 18th century.

Of additional note is the work of Ḥāfeẓ (also spelled Hafiz; died *c.* 1389/90), considered among the finest lyric poets of Persia, whose depth of imagery and multilayered metaphors revitalized the ghazal and perfected it as a poetic form.

Ghazālī, al-, also spelled AL-GHAZZĀLĪ, in full ABŪ ḤĀMID MUḤAMMAD IBN MUḤAMMAD AṬ-ṬŪSĪ AL-GHAZĀLĪ (b. 1058, Ṭūs, Iran—d. Dec. 18, 1111, Ṭūs), Muslim theologian and mystic whose great work, *Iḥyāʾ ʿulūm ad-dīn* ("The Revival of the Religious Sciences"), made Ṣūfism (Islāmic mysticism) an acceptable part of orthodox Islām.

Al-Ghazālī was born at Ṭūs (near Meshed in eastern Iran) and was educated there, then in Jorjān, and finally at Nishapur (Neyshābūr), where his teacher was al-Juwaynī, who earned the title of *imām al-ḥaramayn* (the imam of the two sacred cities of Mecca and Medina). After the latter's death in 1085, al-Ghazālī was invited to go to the court of Niẓām al-Mulk, the powerful vizier of the Seljuq sultans. The vizier was so impressed by al-Ghazālī's scholarship that in 1091 he appointed him chief professor in the Niẓāmīyah college in Baghdad. While lecturing to more than 300 students, al-Ghazālī was also mastering and criticizing the Neoplatonist philosophies of al-

Fārābī and Avicenna (Ibn Sīnā). He passed through a spiritual crisis that rendered him physically incapable of lecturing for a time. In November 1095 he abandoned his career and left Baghdad on the pretext of going on pilgrimage to Mecca. Making arrangements for his family, he disposed of his wealth and adopted the life of a poor Ṣūfī, or mystic. After some time in Damascus and Jerusalem, with a visit to Mecca in November 1096, al-Ghazālī settled in Ṭūs, where Ṣūfī disciples joined him in a virtually monastic communal life. In 1106 he was persuaded to return to teaching at the Niẓāmīyah college at Nishapur. A consideration in this decision was that a "renewer" of the life of Islām was expected at the beginning of each century, and his friends argued that he was the "renewer" for the century beginning in September 1106. He continued lecturing in Nishapur at least until 1110, when he returned to Ṭūs, where he died the following year.

More than 400 works are ascribed to al-Ghazālī, but he probably did not write nearly so many. Frequently the same work is found with different titles in different manuscripts, but many of the numerous manuscripts have not yet been carefully examined. Several works have also been falsely ascribed to him, and others are of doubtful authenticity. At least 50 genuine works are extant.

Al-Ghazālī's greatest work is *Iḥyāʾ ʿulūm ad-dīn.* In 40 "books" he explained the doctrines and practices of Islām and showed how these can be made the basis of a profound devotional life, leading to the higher stages of Ṣūfism, or mysticism. The relation of mystical experience to other forms of cognition is discussed in *Mishkāt al-anwār* (*The Niche for Lights*). Al-Ghazālī's abandonment of his career and adoption of a mystical, monastic life is defended in the autobiographical work *al-Munqidh min aḍ-ḍalāl* (*The Deliverer from Error*).

His philosophical studies began with treatises on logic and culminated in the *Tahāfut* (*The Inconsistency—or Incoherence—of the Philosophers*), in which he defended Islām against such philosophers as Avicenna who sought to demonstrate certain speculative views contrary to accepted Islāmic teaching. In preparation for this major treatise, he published an objective account of *Maqāṣid al-falāsifah* (*The Aims of the Philosophers; i.e.,* their teachings). This book was influential in Europe and was one of the first to be translated from Arabic to Latin (12th century).

Most of his activity was in the field of jurisprudence and theology. Toward the end of his life he completed a work on general legal principles, *al-Mustaṣfā* (*Choice Part,* or *Essentials*). His compendium of standard theological doctrine (translated into Spanish), *al-Iqtiṣād fī al-ʿiqād* (*The Just Mean in Belief*), was probably written before he became a mystic, but there is nothing in the authentic writings to show that he rejected these doctrines, even though he came to hold that theology—the rational, systematic presentation of religious truths—was inferior to mystical experience. From a similar standpoint he wrote a polemical work against the militant sect of the Assassins (Ismāʿīlīyah), and he also wrote (if it is authentic) a criticism of Christianity, as well as a book of *Counsel for Kings* (*Naṣīḥat al-mulūk*).

Al-Ghazālī's abandonment of a brilliant career as a professor in order to lead a kind of monastic life won him many followers and critics among his contemporaries. Western scholars have been so attracted by his account of his spiritual development that they have paid him far more attention than they have other equally important Muslim thinkers.

(W.M.W.)

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Ghāzān, Maḥmūd (b. Nov. 5, 1271, Abaskun, Iran—d. May 11, 1304), most prominent of the Il-Khans (subordinate *khāns*) to rule the Mongol dynasty in Iran. Reigning from 1295 to 1304, he is best known for the conversion of his state to Islām and his wars against Egypt.

Early life. Ghāzān's early childhood was spent largely in the company of his grandfather, the Il-Khan Abagha (1265–82), and he was brought up in the Buddhist faith that both his father and his grandfather professed. Upon his father's accession to the throne in 1284, Ghāzān was appointed viceroy of the

Maḥmūd Ghāzān receiving the nobles of Khorāsān, detail of an illumination from the Mongol manuscript *Jāmiʿ at-tawārikh, c.* 1307; in the University of Edinburgh Library (MS. Or.20)

By courtesy of the Edinburgh University Library

provinces of northeastern Persia, where he resided for the next 10 years and defended the frontier against the Chagatai Mongols of Central Asia and then against his own lieutenant Nawrūz, who had risen in revolt with the Chagatai. Ghāzān's relations with Arghun's successor, Gaykhatu (1291–95), were cool; those with Baydū, the latter's cousin, who dethroned him and usurped the throne, came to open war. After a first encounter, followed by a truce and parley, Ghāzān spent the summer of 1295 in the mountains north of present-day Tehrān, where, on the advice of Nawrūz, with whom he was now reconciled, he declared himself a convert to Islām, and his example was followed by the troops under his command. It was thus at the head of a Muslim force that he resumed the attack against Baydū, who, deserted by his supporters, was captured and executed on the very day of Ghāzān's entry into the Il-Khanid capital of Tabriz.

Career as Il-Khan. Ghāzān was formally enthroned on Nov. 3, 1295, and during the first year of his reign he had to cope with a number of revolts against his authority. All were suppressed with the utmost severity—no fewer than five princes of the blood were executed for their complicity. Nawrūz himself, who had helped raise Ghāzān to the throne, was soon to pay with his life for suspected collusion with the Mamlūks. Though now the Muslim head of a Muslim state, Ghāzān took up the hereditary quarrel of his family with these champions of Islām. In 1299–1300 he invaded Syria, defeated the Egyptian army at Homs, and made a triumphal entry into Damascus. Upon his return to Persia early in 1300, however, the country was reoccupied by the Mamlūks. In the autumn of the same year he returned to the attack, but poor weather rendered military operations impossible; the campaign was abandoned before contact could be made with the enemy. For a third campaign he sought an alliance with the Christian West. In a letter to Pope Boniface VIII dated April 12, 1302, he refers to a detailed plan for the invasion of Syria, which he had previously proposed to the princes of Europe and continues:

> As for now, we are making our preparations exactly in the manner [laid down in that plan]. You too should prepare your troops, send word to the rulers of the various nations and not fail to keep the rendezvous. Heaven willing, we [*i.e.*,Ghāzān] shall make the great work [*i.e.,* the war against the Mamlūks] our sole aim.

The campaign to which Ghāzān here alludes was launched in the spring of 1303 without European aid. The Mongols advanced through Syria without meeting serious resistance until they were halted and decisively defeated south of Damascus. A fourth campaign was prevented by an illness that attacked Ghāzān in the autumn of 1303; he recovered for a while but then suffered a relapse and died on May 11, 1304.

Assessment. Ghāzān's accomplishments were in no way restricted to his activities on the battlefield. A man of great intellectual curiosity, he was conversant with such diverse topics as natural history, medicine, astronomy, and chemistry and was also an adept in several handicrafts. "No one surpassed him," says the Byzantine historian Pachymeres, "in making saddles, bridles, spurs, greaves and helmets; he could hammer, stitch and polish, and in such occupations employed the hours of his leisure from war." Besides his native Mongolian, he is said to have had a knowledge of the Arabic, Persian, Hindi, Kashmiri, Tibetan, Chinese, and Frankish (*i.e.,* probably French) languages.

It was at his suggestion and with his assistance that his vizier Rashīd ad-Dīn composed a celebrated history of the Mongols, which was later expanded to embrace all the peoples of Asia and Europe with which their conquests had brought them in contact. Rashīd ad-Dīn, Ghāzān's great minister, was perhaps the real author of the fiscal reforms that go under his master's name and that were designed to protect the sedentary population from the extortions of the nomad aristocracy. These measures, coupled with the adoption of Islām, must have played their part in welding the Mongols and Persians (like the Normans and English) into a single nation, and the Il-Khans might have ended, like the Plantagenets, by becoming a truly national dynasty. In fact, Ghāzān himself, by his ruthless elimination of princely rivals, must have contributed to the extinction of the Il-Khanids, who survived his death by little more than 30 years.

(J.A.Bo.)

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Ghāziābād, formerly GHĀZIUDDINNAGAR, town, administrative headquarters of Ghāziābād district, Uttar Pradesh state, northern India. Founded in 1740, it is located on the Grand Trunk Road 12 mi (19 km) east of New Delhi. Modern Ghāziābād is a rapidly developing industrial town. Many workers commute daily to New Delhi, where goods produced in Ghāziābād are also marketed. Manufacturing and processing industries include vegetable oil, electroplating, tapestries, diesel engines, bicycles, railway coaches, heavy chains, brass brackets, lanterns, glassware, pottery, paint and varnish, and typewriter ribbons. The temples of Dudheśwar Nāth and Devi Durga and many scattered Muslim ruins are in the town. There are three degree-granting colleges, affiliated with Meerut University. There are road and railway connections to the important towns in northern India.

Ghāziābād district (1,000 sq mi [2,600 sq km]), located in the northern part of the state, was established in 1976 and comprises the part of the Upper Ganges Plain that is known historically as the land east of the Sapta Sindhu (Seven Rivers). The region consists of a flat plain traversed by perennial streams. Agriculture dominates the economy; crops include cereals, pulse (legumes), sugarcane, and oilseeds. Industries produce sugar, alcohol, vegetable oil, textiles, paper, agricultural implements, fans, radiators, electrical goods, chemicals, and iron and steel utensils. Rice, dal (pigeon pea), and vegetable-oil milling; handloom weaving; and silk weaving are the cottage industries. Pop. (1981) town, 271,730; metropolitan area, 287,170; district, 1,843,130.

Ghāzīpur, town, administrative headquarters of Ghāzīpur district, Uttar Pradesh state, northern India, northeast of Vārānasi (Benares), on the Ganges River. Its ancient name of Gadhīpūr was changed to Ghāzīpur in about 1330, reputedly in honour of Ghāzī Malik, a Muslim ruler. The town was a strategically important river port under the British, whose former cantonment now contains a college, a church, a bazaar, and the mausoleum of Lord Cornwallis, a British viceroy who died there in 1805. Ghāzīpur is an agricultural market with some industry, including perfume making, handloom weaving, and an opium factory. The town lies on a major road and two railways.

Ghāzīpur district, 1,305 sq mi (3,381 sq km) in area, is a tract of alluvial plain traversed by the Ganges River. A poor district, subject to frequent floods and droughts, it produces a variety of crops, including opium. Pop. (1981) town, 60,725; district, 1,944,669.

Ghāziuddinnagar (India): *see* Ghāziābād.

Ghaznavid DYNASTY (AD 977–1186), Turkish dynasty that ruled in Khorāsān (in northeastern Iran), Afghanistan, and northern India.

The founder of the dynasty was Sebüktigin (ruled 977–997), a former Turkish slave who was recognized by the Sāmānids (an Iranian Muslim dynasty) as governor of Ghazna (modern Ghaznī, Afg.). As the Sāmānid dynasty weakened, Sebüktigin consolidated his position and expanded his domains as far as the Indian border. His son Maḥmūd (ruled 998–1030) continued the expansionist policy, and by 1005 the Sāmānid territories had been divided. The river Oxus formed the boundary between the two successor states to the Sāmānid Empire, the Ghaznavids ruling in the west and the Qarakhanids in the east.

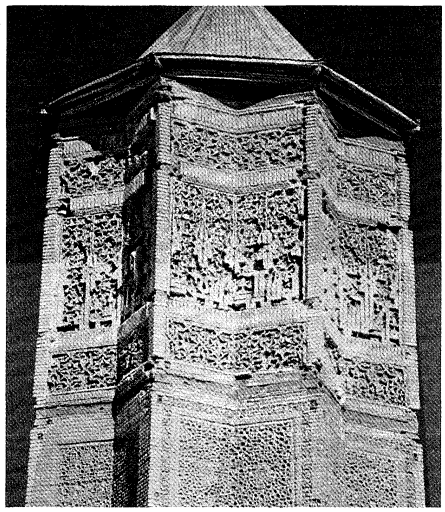
Ghaznavid power reached its zenith during Maḥmūd's reign. He created an empire that stretched from the Oxus to the Indus Valley and the Indian Ocean; in the west he captured (from the Būyids) the Iranian cities of Rayy and Hamadan. A devout Muslim, Maḥmūd reshaped the Ghaznavids from their pagan Turkic origins into an Islāmic dynasty and

expanded the frontiers of Islām. The Persian poet Ferdowsī (died 1020) completed his epic *Shah-nāmeh* ("Book of Kings") at the court of Maḥmūd in about 1010.

Maḥmūd's son Mas'ūd I (ruled 1031–41) was unable to preserve the power or even the integrity of the Ghaznavid empire. In Khorāsān and Khwārezm, Ghaznavid power was challenged by the Seljuq Turks. Mas'ūd suffered a disastrous defeat at the Battle of Dandānqān (1040), whence all the Ghaznavid territories in Iran and Central Asia were lost to the Seljuqs. The Ghaznavids were left in possession of eastern Afghanistan and northern India, where they continued to rule until 1186, when Lahore fell to the Ghūrids.

Little survives of Ghaznavid art, but the period is important for its influence on the Seljuq Turks in Iran and on later Islāmic art in India.

The Ghaznavids introduced the "four *eyvān*" ground plan in the palace at Lashkarī Bāzār near Lashkarī Gāh, on a plateau above the Helmond River, just north of Qal'eh-ye Best, Afghanistan. An *eyvān* is a large vaulted hall, closed on three sides and open to a court on the fourth. The motif of a court surrounded by four *eyvān*s dominated Seljuq mosque architecture and was used continually through the Timurid and Ṣafavid periods in Persia. The victory tower of Mas'ūd III (built 1099–1115) is a precursor of the Seljuq *türbe* (*q.v.*), or tombtower (called *gonbad* in Persian). Of its two original stories, the remaining one is largely covered with ornamental inscription.



Detail of the victory tower of Mas'ūd III, constructed 1099–1115, in Ghaznī (formerly Ghazna), Afg.
Josephine Powell, Rome

Excavations at the site of the palace at Lashkarī Bāzār have uncovered paintings depicting the royal guard. Certain elements, particularly the style of representing figures, are similar to early Seljuq work. The Ghaznavids practiced wood carving as well; the tooled work on the door of Maḥmūd of Ghazna's tomb is similar in geometric style to that of the Fatimids in Egypt.

Ghaznī, *velāyat* (province) in southeastern Afganistan, with an area of 9,024 sq mi (23,373 sq km); it is bordered by the provinces of Bāmiān, Vardak, and Lowgar (north), Paktīā and Paktika (east), Zābol (southwest), and Orūzgān (west). The western part of Ghaznī is mountainous, while the remainder is a bare plateau. Winters are very cold, usually with several feet of snow; summers are plagued by frequent dust storms. The chief occupation is agriculture, with wheat, barley, and corn (maize) among the crops grown. Ghaznī is linked to the rest of the nation by the Kābul–Qandahār highway, upon which Ghaznī town, the provincial capital, lies. Pop. (1982 est.) settled pop. 676,416, mainly Ḥazāras and Ghilzay Pashtuns.

Ghaznī, formerly GHAZNA, capital of Ghaznī *velāyāt* (province), eastern Afghanistan, beside the Ghaznī River on a high plateau at an altitude of 7,300 ft (2,225 m). Afghanistan's only remaining walled town, it is dominated by a 150-ft citadel built in the 13th century.

Marketplace at Ghaznī town, Afg.
Carl Purcell

Around the nearby village of Rowẓeh-e Sultan, on the old road to Kābul (the nation's capital, 80 mi [130 km] northeast), are the ruins of ancient Ghazna, including two 140-ft towers and the tomb of Maḥmūd of Ghazna (971–1030), the most powerful *amīr* (or sultan) of the Ghaznavids.

Ghaznī's early history is obscure; it has probably existed at least since the 7th century. Early in the 11th century, under Maḥmūd of Ghazna, the town became the capital of the vast empire of the Ghaznavids, Afghanistan's first Muslim dynasty. The dynasty lost much of its power later in the same century, and Ghaznī was sacked in 1150–51 by the Ghūrids. The town was fought over by various peoples before the Mongols secured it by 1221. They ruled the area until Timur (Tamerlane), the Turkic conqueror, arrived in the 14th century, and his descendants ruled it until 1504, when the Indian Mughals took Ghaznī and Kābul. In 1747, under Aḥmad Shāh Durrānī, Ghaznī became part of the new Afghan kingdom. It was captured by the British during the First Anglo-Afghan War (1839–42). Ghaznī recovered some importance when it became the main town on the Kābul–Qandahār highway. Intermittent fighting between Afghan guerrillas and Soviet and Afghan army units took place following the Soviet military intervention in 1979, and the guerrillas held the town for a time in 1981.

Ghaznī is a chief commercial and industrial centre of Afghanistan, dealing in livestock, furs, silk, and agricultural products. The surrounding irrigated land yields grain, fruit, and grapes. Pop. (1982 est.) 31,985.

Ghazzah (Gaza Strip): *see* Gaza.

Ghazzah, Qiṭā': *see* Gaza Strip.

ghee, also spelled GHĪ, clarified butter, a staple food on the Indian subcontinent. *See* butterfat.

Ghee Hin, Chinese secret society that flourished in Malaya in the 19th and early 20th centuries. During the 1800s many Chinese migrated to Malaya bringing their secret societies with them. The Ghee Hin had strong branch organizations in Penang. Its membership consisted primarily of Cantonese speakers from southern China. The Ghee Hin was a semilegal society internally controlled by oath taking, ceremonies based on Chinese cosmology and philosophy, and strong sanctions for breaking the society's rules.

Hatred among different linguistic groups in China continued in Malaya, especially between the Ghee Hin (Cantonese) and Hai San (Hakka) societies in Larut, and profoundly influenced events on the peninsula. In Perak, warfare between the two societies over possession of tin mines was mitigated by a British-mediated agreement called the Chinese Engagement (*q.v.*) in 1874. A similar situation occurred in Selangor. The Ghee Hin gradually declined in power as British authority spread throughout the peninsula after 1874.

Gheel (Belgium): *see* Geel.

Ghelderode, Michel de (b. April 3, 1898, Ixelles, Belg.—d. April 1, 1962, Brussels), eccentric Belgian dramatist who wrote in French and was a latter-day Gothic visionary whose folkish morality plays resound with violence, demonism, holy madness, and Rabelaisian humour.

Ghelderode was a prolific dramatist. He scored an early success with his *Images de la vie de Saint François d'Assise* (1927), in which the life and death of the saint are told with sincere faith but with little concern for the reverential attitudes traditionally found in religious plays. Humour, naive realism, and what in 1927 were very advanced theatrical techniques, as well as a deep and moving piety, all abound in this strange play.

Ghelderode was then invited by the Flemish Popular Theatre to write a play for performance in Holy Week. *Barabbas* (1928) was the product of that commission. This unusual interpretation of Christ's last hours on Earth has captivated both popular and highly sophisticated audiences. The style of the dialogue—forceful, colourful, and idiomatic—is as striking as the daring conception of events, the avant-garde staging, and the mixture of religion and ribaldry. The play is largely dependent for its success upon a sympathetic production, and Ghelderode gave detailed instructions for the play's performance. Ghelderode wrote many other plays, including *Escurial* (1927); *Fastes d'enfer* (1929; *Chronicles of Hell,* 1960); *Pantagleize* (1930; Eng. trans., 1960); *Magie rouge* (1934; *Red Magic,* 1964); *Mademoiselle Jaïre* (1934; *Miss Jairus,* 1964); and *Hop, Signor!* (1935; Eng. trans., 1964).

Ghelderode's plays bring to life the macabre carnivals of the Flemish painters Hieronymous Bosch and Ghelderode's contemporary James Ensor. Something of a recluse and content to write for the ordinary people of his native Flanders, Ghelderode was little known even in France until after World War II, when he was belatedly recognized as a master of the avant-garde theatre.

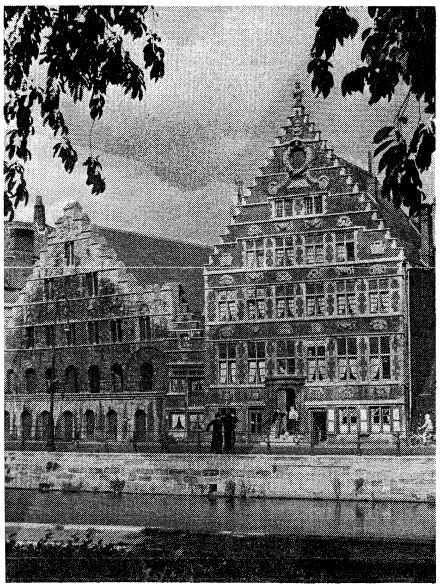
Ghelderode was one of the first dramatists to exploit the idea of total theatre—that is, drama in which every sort of appeal is made to the eye, to the ear, and to the emotions in order to stir the intellect. As a pioneer of total theatre, at a time when the vast dramas of Paul Claudel had yet to be performed in Paris, Ghelderode exerted a powerful influence on the history of the French theatre. His works have only rarely been performed in English-speaking countries.

Ghent, Flemish GENT, French GAND, capital of East Flanders province, northwestern Belgium, at the junction of the canalized Lys (Leie) and Scheldt (Schelde) rivers. It is the centre of an urban complex that includes Ledeberg, Gentbrugge, and Sint-Amandsberg.

One of Belgium's oldest cities (7th century) and the historic capital of Flanders, it was powerful, united in wealthy guilds, and virtually independent until 1584. Within its walls was signed the Pacification of Ghent (1576; an attempt to unite the Lowlands provinces against Spain). The Treaty of Ghent (Dec. 24, 1814) marked the end of the War of 1812 between the U.S. and Britain.

Ghent's prosperity was largely based on the cloth industry, and its privileged position aroused the hostility of the counts of Flanders

and often led to open conflict. Beginning in the late 16th century, the city began to decline economically and politically. Commercial and industrial activity was stimulated by the introduction of cotton-spinning machinery (in particular, by a power loom smuggled out of England), the construction of a port (1827), and the Gent-Terneuzen Canal (1822–29) to the mouth of the Scheldt. Ghent is now the second largest port and chief textile centre of Belgium; its docks became accessible to the largest vessels after extensive improvements were made to the canal and its locks.



Guild houses in Ghent, Belg.
By courtesy of the Tourist Office of the city of Ghent, Belgium

Also a centre of horticulture and market gardening, Ghent holds its great flower show, "Les Floralies," every five years. Other significant economic activities include metallurgy, paper manufacturing, commerce, and banking.

Ghent has retained more traces of its past than any other Belgian town. The feudal castle of the counts of Flanders dates from 1180. The town hall reflects a diversity of styles: the north facade (1518–35) is a magnificent example of Flamboyant Gothic, whereas the east facade completed almost a century later, is Renaissance. The 14th-century Belfry (about 300 ft [90 m] high) with a 52-bell carillon in the centre of the city is crowned with a gilded copper dragon (forged in 1377).

Other notable landmarks include the 13th-century private Castle of Gerard the Devil, which now houses provincial archives; the 14th-century Cloth Hall; and the Vrijdagmarkt (Friday Market), centre of the life of the medieval city. Of Ghent's many famous medieval monasteries, the most notable are the ruined 7th-century St. Bavon's Abbey (birthplace of John of Gaunt—*i.e.*, Ghent—duke of Lancaster; now a lapidary museum), St. Pierre, site of a 7th-century Benedictine order with a Baroque church (built 1629–1729), and the Cistercian Abbey of Byloke, or Bijloke (1228; now housing the Museum of Archaeology and also part of the city hospital). The Gothic Cathedral of St. Bavon, or Baaf (dating from the 12th century), contains many valuable works of art, including Hubert and Jan van Eyck's polyptych altarpiece, "The Adoration of the Lamb".

Other medieval churches include St. Nicholas, which has the third of the great towers of Ghent (others are the Belfry and St. Bavon's); St. James; Saint-Michel, containing Van Dyck's "Christ on the Cross"; and St. Peter (1629–1719), originally the oratory of a 7th-century abbey. Two *béguinages* (retreats for secular nuns) survive from the 13th century.

Ghent has many fine museums, notably the Museum van Schone Kunsten (fine arts), which contains a treasury of paintings by Flemish masters, most of whom were centred in Ghent during the 16th and 17th centuries. There is a state university, founded by William I in 1816, with a notable collection of books and manuscripts in its library, and also an agricultural college. An international airport is at St. Denis-Westrem to the southwest. Pop. (1983 est.) 236,540.

Ghent, Pacification of (Nov. 8, 1576), declaration of union and religious truce by the provinces of the Low Countries, then in revolt against the Spanish Habsburgs, and the first major expression of the Netherlands' national self-consciousness. The pacification called for the expulsion of Spanish troops, restoration of provincial and local prerogatives, and an end to the persecution of Calvinists. While the signatories did not abjure their allegiance to King Philip II of Spain, they clearly wished any reconciliation to be on their own terms.

The religious clauses of the pacification implicitly recognized the right of the largely Calvinist provinces of Holland and Zeeland—the centres of the military resistance—to order their own house as long as they did not attempt to advance their faith beyond their borders. The Catholic provinces, on the other hand, were to leave their Protestants unmolested.

A new royal governor was allowed to assume his duties only after he accepted the pacification and ordered the Spanish troops out of the country (February 1577). Based on the pacification, organs of national government were reconstituted and reasserted. The Spanish governor, however, chafing at the limitations on his power, soon resumed hostilities, and Spanish troops reentered the provinces.

This external threat to the prescribed union was accompanied by internal violations of the document's religious clauses. Calvinists, especially, forced their creed on large areas of Flanders and Brabant. Catholic faith in the union was thus seriously undermined. A further blow was the formation, in January 1579, of "closer unions" within the larger grouping. The Union of Arras, joining the southern provinces, based itself on a Catholic reading of the pacification and tended toward reconciliation with Spain; the Union of Utrecht joined the northern provinces for continued and improved resistance. The general union of the pacification was tenuously maintained until 1584, but by then its spirit had long since been vitiated.

Ghent, State University of, Dutch RIJKSUNIVERSITEIT TE GENT, state-financed coeducational institution of higher learning with limited autonomy in Ghent, Belg. Founded in 1817 under King William I of The Netherlands, the university at first conducted its instruction in Latin; in 1830 the language was changed to French; in 1916, during the German occupation of World War I, to Flemish; in 1918 back to French; and by 1930 back to Flemish. The language of instruction of the faculties is Dutch. They include philosophy and letters, law, sciences, applied sciences, medicine, economics, veterinary sciences, pharmacy, agriculture, and education. Affiliated institutes include, among others, centres for the study of management and environmental sanitation.

Ghent, Treaty of (Dec. 24, 1814), agreement in Belgium between Great Britain and the United States to end the War of 1812 on the general basis of the status quo antebellum (maintaining the prewar conditions). Because the military positions for each side were so well balanced, neither country could obtain desired concessions. No mention was made in the peace settlement of neutral rights, particularly concerning the impressment of seamen—one of the prime reasons the United States had gone to war. (International protection of neutral rights was not achieved until 1856 in the Declaration of Paris at the conclusion of the Crimean War.) Expansionist interests in the American Northwest were better served, since all British-held territory in this area was surrendered to the U.S. This severance of British–American Indian ties led in 1814 and 1815 to a number of treaties of allegiance and land transfer between the Indians and the U.S. and thus opened the way to American migration to, and settlement of, the Northwest. The treaty also provided that certain boundary disputes between Canada and the United States be referred to arbitration commissions, and both the U.S. and British governments agreed to use their best efforts to abolish the international slave trade.

Ghent-Bruges school, group of manuscript illuminators and scribes active during the last quarter of the 15th and first part of the 16th centuries, principally in the Flemish cities of Ghent and Bruges. Credit for founding the tradition that included such masters as Nicolas Spierinc (fl. 1455–*c.* 1499), Liévin van Lathem (fl. 1454–93), Alexander (fl. 1469–1519) and Simon Bening (1483–1561), and Gerard Horenbout (fl. 1487–1541) was formerly given to the Master of Mary of Burgundy, but recent investigations have suggested that the designation "Master of Mary of Burgundy" is more of a scholarly convenience than a reasonable hypothesis and that the works attributed to this nonexistent master were executed by several different illuminators.

The Ghent-Bruges school produced deluxe manuscripts that were eagerly sought by ecclesiastical and secular princes in many parts of Europe—notably by Ferdinand and Isabella of Spain, James IV of Scotland, Louis XI of France, Catharine of Aragon, Margaret of Austria, etc. The masterpiece of the group is the Grimani Breviary (*c.* 1515; Biblioteca Nazionale Marciana, Venice). Illuminated chiefly by Gerard Horenbout and Simon Bening, the calendar of the Breviary is an updating of the calendar from the *Très riches heures du duc de Berry* (Musée Condé, Chantilly, Fr.), which had been executed a century earlier.

During the last part of the school's activity, Simon Bening was its major master, but, by his death in 1561, manuscript illumination, like the handwritten book itself, had long been superseded by the invention of printing with movable type and mass-reproduction techniques.

Ghent–Terneuzen Canal, waterway running 32 mi (51 km) south to north between Ghent, Belg., and the western Scheldt at Terneuzen, Neth. The canal was built in 1827 and was reconstructed during the early 20th century and reopened in 1911 to enable Ghent to take 60,000-ton ships. In the early 1970, the canal was 315 ft (96 m) wide, 28 ft (8.5 m) deep, and provided with 6 locks.

Gheorghe Gheorghiu-Dej, city, Bacău *judeţ* (district), eastern Romania. The city was developed as a planned new town, begun in 1953 on the site of a 15th-century settlement. It was named for the Romanian patriot and post-World War II Communist leader. Its development was a consequence of the oil, chemical, and industrial complexes in the Trotuş River Valley, which includes the older settlements of Dărmăneşti and Tîrgu Ocna. The city has a giant oil refinery and a technical school for the petrochemical industry. Just southeast are chemical and synthetic rubber works and a thermoelectric power station that supplies the city. Pop. (1982 est.) 45,803.

Gheorghiu-Dej, Gheorghe (b. Nov. 8, 1901, Bîrlad, Rom.—d. March 19, 1965, Bucharest), long-time head of the Romanian Communist Party, prime minister (1952–55), and president of Romania's State Council (1961–65).

Having become a revolutionary after World War I, Gheorghiu-Dej joined the then-outlawed Romanian Communist Party in 1930 and was sentenced to 12 years' hard labour for his role in the Grivița railwaymen's strike of 1933. Escaping prison in August 1944, he had established himself as secretary general—*i.e.*, official head—of the party by the time of the anti-Fascist coup of Aug. 23, 1944, which brought Romania into the war against Germany. He became minister of communications in the first liberation cabinets (1944–46). Despite his relatively minor government position, he played an instrumental role in forcing Prime Minister Nicolae Rădescu out of office and establishing a government dominated by Communists and their political allies (early 1945). Between 1946 and 1952 he held several key posts in government economic planning; strictly adhering to the goals of socialization laid down by Moscow, he promoted the development of industry in Romania.

In 1952, after purging the party of his rivals, who had been closely identified with Soviet leaders and policies, Gheorghiu-Dej became prime minister. He gradually adopted economic and foreign policies that served Romania's national interests rather than those of international socialism as defined by the Soviet leaders. He resigned as prime minister in 1955 but assumed the equivalent position of president of the State Council in 1961. Following an even more determined independent course, he overcame the objections of the other Soviet-bloc countries, which wanted Romania's economy to remain primarily agricultural, and pursued a far-reaching program of industrialization in 1964. In the mid-1960s Gheorghiu-Dej also demonstrated Romania's independence from Soviet domination by forming cordial relations with non-Communist nations and with the People's Republic of China, which had become increasingly alienated from the Soviet Union.

Gherardesca FAMILY, one of the foremost families of the Tuscan nobility, whose lands included the counties of Gherardesca, Donoratico, and Montescudaio, near Pisa. At the beginning of the 13th century, they led the pro-imperial Ghibelline party of the Pisan republic against the pro-papal Guelf party led by the Visconti family of Milan. The Gherardesca family produced several churchmen but is especially noted for its soldiers and statesmen.

The first documented member of the family is Gerardo (d. *c.* 990), who established himself as count of Gherardesca and of Donoratico. Tedicio became the first podesta, or feudal mayor, of Pisa (1190). Upholding Ghibelline interests, Gherardo and Galvano fought with Conradin, duke of Swabia and last of the Hohenstaufen dynasty, in his ill-fated attempt to regain Naples from the Guelfs. They were decapitated along with their leader in Naples (October 1268). The most famous member of the family is Ugolino della Gherardesca, conte di Donoratico (d. March 1289), who switched allegiance from the Ghibellines to the Guelfs and became tyrannical master of Pisa.

In 1284, when Pisa was menaced by Genoa, the city elected Ugolino podesta and captain of the people for 10 years. He concluded a peace with Florence and used his position to banish his personal enemies and to destroy their castles. He soon quarreled with his allies, the Visconti of Milan, and his interests then conflicted with those of the archbishop Ruggieri degli Ubaldini, who wanted to revive the republican order. Ruggieri accused Ugolino of treason and in 1288 imprisoned him, along with two of his sons and two of his grandsons, in the tower of Gualandi, where he was left to die of starvation.

During 1316–47 various Gherardesci held the lordship (*signoria*) of Pisa. Gaddo, count of Donoratico (d. 1320), overthrew the tyrant Uguccione della Faggiuola in 1316 and governed the republic with moderation and justice until his death. Then Ranieri instituted a harsher rule with the resumption of Ghibelline politics. Fazzio, count of Donoratico (d. 1340/41), led the insurrection that freed the city from the despot Castruccio Castracani. Elected captain, he followed a policy of accord with Florence, the king of Naples, and the pope, while at the same time he fostered Pisan scholarship. Ranieri (d. 1347) succeeded his father as lord of Pisa and was the last of the family to play an important political role. His death and the Black Death (1348) signaled the decline of the family in Pisa.

A branch of the family reestablished itself at the beginning of the 16th century in Florence, where the Gherardesci again achieved prominence in Italian aristocracy. They received Florentine citizenship in 1534 and recovered the county of Donoratico (1710–75). Notable descendants of this branch of the family include Ugo (1588–1646), a writer of military history; Tommaso Bonaventura (1654–1721), bishop of Fiesole (1702), archbishop of Florence (1703), and founder of the seminary in Florence; and Ugolino (1823–82), a deputy of parliament and a senator of the kingdom.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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gherkin, also called BUR GHERKIN, or WEST INDIAN GHERKIN (*Cucumis anguria*), trailing vine, of the gourd family (Cucurbitaceae), grown for its edible fruit. The gherkins sold in pickle mixtures are not *C. anguria* but rather are small pickled immature cucumbers (*Cucumis sativus*). A true gherkin has palmately

Gherkin (*Cucumis anguria*)
John Colwell/Grant Heilman Photography

lobed leaves with toothed edges, small flowers, and furrowed, prickly fruits about five centimetres (two inches) long that are borne on crooked stalks. Although its fruit is also pickled, the plant is frequently grown only as a curiosity.

ghetto, formerly a street, or quarter, of a city set apart as a legally enforced residence area for Jews. One of the earliest forced segregations of Jews was in Muslim Morocco when, in 1280, they were transferred to segregated quarters called *millahs*. In some Muslim countries, rigid ghetto systems were enforced with restrictions on the sizes of houses and doors. Forced segregation of Jews spread throughout Europe during the 14th and 15th centuries. The ghettos of Frankfurt am Main and the Prague *Judenstadt* (German: "Jew town") were renowned. In Poland and Lithuania, Jews were numerous enough to constitute a majority of the population in many cities and towns in which they occupied entire quarters. The name ghetto, probably derived from an iron foundry in the neighbourhood, was first used in Venice in 1516. In that year an area for Jewish settlement was set aside, shut off from the rest of the city, and provided with Christian watchmen. It became a model for ghettos in Italy.

Customarily, the ghettos were enclosed with walls and gates and kept locked at night and during church festivals such as Holy Week, when anti-Semitic outbursts were particularly likely because of the alleged guilt of the Jews in the crucifixion of Christ. Inside the ghetto the Jews were autonomous, with their own religious, judicial, charitable, and recreational institutions. Since lateral expansion of the ghetto, as a rule, was impossible, houses tended to be of unusual height, with consequent congestion, fire hazards, and unsanitary conditions. Outside the ghetto, Jews were obliged to wear an identifying badge (usually yellow), and they were in danger of bodily harm and harassment at all times.

The ghettos in western Europe were permanently abolished in the course of the 19th century. The last vestige disappeared with the occupation of Rome by the French in 1870. In Russia the Pale of Settlement (*see* pale), a restrictive area on the western provinces of the empire, lasted until the 1917 Revolution. Ghettos continued in some Islāmic countries, such as Yemen, until the large-scale emigration to Israel in 1948. The ghettos revived by the Nazis during World War II were merely overcrowded holding places that served as preliminaries to extermination. The Warsaw ghetto was the foremost example. *See also* anti-Semitism.

More recently, the term ghetto has come to apply to any urban area exclusively settled by a minority group. In the United States, immigrant groups and blacks have been compelled to live in ghettos, not so much by legal devices as by economic and social pressures. The goal of modern legislation has been to dissipate ghettos, but enforcement of the civil rights laws passed in the 1960s is hampered by some of the same social prejudices that brought the first ghettos into being.

Gheyn, Matthias van den (b. April 7, 1721, Tirlemont, Austrian Netherlands [now Tienen, Belg.]—d. June 22, 1785, Louvain [now in Belgium]), Flemish organist, composer, and an outstanding virtuoso of the carillon, particularly known for his brilliant improvisations.

He was born into a celebrated family of Flemish bell founders. He moved with his family to Louvain in 1726 and probably received his first musical education from Abbé Dieudonné Raick, then organist at the Church of St. Peter. He replaced his teacher in that post in 1741. After the death of the town carillonneur, a public competition was held, and van den Gheyn, who was the easy winner, assumed the post on July 1, 1745. He remained in Louvain in charge of the organ and carillon until his death.

Van den Gheyn's compositions are in the tradition of George Frideric Handel. Several of his harpsichord and organ compositions were printed in his lifetime, along with a treatise on basso continuo. In addition, many compositions for harpsichord, organ, and carillon and a second treatise on harmony remain in manuscript.

Ghezzi, Pier Leone (b. 1674, Rome—d. 1755, Rome), Italian artist and probably the first professional caricaturist.

Ghezzi made religious paintings for Roman churches but was best known for penned and etched caricatures of Rome's residents and tourists. He often portrayed a single figure with exaggerated anatomy and appropriate eccentricities of clothing and posture. In group portraits he produced comedy by repeating an awkward stance or expression. He also parodied classical symbols, such as making a Janus, the two-faced Roman god of departures, from two unsuspecting elderly men placed back to back.

ghī, also spelled GHEE, clarified butter, a staple food on the Indian subcontinent. *See* butterfat.

Ghibelline, in medieval Italy, member of the pro-imperial party, opponents of the propapal Guelfs. *See* Guelf and Ghibelline.

Ghiberti, Lorenzo (b. *c.* 1378, Pelago, Italy—d. Dec. 1, 1455, Florence), important early Italian Renaissance sculptor, whose doors ("Gates of Paradise"; 1425–52) for the Baptistery of the cathedral of Florence are considered one of the greatest masterpieces of Italian art in the Quattrocento. Other works include three

Lorenzo Ghiberti, self-portrait from the "Gates of Paradise," bronze sculpture, 1425–52; the Baptistery, Florence

Brogi—Alinari from Art Resource/EB Inc.

bronze statues for Or San Michele (1416–25) and the reliefs for Siena cathedral (1417–27). Ghiberti also wrote three treatises on art history and theory.

Ghiberti's mother had married Cione Ghiberti in 1370, and they lived in Pelago, near Florence; at some point she went to Florence and lived there as the common-law wife of a goldsmith named Bartolo di Michele. They were married in 1406 after Cione died, and it was in their home that Lorenzo Ghiberti spent his youth. It is not certain which man was Ghiberti's father, for he claimed each as his father at separate times. But throughout his early years, Lorenzo considered himself Bartolo's son, and it was Bartolo who trained the boy as a goldsmith. Ghiberti also received training as a painter; as he reported in the autobiographical part of his writings, he left Florence in 1400 with a painter to work in the town of Pesaro for its ruler, Sigismondo Malatesta.

Ghiberti returned quickly to his home city when he heard, in 1401, that a competition was being held for the commission to make a pair of bronze doors for the Baptistery of the cathedral of Florence. He and six other artists were given the task of representing the biblical scene of Abraham's sacrifice of Isaac in a bronze relief of quatrofoil shape. The entry panels of Ghiberti and of Filippo Brunelleschi are the sole survivors of the contest. Ghiberti's panels displayed a graceful and lively composition executed with a mastery of the goldsmith's art. In 1402 Ghiberti was chosen to make the doors by a large panel of judges; their decision brought immediate and lasting recognition and prominence to the young artist. The contract was signed in 1403 with Bartolo di Michele's workshop—overnight the most prestigious in Florence—and in 1407 Lorenzo legally took over the commission.

The work on the doors lasted until 1424, but Ghiberti did not devote himself to this alone. He created designs for the stained-glass windows in the cathedral; he regularly served as architectural consultant to the cathedral building supervisors, although it is unlikely that he actually collaborated with Brunelleschi on the construction of the dome as he later claimed. The Arte dei Mercanti di Calimala, the guild of the merchant bankers, gave him another commission, around 1412, to make a larger than life-size bronze statue of their patron saint, John the Baptist, for a niche on the outside of the guilds' common building, Or San Michele. The job was a bold undertaking, Ghiberti's first departure from goldsmith-scale work; it was, in fact, the first large bronze in Florence. Ghiberti successfully finished the "St. John" in 1416, adding gilding in the following year. The technical achievement and the modernity of its style brought Ghiberti commissions for two similarly large bronze figures for guild niches at Or San Michele: the "St. Matthew" in 1419 for the bankers' guild and the "St. Stephen" for the wool guild in 1425.

These last two commissions brought Ghiberti into open competition with the newly prominent younger sculptors Donatello and Nanni di Banco, who had made stone statues for Or San Michele after Ghiberti's first figure there. The "St. John" was a frail figure enveloped by flowing draperies. It is characteristic of the style art historians call International Gothic, which swept Europe in the late 14th century and was quite new in Florence in the early 15th century. Ghiberti's "St. John" combined the soft draperies and closely observed, small-scale details in a sculpture larger than life. Donatello's "St. Mark" and "St. George" and Nanni di Banco's "St. Philip" and "Quattro Coronati" ("Four Crowned Saints") were as large as Ghiberti's figure but were designed with monumental proportions to match their scale. The boldness and strength of the weighty new classical figures constituted a challenge for Ghiberti, but he met it with success in his next sculptures, and maintained his preeminent position as a leading artist in Florence.

The teens and '20s were years of flourishing expansion for Ghiberti and his firm. He had completed a great deal of the modelling and casting of the panels for the Baptistery doors by 1413, and he was in control of a smoothly functioning workshop with many assistants. In 1417 Ghiberti was asked to make two bronze reliefs for the baptismal font of the cathedral in Siena; he was so busy that he only finished them, under pressure from the Sienese authorities, 10 years later. In 1419, when Pope Martin V was in Florence, Ghiberti was called on as a goldsmith to fashion a morse and mitre for the Pontiff; unfortunately these pieces, like other examples of Ghiberti's art in rare stones and precious metals, have disappeared. During these years, too, Lorenzo found a wife—Marsilia, the 16-year-old daughter of Bartolomeo di Luca, a wool carder. She soon bore him two sons: Tommaso was born in 1417 and Vittorio the next year; his sons later joined Ghiberti in his business, and Vittorio continued its operation after his father's death. Ghiberti's artistic success also had its financial rewards; a surviving tax return of 1427 lists property in Florence, land out of town, and a substantial amount of money invested in government bonds to his credit. Over the years, his real estate and monetary holdings continued to grow. In addition to being well paid, Ghiberti was a businessman who managed his affairs shrewdly. He was a well-to-do member of Florentine society and a rich man among the artists of his time.

Ghiberti was actively involved with and interested in other artists and their work; some (Donatello, Paolo Uccello, Michelozzo, Benozzo Gozzoli) had worked for a time in his workshop as young assistants. Ghiberti's association with the painter Fra Angelico is documented: Ghiberti designed the frame for his "Linaiuoli Altarpiece." In his commentaries, Ghiberti exaggerates only a bit when he proudly claims that "few important things were done in our city which were not devised or designed by my hand"; among his undocumented works may be noted some half-dozen floor tombs and sarcophagi, but the vast extent to which Ghiberti's providing of designs and models influenced Florentine art is hard to measure. He appears to have shared his knowledge and talent generously and freely. Long before the completion of his second pair of doors (the "Gates of Paradise") in 1452, the fund of figures and models assembled in connection with this work, which the public saw only later, was open to painters of frescoes in the Chiostro Verde (Green Cloister) of SS. Annunziata and to the sculptor Luca della Robbia, who was working on a marble singing gallery for the cathedral. Naturally, the impact of the "Gates" increased after they were installed.

When he was 45 years old, Ghiberti finished the first doors. They are the effort of more than 20 years of work and the major sculptural complex of the International Gothic style in Italy. They show some changes in the latest parts, however, to a more classical style that emphasizes the bodies of figures more than the elegant draperies that enfold them. Ghiberti created expressive, strong faces based on examples he knew of ancient Roman art—portrait busts and carved sarcophagi. Because of the success of the first doors, a contract was soon signed with the Calimala for a second pair, but the political and financial fortunes of the city and the guild did not permit work to get underway for about five years.

Following the completion of the first doors, Ghiberti embarked on a decade of intense exploration of new ways of forming pictorial space and making gracefully active and lifelike figures. His works of the late 1420s show him able to make space increasingly intelligible in a series of clearly receding planes; using shallow relief, Ghiberti depicted volumes of bodies and deep architectural spaces. Examples of these are the reliefs in Siena; the Dati Tomb (the bronze plaque for the floor tomb of the Dominican general Leonardo Dati); and the two shrines in Florence, "Cassa di S. Zenobius" (a bronze casket with relief panels of stories from the saint's life) and "Shrine of SS. Protus, Hyacinth, and Nemesius" (a bronze container for the relics of three martyrs). It is likely that at this time Ghiberti encountered Leon Battista Alberti, a young Humanist scholar, who, inspired by the new art in Florence, was composing theoretical treatises on the visual arts. Their mutual belief that beauty was synonymous with the conception they shared of antique art makes it difficult to know whether or not Alberti's ideas in *De pictura* (*On Painting*) precede the three panels of the second door (Isaac, Joseph, and Solomon), which are the visual equivalent of those ideas. The beauty of antique art meant for both Alberti and Ghiberti an idealization of nature; capturing its essence meant revealing life by depicting movement, life's most salient

visible characteristic. For the representation of a realistic spatial setting for these naturalistic figures, Alberti's treatise sets forth a perspective system for projecting such spaces onto the picture plane of a painting or bas-relief. Ghiberti's three panels seem an embodiment of the Humanist's formulations for Renaissance pictorial art, and it is clear that any assessment of his art must account for the incorporation of the new theory as well as for the beauty and charm of these works. Ghiberti was himself so proud that he claimed to have made, in all 10 panels,

> architectural settings in the relation with which the eye measures them, and real to such a degree that... one sees the figures which are near appear larger, and those that are far off smaller, as reality shows it.

Ghiberti's writings, *I Commentarii* (probably completed around 1447), shed more light on his Humanist interests.The commentaries are composed of three books. The first, a history of art in ancient times, is Ghiberti's digest of writings of Latin authors he had read on the subject; in it he reveals his belief that the inseparability of practice and theory is responsible for the excellence of ancient art. The second book records the art of the immediate past, and Ghiberti expresses his admiration for certain Sienese painters and for a late 14th-century northern goldsmith named Gusmin who is known only through Ghiberti's pages; this book includes an autobiography, in which Ghiberti establishes his place in the history of art. The last book was apparently more theoretical, but in the surviving manuscript it is fragmentary. The commentaries demonstrate Ghiberti's confidence in his position as an important leader in the Florentine Renaissance—one interested in recapturing the art of the ancients and studying it as a Humanist scholar would, and one who developed a new style *all'antica* in which he freely created art works with a grace and beauty that have been found winning since their invention.

(C.Lo.)

MAJOR WORKS. *Sculpture.* Competition relief for Baptistery doors, Florence (1401; Bargello, Florence); north door reliefs (1403–24; Baptistery, Florence); "St. John the Baptist" (1412–16; Or San Michele, Florence); reliefs showing St. John the Baptist before Herod and the Baptism of Christ (1417–27; Baptistery font, Siena); "St. Matthew" (1419–22; Or San Michele, Florence); "Tomb of Leonardo Dati" (1423–27; Sta. Maria Novella, Florence); "St. Stephen" (1425–28; Or San Michele, Florence); "Gates of Paradise," bronze door (1425–52; Baptistery, Florence); "Cassa di S. Zenobius" (1430s; cathedral, Florence).

Stained glass. "Assumption" (*c.* 1425; cathedral window, Florence).

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ghibli, hot and dusty wind descending from the interior highlands of Libya toward the Mediterranean Sea. *See* foehn.

Ghica, Ion (b. 1816, Bucharest—d. May 4, 1897, Ghergani, Rom.), member of a great Romanian princely family, prominent man of letters, and prime minister of Romania (1866, 1870–71).

Descended from the Walachian prince Grigore III Ghica, Ion Ghica joined the opposition to the rule of his cousin Alexandru II Ghica, prince of Walachia from 1834, that resulted in Alexandru's deposition in October 1842. Ghica figured prominently in the revolutionary activity of 1848 and was subsequently forced into exile. Named prince of Samos by the Turkish government in 1854, he headed the administration of the island until 1859.

After his return to Romania in 1866 he joined the secret committee that secured the overthrow of the first prince of united Romania, Alexandru Cuza, and his replacement by Prince Karl of Hohenzollern-Sigmaringen, thereafter Carol I (prince, 1866–81; subsequently king). Twice prime minister in 1866, Ghica, during his second administration, won the agreement of the Sultan to Carol's accession. He served again as prime minister in 1870–71 and was subsequently Romanian minister in London (1880–87). Among his works, *Scrisori către V. Alecsandri* ("Letters to V. Alecsandri") is best known.

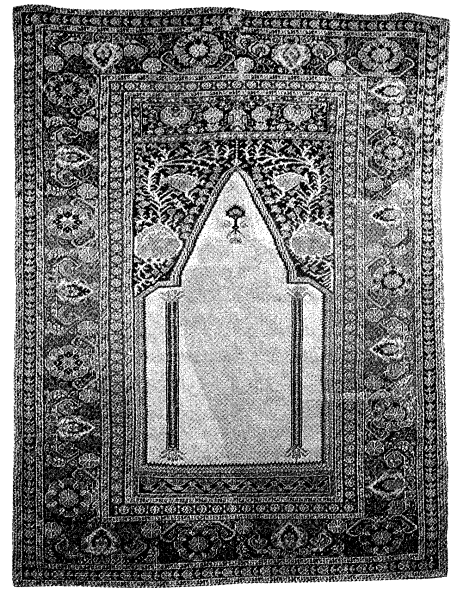
Ghilzay, also spelled GILZAI, GHILZAI, or GHALJAI, one of the largest of the Pashto-speaking tribes in Afghanistan, whose traditional territory extended from Ghazni and Kalat-i-Ghilzai eastward into the Indus Valley. They are reputed to be descended at least in part from the Khalaj or Khilji Turks, who entered Afghanistan in the 10th century. The Lodi, who established a dynasty on the throne of Delhi in Hindustan (1450–1526), were a branch of the Ghilzay, and in the early 18th century Mir Vais Khan, a Ghilzay chieftain, captured Kandahar and established an independent kingdom there (1709–15). From this capital his son Mahmud conquered Persia.

Some of the Ghilzay had long been nomadic merchants, buying goods in India, where they wintered, and in summer transporting these by camel caravan for sale or barter in Afghanistan. In the late 19th century Afghan nomads began to enter the central mountains of Afghanistan, and several summer trading camps were established in the western mountains. Also, former stockbreeding nomads, who had always obtained grain and other necessities from villagers along their route, increased their trading activities. Some acquired land and, in summer, moved from one tenant-cultivated property to another. In eastern Afghanistan many Ghilzay have become settled cultivators.

Ghiordes carpet, floor covering handwoven in the town of Ghiordes (Görde), northeast of Izmir in western Anatolia (now in Turkey). The prayer rugs of Ghiordes, together with those of Kula and Ladik, have long been especially prized in the Near East, as well as in Europe and the United States. Some of them date from the last decades of the 18th century, borrowing elements from much earlier Ottoman court designs, with fields of red or ivory. Most, however, were produced during the 19th century, during which time other colours—blue, green, and brown—were used, and the field began to exhibit small motifs.

Characteristics of the Ghiordes carpet include a finely stepped acute arch with prominent shoulders, and two cross panels, one above and the other below the niche, or miḥrāb. In the late 19th century, rugs of the Kiz-Ghiordes type, a dealers' term suggesting a girl's trousseau, became popular.

After the 18th century, cotton was normally used for the weft of Ghiordes carpets, while



Ghiordes prayer rug from Western Anatolia, early 19th century; in a New York state private collection

New York state private collection; photograph, Otto E. Nelson—EB Inc.

wool was preferred in the warp. The pile is generally of wool or, rarely, of silk. After the turn of the 20th century, the quality of Ghiordes carpets declined. Ghiordes has given its name to the form of knot whose cut ends produce the pile in Turkish, Caucasian, and many Persian rugs.

Ghirlandajo, Domenico, Ghirlandajo also spelled GHIRLANDAIO, original name DOMENICO DI TOMMASO BIGORDI (b. 1449, Florence—d. Jan. 11, 1494, Florence), early Renaissance painter of the Florentine school noted for his detailed narrative frescoes, which include many portraits of leading citizens in contemporary dress.

Domenico was the son of a goldsmith, and his nickname "Ghirlandajo" was derived from his father's skill in making garlands. Domenico probably began as an apprentice in his father's shop, but almost nothing is known about his training as a painter or the beginnings of his career. The earliest works attributed to him, dating from the early 1470s, show strong influence from the frescoes of Andrea del Castagno, who died when Ghirlandajo was about eight years old. Giorgio Vasari, the biographer of Renaissance artists, recorded in his *Lives* (1550) that Ghirlandajo was a pupil of the Florentine painter Alesso Baldovinetti, but Baldovinetti was only four or five years older than Ghirlandajo himself. He worked in fresco on large wall surfaces in preference to smaller scale paintings executed on wood panels, although he used them for the altarpieces that were the centrepieces of the fresco cycles in his major undertakings. He never experimented with oil painting, although most Florentine painters of his generation began to use it exclusively in the last quarter of the 15th century.

The village church of Cercina, near Florence, has a fresco of three saints, now thought to be Ghirlandajo's earliest work, but there is general agreement that some frescoes in the church of Ognissanti in Florence, almost certainly dating from around 1472–73, show his style at its earliest developed stage. One of

them represents the "Pietà" and depicts several members of the Vespucci family as mourners, thus already introducing Ghirlandajo's characteristic combination of portrait figures in contemporary dress with a specifically religious subject. Something of the passion for minute detail shown by the early Flemish painters can be found in Ghirlandajo's work at this period; his fresco "St. Jerome," also in Ognissanti and dated 1480, may even be an enlarged version in fresco of an oil painting by the Flemish painter Jan van Eyck, which had found its way to Florence. The "St. Jerome" fresco is particularly important because it is a companion piece to one of "St. Augustine" by Botticelli; the difference between the two reveals Ghirlandajo's rather pedestrian and anecdotal style.

"The Birth of the Virgin," fresco by Ghirlandajo, 1486–90; in the choir of Sta. Maria Novella, Florence

Brogi—Alinari from Art Resource/EB Inc.

The first major commissioned works were the frescoes the "Life of Sta. Fina," painted in 1475 in the church at San Gimignano, near Florence, which derive from Fra Filippo Lippi's slightly earlier fresco cycle in the cathedral at Prato and contain a number of portrait heads arranged, rather stiffly, in the symmetrical type of composition that was to become increasingly identified with him. Even then he was already employing assistants; in his later works he clearly could only complete large commissions in the comparatively short time allotted by the extensive use of highly trained assistants working simultaneously on different parts of the frescoes. In 1481–82 he received an important commission in the Vatican for a fresco, nominally representing the calling of the first Apostles, in the Sistine Chapel. Its style is reminiscent of the frescoes by Masaccio of about 1427, which had been the great innovating works of the early 15th century in Florence but by then must have seemed somewhat old-fashioned. The principal feature of this fresco is the group of portraits of the Florentine colony in Rome, who are represented as witnesses of the biblical event. It has been suggested that the inclusion of these Florentines in a fresco painted for the Vatican had political significance, because the Florentine government had recently accused Pope Sixtus IV of complicity in the conspiracy of the Pazzi, another powerful Tuscan banking family, to murder the leading members of the Florentine Medici family.

Ghirlandajo must have used his stay in Rome to study Roman antiquities at first hand, for many details of triumphal arches, ancient sarcophagi, and similar antique elements occur in his works throughout the rest of his career. A sketchbook filled with drawings of such antiquities (now in El Escorial, near Madrid) seems to be the work of a member of his shop.

Late in his short life, Ghirlandajo and his assistants, including his brothers Davide and Benedetto, produced two major fresco cycles. The earlier, a series of frescoes and an altarpiece painted in tempera, was executed for the Sasetti Chapel in Sta. Trinità in Florence. Commissioned by Francesco Sasetti, an agent of the Medici bank, they were executed between about 1482 and 1485. They represent scenes from the life of St. Francis of Assisi, Sassetti's patron saint. Once more, the frescoes contain many details of the buildings and customs of the period—for example, the original front of the church of Sta. Trinità itself—and, in particular, there are numerous portraits of members of the Sassetti family shown together with some of the leading members of the Medici family, what may appear to have been a closer intimacy than was actually the case. The altarpiece, dated 1485, contains further evidence of Ghirlandajo's interest in classical antiquity, for it shows the "Adoration of the Shepherds" with a Roman triumphal arch in the background and a Roman sarcophagus in place of the traditional manger. This painting in tempera has several direct references to contemporary Flemish paintings, especially the enormous altarpiece painted in oil by Hugo van der Goes, which had been commissioned in Flanders by Tommaso Portinari, another agent of the Medici bank, and which arrived in Florence in the late 1470s.

Ghirlandajo's last and greatest fresco cycle was painted for another Medici banker, Giovanni Tornabuoni, and represents scenes from the life of the Virgin and of St. John the Baptist. Ghirlandajo signed the contract on Sept. 1, 1485, for these large frescoes on the walls of the choir of Sta. Maria Novella in Florence. The altarpiece was still incomplete when he died, but his assistants, among whom was probably the boy Michelangelo, had completed the frescoes by about 1490. Even more than in the Sassetti Chapel the narrative scenes contain a wealth of detail showing patrician interiors and contemporary dress; as a result they are one of the most important sources for current knowledge of the furnishings of a late 15th-century Florentine palace.

The frescoes in Sta. Maria Novella are overcrowded with detail, so that the compositions fail to make their full impact. Some of his smaller panel paintings, particularly the portrait of Giovanna Tornabuoni, have a simplicity that makes them far more striking than than the frescoes of Sta. Maria Novella. The portrait representing an old man with a strawberry nose with his grandchild (Louvre, Paris) is perhaps Ghirlandajo's finest painting, notable for its tenderness and humanity, as well as a simplicity and directness of handling.

Ghirlandajo never received a major commission from the Medici family or from any other leading patrons. In the late 19th century, however, because of the high degree of realism in his work, he was ranked as a leading Florentine painter of the 15th century. Although during much of the 20th century the greater imaginative power of Botticelli or Filippino Lippi made Ghirlandajo's paintings seem dull, since the 1960s the honesty and truth of his works have brought him back into critical favour. (P.J.Mu.)

MAJOR WORKS. "SS. Barbara, Jerome and Anthony Abbot" (early 1470s; Cercina, Italy); frescoes over Vespucci Altar (*c.* 1472–73; church of Ognissanti, Florence); "Life of Sta. Fina" (1475; chapel of Sta. Fina, Collegiata, San Gimignano, Italy); "Madonna and Child Enthroned, with SS. Michael, Raphael, Justus, and Zenobius" (*c.* 1480; Uffizi, Florence); "Last Supper" (1480; church of Ognissanti); "St. Jerome" (1480; church of Ognissanti); "Christ Calling SS. Peter and Andrew" (1481–82; Sistine Chapel, Vatican, Rome); "Roman Heroes" (1482; Palazzo Vecchio, Sala dei Gigli, Florence); "Adoration of the Shepherds" (1485; Sta. Trinità, Sassetti Chapel, Florence); "Madonna and Saints," formerly the Sta. Maria Novella altarpiece (1485–94, unfinished; mostly in Alte Pinakothek, Munich); scenes from the lives of the Virgin and St. John the Baptist (1486–90; Choir, Sta. Maria Novella, Florence); "Adoration of the Magi" (1488; Ospedale degli Innocenti, Florence); "Giovanna Tornabuoni" (1488; Thyssen-Bornesmisza Collection, Castagnola, Switz.); "The Visitation" (1491; Louvre, Paris).

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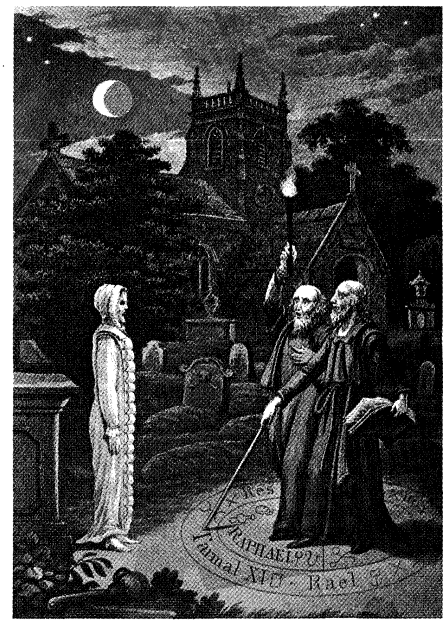
Ghislieri, Antonio (pope): *see* Pius V, Saint.

Ghiyāth ibn Ghawth ibn aṣ-Ṣalt al-Akhṭal: *see* Akhṭal, al-.

Ghor (Afghanistan): *see* Ghowr.

Ghose, Śrī Aurobindo (Indian philosopher): *see* Aurobindo, Śrī.

ghost, soul or spectre of a dead person, usually believed to inhabit the netherworld and to be capable of returning in some form to the world of the living. According to descriptions or depictions provided by believers, a ghost may appear as a living being or as a nebulous likeness of the deceased and, occasionally, in other forms. Belief in ghosts is based on the ancient notion that a human spirit is separable



A magician raising a ghost, illustration by W. Raphael from *The Astrologer of the Nineteenth Century,* 1825

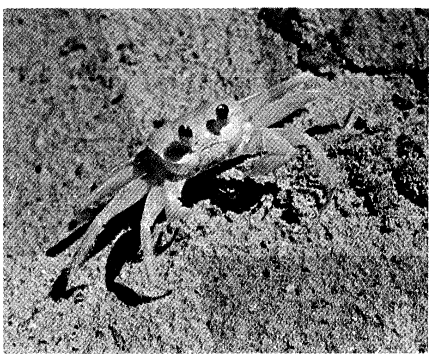
By courtesy of the trustees of the British Museum; photograph, R.B. Fleming

from the body and may maintain its existence after the body's death. In many societies funeral rituals are believed to prevent the ghost from haunting the living.

A place that is haunted is thought to be associated by the haunting spirit with some strong emotion of the past—remorse, fear, or the terror of a violent death. Individuals who are haunted are believed to be responsible for, or associated with, the ghost's unhappy past experience (*compare* possession, spirit). The traditional visual manifestations of haunting include ghostly apparitions, the displacement of objects, or the appearance of strange lights; auditory signs include disembodied laughter and screams, footsteps, ringing bells, and the spontaneous emanation of sounds from musical instruments.

Tales of specific ghosts are still common in living folklore worldwide. The telling of elaborate, grisly ghost stories, often in a setting enhanced by darkness or thunderstorm, is a popular pastime in many groups, particularly among children. *See also* ghoul; kobold; poltergeist.

ghost crab, also called SAND CRAB, any of the approximately 20 species of the genus *Ocypode* (order Decapoda of the class Crustacea). *O. quadratus,* the beach crabs noted for their running speed, occur on dry sand above the high-tide mark on the western Atlantic coast



Ghost crab (*Ocypode*)
Carleton Ray—Photo Researchers

from New Jersey to Brazil. The crab, sandy or whitish in colour, has claws of unequal size and rather hairy legs. The back, or carapace, is nearly rectangular in shape and about 3.75 to 5 centimetres (about 1.5 to 2 inches) across. Long stalks support the eyes. The crab lives in burrows sometimes 1 metre (3.3 feet) deep. Sand fleas are an important part of the diet.

O. ceratophthalmus, found on beaches of the Indian and Pacific oceans, uses its claws to catch flies from the undersides of leaves. The male of *O. saratan,* of the Red Sea, builds a sand mound about 16 cm high and tamps a path from the mound to his burrow, some 40 cm away. The female, attracted to the mound, follows the path to the male's burrow.

Ghost Dance, either of two distinct cults in a complex of late 19th-century religious movements that represented an attempt of Indians in the western United States to rehabilitate their traditional cultures. Both cults arose from Northern Paiute prophet-dreamers in western Nevada who announced the imminent return of the dead (hence "ghost"), the ousting of the whites, and the restoration of Indian lands, food supplies, and way of life. These ends, it was believed, would be hastened by the dances and songs revealed to the prophets in their vision visits to the spirit world and also by strict observance of a moral code that resembled Christian teaching and forbade war against Indians or whites. Many dancers fell into trances and received new songs from the dead they met in visions or were healed by Ghost Dance rituals.

The first Ghost Dance developed in 1869 around the dreamer Wodziwob (died *c.* 1872) and in 1871–73 spread to California and Oregon tribes; it soon died out or was transformed into other cults. The second derived from Wovoka (*c.* 1856–1932), whose father, Tavibo, had assisted Wodziwob. Wovoka had been influenced by Presbyterians on whose ranch he worked, by Mormons, and by the Indian Shaker Church. During a solar eclipse in January 1889 he had a vision of dying, speaking with God in heaven, and being commissioned to teach the new dance and millennial message. Indians from many tribes travelled to learn from Wovoka, whose self-inflicted stigmata on hands and feet encouraged belief in him as a new messiah, or Jesus Christ, come to the Indians.

Thus, the Ghost Dance spread as far as the Missouri River, the Canadian border, the Sierra Nevada, and northern Texas. Early in 1890 it reached the Sioux and coincided with the rise of the Sioux outbreak of late 1890, for which the cult was wrongly blamed. This outbreak culminated in the massacre at Wounded Knee, S.D., where the "ghost shirts" failed to protect the wearers, as promised by Wovoka.

As conditions changed, the second Ghost Dance became obsolete, though it continued in the 20th century in attenuated form among a few tribes. Both cults helped to reshape traditional shamanism (a belief system based on the healing and psychic transformation powers of the shaman, or medicine man) and prepared for further Christianization and accommodation to white culture.

ghost moth: *see* swift.

ghost shark: *see* chimaera.

ghosts, word game in which each player in turn presents a letter that must contribute to the eventual formation of a word but not complete it. The player whose letter completes a word loses the round and becomes one-third of a ghost. Three losses make a player a full ghost, putting him out of the game. Letters are usually spelled in the order presented, as *a* is added to *pl* to form *pla,* which may eventually become "placating." In the variant game double ghosts the player may specify whether his letter is to be attached before or after the preceding letters.

A player may challenge his preceding opponent, and, if the opponent cannot name a word that could be developed from the combination of letters he has produced he loses the round. If, however, he does name a valid word, the challenger is the loser.

A similar game, played without the "ghost" terminology, is known as endbee.

ghoul, Arabic GHŪL, in popular legend, demonic being believed to inhabit burial grounds and other deserted places. In ancient Arabic folklore *ghūl*s belonged to a diabolic class of *jinn* (spirits) and were said to be the offspring of Ibis, the Muslim prince of darkness. They were capable of constantly changing form, but their presence was always recognizable by their unalterable sign: ass's hooves.

Considered female by the ancients, the *ghūl* was often confused with the *sílā,* also female; the *sílā,* however, was a witchlike species of *jinn,* immutable in shape. A *ghūl* stalked the desert, often in the guise of an attractive woman, trying to distract travellers, and, when successful, killed and ate them. The sole defense that one had against a *ghūl* was to strike it dead in one blow; a second blow would only bring it back to life again.

The *ghūl,* as a vivid figure in the Bedouin imagination, appeared in pre-Islāmic Arabic poetry, notably that of Ta'abbata Sharran. In North Africa, it was easily assimilated into an ancient Berber folklore already rich in demons and fantastic creatures. Modern Arabs use *ghūl* to designate a human or demonic cannibal and frequently employ the word to frighten disobedient children.

Anglicized as "ghoul," the word entered English tradition and was further identified as a grave-robbing creature that feeds on dead bodies and on children. In the West ghouls have no specific image and have been described (by Edgar Allan Poe) as "neither man nor woman . . . neither brute nor human." They are thought to assume disguises, to ride on dogs and hares, and to set fires at night to lure travellers away from the main roads.

Ghowr, also spelled GHŪR, or GHOR, *velāyat* (province) in west central Afghanistan, 14,926 sq mi (38,658 sq km) in area, with its capital at Chaghcharān. It is bounded by the provinces of Fāryāb and Jowzjān (north), Bāmiān (east), Orūzgān, Helmand, and Farāh (south), and Herāt and Bādghīsāt (west). Its mountainous terrain is drained by the Farāh Rūd, Harīrūd, and Morghāb rivers. Most of the people are engaged in agriculture, although some lead and zinc are mined. In the 12th and early 13th centuries Ghowr was part of a large empire ruled by the Ghūrid dynasty, which was named after the territory. Pop. (1982 est.) settled pop. 353,494, predominantly Ghilzay Pashtuns.

Ghudāmis (Libya): *see* Ghadāmis.

Ghulam Ahmad, Mirza (b. *c.* 1839, Qādiān, India—d. May 26, 1908, India), Indian Muslim leader who founded an important Muslim sect known as the Aḥmadīyah (*q.v.*).

The son of a prosperous family, Ghulam Ahmad received an education in Persian and Arabic. He refused his father's urgings that he go into the British government service or practice law. Instead, he led a life of contemplation and religious study. He claimed to hear voices and declared in 1889 that he had had a revelation in which God had entitled him to receive *bayʿat* (an oath of allegiance). Soon he gathered a small group of devoted disciples. From then on his influence and following steadily increased, as did opposition from the Muslim community.

Ghulam Ahmad claimed not only that he was the *mahdī* (a promised Muslim "saviour") and a reappearance (*burūz*) of the Prophet Muḥammad but also that he was Jesus Christ and the Hindu god Krishna returned to Earth. A number of his rather unorthodox teachings were incorporated into the beliefs of the Aḥmadīyah. While he made an attempt to copy the centralized missionary organizations and schools of the Christians, he had little interest in reconciling Christian and Muslim religious doctrine and evidently wanted only to be more effective in his struggle to supplant Western influences. Despite the vagueness of his purpose, he was an effective leader and gathered a cohesive body of disciples. After his death his followers disputed whether he really claimed to be a prophet and if so what he meant by his prophethood. Nonetheless his devotees formed a community of believers and elected a *khalīfah* (successor) to lead them.

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Ghurdaqah, al-, capital of al-Baḥr al-Aḥmar *muḥāfaẓah* (governorate), Egypt. The town is a small Red Sea port, but its main industry is oil exploration and production. It is the site of a large oil field and serves as the administrative and support centre for the Red Sea and Gulf of Suez oil fields. The Marine Biology Station for oceanographic and fisheries research is located in the town. A highway along the Red Sea coast links al-Ghurdaqah to Suez City in the north and to al-Quṣayr to the south.

Ghūrid SULTANATE, rulers of a kingdom centred in Ghūr (Modern Ghowr) in north-

western Afghanistan from the mid-12th to the early 13th century. Its founder was Ala-ud-din Husain.

The sultanate's greatest ruler, Muḥammad of Ghūr, extended his domain into northern India. The last sultan, Shihabuddin, was killed in 1206.

Ghurkha (Nepalese soldier): *see* Gurkha.

ghusl, in Islām, the "major ablution" that entails washing the entire body in ritually pure water and is required in specified cases for both the living and the dead. The *ghusl,* accompanied by a statement of intent, must be performed whenever a state of major ritual impurity has been incurred: following sexual intercourse, seminal emission, menstruation, or childbirth. One who is *junub* (impure) cannot perform the daily ritual prayer, circumambulate the Ka'bah in Mecca during the major and lesser pilgrimages, touch the Qur'ān or recite its verses, or enter a mosque.

Traditionally, the *ghusl* is also performed before the Friday prayer (*ṣalāt al-jum'ah*) at the mosque, the two major Muslim festivals, and the major pilgrimage (*ḥajj*). With the exception of martyrs, who by the manner of their death are forgiven their sins and are thus purified, all Muslims must undergo *ghusl* before burial.

Gia Dinh, town just north of Ho Chi Minh City (formerly Saigon), southern Vietnam, in an area of intensive rice cultivation. It has three hospitals and an institution of higher learning. The Gia Dinh industrial park includes rubber tire and textile plants. It was largely ruined during the 1968 Viet Cong Tet offensive, but subsequently rebuilt. Pop. (1971 est.) town, 400,109.

Gia Lai-Cong Tum, *tinh* (province) in the central highlands, central Vietnam. It has an area of 9,860 sq mi (25,536 sq km) and was created in 1976 from the former provinces of Pleiku and Kontum. Bordering Kampuchea (Cambodia) and Laos on the west, it embraces most of the Plateau du Cong Tum, which has an elevation of about 6,000 ft (2,000 m). In the east central part of the province, the peaks of the Chaîne Annamitique (Annamite Chain; Vietnamese Truong Son) reach 8,524 ft at Nui (mountain) Ngoc Linh; they are drained largely westward to the Mekong River. Farther south are the northernmost tributaries of the Song (river) Ba, which drains southeastward into the South China Sea.

The economy is based on agriculture and cattle raising. The coffee and tea plantations started by the French in 1925 have been returned to production. Other crops include tobacco, rubber, cotton, sugarcane, hemp, and upland rice. Iron ore, limestone, kaolin, tin, and lead are found in the province. Thac (waterfall) Yali is a source of hydroelectric power. Roads connect Cong Tum, the provincial seat, with Pleiku to the south and with Oui Nhon on the South China Sea coast to the east. Pleiku, Le Thanh, Cong Tum, and Dac To have airfields. About one-half of the population of the province belongs to ethnic groups. In the north and east live the Mon-Khmer-speaking Bahnar, and in the west live the Austronesian-speaking Jarai, who are descended from Chams; these peoples together are sometimes referred to as Montagnards, or mountain men. The government has adopted a policy of settling these people on farms. Pop. (1979) 595,906.

Gia Long, original name NGUYEN PHUC ANH (b. Feb. 8, 1762, Hue, Vietnam—d. Jan. 25 or Feb. 3, 1820, Hue), emperor and founder of the last dynasty of Vietnam before conquest by France.

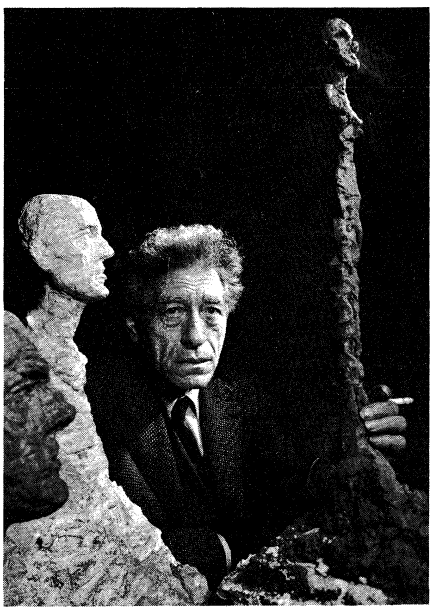
Nguyen Anh—the nephew of Hue Vuong, the legitimate heir to the throne, who died in prison during a civil war in 1766—became a great general. He was aided in winning his kingdom by French mercenaries and other Western soldiers of fortune, whose assistance he accepted only after long deliberation. With French forces and advanced European armaments and technical equipment, Nguyen Anh won decisive victories over rival claimants at Hue and Hanoi in 1802. On June 1 he proclaimed himself emperor, assuming the title Gia Long.

Gia Long was a cautious ruler, and his reign is notable for its conservatism, which coloured the policies of successive kings of his dynasty. He failed to take advantage of the presence of Europeans to expand Vietnam's commercial relations and did not borrow European technological skills or equipment to further scientific progress in his country. He felt that foreign trade was not essential to Vietnamese development and was the first of a line of kings who tried to keep the country in isolation from Europe. Gia Long permitted French missionaries to preach Christianity in Vietnam, though he himself refused to be converted and disliked the new religion. He refused to give the French any special consideration, however, and he advised his successor to do the same.

During Gia Long's reign, Cambodia was secured as a vassal; the old Mandarin Road, running almost the length of Vietnam, was repaired; and an efficient postal service was established. Public granaries were built to store harvests against years of famine. There were significant monetary and legal reforms and a reformulation of the ancient Le law code.

Gia Long departed from tradition by naming as successor his own youngest son, Phuoc Chi Dam, later Emperor Minh Mang, instead of the son (who was still a minor) of his eldest son, who had died. This act led to a series of court intrigues and a confusion of candidates for the succession later in the 19th century.

Giacometti, Alberto (b. Oct. 10, 1901, Borgonovo, Switz.—d. Jan. 11, 1966, Chur), Swiss sculptor and painter, best known for his attenuated sculptures of solitary figures. Notable works include "Head of a Man on a Rod" (1947) and "Composition with Seven Figures and a Head (The Forest)" (1950). His work has been compared to that of the Existentialists in literature; in 1963 Giacometti designed the set for Samuel Beckett's drama *Waiting for Godot.*



Giacometti, photograph by Yousuf Karsh, 1965

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Giacometti displayed precocious talent and was much encouraged by his father, Giovanni, a Postimpressionist painter, and by his godfather, Cuno Amiet, a Fauvist painter. He spent a happy childhood in the nearby village of Stampa, to which he returned regularly until his death. His brother Diego became known as a furniture designer and shared Giacometti's life as his model and aid. Another brother, Bruno, became an architect.

Giacometti left secondary school in Schiers in 1919 and then went to Geneva, where he attended art classes during the winter of 1919–20. After a time in Venice and Padua (May 1920) he went to Florence and Rome (fall 1920–summer 1921), where rich collections of Egyptian art taught him that the impact of ancient and primitive hieratic styles—which adhere to fixed, conventional types and frontal or rigid figures—could be used as an equivalent for the force of reality.

Between 1922 and 1925 Giacometti studied at the Académie de la Grande-Chaumière in Paris. Although he owed much to his teacher, Émile-Antoine Bourdelle, his style was very different. It was related to the Cubist sculpture of Alexander Archipenko and Raymond Duchamp-Villon and to the Post-Cubist sculpture of Henri Laurens and Jacques Lipchitz. An example is "Torso" (1925). He was also inspired by African and Oceanic art, as in "The Spoon-Woman" (1926). His first important personal achievements were flat, slablike sculptures, such as "Observing Head" (1927/28), which soon made him popular among the Paris avant-garde.

Any resemblance to reality had been abandoned in the period 1925–29, when he created mannered figures, such as "Cubist Composition" (1926) and "Three Figures Outdoors" (1929). The trend continued in the period 1930–32, in works in which emotions and erotic themes were given Surrealist sculptural form ("Suspended Ball" and "The Palace at 4 A.M."). In 1933–34 Giacometti attempted metaphorical compositions using the themes of life and death ("The Invisible Object" and "1 + 1 = 3"). At this time he was disturbed by the thought that his serious works of art had as little reference to reality as the merely decorative vases and lamps that he made to earn a living. Breaking definitely with the Surrealist group in 1935, he began to work after nature again; what had started as mere studies became a lifelong adventure and a turning point in art history: the phenomenological approach to reality—that is, the search for the given reality in what one sees when one is looking at a person.

Around 1940 Giacometti arrived at matchstick-sized sculptures: figures and heads seen frontally as ungraspable appearances of reality far away in space. Around 1947 his massless, weightless image of reality was expressed in a skeletal style, with figures thin as beanstalks. From 1947 to 1950 he did compositions related to his work of the early 1930s—"Tall Figures"; "City Square"; "Composition with Seven Figures and a Head (The Forest)"; and "Chariot"—and rapidly became known, especially in the United States, through two exhibitions (1948 and 1950) at the Pierre Matisse Gallery in New York City and an essay on his art by the French Existentialist writer Jean-Paul Sartre.

The evolution of his art continued, taking the form of a search for ways to challenge, actually to equal, reality in sculpture as well as in painting. For Giacometti an artwork was to become an almost magical evocation of reality in an imaginary space, as in heads of Diego and figures after his wife Annette (1952–58), executed like apparitions on gray canvases or on space-delimiting bases. The artwork also had to be invested with the power of acting on the spectator like a double of reality in real space, as in portraits of Caroline or Elie Lotar, his models and friends in the last years (1958–

65), which are heads and busts gazing intently and made only with lines of force, without contour lines or surfaces. At this point the phenomenological approach was superseded; he felt that reality was no longer dependent on being perceived by someone; reality simply was. Like the characters of Samuel Beckett's novels and plays his figures represented a world-view in which space and time have their origin in the core of each being. Giacometti died of an inflammatory heart condition, without having carried out the final composition of the work he had been concerned with since the early 1930s, the metaphor of the totality of life.

Giacometti was one of the outstanding artists of the 20th century. At a time when avant-garde artists aimed at rendering nonfigurative or expressive qualities rather than achieving resemblance to reality he worked for the unattainable goal of equalling reality by rendering a portrait—whether drawing, painting, or sculpture—so that it would be perceived by the spectator with the impact it would have were it a living person. To do this he introduced into the art of sculpture a new concept of rendering distance. Massless and weightless, his figures and heads are immediately seen from a specific frontal point of view and therefore perceived as situated in distance and space.

Giacometti had such intellectual integrity—for example, living in a shabby studio in Montparnasse even after fame and fortune had reached him—that he became for his contemporaries, especially those of the postwar generation, an almost legendary figure during his lifetime. (Re.H.)

MAJOR WORKS. *Sculpture.* Many of these works exist in editions of more than one cast and may therefore be seen in more than one collection. The Kunsthaus in Zürich and the Galerie Beyeler in Basel, Switz., have the most comprehensive collections of Giacometti's work on loan from the Alberto Giacometti Foundation. Other important collections are in the Museum of Modern Art, New York City, and in the Fondation Maeght, Saint-Paul, Fr. "Torso" (1925); "The Couple" (1926); "The Spoon-Woman" (1926); "Cubist Composition" (1926); "Observing Head" (1927–28); "Man" (1929); "Reclining Woman Who Dreams" (1929); "Three Figures Outdoors" (1929); "Suspended Ball" (1930–31); "Disagreeable Object" (1931); "Hand Caught by a Finger" (1932); "Woman with Her Throat Cut" (1932); "The Palace at 4 A.M." (1932–33; Museum of Modern Art, New York City); "No More Play" (1933); "Cubist Head" (1934–35); "Nude" (1933–34); "The Invisible Object" (1934); "1 + 1 = 3" (1934); "Woman with the Chariot I" (1942–43); "Man Pointing" (1947); "Head of a Man on a Rod" (1947); "Tall Figure I" (1947); "City Square" (1948); "Three Men Walking" (1949); "Walking Quickly Under the Rain" (1949); "Tall Figure" (1949); "Composition with Seven Figures and a Head (The Forest)" (1950); "Between Two Houses" (1950); "The Cage" (1950–51); "Four Women on a Base" (1950); "Chariot" (1950); "Dog" (1951); "Head" (1952); "Woman" (1953); "Nine Standing Figures (Venice)" (1956); "Tall Figures" (1960); "Walking Man I" (1960); "Monumental Head" (1960); "Bust of Annette" (1962); "Figure Standing" (1964); "Head of Diego" (1965); "Bust of Elie Lotar" (1965).

Paintings. "Self-Portrait" (1921; Kunsthaus); "The Artist's Mother" (1950; Museum of Modern Art); "Caroline" (1961; private collection).

Lithographs. "Paris sansfin" (1958–65).

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Giacomo (Italian personal name): *see under* James, except as below.

Giacomo DA LENTINI, also called JACOPO DA LENTINI (fl. 1st half of 13th century), senior poet of the Sicilian school and notary at the court of Frederick II. Celebrated during his life, he was acclaimed as a master by the poets of the following generation, including Dante, who memorialized him in the *Purgatorio* (XXIV, 55–57).

Giacomo is traditionally credited with the invention of the sonnet, and his works in that form remain the earliest known. He adapted the themes, style, and language of Provençal poetry to Italian, infusing it with his own aristocratic and exclusive tastes. All his extant poetry—some 40 lyrics, including sonnets, *canzoni, tenzoni* (poetic debates), and one *discordo* (poetic disagreement)—concerns the theme of love, which, in the courtly tradition, is seen in feudal terms as the service of the lover to his lady. None of his poetry survives in the original Sicilian dialect but has, rather, been modified to conform to Tuscan.

Giacomo DA PONTE: *see* Bassano, Jacopo.

Giaever, Ivar (b. April 5, 1929, Bergen, Nor.), Norwegian-born U.S. physicist who shared the Nobel Prize for Physics in 1973 with Leo Esaki and Brian Josephson for work in solid-state physics.

Giaever received an engineering degree at the Norwegian Institute of Technology in Trondheim in 1952 and became a patent engineer for the Norwegian government. In 1954 he migrated to Canada, where he worked as a mechanical engineer with the General Electric Company in Ontario. In 1956 he was transferred to General Electric's Development Center in Schenectady, N.Y. There he shifted his interest to physics and did graduate work at the Rensselaer Polytechnic Institute in Troy, N.Y., receiving a Ph.D. in 1964.

Giaever concentrated in solid-state physics and particularly in superconductivity. He pursued possible applications to superconductor technology of Leo Esaki's work in tunnelling, eventually "marrying," as he put it, the two concepts to produce superconductor devices that flouted previously accepted limitations and allowed electrons to pass like waves of radiation through "holes" in solid-state devices. Using a sandwich consisting of an insulated piece of superconducting metal and a normal one, he achieved new tunneling effects that led to greater understanding of superconductivity and that provided support for the BCS theory of superconductivity, for which John Bardeen (B), Leon Cooper (C), and John Robert Schrieffer (S) had won the Nobel Prize for Physics in 1972. It was for this work—based in part on Esaki's and further developed by Josephson—that Giaever shared the 1973 Nobel Prize with Esaki and Josephson.

Giamame (Somalia): *see* Jamaame.

Giambologna, also called GIOVANNI DA BOLOGNA, or JEAN BOULOGNE (b. 1529, Douai, Spanish Netherlands—d. Aug. 13, 1608, Florence), pre-eminent Mannerist sculptor in Italy during the last quarter of the 16th century.

First trained under Jacques Dubroeucq, a Flemish sculptor who worked in an Italianate style, Giambologna went to Rome around 1555, where his style was influenced by Hellenistic sculpture and the works of Michelangelo. Settling in Florence (1557), where he

"Mercury," bronze figure by Giambologna, *c.* 1580; in the Bargello, Florence

Alinari—Art Resource/EB Inc.

spent the rest of his life, he attracted the notice of Francesco de' Medici, for whom many of his most important works were made. Among his earliest Florentine works were a bronze Bacchus, later placed on a fountain in the Borgo San Jacopo, and a bronze Venus, made for the Villa di Castello and now at the Villa Medicea della Petraia, near Florence. The "Fountain of Neptune" at Bologna (1563–66), which emulated Michelangelo's "Victory," established his reputation. The full-scale plaster model of this work (Accademia, Florence), initially set up with the "Victory" in the Palazzo Vecchio, was replaced in 1570 by the marble version, now in the Museo Nazionale. His "Samson and a Philistine" (1567; Victoria and Albert Museum, London) displays violence and anguish in a masterfully contrived composition that recalls such complex Hellenistic pieces as the "Laocoon." The "Rape of the Sabines" (1579–83; Loggia dei Lanzi, Florence), while uncluttered and monumental, is even more complex. The composition is subtly designed so that it can be viewed from any side with equal effect. In his fountain "Mercury" (*c.* 1580; Bargello, Florence) Giambologna uses the shimmering play of light on the figure's

smooth surface to enhance the effect of fleetness. His bronze equestrian portrait of Cosimo I de' Medici (1587–94; Piazza della Signoria, Florence) is also notable.

Giambologna enjoyed great popularity as a maker of garden sculpture for the Boboli Gardens, Florence ("Fountain of Oceanus," 1571–76; "Venus of the Grotticella," 1573), and for the Medici villas at Pratolino (the colossal "Apennine," 1581), Petraia, and Castello. He was also a prolific manufacturer of bronze statuettes. In addition to his secular commissions, Giambologna was responsible for a large number of religious sculptures, which include (in marble) the fine "Altar of Liberty" in Lucca cathedral (1577–79) and several bronze reliefs.

An Italian sculptor in all but birth, Giambologna transformed the Florentine Mannerism of the mid-16th century into a style of European significance. His ability to capture fleeting expression and the vivacity and sensual delight of his mature style anticipate the Baroque sculpture of Gian Lorenzo Bernini. For three centuries his work was more generally admired than that of any sculptor except Michelangelo.

Gian Gastone, in full GIAN GASTONE DE' MEDICI (b. 1671—d. July 9, 1737), the last Medicean grand duke of Tuscany (1723–37).

His father, Cosimo III, had passed his 80th year at the time of his death, and thus Gian Gastone succeeded at a late age, 53—in bad health, worn out by dissipation, and possessing neither ambition nor aptitude for rule. The European great powers had already determined, in 1718, that the grand duchy should pass to Charles of Bourbon (the future Charles III of Spain) when the Medici line ran out, without male heirs. Charles, however, led a Spanish army in the conquest of Naples, and the resultant peace treaty of 1735 transferred the Tuscan succession to Francis II, duke of Lorraine and husband of Maria Theresa of Austria. Gian Gastone was finally obliged to submit to this. Spain withdrew its garrisons from Tuscany, and Austrian soldiers took their place and swore fealty to the grand duke on Feb. 5, 1737.

Gian Gastone died five months later, bringing the Medicean dynasty to an end.

Giancana, Sam, byname MOMO, original name SALVATORE GIANCANA (b. May 24, 1908, Chicago, Ill., U.S.—d. June 19, 1975, Oak Park, Ill.), major U.S. gangster, the top syndicate boss in Chicago from 1957 to 1966, noted for his friendships with show-business personalities and for his ruthlessness.

Born and reared in Chicago's "Little Italy" on the near southwest side, Giancana began working for Al Capone in the 1920s and, by 1966, had been arrested some 70 times and served five years for burglary and four years for operating an illegal still. In 1965–66 he spent a year in jail for contempt of a federal grand jury (1965) that had granted him immunity in return for testimony, an offer that he had rebuffed. After release from prison he disappeared into Mexico, Argentina, and other Latin-American countries to avoid further U.S. government inquiry. In July 1974, however, he was seized by police in Mexico City and shipped back to Chicago. One year later he was bullet-riddled in his home in Oak Park, Ill., by unknown assailants. He had been scheduled to appear before the U.S. Senate Intelligence Committee to discuss his alleged involvement in a Central Intelligence Agency plot to assassinate Fidel Castro in the early 1960s.

Giannini, A(madeo) P(eter) (b. May 6, 1870, San Jose, Calif., U.S.—d. June 3, 1949, San Mateo, Calif.), American banker, founder of the California-based Bank of Italy—later the Bank of America—which, by the 1930s, was the world's largest commercial bank. He was a major pioneer of branch banking.

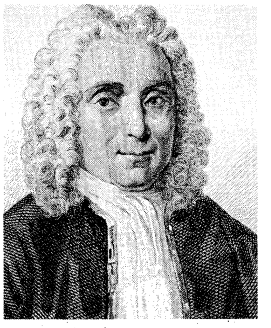
The son of Italian immigrants, Giannini left school at age 13 to work full-time in his stepfather's prosperous wholesale produce business in San Francisco and continued at this work for 18 years (1883–1901), becoming a partner in 1889. He retired at age 31, married and financially secure, but was drawn back into business in 1902 when his father-in-law died, obliging him to manage the family's estate, which included banking interests. In 1904 Giannini and five partners founded the Bank of Italy. From the beginning he was financially unorthodox; he made loans to small farmers and businessmen and, going even more against tradition, actively solicited customers. The bank's loans and deposits quintupled within about a year, and in 1906, when earthquake and fire struck San Francisco, Giannini was able to rescue the bank's gold and currency and resume banking operations before most of the other city banks. When the Panic of 1907 struck San Francisco, the Bank of Italy was able to continue issuing currency and paying gold on demand, surviving while many other banks went under.

In 1909 Giannini began buying banks elsewhere throughout the state of California and converting them into branches of the Bank of Italy. By 1918 the Bank of Italy had become the first statewide branch-banking system in the United States. In 1927 he began acquiring a second network of branch banks, and in the following year he unified them under the name of Bank of America of California. After creating a holding company, Transamerica Corporation (1928), for his banking interests, he merged the Bank of Italy and the Bank of America of California in 1930, resulting in the Bank of America National Trust and Savings Association.

During these years, Giannini's banks continued to make loans to both large and small enterprises, notably to the young motion-picture industry. His farm mortgage policies also helped in the phenomenal expansion of agriculture in central and northern California.

In 1930 Giannini retired, but a year later, when his successor inaugurated conservative policies in face of the growing Great Depression, Giannini angrily waged a successful proxy fight, ousting his rivals and resuming the chairmanship of Transamerica and the Bank of America. He relinquished the chairmanship of Bank of America in 1934 but continued as board chairman of Transamerica until his death. By the time of his death Bank of America had more than 500 branch banks, with more than $6 billion in deposits. He left two foundations, the Bank of America-Giannini Foundation for medical research and educational scholarships and the Giannini Foundation of Agricultural Economics of the University of California.

Giannone, Pietro (b. May 7, 1676, Ischitella, Naples [Italy]—d. March 17, 1748, Turin, Kingdom of Sardinia), Italian historian whose works opposed papal interference in Naples.



Giannone, engraving by Maffeis

By courtesy of the Biblioteca Nazionale, Florence

Giannone graduated in law (Naples, 1698), became interested in the "New Learning," and wrote the *Istoria civile del regno di Napoli* (1723; *The Civil History of the Kingdom of Naples*)—a polemical survey of Neapolitan history in which he espoused the side of the civil power in its conflicts with the Roman Catholic hierarchy. As a result of this, the *Istoria* was placed on the *Index librorum prohibitorum* (the papal register of prohibited books), and Giannone was excommunicated. In Vienna, where, until 1734, he received a pension from the Holy Roman emperor Charles VI, Giannone prepared his most important work, *Il triregno, ossia del regno del cielo, della terra, e del papa,* 3 vol. ("The Triple Crown, or the Reign of Heaven, Earth, and the Pope"). On the transfer of the Neapolitan crown to Charles of Bourbon, (the future Charles III of Spain), Giannone left Vienna for Venice. A suspicion that his views on maritime law were not favourable to the pretensions of the republic, together with clerical intrigues, caused him finally to seek refuge in Geneva (1735). But, while visiting a village in Piedmont, he was kidnapped by agents of the Sardinian government and imprisoned. He wrote his *Autobiografia* while incarcerated during the last 12 years of his life in the fortresses of Ceva and Turin.

Consult the INDEX *first*

giant, in folklore, huge mythical being, usually humanlike in form. The term derives (through Latin) from the Giants (Gigantes) of Greek mythology, who were monstrous, savage creatures often depicted with men's bodies terminating in serpentine legs. According to the Greek poet Hesiod, they were sons of Ge ("Earth") and Uranus ("Heaven"). The Gigantomachy was a desperate struggle between the Giants and the Olympians. The gods finally prevailed through the aid of Heracles the archer, and the Giants were slain. Many of them were believed to lie buried under mountains and to indicate their presence by volcanic fires and earthquakes. The Gigantomachy became a popular artistic theme (found, for example, on the frieze adorning the great altar at Pergamum), and it was interpreted as a symbol of the triumph of Hellenism over barbarism, of good over evil.

The giants of Norse mythology were primeval beings existing before the gods and overcome by them. Giants in folklore were mortals who inhabited the world in early times. Israelite spies in Canaan saw giants (Numbers 13:32–33), and such beings once, in legend, roamed Cornwall in Britain (*see* Corineus).

European medieval towns often had tutelary giants whose effigies were carried in procession. In London the giant figures of Gog (*q.v.*) and Magog are said to represent two Cornish giants made captive by Brutus, the legendary founder of Britain. The 40-foot (12-metre) effigy of Druon Antigonus at Antwerp and the 22-foot (7-metre) figure of Gayant at Douai, Fr., preserve similar traditions.

In most European tales giants appear as cruel and stupid, given to cannibalism, and often one-eyed. Heroes who killed them often did so more by wit than by strength. Although kindly giants occur (*e.g.,* Rübezahl, who lived in the Bohemian forest), most were feared and hated; but marriages between their daughters and the hero were possible.

Hill figures, such as the giant of Cerne cut in the chalk near Cerne Abbas, Dorset, as well as megalithic monuments and long barrows, suggested giant builders of the past; and an ancient European tradition held that people

had once been taller and stronger but had degenerated after a golden age.

giant African water shrew, species of otter shrew (*q.v.*).

giant arborvitae, also called WESTERN ARBORVITAE (*Thuja plicata*), an ornamental and timber evergreen conifer of the cypress family (Cupressaceae), native to the Pacific Coast of North America. Common lumber trade names for this species are western red cedar and British Columbia red cedar.

Giant arborvitae trees and shrubs are pyramidal in form and may be up to 60 metres (about 200 feet) tall and 6 metres in circumference, measured above the strongly buttressed base. The cinnamon-red or brownish outer bark is relatively thin, fissured, and scaly,

Giant arborvitae (*Thuja plicata*)
Verna R. Johnston

shedding in irregular flakes; the inner bark is fibrous. Short, horizontal, or slightly drooping branches bear dense branchlet systems in flattened sprays that appear bright green on the upper side and dark, waxy green beneath. The tiny, pointed, scalelike leaves may have faint whitish patches on the undersurfaces. The egg-shaped or slightly elongated cones, 8 to 12 millimetres (about 1/2 inch) long, bear five to six pairs of thin, flexible scales.

Giant arborvitae is a popular ornamental and hedge tree in North America and Great Britain. The wood is used for shingles, posts, pilings, boat-making, greenhouse fittings, and other purposes for which resistance to moisture and decay is more important than strength.

giant axon (anatomy): *see* giant nerve fibre.

giant-cell thyroiditis, also called SUBACUTE, PSEUDOTUBERCULOUS, or DE QUERVAIN'S THYROIDITIS: *see* granulomatous thyroiditis.

giant cell tumour of bone: *see* osteoclastoma.

giant crab (*Macrocheira kaempferi*), species of spider crab (*q.v.*) native to Pacific waters near Japan. It occurs at depths of 50 to 300 metres (150 to 1,000 feet). The largest specimens exceed 4 m (about 13 ft) from the tip of one outstretched claw to another. The body is about 37 centimetres (15 inches) across, and the total weight of the body is more than 18 kilograms (40 pounds). The giant crab (order Decapoda of the class Crustacea) is probably the largest known species of the invertebrate phylum Arthropoda.

Giant Mountains, Czech KRKONOŠE, German RIESENGEBIRGE, Polish KARKONOSZE, mountains, major segment of the Sudeten in northeastern Bohemia, forming part of the western Czechoslovak–Polish frontier. The highest peak both in the mountains and in Bohemia is Sněžka (5,259 ft [1,603 m]). The Elbe (Czech Labe) River rises in Bohemia on the southern slope, and tributaries of the Oder (Czech Odra) River flow northward from the Polish side.

The traditional textile industry—wool, cotton, and linen—is centred at Liberec, Czech. Quartz is used in making Bohemian glass in some of the southern foothills, notably at Jablonec nad Nisou. Glassmaking is typified by the small works that extend high up the slopes of the mountains, with prominent forge chimneys attached to each cottage. These activities, together with machine production and timber working, account for most of the region's employment. A railway line from Prague runs across the mountains and branches off to Görlitz (Germany) and Wrocław (Poland). The main road from Prague to Wrocław crosses near Náchod, Czech. Extensive beech, pine, and fir forests and hiking trails and ski slopes support a year-round tourist industry with centres at Vrchlabí, Jilemnice, Trutnov, Špindlerův Mlýn, and Janské Lazně in Czechoslovakia and at Szklarska Poręba and Karpacz in Poland. Both Czechoslovakia and Poland have parts of the area under protection as nature preserves.

giant nerve fibre, also called GIANT AXON, in biology, a nerve fibre much larger than the usual ones. They are present in many invertebrates, such as the cockroach. The speed with which a nerve fibre conducts impulses varies directly with its size; the giant nerve fibre, therefore, enables an animal to react more quickly to danger than would smaller fibres.

giant reed (*Arundo donax*), tall perennial grass of the family Poaceae, native to Europe and introduced into southeastern North America as an ornamental. Giant reed is 1.8 to 7 metres (about 6 to 23 feet) tall and grows in dense clumps. The flat leaves, often 60 centimetres (2 feet) long and about 7.5 cm wide, are used to make mats.

The woody, tubelike stems of giant reed have been used in manufacturing flutes and organ pipes and are the source of reeds for woodwind

Giant reed (*Arundo donax*)
A.J. Huxley—EB Inc.

instruments. The plant also has been used for erosion control and in highway beautification programs.

giant sequoia: *see* big tree.

giant silkworm moth: *see* saturniid moth.

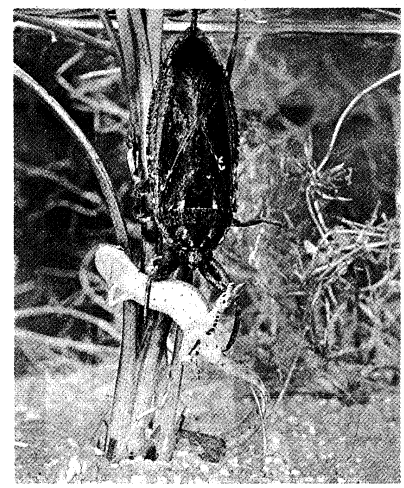
giant star, any star having a relatively large radius for its mass and temperature; because the radiating area is correspondingly large, the brightness of such stars is high. Subclasses of giants are supergiants, with even larger radii and brightness for their masses and temperatures (*see* supergiant star); red giants, which have low temperatures but are of great brightness; and subgiants, which have slightly reduced radii and brightness.

Some giants have luminosities hundreds of thousands of times that of the Sun. Their position in the Hertzsprung–Russell diagram (*q.v.*) is above the main sequence, in which the majority of stars, called dwarf stars in contrast, fall. Masses of giants and supergiants may be 10 to 30 times that of the Sun, but their volumes are often 1,000,000 to 10,000,000 times greater volumes. Thus, they are low-density "diffuse" stars.

giant unicorn (extinct rhinoceros): *see* Elasmotherium.

giant urticaria (disorder): *see* angioedema.

giant water bug, any wide and flat-bodied aquatic insect of the family Belostomatidae (order Heteroptera). This family, although containing only about 100 species, includes the largest bugs in the order: sometimes exceeding 10 centimetres (4 inches) in the South American species *Lethocerus grandis,* and ranging between 2 and 5 cm in northern climates. These insects are usually seen suspended in a quiet pond or lake, the tip of their abdomen piercing the water surface and the brown, oval body hanging below.



Giant water bug (*Benacus griseus*) with prey
Lynwood M. Chace

The front legs are adapted for grasping prey; the hind pair is flat and oarlike—adapted for swimming. Giant water bugs feed on insects, salamanders, tadpoles, snails, and even small fishes. Because they are attracted to light these insects are sometimes called electric-light bugs. When disturbed, some species play dead; others emit an odorous fluid from the anus; and still others make a soft chirping sound.

The females of some genera (*e.g., Belostoma, Abedus*) forcefully glue their eggs onto the backs of the males, where they remain until hatched. In other genera (*e.g., Benacus, Lethocerus*) the eggs are deposited on pond vegetation. The bite of these bugs is quite painful to man. In Asia the giant water bug *Lethocerus indicus* is often eaten. Creeping water bug (*q.v.*) is the common name for the heteropteran family Naucoridae.

giant water scorpion, also called SEA SCORPION, any member of the extinct order Eurypterida of the arthropod class Merostomata, a group of large, scorpion-like, aquatic invertebrates that flourished during the Silurian Period (438,000,000 to 408,000,000 years ago). Well over 200 species have been identified and divided into 18 families. They include the largest arthropod species known, *Pterygotus rhenanius,* which measures nearly three metres (ten feet) in length. Several other eurypterid forms were almost as large. The fossils of giant water scorpions are usually found in brackish and freshwater deposits, but the animals probably first lived in shallow coastal areas and estuaries and moved into freshwater environments later. Only a few species appear to have been good swimmers. The reason for their extinction is unknown. Their close rel-

ative the horseshoe crab (*q.v.*), of the order Xiphosura, has survived to the present day.

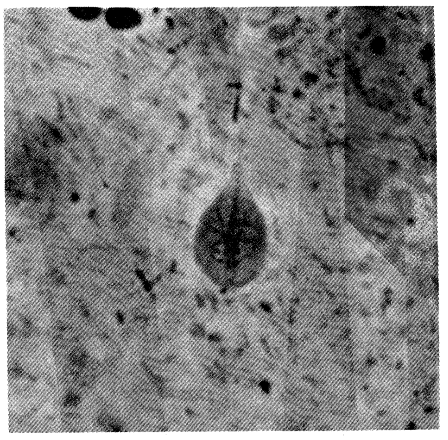
Gianti Agreement (1755), in Indonesia, treaty between two members of the Mataram royal family as a result of a succession war in 1749–57. Pakubuwono II, king of Mataram, had backed a Chinese rebellion against the Dutch. In 1743, in payment for his restoration to power, the King ceded the north coast of Java and Madura to the Dutch East India Company. Later, before his death in 1749, he ceded the remainder of the kingdom. Mataram then became a vassal state of the company.

Pakubuwono III, who was supported by the company, became the new king, but he had to face a rival of his father, Raden Mas Said, who had occupied a region called Sukowati. In 1749 Mangkubumi, the brother of the late Pakubuwono II, dissatisfied with his inferior position, joined Raden Mas Said in the struggle against Pakubuwono III. The company sent troops to assist its vassal king, but the rebellion continued. Not until 1755 did Mangkubumi break away from Raden Mas Said and accept a peace offer at Gianti, by which Mataram was divided into two parts. Eastern Mataram was headed by Pakubuwono III, with Surakarta as its capital, while western Mataram was ruled by Mangkubumi, later known as Sultan Amangku Buwono I, who built his palace in Jogjakarta. Raden Mas Said signed a treaty with the company in 1757, which entitled him to have a part of eastern Mataram. He was thenceforth known as Mangkunegara I.

Giant's Causeway, Irish CLOCHÁN AN AIFIR, promontory of columnar basalt on the northwest coast of Moyle district (established 1973), formerly in County Antrim, Northern Ireland, between Portrush and Ballycastle. Its prismatic, or brilliant, forms (mostly irregular hexagons) were caused by the rapid cooling of the lava flows at their entry to the sea. The columns vary from 15 to 20 in. (375 to 500 mm) in diameter, and some are 20 ft (6 m) in height. In places, the causeway is 40 ft wide and is highest at its narrowest part. The most remarkable of the cliffs is the Pleaskin, the upper pillars of which are 400 ft high. Local folklore ascribes its formation to a race of giants who built it as a roadway to Staffa, where a similar structure occurs.

Giarabub (Libya): *see* Jaghbūb, al-.

Giardia lamblia, also called G. INTESTINALIS, single-celled zooflagellate protozoan parasite of the order Diplomonadida. Pear- or beet-shaped, the cells have two nuclei and eight flagella. This species attaches to human intestinal mucosa with a sucking organ; it may cause the disease giardiasis. In children, who are more apt to be infected than adults, diarrhea, pain, and distension of the stomach may occur. The infection can result in intestinal malabsorption and intestinal ulceration.



Giardia lamblia
J.M. Langham

Giardini, Felice (b. April 12, 1716, Turin, Savoy—d. June 8, 1796, Moscow), Italian violinist and composer who influenced the music of 18th-century England.

Giardini was a chorister at Milan cathedral and studied singing, composition, and violin in Turin under the celebrated violinist G.B. Somis. He played in opera orchestras of Rome and Naples, often improvising violin cadenzas at the end of arias, for which the composer Jommelli once boxed his ears. In 1748 he toured Germany and arrived in England about 1750. His brilliant playing made him a sensation, and his popularity rivalled that of the actor Garrick. He spent the greater part of his life in London as a composer, violinist, concert director, director of the Italian Opera (40 years), and even as an impresario. With his colleagues J.C. Bach, K.F. Abel, and J.C. Fischer, he was a leader of the new gallant style. His compositions include operas, concerti, chamber music, and keyboard works.

Giardino di Boboli: *see* Boboli Gardens.

Giauque, William Francis (b. May 12, 1895, Niagara Falls, Ont., Can.—d. March 28, 1982, Berkeley, Calif., U.S.), Canadian-born U.S. physical chemist and winner of the Nobel Prize for Chemistry in 1949 for his studies of the properties of matter at temperatures close to absolute zero.

Giauque's work established a firm experimental basis for quantum statistics and the third law of thermodynamics and led to an understanding of the apparent exceptions to this law. With Herrick L. Johnston he discovered the oxygen isotopes of mass 17 and 18. In 1926 he proposed a method for obtaining temperatures well below $-457.87°$ F ($-272.15°$ C) and in 1935, with D.P. MacDougall, first successfully employed it.

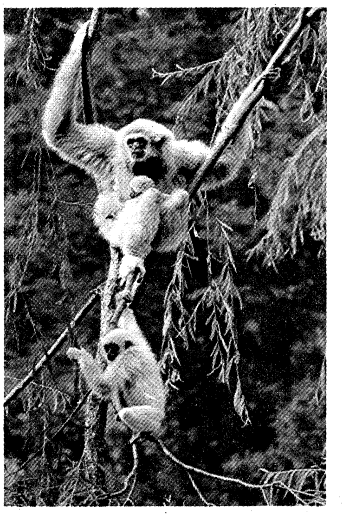
Upon receiving his Ph.D. from the University of California, Berkeley (1922), he became a member of the chemistry faculty there, becoming professor emeritus in 1962.

gibber, rock- and pebble-littered area of arid or semi-arid country in Australia. The rocks are generally angular fragments formed from broken up duricrust, usually silcrete, a hardened crust of soil cemented by silica (SiO_2). The gravel cover may be only one rock fragment deep, or it may consist of several layers buried in fine-grained material that is thought to have been blown in. A gibber is generally considered a result of mechanical weathering because silica is almost inert to chemical weathering.

gibberellin, any of a group of plant hormones that occur in seeds, young leaves, and roots. The name is derived from GIBBERELLA FUJIKUROI, a hormone-producing fungus (phylum Mycota). Evidence suggests that gibberellins stimulate the growth of main stems, especially when applied to the whole plant. They also promote the growth of dwarf peas and are involved in the bolting (elongation) of rosette plants (*e.g.,* the carrot) after such plants have been exposed to certain environmental stimuli (*e.g.,* cold or long periods of daylight). Gibberellic acid, a gibberellin, is found in both higher plants and fungi.

gibbon (*Hylobates*), any of about six species of small, manlike apes, family Hylobatidae, found in Indo-Malayan forests. Gibbons, unlike the great apes (chimpanzee, orangutan, gorilla), have small callosities on the buttocks and relatively longer arms. They have large canine teeth and their voices are characteristic in volume, musical quality, and carrying power.

Gibbons are arboreal and progress from branch to branch with great agility by brachiation (swinging from the arms). On the ground, gibbons walk erect with the arms held aloft or behind. They are diurnal, live in small groups, and feed on shoots, fruit, and some insects, birds' eggs, and young birds. A single offspring is born after about seven months' gestation.



Gibbon (*Hylobates*)
Edmund Appel—Photo Researchers

Gibbons are long-haired, tailless apes about 40–65 centimetres (16–26 inches) in head and body length. They vary in colour, both in and among species, from tan or silvery to brown or black. In the concolour, or black, gibbon (*Hylobates concolor*) and the hoolock gibbon (*H. hoolock*), adult males are black and females are brown. The dark-handed gibbon (*H. agilis*) may be either tan or black and has white face markings. The white-handed gibbon, or Malayan lar (*H. lar*), is similar but also has white extremities. Kloss's gibbon (*H. klossii*), sometimes placed in the siamang genus, *Symphalangus*, is usually grayish.

Gibbons are sometimes classified as the subfamily Hylobatinae, family Pongidae.

Gibbon, Edward (b. May 8 [April 27, old style], 1737, Putney, Surrey, Eng.—d. Jan. 16, 1794, London), English rationalist historian and scholar best known as the author of *The History of the Decline and Fall of the Roman Empire* (1776–88), a continuous narrative from the 2nd century AD to the fall of Constantinople in 1453.

Life. Gibbon's grandfather, Edward, had made a considerable fortune and his father, also Edward, was able to live an easygoing life

Edward Gibbon, oil painting by Henry Walton, 1774; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

in society and Parliament. He married Judith, a daughter of James Porten, whose family had originated in Germany. Edward, too, had independent means throughout his life. He was the eldest and the only survivor of seven children, the rest dying in infancy.

Gibbon's own childhood was a series of illnesses and more than once he nearly died. Neglected by his mother, he owed his life to her sister, Catherine Porten, whom he also called "the mother of his mind," and after his mother's death in 1747 he was almost entirely in his aunt's care. He early became an omnivorous reader and could indulge his tastes the more fully since his schooling was most irregular. He attended a day school in Putney and, in 1746, Kingston grammar school, where he was to note in his *Memoirs* "at the expense of many tears and some blood, [he] purchased a knowledge of Latin syntax." In 1749 he was admitted to Westminster School. He was taken in 1750 to Bath and Winchester in search of health and after an unsuccessful attempt to return to Westminster was placed for the next two years with tutors from whom he learned little. His father took him on visits to country houses where he had the run of libraries filled with old folios. He noted his 12th year as one of great intellectual development and says in his *Memoirs* that he had early discovered his "proper food," history. By his 14th year he had already covered the main fields of his subsequent masterpiece, applying his mind as well to difficult problems of chronology. The keynote of these early years of study was self-sufficiency. Apart from his aunt's initial guidance, Gibbon followed his intellectual bent in solitary independence. This characteristic remained with him throughout his life. His great work was composed without consulting other scholars and is impressed with the seal of his unique personality.

In his *Memoirs* Gibbon remarked that with the onset of puberty his health suddenly improved and remained excellent throughout his life. Never a strong or active man, he was of diminutive stature and very slightly built and he became corpulent in later years. The improvement in his health apparently accounts for his father's sudden decision to enter him at Magdalen College, Oxford, on April 3, 1752, about three weeks before his 15th birthday. He was now privileged and independent. Any expectations of study at Oxford were soon disappointed. The authorities failed to look after him intellectually or spiritually or even to note his absences from the college. Left to himself, Gibbon turned to theology and read himself into the Roman Catholic faith. It was a purely intellectual conversion. Yet he acted on it and was received into the Roman Catholic Church by a priest in London on June 8, 1753.

His father, outraged because under the existing laws his son had disqualified himself for all public service and office, acted swiftly, and Edward was dispatched to Lausanne and lodged with a Calvinist minister, the Rev. Daniel Pavillard. Though the change was complete, and Gibbon was under strict surveillance, in great discomfort, and with the scantiest allowance, he later spoke of this period with gratitude. To Pavillard he owed kindly and competent instruction and the formation of regular habits of study. He mastered the bulk of classical Latin literature and studied mathematics and logic. He also became perfectly conversant with the language and literature of France, which exercised a permanent influence on him. These studies made him not only a man of considerable learning but a stylist for life. He began his first work, written in French, *Essai sur l'étude de la littérature* (1761; *An Essay on the Study of Literature,* 1764). Meanwhile, the main purpose of his exile had not been neglected. Not without weighty thought, Gibbon at last abjured his new faith and was publicly readmitted to the Protestant communion at Christmas 1754. "It was here," Gibbon says somewhat ambiguously, "that I suspended my religious enquiries, acquiescing with implicit belief in the tenets and mysteries which are adopted by the general consent of Catholics and Protestants."

In the latter part of his exile Gibbon entered more freely into Lausanne society. He attended Voltaire's parties. He formed an enduring friendship with a young Swiss, Georges Deyverdun, and also fell in love with and rashly plighted himself to Suzanne Curchod, a pastor's daughter of great charm and intelligence. In 1758 his father called Gibbon home shortly before his 21st birthday and settled an annuity of £300 on him. On the other hand, he found that his father and his stepmother were implacably opposed to his engagement, and he was compelled to break it off. ("I sighed as a lover, I obeyed as a son.") He never again thought seriously of marriage. After a natural estrangement he and Curchod became lifelong friends. She was well known as the wife of Jacques Necker, the French finance minister under Louis XVI. During the next five years Gibbon read widely and considered many possible subjects for a historical composition. From 1760 until the end of 1762, his studies were seriously interrupted by his service on home defense duties with the Hampshire militia. With the rank of captain he did his duty conscientiously and later claimed that his experience of men and camps had been useful to him as a historian.

Gibbon left England on Jan. 25, 1763, and spent some time in Paris, making the acquaintance of several Philosophes, Denis Diderot and Jean Le Rond d'Alembert among others. During the autumn and winter spent in study and gaiety at Lausanne, he gained a valuable friend in John Baker Holroyd (later Lord Sheffield), who was to become his literary executor. In 1764 Gibbon went to Rome, where he made an exhaustive study of the antiquities and, on Oct. 15, 1764, while musing amid the ruins of the Capitol, was inspired to write of the decline and fall of the city. Some time was yet to pass before he decided on the history of the empire.

At home, the next five years were the least satisfactory in Gibbon's life. He was dependent on his father and although nearly 30 had achieved little in life. Although bent on writing a history, he had not settled on a definite subject. Impressed by the supremacy of French culture in Europe, he began in that language a history of the liberty of the Swiss, but was dissuaded from continuing it. He and Deyverdun published two volumes of *Mémoires littéraires de la Grande Bretagne* (1768–69). In 1770 he sought to attract some attention by publishing *Critical Observations on the Sixth Book of the Aeneid.*

His father died intestate in 1770. After two years of tiresome business, Gibbon was established in Bentinck Street, London, and concentrated on his Roman history. At the same time he entered fully into social life. He joined the fashionable clubs and was also becoming known among men of letters. In 1775 he was elected to the Club, the brilliant circle that the painter Sir Joshua Reynolds had formed round the writer and lexicographer Dr. Samuel Johnson. Although Johnson's biographer, James Boswell, openly detested Gibbon, and it may be inferred that Johnson disliked him, Gibbon took an active part in the Club and became intimate with Reynolds and the actor David Garrick. In the previous year he had entered Parliament and was an assiduous, though silent, supporter of Lord North.

The "Decline and Fall." The first quarto volume of his history, published on Feb. 17, 1776, immediately scored a success that was resounding, if somewhat scandalous because of the last two chapters in which he dealt with great irony with the rise of Christianity. Reactions to Gibbon's treatment of Christianity have displayed various phases. Both in his lifetime and after, he was attacked and personally ridiculed by those who feared that his skepticism would shake the existing establishment. In the 19th century he was hailed as a champion by militant agnostics. Gibbon himself was not militant. He did not cry with Voltaire, *"Écrasez l'Infâme!"* ("Crush the Infamy!") because in his England and Switzerland he saw no danger in the ecclesiastical systems. His concern was past history. One may say, however, with confidence, that he had no belief in a divine revelation and little sympathy with those who had such a belief. While he treated the supernatural with irony, his main purpose was to establish the principle that religions must be treated as phenomena of human experience. In this his successors have followed him and added to the collateral causes of Christianity's growth those that he had overlooked or could not know of, such as the various mystery religions of the empire and particularly the Mithraic cult. Although Gibbon's best known treatment of Christianity is found mainly in the 15th and 16th chapters, no less significant are later chapters in which he traced the developments of theology and ecclesiasticism in relation to the breakup of the empire.

Gibbon went on to prepare the next volumes. Meanwhile, he was assailed by many pamphleteers and subjected to much ridicule. His ugliness and elaborate clothes made him an easy target. For the most part he ignored his critics. The historians David Hume and William Robertson recognized him as their equal if not their superior. Only to those who had accused him of falsifying his evidence did he make a devastating reply in *A Vindication of Some Passages in the Fifteenth and Sixteenth Chapters of the Decline and Fall of the Roman Empire* (1779).

In the same year he obtained a valuable sinecure as a commissioner of trade and plantations. Shortly after that he composed *Mémoire justificatif* (1779; a French and English version, 1780), a masterly state paper in reply to continental criticism of the British government's policy in America. In 1781 he published the second and third volumes of his history, bringing the narrative down to the end of the empire in the West. Gibbon paused at this point to consider continuing his history. In 1782, however, Lord North's government fell, and soon Gibbon's commission was abolished. This was a serious loss of income. To economize he left England and joined Deyverdun in a house at Lausanne. There he quietly completed his history in three more volumes, writing the last lines of it on June 27, 1787. He soon returned to England with the manuscript, and these volumes were published on his 51st birthday, May 8, 1788. The completion of this great work was acclaimed on all sides.

The Decline and Fall is thus comprised of two divisions, equal in bulk but inevitably different in treatment. The first half covers a period of about 300 years to the end of the empire in the West, about AD 480. In the second half nearly 1,000 years are compressed. Yet the work is a coherent whole by virtue of its conception of the Roman Empire as a single entity throughout its long and diversified course. Gibbon imposed a further unity on his narrative by viewing it as an undeviating decline from those ideals of political and, even more, intellectual freedom that he had found in classical literature. The material decay that had inspired him in Rome was the effect and symbol of moral decadence. However well this attitude suited the history of the West, its continuance constitutes the most serious defect of the second half of Gibbon's history and involved him in obvious contradictions. He asserted, for example,

that the long story of empire in the East is one of continuous decay, yet for 1,000 years Constantinople stood as a bulwark of eastern Europe. The fact is that Gibbon was not only out of sympathy with Byzantine civilization; he was less at home with Greek sources than with Latin and had no access to vast stores of material in other languages that subsequent scholars have assembled. Consequently there are serious omissions in his narrative, as well as unsatisfactory summaries.

Nevertheless, this second half contains much of Gibbon's best. With all its shortcomings, it marshals with masterly lucidity the successive forces that eventually overthrew Constantinople. Many of his most famous chapters occur there. These include sections on Justinian, the Trinitarian controversies, the rise of Islām, and the history of Roman law. There is, in addition, a brilliant and moving story of the last siege and capture of Constantinople and, finally, the epilogue of chapters describing medieval and Renaissance Rome, which gives some hope that the long decline is over and that mankind has some prospect of recovering intellectual freedom. The vindication of intellectual freedom is a large part of Gibbon's purpose as a historian. When toward the end of his work he remarks, "I have described the triumph of barbarism and religion," he reveals epigrammatically his view of the causes of the decay of the Greco-Roman world. They can hardly be disputed. But there is the further question of whether the changes brought about are to be regarded as ones of progress or retrogression. Writing as a mid-18th-century "philosopher," Gibbon saw the process as retrogression, and his judgment remains of perpetual interest.

Returning to Lausanne, Gibbon turned mainly to writing his memoirs. His happiness was broken first by Deyverdun's death in 1789, quickly followed by the outbreak of the French Revolution and the subsequent apprehension of an invasion of Switzerland. He had now become very fat and his health was declining. In 1793 he suddenly returned to England on hearing of Lady Sheffield's death. The journey aggravated his ailments, and he died in a house in St. James's Street, London. His remains were placed in Lord Sheffield's family vault in Fletching Church, Sussex.

Assessment. Modern knowledge of history, in Gibbon's field alone, has increased conspicuously. Economic, social, and constitutional history have grown up. The study of coins, inscriptions, and archaeology generally has brought in a great harvest. Above all, the scientific examination of literary sources, so rigorously practiced now, was unknown to Gibbon. Yet he often exhibits a flair and an acumen that seem to anticipate these systematic studies. He had genius in large measure, as well as untiring industry and accuracy in consulting his sources. Though he was unsympathetic to Christianity, his sense of fairness and probity made him respectful of honest opinion and true devotion, even among those with whom he disagreed. These qualities, expressed with his command of historical perspective and his incomparable literary style, justify a modern historian's dictum that, "whatever else is read Gibbon must be read too," or the conclusion of the great Cambridge historian J.B. Bury:

> That Gibbon is behind date in many details and in some departments of importance, simply signifies that we and our fathers have not lived in an absolutely incompetent world. But in the main things he is still our master above and beyond "date."

(D.M.Lo.)

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Gibbon, Lewis Grassic, pseudonym of JAMES LESLIE MITCHELL (b. Feb. 13, 1901, at or near Auchterless, Aberdeenshire, Scot.—d. Feb. 21, 1935, Welwyn Garden City, Hertfordshire, Eng.), Scottish novelist whose work signalled a 20th-century revival of Scottish themes and of the use of Lallans, a dialect of the Scottish Lowlands and a literary language of the past. He was also a respected historian and archaeologist.

Mitchell served in the British armed forces in the Middle East during World War I. During the 1920s he undertook archaeological work and then began to write tales of adventure under the name Lewis Grassic Gibbon. He achieved real fame with his trilogy *A Scots Quair*—consisting of *Sunset Song* (1932), *Cloud Howe* (1933), and *Grey Granite* (1934)—which traces Scottish life in all "its sourness, its harshness, in its beauty, and its sorrow" from the pre-war Scottish countryside through post-war depression and economic and social crises. *Sunset Song* was adapted for television by the British Broadcasting Company in the 1980s. *Scottish Scene* (1934; written in collaboration with poet Hugh MacDiarmid) provides a multifaceted picture of Scotland through a variety of literary vehicles such as poems, plays, short stories, and essays.

His scientific and historical works, published under his real name, include *Niger: the Life of Mungo Park* (1934) and *The Conquest of the Maya* (1934).

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Gibbons, Cedric (b. March 23, 1893, Dublin—d. July 26, 1960, Westwood, Calif., U.S.), art director for the Metro-Goldwyn-Mayer (MGM) motion-picture studio; his name appears on nearly 1,500 films produced by that studio during the 32 years (1924–56) that he worked there.

Gibbons' earliest work was for the Thomas A. Edison and Goldwyn studios. While negotiating with MGM in 1924, he had a clause inserted in his contract that said his name would be listed as art director on every MGM film made in the United States, but from 1925 on, almost all of the studio's productions were designed by a group of artists. Gibbons was nominated by the Motion Picture Academy of Arts and Sciences for 37 Academy Awards and won 11, but only one was for a film that he had designed alone—*The Bridge of San Luis Rey* (1929). Credit is usually given to Gibbons for designing the Academy's Oscar statuette that is awarded to winning nominees.

Gibbons was among the first to replace painted scenery with three-dimensional furnishings. Innovations in film and lighting enabled him to use large areas of white effectively, a style that became part of the MGM look. The Art Deco sets for *Our Dancing Daughters* (1928) and other films of the same period set interior decorating trends across America.

Gibbons directed one film, *Tarzan and His Mate* (1934), highly praised for its visual qualities, and in 1950 the Academy gave him a special award for his "consistent excellence" in production design.

Gibbons, Grinling (b. April 4, 1648, Rotterdam—d. Aug. 3, 1721, London), British wood-carver known for his decorative woodwork and for much stone ornamentation at Blenheim and Hampton Court palaces, and at St. Paul's Cathedral.

After a childhood in the Netherlands, where his English father had settled, Gibbons went to England and took up residence in Dept-

Detail of ornamentation from the interior of Petworth House, Sussex, Eng., designed by Grinling Gibbons, *c.* 1690

By courtesy of the National Trust, at Petworth House

ford where by 1671 he had made a name as a wood-carver. Called to decorate Charles II's new royal apartments at Windsor Castle, he continued such work for William and Mary at Kensington Palace and Hampton Court, winning appointment as master carver in 1693. At St. Paul's Cathedral he carved choir stalls, thrones, and a great organ screen (removed in 1860); for the exterior he carved most of the stone panels below the lower windows. Well-known examples of Gibbons' work include a wooden reredos and organ case and a marble font in St. James's Church in London (designed by Christopher Wren) and a carved room at Petworth House, Sussex.

Gibbons, James (b. July 23, 1834, Baltimore—d. March 24, 1921, Baltimore), archbishop of Baltimore and second Roman Catholic cardinal of North America.

Ordained in 1861, he spent four years as pastor and volunteer chaplain to the Civil War troops in the military hospitals of Baltimore. In 1868 he was consecrated bishop and appointed to organize the new Vicariate Apostolic of North Carolina; in this capacity he

James Gibbons
EB Inc.

attended the first Vatican Council in 1869–70. In 1872 he was created bishop of Richmond, Va., and in 1877 he was named coadjutor to the archbishop of Baltimore. His experiences as a missionary bishop made him aware of the need for a simple and concise statement of Roman Catholic doctrines, and while at Richmond he wrote *The Faith of Our Fathers* (1876), which became one of the most popular volumes of Roman Catholic apologetics published in the United States.

Appointed archbishop of Baltimore in 1877, thereby becoming a leader of the church in the United States, he was made cardinal in 1886 by Pope Leo XIII. He became the first chancellor of the Catholic University of America, Washington, D.C. (1889). In the 1880s and '90s he sought peace between immigrating Roman Catholic groups, particularly Irish and German. Politically, he emphasized to Rome the separation of church and state in the United States, whose constitution he believed was the finest instrument of government yet created. Gibbons' golden jubilee celebration in Baltimore (1911) was led by President William Howard Taft. His *Discourses* and *Sermons* were published in 1908.

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Gibbons, Orlando (b. 1583, Oxford, Oxfordshire, Eng.—d. June 5, 1625, Canterbury, Kent), composer, one of the last great figures of the English polyphonic school. He was the most illustrious of a large family of musicians.

His father, William Gibbons (*c.* 1540–95), was appointed one of the waits at Cambridge in 1567. Four of William's sons were accomplished musicians. At the age of 21 Orlando Gibbons was made organist of the Chapel Royal, a post that he retained for the remainder of his life, receiving many marks of royal favour. In 1619 he was appointed one of the "musicians for the virginalles to attend in his highnes privie chamber," and in 1622 he was made honorary doctor of music of the University of Oxford. The following year he became organist at Westminster Abbey, where he later officiated at the funeral service of King James I. Gibbons was part of the retinue attending Charles I when the king traveled to Dover to meet his bride, Henrietta Maria, on her arrival from France. Gibbons' full anthems are among his most distinguished works, as are the "little" anthems of four parts.

His *Madrigals and Motetts of 5 Parts* was published in 1612. This collection contains deeply felt and very personal settings of texts that are, for the most part, of a moral or philosophical nature. It shows Gibbons' mastery of the polyphonic idiom of his day and contains many masterpieces of late madrigalist style, among them the well-known "The Silver Swan" and "What Is Our Life?" Two years previously there appeared *Fantasies in Three Parts Compos'd for Viols* (*c.* 1610), said to be the first music printed in England from engraved copperplates.

Gibbons was famous as a keyboard player, and toward the end of his life he was said to be without rival in England as an organist and virginalist. Several of his virginal pieces were published in *Parthenia* (*c.* 1612), and more than 40 others survive in manuscript. Gibbons lived at a time when the polyphonic and basically vocal styles of the 16th century were becoming modified by a more markedly instrumental and harmonically conceived idiom. These changes left him almost untouched; his music, rather, sums up the achievement of the past generation.

Gibbons, Stella (Dorothea) (b. Jan. 5, 1902, London, Eng.—d. Dec. 19, 1989, London), English novelist and poet whose first novel, *Cold Comfort Farm* (1932), a burlesque of the rural novel, won for her in 1933 the Femina Vie Heureuse Prize and immediate fame.

The daughter of a London doctor who worked in the poor section of London, she experienced many unhappy years as a child. Depressed by her environment and family life, Gibbons, the eldest of three children, created marvelous fairy tales that she told to her two brothers to help them forget their unhappy situation. Educated at home until she reached her teens, she then attended the North London Collegiate School for Girls and University College, London, where she studied journalism. After graduation she worked for a time for the *British United Press* as a cable decoder and held various other jobs over a period of 10 years (1923–33), including those of drama and literature critic, reporter, and fashion writer.

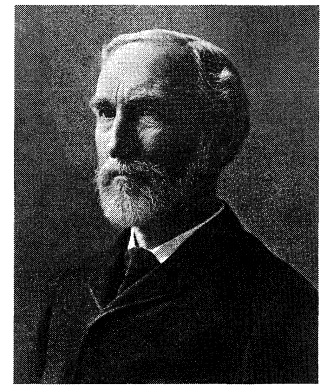
Cold Comfort Farm was a popular and critical success but was never equaled by her later work. Her later fiction, although well-written, was said by critics to dwindle into magazine entertainment. Gibbons wrote several other novels, including *Westwood; or, The Gentle Powers* (1946) and *Here Be Dragons* (1956), two works that deal with a young woman's disillusionment and education, as well as *The Charmers* (1965) and *The Woods in Winter* (1970). She also published poetry and four collections of short stories.

Gibbons v. Ogden (1824), U.S. Supreme Court case establishing the principle that states cannot, by legislative enactment, interfere with the power of Congress to regulate commerce. The state of New York agreed in 1798 to grant Robert Fulton and his backer, Robert R. Livingston, a monopoly on steamboat navigation in state waters if they developed a steamboat capable of traveling 4 miles (6.4 km) per hour upstream on the Hudson River. Fulton and Livingston satisfied the condition of the grant in 1807. Subsequently, Aaron Ogden purchased from Fulton and Livingston rights to operate steamboats between New York City and New Jersey. In 1819 Ogden sued Thomas Gibbons, who was operating steamboats in the same waters without the authority of Fulton and Livingston. Ogden won in 1820 in the New York Court of Chancery.

Gibbons appealed to the U.S. Supreme Court, contending that he was protected by terms of a federal license to engage in coasting trade. His case was argued before the Supreme Court by Daniel Webster, the leading lawyer of the era, and in an opinion written by Chief Justice John Marshall, the Supreme Court ruled in favour of Gibbons. The decision was an important development in interpretation of the commerce clause of the Constitution, and it freed all navigation of monopoly control. The dismantling of navigational monopolies in New York and Louisiana, in particular, facilitated the settlement of the American West.

Gibbs, J(osiah) Willard (b. Feb. 11, 1839, New Haven, Conn., U.S.—d. April 28, 1903, New Haven), theoretical physicist and chemist who was one of the greatest scientists in the United States in the 19th century. His application of thermodynamic theory converted a large part of physical chemistry from an empirical into a deductive science.

Gibbs was the fourth child and only son of Josiah Willard Gibbs, Sr., professor of sacred literature at Yale University. There were college presidents among his ancestors and scientific ability in his mother's family. Facially and mentally, Gibbs resembled his mother. He was a friendly youth but was also withdrawn and intellectually absorbed. This circumstance and his delicate health kept him from participating much in student and social life. He was educated at the local Hopkins Grammar School and in 1854 entered Yale, where he won a succession of prizes. After graduating, Gibbs pursued research in engineering. His thesis on the design of gearing was distinguished by the logical rigour with which he employed geometrical methods of analysis. In 1863 Gibbs received the first doctorate of engineering to be conferred in the United States. He was appointed a tutor at Yale in the same year. He devoted some attention to engineering invention.



J. Willard Gibbs
By courtesy of Yale University

Gibbs lost his parents rather early, and he and his two older sisters inherited the family home and a modest fortune. In 1866 they went to Europe, remaining there nearly three years while Gibbs attended the lectures of European masters of mathematics and physics, whose intellectual technique he assimilated. He returned more a European than an American scientist in spirit—one of the reasons why general recognition in his native country came so slowly. He applied his increasing command of theory to the improvement of James Watt's steam-engine governor. In analyzing its equilibrium, he began to develop the method by which the equilibriums of chemical processes could be calculated.

He was appointed professor of mathematical physics at Yale in 1871, before he had published his fundamental work. His first major paper was "Graphical Methods in the Thermodynamics of Fluids," which appeared in 1873. It was followed in the same year by "A Method of Geometrical Representation of the Thermodynamic Properties of Substances by Means of Surfaces" and in 1876 by his most famous paper, "On the Equilibrium of Heterogeneous Substances." The importance of his work was immediately recognized by the Scottish physicist James Clerk Maxwell in England, who constructed a model of Gibbs's thermodynamic surface with his own hands and sent it to him.

He remained a bachelor, living in his surviving sister's household. In his later years he was a tall, dignified gentleman, with a healthy

stride and ruddy complexion, performing his share of household chores, approachable and kind (if unintelligible) to students.

Gibbs was highly esteemed by his friends, but U.S. science was too preoccupied with practical questions to make much use of his profound theoretical work during his lifetime. He lived out his quiet life at Yale, deeply admired by a few able students but making no immediate impress on U.S. science commensurate with his genius. He never even became a member of the American Physical Society. He seems to have been unaffected by this. He was aware of the significance of what he had done and was content to let posterity appraise him.

The contemporary historian Henry Adams called Gibbs "the greatest of Americans, judged by his rank in science." His application of thermodynamics to physical processes led him to develop the science of statistical mechanics; his treatment of it was so general that it was later found to apply as well to quantum mechanics as to the classical physics from which it had been derived.

(J.G.Cr.)

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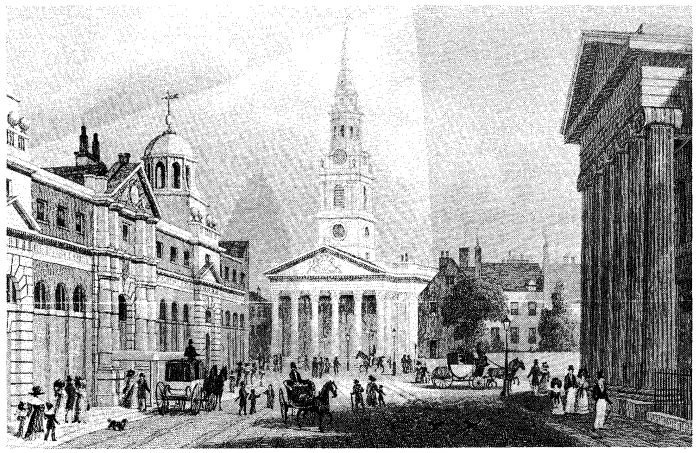
Gibbs, James (b. Dec. 23, 1682, Footdeesmire, Aberdeenshire, Scot.—d. Aug. 5, 1754, London), architect whose synthesis of Italian and English modes, exemplified in his church of St. Martin-in-the-Fields, London, set a standard for 18th-century British and American church architecture.



St. Martin-in-the-Fields, London, church by James Gibbs, 1722–26; engraving by H.W. Bond after a drawing by Thomas H. Shepherd, 1827

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Gibbs studied in Rome with Carlo Fontana, a leading exponent of the Italian Baroque style. His Roman experience gave him a decisive edge over competitors on his return to England in 1709. The first to employ him in London was John, earl of Mar, whose house in Whitehall Gibbs altered. Mar's influence, and the recommendation of the architect Christopher Wren, obtained for Gibbs a post with a church-building commission. This appointment resulted in Gibbs's first public building, the church of St. Mary-le-Strand, which shows most directly his Italian Baroque influence. He soon became the foremost Tory architect. Private houses that he built, or in which he had a hand, number at least 50. After the 1720s the Baroque influence in his works declined, influenced by the aggressive Palladianism of Lord Burlington and the concurrent shift in public taste toward the classical.

Gibbs's mature style represents a synthesis of Italian sources, both Baroque and Palladian, with medieval English vernacular style. His best known work, St. Martin-in-the-Fields (designed 1720), with its Gothic-derived steeple and classical portico, clearly demonstrates the intermingling of influences. Though criticized in its time—the French admired the portico and despised the steeple—St. Martin's became the archetype of countless British and American churches. His major written work, *A Book of Architecture* (1728), was the most widely used architectural pattern book in Britain and its colonies during the 18th century.

Gibbs, William Francis (b. Aug. 24, 1886, Philadelphia—d. Sept. 6, 1967, New York City), naval architect and marine engineer who directed the mass production of U.S. cargo ships during World War II, designed the famous, standardized cargo-carrying Liberty ships, and made many improvements in ship design and construction, notably in the passenger liner "United States" (1952).

Gibbs became a lawyer in 1913 to please his father but abandoned the profession after winning his first and only case. Turning to naval architecture, he studied for a year in seclusion; then, in partnership with his brother Frederick H. Gibbs, he designed a transatlantic liner. On the strength of that design, the brothers were given positions with the International Mercantile Marine Company, where they continued on their project until the outbreak of World War I. Wartime design work for the U.S. government made Gibbs's reputation, and at war's end he was chief of construction of the company.

In 1922 the Gibbs brothers won a contract to recondition the "Leviathan," for which they organized their own firm. Success with that project led to further reconditioning work and finally to shipbuilding contracts. In 1927 Gibbs designed the "Malolo," whose numerous watertight compartments provided an exceptionally high safety factor. When during her trial run the "Malolo" was rammed and a gash torn in her hull, her survival made the Gibbs design standard.

Gibbs built several yachts and luxury liners in partnership with the yacht designer Daniel Hargate Cox, and in 1933 they began to design destroyers for the U.S. Navy, developing a high-pressure, high-temperature steam turbine of great efficiency. In 1940 Gibbs undertook the design of a cargo ship suitable for mass-production manufacture. Breaking completely with shipbuilding custom, he proved that different portions of a ship could be constructed in different places and brought together for assembly. The result was the reduction of production time for a single vessel from as long as four years to as little as four days.

After World War II Gibbs and Cox continued design work for the U.S. Navy. In 1952 the "United States" was launched. Built for speed, safety, and quick conversion to troop transport in case of war, the vessel incorporated many of Gibbs's most advanced design concepts and set new speed records in transatlantic passenger service.

Gibbs–Duhem equation, mathematical relationship between variations of temperature, pressure, and chemical potentials of a mixture or a multicomponent system. It is useful in solving many chemical problems and in establishing relations between properties of multicomponent systems and tabulated properties of one-component systems.

gibbsite, the mineral aluminum hydroxide [$Al(OH)_3$] an important constituent of bauxite (*q.v.*) deposits, particularly those in the Western Hemisphere, where it occurs as white, glassy crystals, earthy masses, or crusts. In significant deposits it is of secondary origin, but small-scale hydrothermal sources are known. Under extreme weathering conditions, it may develop from any aluminous material, especially feldspars and feldspathoids; it may form from these directly or from boehmite or after the intermediate formation of clay minerals. Gibbsite is prominent in bauxites from Arkansas, Jamaica, Suriname, Guyana, Brazil, West Africa, and India. Synthetic gibbsite is made from bauxite or high-alumina materials for use in the production of aluminum metal and alumina chemicals. For detailed physical properties, *see* oxide mineral (table).

Gibeah, modern TALL AL-FŪL, ancient town of the Israelite tribe of Benjamin, located just north of Jerusalem. The site, severely denuded by wind and rain, was partly excavated by William F. Albright in 1922 and 1933. A summit fortress had originally been built in the Middle Bronze Age (*c.* 2000–1550 BC) and was reconstructed in the 12th–11th centuries BC. It was finally replaced by an imposing citadel during the time of King Saul (10th century BC) when it served as the first "royal" residence of Israel. Later becoming insignificant, it was finally destroyed at the time of the first Jewish revolt, AD 70.

Gibeon, modern AL-JĪB, important town of ancient Palestine, located northwest of Jerusalem. Its inhabitants submitted voluntarily to Joshua at the time of the Israelite conquest of Canaan (Josh. 9). Excavations undertaken in 1956 by a U.S. expedition revealed that the site had been occupied during parts of the Early and most of the Middle Bronze Age (*c.* 3000–1550 BC) and in the latter part of the Late Bronze Age (*c.* 1550–1200 BC), just before Joshua's conquest of Canaan—the

The pool at Gibeon showing part of the 79 rock-cut steps

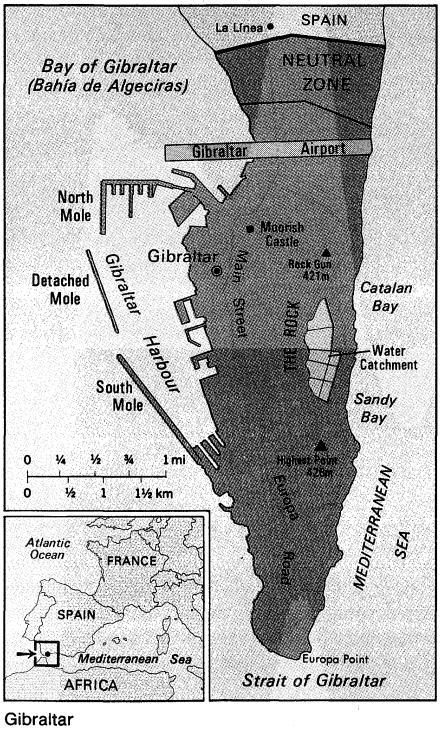
By courtesy of the University Museum, University of Pennsylvania, Philadelphia

town at that time being a dependency of the city-state of Jerusalem and probably not fortified.

It does not appear to have been destroyed by the Babylonians, who invaded the area in the early 6th century BC, and it continued to be occupied during the exile. Remains of this period included a large number of inscribed wine-jar handles, of which more than 30 contained the name Gibeon in Hebrew characters of that period.

Gibraltar, British colony occupying a narrow peninsula of Spain's southern Mediterranean coast, just northeast of the Strait of Gibraltar. It is 3 miles (5 km) long and 3/4 mile wide and is connected to Spain by a low, sandy isthmus that is one mile long. Its name is derived from the Arabic Jabal Ṭāriq (Mount Tarik), honouring Ṭāriq ibn Ziyād, who captured the peninsula in AD 711. The colony's total area is 2.25 square miles (5.8 square km). Gibraltar is a heavily fortified British air and naval base that guards the Strait of Gibraltar, which is the only entrance to the Mediterranean Sea from the Atlantic Ocean.

The peninsula consists of a limestone and shale ridge known as the Rock. It rises abruptly



Gibraltar

from the isthmus to 1,380 feet (421 m) at Rock Gun, which is its northernmost summit. Its greatest height, 1,396 feet (426 m), is attained near its southern end. The Rock shelves down to the sea at Europa Point, which faces Ceuta (a Spanish enclave in Morocco), 20 miles (32 km) to the south across the strait. From the Mediterranean, Gibraltar appears as a series of sheer, inaccessible cliffs, fronting the sea on the peninsula's east coast. The Rock's slope is more gradual on its western side and is occupied by tier upon tier of houses that stretch for some 300 feet (90 m) above the old defensive walls. Higher up, limestone cliffs almost isolate the Upper Rock, which is covered with a tangle of wild trees.

Gibraltar has no springs or rivers, and 34 acres (14 hectares) of sand slopes above Catalan and Sandy bays have been sheeted over to provide a rain-catchment area. The water is stored in a number of tanks blasted into the Rock. The rainwater is then blended with water pumped from wells on the isthmus or distilled from the sea. Seawater is supplied for sanitation purposes. Gibraltar has hot, humid, and almost rainless summers; mild winters during which there is usually adequate rain; and warm, moderately rainy transitional seasons.

There are more than 500 species of small flowering plants on Gibraltar, and the Gibraltar candytuft is a flower native only to the Rock. Wild olive and pine trees grow on the Upper Rock. Mammals include rabbit, fox, and Barbary ape. The only wild monkeys in Europe, the Barbary apes have roamed the Rock for hundreds of years and were long a symbol of the British presence in Gibraltar. Although free to wander at will, they are generally to be seen on the Upper Rock. Migratory birds are common, and Gibraltar is the home of the only specimens of Barbary partridge in Europe.

Gibraltar is considered to have been one of the two Pillars of Hercules, the other being Mount Hacho, on the African coast opposite. The Pillars defined the western limits of navigation for the ancient Mediterranean world. Since the 18th century Gibraltar has been a symbol of British naval strength, and it is commonly known in that context as "the Rock." With the opening of the Suez Canal in 1869, Gibraltar increased in strategic importance, and its position as a provisioning port was greatly enhanced. Since World War II the British military garrison and naval dockyard have continued to be an important part of Gibraltar's economy, and naval operations of the North Atlantic Treaty Organization (NATO) often use the port facilities.

Gibraltar is a colony of the United Kingdom and is self-governing in all matters but defense. In 1981 Gibraltarians were granted full British citizenship; Gibraltarians of both sexes over 18 years of age and British civilians resident for more than six months are entitled to vote. The governor, appointed by the British sovereign, is the head of the executive and is advised by the Gibraltar Council. The governor appoints the Council of Ministers, composed of the chief minister and up to eight other ministers, from the party or coalition of parties that gains a majority of seats in the House of Assembly. The House of Assembly consists of the speaker (appointed by the governor), 15 members elected to four-year terms, and 2 ex-officio members. Instead of a city council, one minister is responsible for municipal affairs.

Because of lack of space on the peninsula, there is no agriculture. There is a small amount of light industry—tobacco, beverages, canning—but the main sources of income are the provisioning of ships and military personnel, tourism, and the re-export trade. Large-scale expansion of hotel and beach facilities has been undertaken to stimulate tourism. The port facilities occupy most of the western shore and a portion of land reclaimed from the sea. Income and customs taxes produce most of the colony's revenue. The United Kingdom supplies a significant amount of development aid. Principal expenditures include social services, public works, and municipal services. Gibraltar joined the European Economic Community with the United Kingdom in 1973.

Passenger and cargo vessels stop at Gibraltar's port, and a car ferry crosses daily to Tangier, Mor. There are regular flights linking Gibraltar to London and Tangier. The peninsula has a road system and a system of tunnels within the Rock for vehicular traffic. A cable car ascends to the central summit of the ridge.

Two-thirds of the population are Gibraltarians—those born in Gibraltar before 1925 and their descendants. About one-fifth are resident aliens, and the remainder are the families of British military personnel. Only Gibraltarians have the right to live in the colony. All others must obtain residence permits. Most Gibraltarians are of mixed Genoese, British, Spanish, Maltese, and Portuguese descent. The alien community includes Indian shopkeepers and their families and workers from Morocco.

The majority of the population belongs to the Roman Catholic Church. The Anglican bishopric also covers communities in southern Europe. The small Jewish community is of Sephardic descent. Spanish is the language of most homes, although most Gibraltarians are bilingual in English and Spanish.

Education is free and compulsory between the ages of 5 and 15. Educational facilities include several government primary schools and two comprehensive secondary schools. There are also private and military institutions, a school for handicapped children, and a technical college.

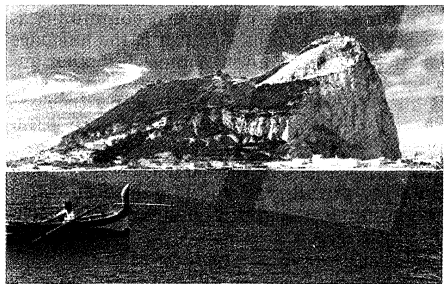
Excavations of limestone caves in the Rock have revealed that Gibraltar was sporadically inhabited from prehistoric times. The Muslim commander Ṭāriq ibn Ziyād captured Gibraltar in AD 711, and the site was thereafter held as a fortress by all its successive occupiers. The Muslim occupation was permanently ended by the Spanish in 1462, and Isabella I annexed Gibraltar to Spain in 1501. But in 1704, during the War of the Spanish Succession, Sir George Rooke captured Gibraltar for the British, and Spain formally ceded it to Britain under the terms of the Treaty of Utrecht in 1713. The Spanish nevertheless made several attempts to retake Gibraltar from Britain, most notably in a protracted but unsuccessful military siege that lasted from 1779 to 1783. In 1830 Gibraltar became a British crown colony. The opening of the Suez Canal (1869) heightened British determination to keep possession of Gibraltar, since the Mediterranean was now the main route to Britain's colonies in East Africa and southern Asia.

Early in the 20th century the Rock was tunneled to facilitate communication between the peninsula's east and west sides, and the excavated material was used to reclaim 64 acres (26 hectares) from the sea and thus expand the area of the cramped settlement. Gibraltar was a vital repair and assembly point for Allied convoys during the world wars. In the 1960s the Spanish government stepped up its demands for the "decolonization" of Gibraltar. A referendum that Britain held in Gibraltar in 1967 gave the colony's residents a choice of opting either for Spanish sovereignty or for continued close association with Britain; the result was an overwhelmingly pro-British vote (12,138 votes to 44). The new constitution that Britain introduced for Gibraltar in 1969 explicitly reaffirmed Gibraltar's link with Britain while also granting it full internal self-government. Spain responded by closing its border with Gibraltar, thus depriving the colony of its Spanish trade and a labour force of Spanish commuters. Spain lifted its border blockade in 1985. Pop. (1986 est.) 28,843.

Gibraltar, Strait of, Latin FRETUM HERCULEUM, channel connecting the Mediterranean Sea with the Atlantic Ocean, lying between southernmost Spain and northwesternmost Africa. It is 36 miles (58 km) long and narrows to 8 miles (13 km) in width between Point Marroquí (Spain) and Point Cires (Morocco). The strait's western extreme is 27 miles (43 km) wide between the capes of Trafalgar (north) and Spartel (south), and the eastern extreme is 14 miles (23 km) wide between the Pillars of Hercules—which have been identified as the Rock of Gibraltar (north) and Mount Hacho, just east of Ceuta, a Spanish enclave in Morocco (south). The strait is an important gap, averaging 1,200 feet (365 m) in depth in the arc formed by the Atlas Mountains of North Africa and the high plateau of Spain.

The winds in the strait tend to be either easterly or westerly. Shallow cold-air masses,

invading the western Mediterranean from the north, often stream through as a low-level, high-speed easterly wind, known locally as a levanter. There is also a significant exchange



The Rock of Gibraltar
Hans Huber

of water through the strait. A two-knot surface current flows eastward through the centre of the channel, except when affected by easterly winds. This surface movement exceeds a westward flow of heavier, colder, and more saline water, which takes place below a depth of about 400 feet. Thus, only the existence of the strait prevents the Mediterranean from becoming a shrinking salt lake.

The Pillars of Hercules marked the western end of the classical world. Of great strategic and economic importance, the strait was used by many early Atlantic voyagers and has continued to be vital to southern Europe, northern Africa, and western Asia as a shipping route. Much of the area's history involved rivalry over control of the Rock of Gibraltar.

Gibran, Khalil, Gibran also spelled JIBRAN, Arabic name in full JUBRĀN KHALĪL JUBRĀN (b. Jan. 6, 1883, Bsharrī, Lebanon—d. April 10, 1931, New York City), Lebanese-American philosophical essayist, novelist, mystic poet, and artist.

Having received his primary education in Beirut, Gibran immigrated with his parents to Boston in 1895. He returned to Lebanon in 1898 and studied in Beirut, where he excelled in the Arabic language. On his return to Boston in 1903, he published his first literary essays and met Mary Haskell, who was to be his benefactor all his life. In 1912 Gibran settled in New York City and devoted himself to writing literary essays and short stories, both in Arabic and in English, and to painting.

Gibran's literary and artistic output is highly romantic in outlook and was influenced by the Bible, Friedrich Nietzsche, and William Blake. His writings in both languages, which deal with such themes as love, death, nature, and a longing for the homeland, are full of lyrical outpourings and are expressive of Gibran's deeply religious and mystic nature.

Gibran's principal works in Arabic are: *ʿArāʾis al-Murūj* (1910; *Nymphs of the Valley*); *Damʿah wa Ibtisāmah* (1914; *A Tear and a Smile*); *al-Arwāḥ al-Mutamarridah* (1920; *Spirits Rebellious*); *al-Ajniḥah al-Mutakassirah* (1922; "Broken Wings"); *al-Awasif* (1923; "The Storms"); and *al-Mawākib* (1923; "The Processions"), poems. His principal works in English are *The Madman* (1918), *The Forerunner* (1920), *The Prophet* (1923), *Sand and Foam* (1926), and *Jesus, the Son of Man* (1928).

Gibson, Althea (b. Aug. 25, 1927, Silver, S.C., U.S.), American tennis player who dominated women's competition in the late 1950s. She was the first black to win the Wimbledon and U.S. singles championships.

Gibson grew up in Harlem in New York City and in 1950 became the first black athlete to play Forest Hills, narrowly losing to third-seeded Louise Brought in the second round. She graduated from Florida Agricultural and Mechanical University, Tallahassee, in 1953, and rose to sudden prominence in 1956, becoming the first black to win a major title—the Wimbledon doubles—as well as the French singles and doubles and the Italian singles. She went on to win the Wimbledon singles and doubles and the U.S. singles in 1957–58, as well as the U.S. mixed doubles and the Australian women's doubles (in 1957).

Gibson turned professional in 1958, but women's professional tennis at that time offered few tournaments and prizes. After winning the U.S. professional women's title in 1960, she became a professional golfer in 1963, with moderate success. She married William Darben in 1965 and attempted professional tennis again, after open tennis started in 1968, but without much success. In 1971 she was elected to the National Lawn Tennis Hall of Fame. In 1975 she was named athletic director for the state of New Jersey.

Gibson, Bob, byname of ROBERT GIBSON (b. Nov. 9, 1935, Omaha, Neb., U.S.), U.S. professional National League right-handed baseball pitcher, who was at his best in crucial games. In nine World Series games, he won seven and lost two.

At Omaha Technical High School Gibson was a star in basketball and track, as well as a baseball catcher. He played basketball and baseball at Creighton University (Omaha) as a shortstop and outfielder. He was signed to a contract by the St. Louis Cardinals in 1957 and played with their minor league teams until 1959. A regular with the Cardinals from 1961, he won 20 games in 1965 and 22 (including 13 shutouts) in 1968; he led the league with 23 victories in 1970. In 1968 he started 34 games, completed 28, and had an earned run average of 1.12. He pitched quickly, and his best pitches were a fastball and a slider. In his career he had 3,117 strikeouts, the first pitcher to accumulate more than 3,000 since Walter Johnson in the 1920s. He retired as a player in 1975 and was elected to the Baseball Hall of Fame in 1981.

Gibson, Charles Dana (b. Sept. 14, 1867, Roxbury, Mass., U.S.—d. Dec. 23, 1944, New York City), artist and illustrator, whose Gibson girl drawings delineated the American ideal of femininity at the turn of the century.

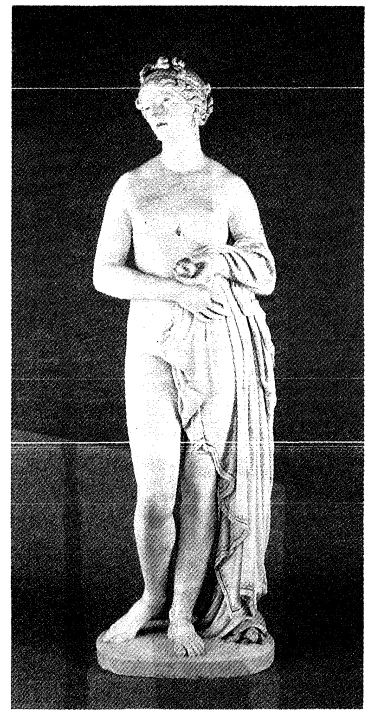
After studying for a year at the Art Students' League in New York City, Gibson began contributing to the humorous weekly *Life*. His Gibson girl drawings, modeled after his wife, followed and had an enormous vogue. Gibson's facile pen-and-ink style, characterized by a fastidious refinement of line, was widely imitated and copied. His popularity is attested by the fact that *Collier's Weekly* paid him

"School Days," drawing by Charles Dana Gibson, 1899, from *A Collection of the Published Works of Charles Dana Gibson*, 1907
By courtesy of Langhorn Gibson

$50,000, said at the time to have been the largest amount ever paid to an illustrator, for which Gibson rendered a double-page illustration every week for a year, usually of comic or sentimental situations of the day.

In 1905 he withdrew from illustrative work to devote himself to portraiture in oil, which he had already taken up; but within a few years he again returned to illustration. He also illustrated books, notably *The Prisoner of Zenda*, and published a number of books of his drawings. *London as Seen by C.D. Gibson* (1895–97), *People of Dickens* (1897), and *Sketches in Egypt* (1899) were editions of travel sketches. The books of his famed satirical drawings of "high society" included *The Education of Mr. Pipp* (1899), *Americans* (1900), *A Widow and Her Friends* (1901), *The Social Ladder* (1902), and *Our Neighbors* (1905).

Gibson, John (b. June 19, 1790, Gyffin, Caernarvonshire, Wales—d. Jan 27, 1866, Rome), British Neoclassical sculptor who attempted to revive the ancient Greek practice of tinting marble sculptures.



"Tinted Venus," tinted marble sculpture by John Gibson, 1851–55; in the Walker Art Gallery, Liverpool
By courtesy of the Walker Art Gallery, Liverpool

In 1804 Gibson was apprenticed to a monument mason in Liverpool, where he remained until 1817. One of his first Royal Academy submissions, "Psyche Borne on the Wings of Zephyrus" (1816), was praised by John Flaxman, who persuaded him to go to Rome in 1817. There he was befriended by Antonio Canova, and he was also instructed after 1822 by Bertel Thorvaldsen.

Invoking the ancient Greek practice of painting skin colour and facial details onto carved marble figures, Gibson introduced colour onto a statue of Queen Victoria done for Liverpool in 1847, tinting only the diadem, sandals, and robe hem. A repetition of the 1833 "Cupid Tormenting the Soul" was, however, completely coloured, and the best known example of this polychromy was the "Tinted Venus" (1851–55), which caused a sensation when it was exhibited in London in 1862. Gibson's tinted sculptures are now regarded as mildly unpleasant, and they no doubt fall short of the vanished Greek practices that Gibson sought to imitate. Gibson was made a full member of the Royal Academy in 1838.

Gibson, Josh (b. Dec. 21, 1911, Buena Vista, Ga., U.S.—d. Jan. 20, 1947, Pittsburgh), American professional baseball player called the black Babe Ruth, one of the greatest players kept from the major leagues by the unwritten rule (enforced until the year of his death) against black ballplayers.

Gibson played as a catcher for the Pittsburgh Crawfords (1927–29, 1932–36) and the Homestead (Pa.) Grays (1930–31, 1937–46). Although precise records do not exist, he is believed to have led the Negro National League in home runs for 10 consecutive seasons and to have had a career batting average of .347. His catching ability was praised by Walter Johnson and other major league stars against whom he played in exhibition games. Gibson was elected to the Baseball Hall of Fame in 1972.

Gibson, Wilfred Wilson (b. Oct. 2, 1878, Hexham, Northumberland, Eng.—d. May 26, 1962, Virginia Water, Surrey), British poet who drew his inspiration from the workaday life of ordinary provincial English families.

Gibson was educated privately, served briefly in World War I, and thereafter devoted his life to poetry. A period in London in 1912 brought him into contact with Lascelles Abercrombie, Rupert Brooke, John Drinkwater, and other Georgian poets, with whom he founded the short-lived poetry magazine *New Numbers.* In 1917 he made a long lecture tour of the United States. His first poem had appeared in *The Spectator* in 1897, but it was with his realistic presentation of the lives of country folk in *Stonefolds* and *On the Threshold* (both 1907) that he first exploited the themes of contemporary life which distinguished his major works. These included *Daily Bread* (a series of 18 short verse plays, 1910), the narrative poem *Fires* (1912), *Borderlands* (1914), *Livelihood* (1917), *Krindlesyke* (1922), *Kestrel Edge* (1924), *Coming and Going* (1938), and *The Outpost* (1944). His last work, *Within Four Walls,* five short plays about border-country families, appeared in 1950.

Gibson, William Hamilton (b. Oct. 5, 1850, Sandy Hook, Conn., U.S.—d. July 16, 1896, Washington, Conn.), American illustrator, author, and naturalist.

Gibson had sketched flowers and insects when he was only eight years old, had long been interested in botany and entomology, and had acquired great skill in making wax flowers. His first drawings, of a technical character, were published in 1870. He rapidly became an expert illustrator and a remarkably able wood engraver, while also practicing lithography with great success. He drew for many periodicals, his most popular works being a long series of nature articles published in *Harper's Weekly, Scribner's Monthly,* and *Century.* Gibson was an expert photographer, and his drawings had a nearly photographic and almost microscopic accuracy of detail. He was perfectly at home in black-and-white, but rarely (and feebly) used colours.

Gibson Desert, arid zone in the interior of Western Australia. The desert lies south of the Tropic of Capricorn between the Great Sandy Desert (north), the Great Victoria Desert (south), the Northern Territory border (east), and Lake Disappointment (west). The area now constitutes Gibson Desert Nature Reserve, and is a home to many desert animals. A vast, dry region of sandhills and *Triodia* desert grass, it was penetrated in 1874 by Ernest Giles and was first crossed by him in 1876. It was named for Alfred Gibson, a member of Giles's expedition, who was lost while searching for water.

Gichtel, Johann Georg (b. May 4/14, 1638, Imperial Free City of Regensburg—d. Jan. 21, 1710, Amsterdam), Protestant visionary and theosophist, who promoted the quasi-pantheistic teaching of the early 17th-century Lutheran mystic Jakob Böhme and compiled the first complete edition of Böhme's works (1682–83, 10 vol.). Alienated from orthodox Lutheran doctrine and worship by his ascetic tendency (with the accent on celibacy) and by his ambiguous mysticism oscillating between monism and dualism, Gichtel founded a small sect that survived in Holland and Germany until recent times. He synthesized his teaching in *Theosophia Practica* (1701–22; "Practical Theosophy").

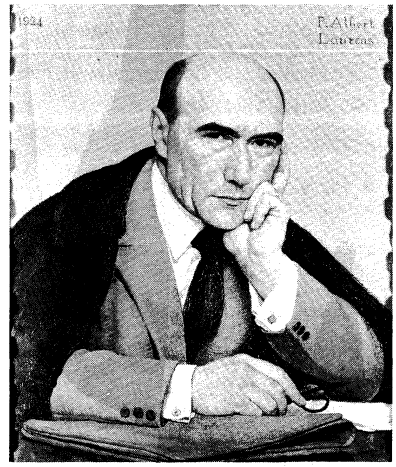
giddha, also spelled GIDDA, traditional pastoral dance performed by women of the Punjab, India, and Pakistan at festival times and at the sowing and reaping of the harvest. Patterned on a circle, it is notable for the bodily grace of the women's movements (especially of the arms and hands) and for the charming melody that accompanies it.

Giddings, Franklin H(enry) (b. March 23, 1855, Sherman, Conn., U.S.—d. June 11, 1931, Scarsdale, N.Y.), sociologist, one of the first in the United States to turn sociology from a branch of philosophy into a research science dependent on statistics. He was noted for his doctrine of the "consciousness of kind," which he derived from Adam Smith's conception of "sympathy," or shared moral reactions. In Giddings' view, consciousness of kind fostered a homogeneous society and resulted from the interaction of individuals and their exposure to common stimuli. Some critics regarded consciousness of kind as a euphemism for the herd instinct.

As a journalist in Springfield, Mass., Giddings attracted attention with his writings on the social sciences. He succeeded Woodrow Wilson as professor of politics at Bryn Mawr College, Bryn Mawr, Pa., in 1888 and was professor of sociology at Columbia University from 1894 to 1928. In addition to Smith's concept of "sympathy," Auguste Comte's positivism and Herbert Spencer's social Darwinism influenced Giddings' sociology. His books include *The Principles of Sociology* (1896); *Studies in the Theory of Human Society* (1922), considered the best statement of his matured ideas; and *The Scientific Study of Human Society* (1924).

Gide, André(-Paul-Guillaume) (b. Nov. 22, 1869, Paris—d. Feb. 19, 1951, Paris), French writer, humanist, and moralist, who received the Nobel Prize for Literature in 1947.

Heritage and youth. Gide was the only child of Paul Gide and his wife, Juliette Rondeaux. His father was of southern Huguenot peasant stock; his mother, a Norman heiress, although Protestant by upbringing, belonged to a northern Roman Catholic family long established at Rouen. When Gide was eight he was sent to the École Alsacienne in Paris, but his education was much interrupted by neurotic bouts of ill health. After his father's early death in 1880, his well-being became the chief concern of his devoutly austere mother; often kept at home, he was taught by indifferent tutors and by his mother's governess. While in Rouen Gide formed a deep attachment for his cousin, Madeleine Rondeaux.



Gide, oil painting by P.A. Laurens, 1924; in the National Museum of Modern Art, Paris

© A.D.A.G.P. 1970; photograph, Giraudon—Art Resource/EB Inc.

Gide returned to the École Alsacienne to prepare for his *baccalauréat* examination, and after passing it in 1889, he decided to spend his life in writing, music, and travel. His first work was an autobiographical study of youthful unrest entitled *Les Cahiers d'André Walter* (1891; *The Notebooks of André Walter*). Written, like most of his later works, in the first person, it uses the confessional form in which Gide was to achieve his greatest successes.

Symbolist period. In 1891 a school friend, the writer Pierre Louÿs, introduced Gide into the poet Stéphane Mallarmé's famous "Tuesday evenings," which were the centre of the French Symbolist movement, and for a time Gide was influenced by Symbolist aesthetic theories. His works "Narcissus" (1891), *Le Voyage d'Urien* (1893; *Urien's Voyage*), and "The Lovers' Attempt" (1893) belong to this period.

In 1893 Gide paid his first visit to North Africa, hoping to find release there from his dissatisfaction with the restrictions imposed by his puritanically strict Protestant upbringing. Gide's contact with the Arab world and its radically different moral standards helped to liberate him from the Victorian social and sexual conventions he felt stifled by. One result of this nascent intellectual revolt against social hypocrisy was his growing awareness of his own homosexual inclinations. The lyrical prose poem *Les Nourritures terrestres* (1897; *Fruits of the Earth*) reflects Gide's personal liberation from the fear of sin and his acceptance of the need to follow his own impulses, however unconventional they may be. But after he returned to France, Gide's relief at having shed the shackles of convention evaporated in what he called the "stifling atmosphere" of the Paris salons. He satirized his surroundings in *Marshlands* (1894)—a brilliant parable of animals who, living always in dark caves, lose their sight because they never use it.

In 1894 Gide returned to North Africa, where he met Oscar Wilde and Lord Alfred Douglas, who encouraged him to admit the nature of his suppressed homosexuality. He was recalled to France because of his mother's illness, however, and she died in May 1895.

In October 1895 Gide married his cousin Madeleine, who had earlier refused him. Early in 1896 he was elected mayor of the commune of La Roque—at 27 the youngest mayor in France. He took his duties seriously but managed to complete *Fruits of the Earth.* It was published in 1897 and fell completely flat, although after World War I it was to become Gide's most popular and influential work. In the postwar generation, its call to each individual to express fully whatever is in him evoked an immediate response.

Great creative period. Le Prométhée mal enchaîné (1899; *Prometheus Misbound*), a return to the satirical style of *Urien's Voyage* and *Marshland,* is Gide's last discussion of man's search for individual values. His next tales mark the beginning of his great creative period. *L'Immoraliste* (1902; *The Immoralist*), *La Porte étroite* (1909; *Strait Is the Gate*), and *La Symphonie pastorale* (1919; "The Pastoral Symphony") reflect Gide's attempts to achieve harmony in his marriage in their treatment of the problems of human relationships. They mark an important stage in his development: adapting his works' treatment and style to his concern with psychological problems.

The Immoralist and *Strait Is the Gate* are in the prose form which Gide termed a *récit; i.e.,* a studiedly simple but deeply ironic tale in which a first-person narrator reveals the inherent moral ambiguities of life by means of his seemingly innocuous reminiscences. In these works Gide achieves a mastery of classical construction and a pure, simple style.

During most of this period Gide was suffering deep anxiety and distress. Although his love for Madeleine had given his life what he called its "mystic orientation," he found himself unable, in a close, permanent relationship, to reconcile this love with his need for freedom and for experience of every kind. *Les Caves du Vatican* (1914; *The Vatican Swindle*) marks the transition to the second phase of Gide's great creative period. He called it not a tale but a *sotie,* by which he meant a satirical work whose foolish or mad characters are treated farcically within an unconventional narrative structure. This was the first of his works to be violently attacked for anticlericalism.

In the early 1900s Gide had already begun to be widely known as a literary critic, and in 1908 he was foremost among those who founded *La Nouvelle Revue Française,* the literary review that was to unite progressive French writers until World War II. During World War I Gide worked in Paris, first for the Red Cross, then in a soldiers' convalescent home, and finally in providing shelter to war refugees. In 1916 he returned to Cuverville, his home since his marriage, and began to write again.

The war had intensified Gide's anguish, and early in 1916 he had begun to keep a second *Journal* (published in 1926 as *Numquid et tu*) in which he recorded his search for God. Finally, however, unable to resolve the dilemma (expressed in his statement "Catholicism is inadmissible, Protestantism is intolerable; and I feel profoundly Christian"), he resolved to achieve his own ethic, and by casting off his sense of guilt to become his true self. Now, in a desire to liquidate the past, he began his autobiography, *Si le grain ne meurt* (1926; *If It Die . . .*), an account of his life from birth to marriage that is among the great works of confessional literature. In 1918 his friendship for the young Marc Allégret caused a serious crisis in his marriage, when his wife in jealous despair destroyed her "dearest possession on earth"—his letters to her.

After the war a great change took place in Gide, and his face began to assume the serene expression of his later years. By the decision involved in beginning his autobiography and the completion in 1918 of *Corydon* (a Socratic dialogue in defense of homosexuality begun earlier), he had achieved at last an inner reconciliation. *Corydon's* publication in 1924 was disastrous, though, and Gide was violently attacked, even by his closest friends.

Gide called his next work, *Les Faux-Monnayeurs* (1926; *The Counterfeiters*), his only novel. He meant by this that in conception, range, and scope it was on a vaster scale than his tales or his *sotie*s. It is the most complex and intricately constructed of his works, dealing as it does with the relatives and teachers of a group of schoolboys subject to corrupting influences both in and out of the classroom. *The Counterfeiters* treats all of Gide's favourite themes in a progression of discontinuous scenes and happenings that come close to approximating the texture of daily life itself.

In 1925 Gide set off for French Equatorial Africa. When he returned he published *Voyage au Congo* (1927; *Travels in the Congo*), in which he criticized French colonial policies. The compassionate, objective concern for humanity that marks the final phase of Gide's life found expression in political activities at this time. He became the champion of society's victims and outcasts, demanding more humane conditions for criminals and equality for women. For a time it seemed to him that he had found a faith in Communism. In 1936 he set out on a visit to the Soviet Union, but later expressed his disillusionment with the Soviet system in *Retour de l'U.R.S.S.* (1936; *Return from the U.S.S.R.*) and *Retouches à mon retour de l'U.R.S.S.* (1937; *Afterthoughts on the U.S.S.R.*).

Late works. In 1938 Gide's wife, Madeleine, died. After a long estrangement they had been brought together by her final illness. To him she was always the great—perhaps the only—love of his life. With the outbreak of World War II, Gide began to realize the value of tradition and to appreciate the past. In a series of imaginary interviews written in 1941 and 1942 for *Le Figaro,* he expressed a new concept of liberty, declaring that absolute freedom destroys both the individual and society: freedom must be linked with the discipline of tradition. From 1942 until the end of the war Gide lived in North Africa. There he wrote "Theseus," whose story symbolizes Gide's realization of the value of the past: Theseus returns to Ariadne only because he has clung to the thread of tradition.

In June 1947 Gide received the first honour of his life: the Doctor of Letters of the University of Oxford. It was followed in November by the Nobel Prize for Literature. In 1950 he published the last volume of his *Journal,* which took the record of his life up to his 80th birthday. All Gide's writings illuminate some aspect of his complex character. He is seen at his most characteristic, however, in the *Journal* he kept from 1889, a unique work of more than a million words in which he records his experiences, impressions, interests, and moral crises during a period of more than 60 years. After its publication he resolved to write no more.

Gide's lifelong emphasis on the self-aware and sincere individual as the touchstone of both collective and individual morality was complemented by the tolerant and enlightened views he expressed on literary, social, and political questions throughout his career. For most of his life a controversial figure, Gide was long regarded as a revolutionary for his open support of the claims of the individual's freedom of action in defiance of conventional morality. Before his death he was widely recognized as an important humanist and moralist in the great 17th-century French tradition. The integrity and nobility of his thought and the purity and harmony of style that characterize his stories, verse, and autobiographical works have ensured his place among the masters of French literature.

MAJOR WORKS. *Collections: Oeuvres complètes,* 15 vol. (1932–39; index, 1954), still awaiting completion but including items unpublished elsewhere; *Romans, récits et soties, oeuvres lyriques* (1958), collected fiction, with commentary and textual notes; *Théâtre* (1947; *My Theater,* 1951); *The André Gide Reader* (1971).

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Drama: Philoctète (1899; "Philoctetes," in *The Return of the Prodigal,* 1953); *Le Roi Candaule* (1901; "King Candaules," in *My Theater,* 1951); *Saül* (1903; Eng. trans. in *The Return of the Prodigal,* 1953); *Bethsabé* (1912; "Bathsheba," in *The Return of the Prodigal,* 1953); *Oedipe* (1931; "Oedipus," in *Two Legends: Oedipus and Theseus,* 1950); *Perséphone* (1934; Eng. trans. in *My Theater,* 1951); *Le Treizième arbre* (1935); *Robert, ou l'intérêt général* (1944-45); *Le Retour* (1946); *Les Caves du Vatican* (1950).

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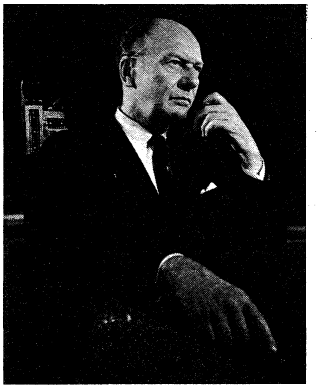
Criticism: Germaine Brée, *Gide* (1963); Wallace Fowlie, *André Gide: His Life and Art* (1965), an interesting account of the development of Gide's thought; Albert J. Guérard, *André Gide,* 2nd ed. (1969), a critical study by a specialist on Gide; Justin O'Brien, *Portrait of André Gide* (1953, reprinted 1977); Enid Starkie, *André Gide* (1953), a sympathetic brief guide based on a long friendship with Gide; George W. Ireland, *André Gide: A Study of His Creative Writings* (1970), a discussion of his novels.

Gideon, also spelled GEDEON, also called JERUBBAAL, or JEROBAAL, a judge and heroliberator of Israel whose deeds are described in the Book of Judges. The author apparently juxtaposed two traditional accounts from his sources in order to emphasize Israel's monotheism and its duty to destroy idolatry. Accordingly, in one account Gideon led his clansmen of the tribe of Manasseh in slaying the Midianites, a horde of desert raiders; but, influenced by the cult of his adversaries, he fashioned an idolatrous image from the booty and induced Israel into immorality. In the parallel version he replaced the idol and altar of the local deity Baal with the worship of Yahweh, the God of Israel, who consequently inspired Gideon and his clan to destroy the Midianites and their chiefs as a sign of Yah-

weh's supremacy over Baal. The story is also important for showing the development of a monarchy in Israel under Gideon's son Abimelech.

Gideons International, organization of Christian business and professional laymen that places copies of the Bible in hotel rooms, hospitals, penal institutions, and schools. Organized by three travelling men in Janesville, Wis., July 1, 1899, the association began placing Bibles in November 1908. During World War II the Gideons supplied the U.S. armed forces with service Testaments. The work is supported through freewill offerings. Their emblem is a two-handled pitcher and torch, in memory of Gideon's victory over the Midianites (Judg. 7).

Gielgud, Sir (Arthur) John (b. April 14, 1904, London), English actor, producer, and director, considered one of the greatest performers of his generation on stage and screen, particularly as a Shakespearean actor. He was knighted in 1953 for services to the theatre.



Gielgud

By courtesy of CBS Television Network Press Information

Gielgud, the grandnephew of the celebrated English actress Ellen Terry, was educated at Westminster School and at the Royal Academy of Dramatic Art, London. After his debut in 1921 at the Old Vic Theatre, London, he later played Romeo at the Regent Theatre, London, in 1924. He made his first appearance in New York City at the Majestic Theatre in 1928. After affiliations with the Oxford Playhouse, he joined the Old Vic company, for which his performance in 1929 as Hamlet established his reputation as one of England's most promising actors. A series of impressive Shakespearean performances followed. His greatest early success was probably as Richard II in the play by that name, which he also directed.

An actor of considerable versatility with a superbly controlled speaking voice, Gielgud performed in such diverse plays as Richard Brinsley Sheridan's *School for Scandal,* Oscar Wilde's *Importance of Being Earnest,* Anton Chekhov's *Seagull,* Graham Greene's *Potting Shed,* and Edward Albee's *Tiny Alice.* He directed the repertory seasons of 1937–38 at the Queen's Theatre, London, and of 1944–45 at the Haymarket Theatre, London.

Ill at ease with the new English drama of the late 1950s, he appeared chiefly in classical revivals and in a solo recital of passages from Shakespeare, *Ages of Man* (1959), touring with this production throughout much of the world. In later years, however, he was acclaimed for his performances in contemporary plays, notably *Home* (1970), by David Storey, and *Veterans* (1972), by Charles Wood. He made many television appearances and was featured in numerous films, including *Arthur* (1981), for which he received an Academy Award for best supporting actor. He also directed for the stage.

His autobiography *Early Stages* was published in 1938, a revised edition in 1976; *Stage Directions,* a collection of speeches and essays, in 1963; and *Distinguished Company,* detailing some of his "youthful enthusiasms" for stars of stage and screen, in 1972. *Gielgud: An Actor and His Time* (1980) is a collaboration with John Mills and John Powell.

Gierek, Edward (b. Jan. 6, 1913, Porąbka, Pol., Austria-Hungary), Communist Party organizer and leader in Poland, who served as first secretary from 1970 to 1980.

After his father, a coal miner, was killed in a mine disaster in Silesia, Gierek emigrated with his mother to France, where in 1931 he joined the French Communist Party. In 1937 he joined the Belgian Communist Party and there during World War II he reputedly was a leader of a group of Poles in the anti-Nazi underground.

Gierek returned to Poland in 1948 and organized the party in Upper Silesia, Poland's most industrialized region. In 1954 he was named director of Poland's heavy industry department and two years later was elevated into the 11-man Politburo. Differing from the "Moscow" faction of the party, Gierek favoured a certain amount of "national reconciliation," or adaptation of the Soviet party line to national and cultural circumstances. When angered industrial workers began rioting to protest a substantial rise in food prices announced by party leader Władysław Gomułka just before the Christmas holidays in 1970, Gierek took over (December 20) as the first secretary of the party's Central Committee with a promise to improve the "material situation" of families and reevaluate the government's economic policies.

In September 1980 Gierek, faced with another outburst of demonstrations by workers, lost his place as first secretary to Stanisław Kania; in 1981 Gierek was expelled from the party.

Gierke, Otto Friedrich von (b. Jan. 11, 1841, Stettin, Prussia—d. Oct. 10, 1921, Berlin), legal philosopher who was a leader of the Germanist school of historical jurisprudence in opposition to the Romanist theoreticians of German law (*e.g.,* Friedrich Karl von Savigny). An incomplete knowledge of his work led some advocates of a pluralistic, decentralized political system to claim him as their spokesman.

Gierke was a professor at Breslau (1871–84), Heidelberg (1884–87), and Berlin (1887–1921). He criticized the first draft (1888) of a new German civil law code for what he considered the gratuitous addition of Roman law elements to an indigenous Germanic content that was sufficient in itself. This controversy inspired his *Deutsches Privatrecht,* 3 vol. (1895–1917; "German Private Law").

Gierke believed that the ideal state was a synthesis of *Genossenschaften* (cooperative associations) and *Herrschaften* (groups subordinated to an individual imperious will). Always a patriotic German, he thought that the *Reich* of Bismarck had nearly achieved that synthesis. His early preference for decentralized government influenced his pupil Hugo Preuss, chief draftsman of the German (Weimar Republic) Constitution of 1919. But Gierke, who had grown more authoritarian, attacked the document for its decentralizing tendency.

His emphasis on the voluntary nature of some associations had considerable effect on pluralist theory, especially in Great Britain, where his increasing desire for national unity was overlooked. The noted English jurist Frederic William Maitland's *Political Theories of the Middle Age* (1900) was a partial translation of Gierke's longest work, *Das deutsche Genossenschaftsrecht,* 4 vol. (1868–1913; "The German Law of Associations").

Giers, Nikolay Karlovich, Giers also spelled GIRS (b. May 21 [May 9, old style], 1820, Radzivilov, Volhynia region, Russia—d. Jan. 26 [Jan. 14, O.S.], 1895, St. Petersburg), statesman and foreign minister of Russia during the reign of Alexander III (ruled 1881–94). He guided Russia into a rapprochement

Giers, portrait by an unknown artist, *c.* 1884

H. Roger-Viollet

with France and thereby formed the basis of the Russo-Franco-British alliance that fought against the Central Powers in World War I.

Having entered the Asiatic department of the Russian foreign ministry in 1838, Giers held a variety of posts abroad. He then served as director of the Asiatic department and deputy minister of foreign affairs (1875–82).

In 1878, when Prince Aleksandr Gorchakov became incapable of performing his duties, Giers became acting foreign minister; he was formally appointed to that post on April 9 (March 28, O.S.), 1882. Although his major aim was to maintain Russia's alliance with Germany and Austria-Hungary (the Dreikaiserbund, or Three Emperors' League), Giers was unable to do so. A major Balkan crisis that began in September 1885 had greatly accentuated the divergent interests of Russia and Austria. When the Dreikaiserbund lapsed in 1887, Giers negotiated a new alliance with Germany only (the Reinsurance Treaty; 1887) but was unable to renew it in 1890.

Giers then considered forming an alliance with France. After arranging a series of French loans to Russia (1888–90), he supervised the conclusion of a formal Russo-French agreement, in which the two states pledged to consult each other in the event that war threatened (August 1891). Although a military convention was prepared the following year, Giers, who had hoped that Germany would respond by seeking a rapprochement, delayed formal approval of it until January 1894, when the convention was confirmed and the Franco-Russian alliance established.

Giesebrecht, (Friedrich) Wilhelm (Benjamin) von (b. March 5, 1814, Berlin—d. Dec. 18, 1889, Munich), German historian, author of the first general history of medieval Germany based on modern critical methods, and a student of Leopold von Ranke.

In 1857 Giesebrecht became professor at Königsberg and in 1862 succeeded Heinrich von Sybel at Munich. In *Geschichte der deutschen Kaiserzeit,* 6 vol. (1855–95; "History of the German Imperial Age," completed by B. von Simson), Giesebrecht concerned himself with political and religious aspects, ignoring legal, social, economic, and constitutional history. His romantic view of the emperors aroused controversy, notably with Sybel. Other works include *Jahrbücher des deutschen Reichs unter Otto II* (1840; "Annals of the German Empire under Otto II") and the restoration of the monastery records *Annales Altahenses* (1841).

Gieseking, Walter (Wilhelm) (b. Nov. 5, 1895, Lyon—d. Oct. 26, 1956, London), German pianist acclaimed for his interpretations of Debussy and Ravel.

The son of German parents living in France, Gieseking began study at the Hanover Municipal Conservatory in 1911 and made his debut in 1913. During World War I he was a regimental bandsman in the German Army. From the early 1920s he toured widely in Europe and the United States. He was known as an interpreter of Beethoven, Prokofiev, and Domenico Scarlatti, as well as of the French impressionists, and was an acknowledged master of pedal technique. His compositions include a set of variations and a sonata for flute and piano.

Accused of collaborating with the Nazis, he was an object of heated controversy after World War II; his 1949 recital in New York City was cancelled because of violent public protest. Officially de-Nazified by an Allied court in Germany, he successfully toured the United States in 1953. In 1955 he was seriously injured in a bus accident in Germany but resumed concert activity in 1956.

Giessen, *Regierungsbezirk* (administrative district), central Hesse *Land* (state), west-central Germany. Giessen is bordered by the *Länder* of Rhineland-Palatinate to the southwest and North Rhine-Westphalia to the northwest and by the *Regierungsbezirke* of Kassel to the north and east and Darmstadt to the south. The district occupies an area of 2,077 square miles (5,380 square km) and comprises part of the larger historic region of Hesse (*q.v.*). Giessen was created by an administrative reorganization in 1980, largely from the northern territory of Darmstadt and from a small portion of southwestern Kassel. The *Regierungsbezirk* takes its name from that of the second largest city and administrative seat of the district.

Giessen is dissected by the West Hessen Depression, a northern continuation of the fertile Wetterau lowland region of Darmstadt. The depression extends from Darmstadt into the Giessen Basin, passes northward through the narrow upper Lahn river valley to Marburg, the largest city of the district, and finally turns eastward toward the Schwalm Basin of Kassel. Potatoes, sugar beets, cereals, and hogs are raised in the depression, one of the district's few intensively farmed regions. West of the depression the eastern plateaus of the Middle Rhine Highlands, including from north to south the Rothaargebirge, Westerwald, and Taunus, rise to about 1,900 feet (600 m) in elevation along the district's fringes. The abundantly forested hills of the Burgwald and Gladenbacher Bergland lie between the Rothaargebirge and the depression. The slopes of the western uplands are covered by beech and spruce forests, pastureland used for cattle rearing, and scattered arable fields. The middle Lahn River drains westward toward the Rhine River, separating the Westerwald and Taunus plateaus. Near the western border the Lahn valley widens at the fertile loess-covered Limburg Basin, which is largely cultivated in wheat. East of the West Hessen Depression are the volcanic areas of the Hessen Central Uplands, including the conical mass of the Honer Vogelsberg (Honer Mountains), covering some 950 square miles, the largest continuous basalt area in Europe. The Vogelsberg is characterized by a drainage pattern that radiates from the Taufstein (2,539 feet [774 m]), the district's highest peak. The region's economy has been plagued by the abandonment of marginal farmland. The federal government has invested money to improve regional conditions and to help develop forestry, tourism, and a productive grass-based livestock industry.

The valleys of the Lahn River and its northern tributary the Dill are the most densely populated areas of Giessen, averaging between 500 and 1,300 persons per square mile (200 and 500 per square km). Industrial development is heaviest along the Dill, where local iron ore deposits are smelted and used in numerous metal-processing industries. Important optical industries are located in Wetzlar, Giessen, and Weilburg.

The majority of the population of Giessen *Regierungsbezirk* are of Hessian Frankish descent and speak the Rhenish Franconian dialect. About two-thirds are Protestant and one-third Roman Catholic. The rural settlement pattern of the West Hessen Depression and its fringes is one of irregular, compact villages with small, fragmented arable fields. Isolated farms and small hamlets are more common in the upland regions. Higher education in the district is centred at Philipps-Universität in Marburg and Justus-Liebig-Universität in Giessen. Pop. (1989 est.) 963,538.

Giessen, city, Hesse *Land* (state), west-central Germany, on the Lahn River between Westerwald and Vogelsberg (mountains). First mentioned in 1197, it was chartered in 1248 and sold to the landgraves of Hesse in 1267. It was part of independent Hesse-Marburg from 1567 until 1604, when it passed to Hesse-Darmstadt. Historic landmarks include the "new castle" (1533–37), the ruins of the old castle (14th century), and the Schiffenberg Monastery. In Giessen University (Justus-Liebig-Universität), founded in 1607, the laboratory of the famous chemist Justus von Liebig may still be seen. The Socialist Wilhelm Liebknecht, born in Giessen, attended the university. There are schools of agriculture and veterinary medicine and a university experimental farm. The Upper Hessian Museum and the botanical gardens are also noteworthy. Giessen is a busy traffic centre; its industries include the manufacture of machinery, textiles, pottery, and rubber, and tobacco products. Pop. (1989 est.) 71,751.

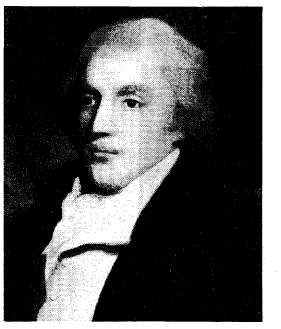
Gifford, Edward W(inslow) (b. Aug. 14, 1887, Oakland, Calif., U.S.—d. May 16, 1959, Berkeley, Calif.), U.S. anthropologist, archaeologist, and student of California Indian ethnography who developed the University of California Museum of Anthropology, Berkeley, into a major U.S. collection.

A competent naturalist, Gifford accompanied expeditions of the California Academy of Sciences and became assistant curator of ornithology (1904–12) of the Academy. His 44-year association (1912–56) with the Museum of Anthropology culminated in his directorship. On the California faculty from 1920, he became professor of anthropology in 1945.

Gifford's California Indian ethnographies are uncommonly rich in detail. Two of his works remain primary sources: *California Kinship Terminologies* (1922) and, on physical characteristics, *California Anthropometry* (1926). He also made an anthropological expedition to the Tonga Islands (1921) and wrote *Tongan Society* (1929). The organization of materials collected by himself and other researchers and the detailed information he provided on their cultural context constituted a notable achievement in museum work. Gifford is also credited with developing the concept of the lineage, an important idea in modern anthropology.

Later Gifford became increasingly interested in archaeology and contributed to the study of northwestern Mexico (1945–46). His Oceanian work led to important excavations in New Caledonia, Fiji, and Yap. He collaborated with anthropologist A.L. Kroeber on *World Renewal* (1949) and wrote *Archaeological Excavations in Fiji* (1951).

Gifford, William (b. April 1756, Ashburton, Devonshire, Eng.—d. Dec. 31, 1826, London), English satirical poet, classical scholar, and early editor of 17th-century English playwrights, remembered as first editor (1809–24) of *The Quarterly Review,* founded by John Murray, a leading London publisher, to combat the liberalism of *The Edinburgh Review.* Gifford owed his editorship to Sir Walter Scott's refusal of it, to Murray's regard for his judgment, and to his connection with the statesman George Canning on *The Anti-Jacobin* (1797–98), a weekly of which he had been editor and in which Canning and other Tories had ridiculed revolutionary principles.



William Gifford, detail of an oil painting by John Hoppner (1758–1810); in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Gifford, a self-important, small-minded man raised to a power to which his talents were unequal, offended eminent contributors by rewriting their literary reviews to introduce political abuse, so provoking William Hazlitt, a leading radical critic, to attack him in *A Letter to William Gifford, Esq.* (1819) and to immortalize him in a portrait etched in vitriol in *The Spirit of the Age* (1825).

Gifford's autobiography (1802) helps to explain his character. Orphaned at 11 and put to uncongenial work, he owed his education at Oxford University to patronage. In *The Baviad* (1791) and *The Maeviad* (1795), verse satires attacking the Della Cruscans, a group of minor English writers of the 1780s who took their name from the Italian Accademia della Crusca, he shows his resentment of those to whom entry to the world of letters, so difficult for him, had been undeservedly easy.

gift, in law, a present or thing bestowed gratuitously. The term is generally restricted to mean gratuitous transfers inter vivos (among the living) of real or personal property. A valid gift requires: (1) a competent donor; (2) an eligible donee; (3) an existing identifiable thing or interest; (4) an intention to donate; (5) delivery; *i.e.,* a transfer of possession to or for the donee and a relinquishment by the donor of ownership, control, and power to revoke (except in gifts mortis causa; *i.e.,* those that are made by someone believing himself to be near death and that become final only if the giver dies); and (6) acceptance by the donee. Formal acceptance is necessary under French law, but Anglo-American law acknowledges implied acceptance.

gift exchange, also called CEREMONIAL EXCHANGE, the transfer of goods or services that, although regarded as voluntary by the people involved, is part of the expected social behaviour. Gift exchange may be distinguished from other types of exchange in several respects: the first offering is made in a generous manner and there is no haggling between donor and recipient; the exchange is an expression of an existing social relationship or of the establishment of a new one that differs from impersonal market relationships; and the profit in gift exchange may be in the sphere of social relationships and prestige rather than in material advantage.

The gift-exchange cycle entails obligations to give, to receive, and to return. Sanctions may exist to induce people to give, disapproval or loss of prestige resulting from a failure to do so. Refusal to accept a gift may be seen as

refusal of social relations and may lead to enmity. The reciprocity of the cycle rests in the obligation to return the gift; the prestige associated with the appearance of generosity dictates that the value of the return be approximately equal to or greater than the value of the original gift.

The French anthropologist Marcel Mauss made the first extended application of the idea of gift exchange to various aspects of social life, stressing the social concomitants of the exchange rather than its economic functions. A gift exchange may not only provide a recipient with what amounts to credit for a period but also validates, supports, and expresses a social relationship in terms of the status of those concerned. The concept of reciprocity behind gift exchange has been extended into the field of ritual and religion. Thus, some sacrifices may be viewed as gifts to supernatural powers from which a return in the form of aid and approval is expected. Reciprocal social relations, as in the transfer of women in marriage between kin groups, is similar in terms of obligations and types of relationships to gift exchange. Gift exchange such as the potlatch (*q.v.*) of the Northwest Pacific coast Indians has also been analyzed as an adaptive subsistence aspect of a socioeconomic system allowing for redistribution of surplus wealth and food in certain ecological settings. *See also* kula.

gift tax, a levy imposed on gratuitous transfers of property, *i.e.,* those made without compensation. Provisions for such taxes are common in national tax systems.

A brief treatment of gift taxes follows. For full treatment, *see* MACROPAEDIA: Taxation.

In the tax systems of many nations, gift taxes are integrated to some degree with a death tax (*q.v.*). The relationship stems not only from the fact that gifts and bequests share the quality of gratuity, but also from the practical consideration that gifts are often resorted to as a means of avoiding death taxes. Where the two are more or less integrated they may be thought of as constituting an "accessions" tax.

Like death taxes, gift taxes are of little significance in the generation of revenue. They serve a symbolic function in reminding the parties to a transfer of property that the legal structure within which such transfers are possible and protected is a creature of the state. A more important function, and in some nations the explicit rationale for gift taxes, is to stem the use of gifts as a means of avoiding death taxes. Canada, Sweden, Germany, and France are examples of nations whose tax systems treat all gratuitous transfers alike. By contrast, the United Kingdom has none. In the United States liberal exemptions leave most gifts free of tax, while whose that are taxed are subject to three-quarters of the estate tax rate. An exception is made for "gifts made in contemplation of death," or in other words those made to avoid death taxes, but difficulties of proof arise in such cases.

Exemptions from the tax are commonly granted for gifts made to charitable, educational, or other qualifying institutions. Such exemptions are expressions of social policy. Similarly, Canadian law exempts all transfers between spouses from gift taxes, although transfers to children are taxed.

gifted child, any of various children who are naturally endowed with a high degree of mental ability. Since little is known about special abilities, the term is usually confined in psychological and educational writings to a child whose innate general ability rises above a certain specified borderline. The borderline itself is largely a matter of administrative convenience. In the United States the most common cutoff point is an intelligence quotient (IQ) of 130–135. This corresponds to the borderline generally adopted in Britain for scholarships to secondary (grammar) schools in the early days of scholarship examinations. Some U.S. school systems, however, place it as low as 120 IQ.

Identification. In countries that make special provision for educating gifted pupils, the most common method of selection consists of written tests administered to the children sitting in groups. Unless carefully checked, the marks obtained in this way are liable at times to be misleading. The best indications of the pupils' relative merits are, or should be, those provided by the teachers themselves, supplemented by the data contained in cumulative school records.

Characteristics. Although standard IQ tests are the most commonly used standards to distinguish gifted children, tests that evaluate both intelligence and creativity are also used. One test developed by American psychologists M.A. Wallach and N. Kogan categorized children into four groups, with divisions for high and low intelligence and high and low creativity. Children with both high intelligence and high creativity appeared to exhibit the ability to entertain both control and freedom, adultlike and childlike modes, mature social awareness and direct responsiveness to other children.

Among the gifted children studied by U.S. psychologist Lewis Terman, "the incidence of physical defects and abnormal conditions generally was well below that reported in the general school population." By the age of 35, 80 percent had posts in the highest occupational groups (semi-professional or higher business) as contrasted with 14 percent of the ordinary population; 20 percent were already mentioned in *Who's Who in America* or *American Men of Science;* and some had achieved international reputations.

One of the greatest differences, according to Terman, was the greater drive to achieve and the greater mental and social adjustment of the gifted group as compared with the non-gifted.

Meeting educational needs. In theory there are two ways of educating children who are intellectually and academically more advanced than their peers: (1) acceleration, whereby the gifted child is promoted more rapidly through the ordinary series of grades or classes; (2) enrichment, whereby he works through the usual grades at the usual pace but the curriculum is supplemented by a variety of cultural activities. In practice the arrangements made must depend largely on the way the school system is organized.

Special schools or classes enable the gifted child to develop at his own accelerated pace. The instruction, method, and materials can be adapted to the needs of each individual, and, working with others who are quick and bright, each child is encouraged to put forth his best effort.

Special schooling has also provoked a number of criticisms. The segregation of children in special schools tends to create an intellectual aristocracy that is quite as objectionable as an aristocracy based on birth, wealth, or political power. Existing methods of selection are imperfect, and since the majority of the gifted are discovered in the higher economic classes, this segregation also exaggerates class distinctions. *See also* creativity; genius; prodigy.

To make the best use of the Britannica, consult the INDEX *first*

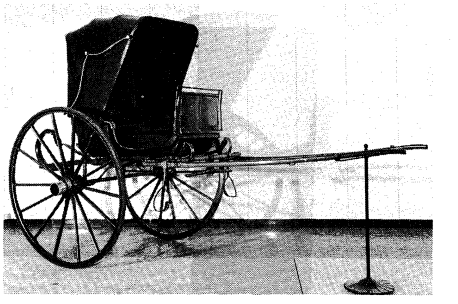
Gifu, city and prefecture (*ken*), central Honshu, Japan, occupying an area of 4,091 sq mi (10,596 sq km). It is landlocked and dominated by mountains except in the south, where the inner part of Nōbi-heiya (Nōbi Plain) is drained by the Nagara, Hida, and Kiso rivers. The plain supports most of the area's agriculture and contains the prefectural capital, Gifu, and other leading cities (Ōgaki, Seki, Mino). Economic ties with neighbouring Nagoya, Aichi Prefecture, are strong, and many industries (producing textiles, pottery, cutlery, automobiles, paper, machinery, and chemicals) are branches or subsidiaries of Nagoya com-

Traditional *gassho-zukuri* farmhouses, Gifu Prefecture, Japan
W.H. Hodge

panies. Forestry is the main occupation in the mountains.

Gifu city is noted for paper lantern manufacture and for trout fishing with cormorants in the summer. Takayama holds festivals (April and September) during which wheeled floats are paraded to the largest shrines in the town. Gifu University (1949) is located in Kamigahara city. There are numerous spas with hot springs, and recreation is provided at Chubu-sangaku National Park and Hida Kiso-gawa Quasi-national Park. Pop. (1983 est.) city, 410,044; prefecture, 2,001,000.

gig, any of several members of a class of light, open, two-wheeled, one-horse carriages, popu-



Gig, 1810; in the Smithsonian Institution, Washington, D.C.
By courtesy of the Smithsonian Institution, Washington, D.C.

lar in France, England, and America. The gig, which first appeared in Paris in the 17th century, is the ancestor of the cabriolet. Popular variations were the Tilbury gig and the Stanhope gig, both designed by Fitzroy Stanhope. The Stanhope gig was an elegant carriage with low wheels that therefore required shafts with an upward reverse curve where attached to the horse's harness. The Tilbury resembled the Stanhope except in its manner of suspension.

At one stage in its career, this gig was fairly unstable; if the horse fell to his knees, the cross springs under the body would jerk and spill the riders. The gig was popular in 19th-century England and America and is still used today in horse shows.

gigaku mask, grotesque wooden mask worn by participants in *gigaku,* a type of Japanese dance drama. *Gigaku* masks are the first known masks used in Japan and among the world's oldest extant masks. Soon after a Korean musician named Mimashi imported *gigaku* plays into Japan from China, in 612, Japanese artisans began to carve *gigaku* masks after Chinese models. Because the plays were often performed out-of-doors at court or temple, the masks were given greatly exaggerated

features so they would retain their comic effect when viewed at a distance.

Gigaku masks, unlike the later *bugaku* masks, covered the entire head and had no movable parts. They were usually carved by Buddhist

Suiko-juu, *gigaku* mask, painted wood, 7th–8th centuries; in the Tokyo National Museum

By courtesy of Kokusai Bunka Shinkokai, Tokyo

sculptors, and they exemplify the style and technique of contemporary Buddhist sculpture. The carving of *gigaku* masks reached its highest point during the Nara period (710–784) but was no longer practiced by the middle of the Heian period (*c.* 990), when it was superseded by the *bugaku* mask (*q.v.*).

gigantism, excessive growth in stature, well beyond the average for the individual's race and environmental conditions. In many cases tall stature results from hereditary, dietary, or other factors. In other cases, gigantism is caused by disease or disorder in those parts of the endocrine system that regulate growth and development. Androgen deficiency, for example, delays the closure of end plates, or epiphyses, of the long bones, which usually takes place when full growth is achieved. If the pituitary gland functions normally, producing appropriate amounts of growth hormone, while epiphyseal closure is delayed, the growth period of the bones will be prolonged. Gigantism associated with androgen deficiency is more frequent in men than in women and may be genetic.

Another type of gigantism associated with endocrine disorder is pituitary gigantism, caused by hypersecretion of the growth hormone somatotropin, during childhood or adolescence, prior to epiphyseal closure. Pituitary gigantism is usually associated with a tumour of the pituitary gland. Acromegaly (*q.v.*), a condition marked by progressive enlargement of skeletal extremities, occurs if growth hormone continues to be produced in large volume after epiphyseal closure. (Signs of acromegaly are occasionally seen in younger patients, prior to closure.) Since most pituitary giants continue to produce somatotropin after they reach adulthood, the two conditions—gigantism and acromegaly—are often concurrent.

In pituitary gigantism, growth is gradual but continuous and consistent; the affected person, with bones in normal proportion, may attain a height of eight feet. Muscles may be well developed but later undergo some atrophy or weakening. The life span of pituitary giants is shorter than normal because of their greater susceptibility to infection, injury, and metabolic disorders. Treatment by surgery or irradiation of the pituitary gland curtails further growth, but stature cannot be reduced once gigantism has occurred.

Gigantopithecus, genus of large fossil ape, of which two species are known: *Gigantopithecus bilaspurensis*, which lived 6,000,000 to 9,000,000 years ago in India, and *Gigantopithecus blacki*, which lived in China until at least 1,000,000 years ago. These apes are known from teeth, lower jaw bones, and possibly a piece of distal humerus. They were large in size, perhaps larger than gorillas. They lived in open country and had powerful grinding and chewing teeth.

The first specimens were found by Dutch paleontologist G.H.R. von Koenigswald in Chinese drugstores, where they were known as "dragon's teeth." The teeth, though large, have a few similarities to human teeth and this led some paleomorphologists to speculate that humans might have had "giant" ancestors. Later discoveries of complete jaw bones demonstrated that they were from extinct apes.

Gigli, Beniamino (b. March 20, 1890, Recanati, near Ancona, Italy—d. Nov. 30, 1957, Rome), one of the greatest Italian operatic tenors of the first quarter of the 20th century.

Gigli studied in Rome and after winning a competition at Parma in 1914 made his debut at Rovigo, Italy, as Enzo in Ponchielli's *La gioconda*. Following engagements in Spain and South America he made his debut at the Metropolitan Opera in New York City (1920) as Faust in Boito's *Mefistofele*. He remained with the company for 12 seasons. Gigli first appeared in London in 1930 at Covent Garden in Giordano's *Andrea Chenier*. Between

Gigli as Vasco de Gama in *L'Africaine*, by Meyerbeer

By courtesy of Metropolitan Opera Archives

1935 and 1951 he made numerous films in Germany and Italy.

His lyric tenor voice was remarkable for its power, mellowness, and smoothness of production. Although his musical taste had flaws and his acting was somewhat stiff, his natural musicianship and the charm of his voice held operatic audiences. From 1946 he often appeared in opera with his daughter, the soprano Rina Gigli. His last operatic appearance was in 1954, his last concert in 1955.

Giglio Island, Italian ISOLA DEL GIGLIO, Latin IGILIUM, mountainous, volcanic islet of the Arcipelago Toscano, in the Tyrrhenian Sea, opposite Monte Argentario, on the west coast of Italy. Part of Grosseto province, the island rises to 1,627 ft (496 m) and has an area of 8 sq mi (21 sq km). Wine is produced, and there is considerable offshore fishing. The village of Giglio Castello, surrounded by medieval walls, and the bathing resort of Campese attract tourists. Giglio Porto, on the east coast, is the only landing place; it is connected by daily ship service with Porto Santo Stefano, on the mainland of Italy. The island was controlled by the cities of Pisa and Florence during most of the Middle Ages. Pop. (1981 prelim.) 1,656.

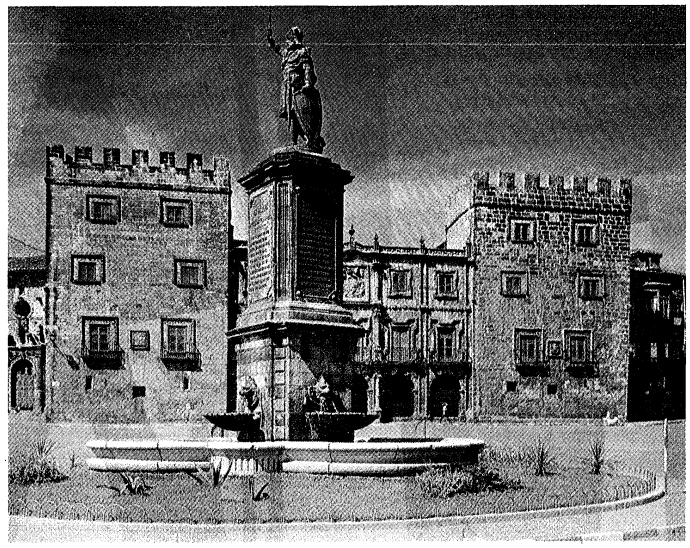
Gignoux, Maurice-Irénée-Marie (b. Oct. 19, 1881, Lyon—d. Oct. 20, 1955, Grenoble, Fr.), French geologist known for his contributions to knowledge of the development of the stratigraphy of the Mediterranean during the Pliocene (from 2,500,000 to 7,000,000 years ago) and Quaternary (from 2,500,000 years ago to the present) epochs.

He joined the meteorological research department of the French Army in 1913 and in 1918 became a member of the faculty of the University of Strasbourg. His work included experimentation with fold models and studies of the structure of the Alps. He wrote *Stratigraphic Geology* (1936) and *Géologie des barrages* (1955).

gigue, courtly version of the English jig (*q.v.*) that became popular in aristocratic circles of Europe during the 17th century. Whereas true jigs were quick and wild solo dances of indefinite form, gigues were danced by couples in formal ballet style. The music was generally performed in $\frac{6}{8}$ or $\frac{12}{8}$ time; melodic lines were fashioned of rapidly moving groups of three eighth notes. As a musical form the gigue was often used in the stylized dance suite as the last movement. Invariably written in fugal style (*i.e.*, using melodic imitation), the gigues of suites retain the characteristic triple groups of eighth notes. Examples occur in the keyboard suites of J.S. Bach.

Giguyu (people): *see* Kikuyu.

Gijón, town, Oviedo province (autonomous community [region] of Asturias), northwest-



Monument to Pelayo, Asturian king and hero of the wars against the Moors, Gijón, Spain

Keystone

ern Spain, located on the Bay of Biscay at the foot of the Cerro (hill) de Santa Catalina, just northeast of Oviedo city. Known to the Romans and Goths as Gigia, it was captured by the Moors early in the 8th century but was retaken about 737, and was the capital of the Kingdom of Asturias until 791. Gijón was burned during civil wars in 1395 and, in the 16th and 17th centuries, suffered many corsair attacks. The remnants of the Spanish Armada took refuge there in 1588.

Historic monuments include Roman baths and several medieval palaces. Gijón is the seat of the Universidad Laboral (Labour University), founded in 1955 for the sons of workers, and of the Instituto de Jovellanos (1797), a commercial and nautical school named after the 18th-century philosopher Gaspar Melchor de Jovellanos y Ramírez, a native of the town.

Gijón's seaport, Puerto del Musel, leads Spain in the coasting trade and is an international port of call. Coal (the chief export) and iron taken from the Asturian mines and fishing are of economic importance. Industries include iron, steel, and chemical manufactures, petroleum refining, liquor distilling, and food processing. Bathing beaches have made Gijón a leading summer resort on the Costa Verde. Pop. (1981) 255,969.

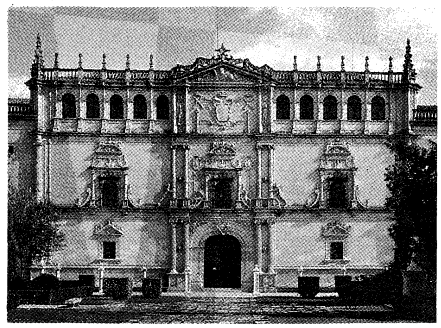
Gikatilla, Joseph (b. 1248, Medinaceli, Castile, Spain—d. *c.* 1305, Peñafiel), major Spanish Kabbalist whose writings influenced those of Moses de León, presumed author of the *Zohar* ("Book of Splendour"), an important work of Jewish mysticism. Gikatilla's early studies of philosophy and the Talmud (the rabbinical compendium of law, lore, and commentary) continued to influence him after he turned to mysticism, as indicated by his attempts to reconcile philosophy with the Kabbala, the compilation of Jewish mystical writings.

While still a young man, Gikatilla became a pupil of Abraham Abulafia, a profound student of the Kabbala. Under his influence, the 26-year-old Gikatilla wrote his seminal *Ginnat e'goz* ("Nut Orchard"), taking his title from the Song of Solomon 6:11. In Gikatilla's lexicon, the nut is an emblem of mysticism itself, while *Ginnat* employs the initial letters of three different names for methods of esoteric exegesis. Gikatilla's book greatly influenced his contemporary and probable friend, Moses de León. Gikatilla was, in turn, influenced by the *Zohar,* as evidenced by his next major work, *Sha'are'ora* ("Gates of Light"), an account of Kabbalist symbolism.

Gikongoro, *préfecture* (Kinyarwanda *prefegitura*), southwestern Rwanda, Central Africa, bordering Burundi (south) and the Rwandan *préfectures* of Kibuye and Gitarama (north), Cyangugu (west), and Butare (east). Most of Gikongoro's area of 845 sq mi (2,190 sq km) lies in the mountainous watershed of the Congo and Nile river systems, where elevations vary from 6,600 ft to more than 8,200 ft (2,000 m to 2,500 m). Three main tributaries of the Nyabarongo River drain the *préfecture* northward. The climate is cool and humid, with abundant (47–55 in. [1,200–1,400 mm] annually) rainfall. The land supports cattle grazing and the growing of sweet potatoes, bananas, potatoes, sorghum, tea, and beans. Gikongoro's administrative headquarters are in Gikongoro town, which has road links with the neighbouring provincial headquarters of Butare and Cyangugu. Pop. (1978 prelim.) 369,891.

Gil, Emilio Portes: *see* Portes Gil, Emilio.

Gil de Hontañón, Juan and Rodrigo (respectively b. *c.* 1480—d. 1526, Salamanca?, Spain; b. *c.* 1500, Burgos—d. May 31, 1577, Segovia), father and son who were celebrated architects. Juan, the father, was *maestro mayor* (official architect) of Segovia cathedral and designed in a late medieval style. The son, Rodrigo, succeeded to the position of *maestro mayor,* working in a style that combined his father's style with the features of the characteristically Spanish style known as Plateresque (*q.v.*). He is best known for his treatise on architecture.



Facade of the University of Alcalá de Henares by Rodrigo Gil de Hontañón, 1541–53
Archivo Mas, Barcelona

Juan Gil de Hontañón worked in Burgos with Simon of Cologne, one of a family of German architects who were responsible for many important Spanish buildings. He laid the cornerstone of the Segovia cathedral in 1525. After his death, his son Rodrigo took command of the project and executed his father's plans. Rodrigo designed two important secular buildings: the Monterrey Palace in Salamanca and the University of Alcalá de Henares (1537–53). He also worked on Salamanca cathedral (after 1538).

The cathedrals of Segovia and Salamanca are both designed in a mixture of late medieval and Plateresque; the spaces are unified under relatively simple roofing. The mature Plateresque can be seen in Rodrigo's masterpieces: the Monterrey Palace and the university in Alcalá. The palace, only partially completed, is a richly ornamented and ponderous structure. The university, free of the few medieval and Mudéjar (Spanish Muslim) traces that still remain in the palace, is a work of remarkable elegance and harmony.

Rodrigo's treatise (*c.* 1538) is a compilation of medieval work on computation of thrusts and the calculation of proportions. It reveals that, as late as the 16th century, architects had no standard system for calculating vault thrusts and buttress requirements.

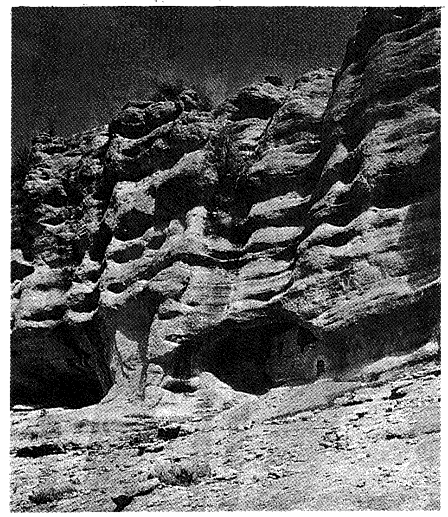
Gil Robles (y Quinoñes), José María (b. Nov. 27, 1898, Salamanca, Spain—d. Sept. 14, 1980, Madrid), Catholic politician and leader during the Second Spanish Republic (1931–36).

Gil Robles, a lawyer, led the Catholic party Acción Popular in the anticlerical first phase of the republic and then formed a coalition called the CEDA (Confederación Española de Derechas Autónomas), which became the most powerful bloc after the elections of November 1933, when women voted for the first time. Nevertheless, the president, Niceto Alcalá Zamora, asked the radical Alejandro Lerroux to form a government, because Alcalá Zamora feared left-wing reactions if the administration were entrusted to Gil Robles, who was accused of wishing to reestablish the monarchy and set up a Catholic corporative state on the Austrian model. CEDA supported, but did not join, both Lerroux's government and that of his successor Ricardo Samper until October 1934. Lerroux then formed another government in which CEDA ministers were included. This provoked the left-wing uprisings of the autumn of 1934. A governmental crisis in March 1935 was resolved by the formation of a new administration, still under Lerroux, in which Gil Robles became, significantly, minister of war. He continued in office under Joaquín Chapaprieta, but resigned, with the other CEDA ministers, in December 1935.

In the ensuing elections of February 1936, Gil Robles led an alliance of CEDA and other conservative parties in a national front, but although CEDA became the largest single party in the new Cortes, the majority was won by the left-wing Popular Front. Gil Robles' supporters now became impatient with his policy of gaining power through peaceful means: he lost the support of the middle classes, and his extremist adherents followed his youth leader Ramón Serrano Súñer into the Falange. He remained chief opposition spokesman in the Cortes, but was increasingly eclipsed there by the monarchist José Calvo Sotelo. He was an intended victim of the plot responsible for Calvo Sotelo's murder (July 1936). Soon after the outbreak of the civil war, he went to Lisbon to set up a mission with Nicolás Franco for the purchase of arms for the rebels. After the war he largely retired from public life. He lived in exile from 1936 to 1953 and again from 1962 to 1964; he worked continously to establish a Christian Democratic party in Spain and, after Franco's death in 1975, reemerged briefly as a political leader.

Gila Bend, town, Maricopa County, southwestern Arizona, U.S., 50 mi (80 km) southwest of Phoenix. The Gila River makes a sweeping 90° bend westward at this point, hence the name. Here in 1774 Father Francisco Garcés founded an Indian rancheria, called it Santos Apóstoles San Simón y Judas, and raised two crops of grain annually by irrigation. A colony of white men began a settlement in 1865 at the site of the old rancheria. The settlement came to be known as Gila Bend. The town location later shifted because a railroad in 1880 laid track away from the river bank. The river itself changed course but by 1945 gave signs of reverting to its old course. Today a prosperous agricultural town, Gila Bend relies on water stored at Gillespie Dam for irrigating its fields. Twenty-five miles northwest of Gila Bend is Painted Rocks State Historic Park where prehistoric denizens left artistic-looking imprints. Nearby is Gila Bend (Pappago Indian) Reservation. Pop. (1980) 1,585.

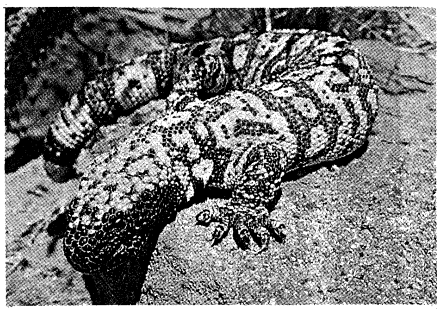
Gila Cliff Dwellings National Monument, national monument in southwestern New Mexico, U.S., in the Gila National Forest near the headwaters of the Gila River. In rugged country 30 mi (48 km) north of Silver City, it contains groups of small but well-preserved Pueblo Indian dwellings in natural cavities of an overhanging cliff 150 ft (45 m) high. The



Pueblo dwellings in Gila Cliff Dwellings National Monument, near Silver City, N.M.
Dick Kent Photography

dwellings were inhabited from about AD 100 to 1300. Established in 1907, the monument occupies 533 ac (216 ha).

Gila monster (*Heloderma suspectum*), one of only two species of venomous lizards, both of the family Helodermatidae and both similar in appearance and habits. The Gila monster was named for the Gila River Basin and occurs in the southwestern United States and northern Mexico. It grows to about 50 centimetres (about 20 inches), is stout-bodied with black and pink blotches or bands, and has beadlike scales. Its relative, the Mexican beaded lizard (*Heloderma horridum*), is slightly larger (to 80 cm) and darker.



Gila monster (*Heloderma suspectum*)
Willis Peterson

During warm weather the Gila monster feeds at night on small mammals, birds, and eggs. Fat stored in the tail and abdomen at this time is utilized during the winter months. Both species of *Heloderma* are sluggish in habit, but they have a strong bite. Most of the teeth have two grooves that conduct the venom, a nerve poison, from glands in the lower jaw. Fatalities to humans are rare.

Gila River, river rising in southwestern New Mexico, U.S., in the Elk Mountains, near the Gila Cliff Dwellings National Monument. The river, draining 58,100 sq mi (150,500 sq km), flows 630 mi (1,015 km) west and southwest over desert land to the Colorado River at Yuma, Ariz. Its chief tributaries are the San Francisco, which it receives near Clifton, Ariz., the San Pedro, the Santa Cruz, the Salt (the major tributary from the northeast), and the Agua Fria rivers. Coolidge Dam (1928) on the Gila near Globe, Ariz., is used for irrigation in the Casa Grande Valley; the dam, together with Roosevelt Dam on the Salt, stores all available surface water, so the Gila River bed is dry and barren down to the Colorado. Important towns on or near the river's course are Yuma, Florence, Safford, Hayden, and Coolidge, all in Arizona. It passes San Carlos, Gila River, and Gila Bend Indian reservations. Gila National Forest and Wilderness Area are near its headwaters. The river's name is from that of an Indian tribe.

Gīlān, *ostān* (province), northwestern Iran, bounded by the Caspian Sea on the north, Azerbaijan Soviet Socialist Republic on the northeast, Āzārbāijān-e Sharqī *ostān* on the west, Zanjān *ostān* on the southwest, Markazī (Tehrān) *ostān* on the south, and Māzandarān *ostān* on the east. Containing 10 counties, it has an area of 5,679 sq mi (14,709 sq km). Gīlān was within the sphere of influence of the successive Achaemenid, Seleucid, Parthian, and Sāsānian empires that ruled Iran until the 7th century AD. The subsequent Arab conquest of Iran led to the rise of many local dynasties, and Gīlān acquired an independent status that continued until 1567. Gīlān is mentioned in *The Regions of the World,* a Persian geography of 982. During the rule (1073–92) of Malik-Shāh, the third Seljuq sultan, a secret sect of Ismailis who formed the core of Shī'ah resistance against the Seljuqs was established in Gīlān and eventually became known as the Assassins (*see* Assassin). The Turko-Mongol invasions in the 13th century resulted in a huge influx of refugees, including the Qājārs, into the sparsely populated region. The Qājārs helped the Ṣafavid rulers seize power at the beginning of the 16th century. Later, the Qājārs sided with Nāder Shāh in 1736, when he was threatened by the Afghans. The Qājārs rose as a dynastic power in 1796, displacing the Zand dynasty. Olearius, an 18th-century traveller, mentions the Gīlān fisheries. In the 19th century, the rivalry between Russia and Great Britain in Iran took the form of economic intervention. After losing several battles with Russia, Iran was forced to grant economic and naval benefits to that country in Gīlān, under the treaties of 1813 and 1828. In 1907 Great Britain and Russia divided Iran into three zones; the northernmost, including the province of Gīlān, was the Russian zone. These events led to the growth of nationalist movements, and contingents recruited from Tabriz, Gīlān, and Isfahan liberated Tehrān, with the result that Aḥmad Mīrzā, son of Shāh Moḥammad Alī, was proclaimed ruler. In the aftermath of the Russian Revolution, Bolshevik troops had control of almost the entire Iranian Caspian seacoast, and a separatist group proclaimed the short-lived Soviet Socialist Republic of Gīlān. In the treaty of 1921 the Soviet Union handed back the region around Enzeli and gave Iran equal navigation rights on the Caspian Sea.

Gīlān divides into a coastal plain including the large delta of the Safīd Rūd and adjacent parts of the Elburz Mountains. The soil is fertile loam, with dunes and marshy stretches along the lower plain. The jungle-like forest contains partly endemic species such as the Caucasian wingnut (a kind of walnut), and silk trees cover part of the plain. Animals include wild boar, lynx, panther, hyena, jackal, and deer, with waterfowl in the coastal stretches. On most cultivated land in Gīlān, rice is grown. Other crops include tobacco, fruits, vegetables, and tea (grown in the foothills above the rice fields). Fishing, developed by the Russians in the 19th century, has been government run since 1953 and is important; most of the catch (sturgeon, salmon, whitefish) is either dried or canned and is exported, as is the caviar, which in the early 1970s accounted for about one-fifth of world production. Gīlān has a few modern factories, mainly for tea and rice processing. Modern developments include a dam at Manjīl.

Gīlān's capital and commercial centre is Rasht, which has a silk mill and a plant processing kenaf (hemp) fibre; rice-straw mats are also made. Rasht is linked to Qazvīn, Tehrān, and other coastal ports by road; it has an airport, and a natural-gas pipeline passes through the city en route to the Soviet Union. Mahījān, Langarūd, and Bandar-e Anzalī (a busy Caspian port) are other important economic centres. Pop. (1983 est.) 1,822,000.

Gilbert CRISPIN (d. *c.* 1117), English cleric, biblical exegete, and proponent of the thought of St. Anselm of Canterbury.

Of noble birth, Gilbert was educated and later became a monk at the monastery of Bec, in Normandy, where Anselm was abbot. Gilbert served as abbot of Westminster from *c.* 1085 until his death.

Gilbert's exegesis was deeply influenced by his friendship with Anselm and his acquaintance with a Jew from Mainz. His skillful writings include *Disputatio Iudaei et Christiani,* in which a dialogue on the Christian faith is carried out between Gilbert and his Jewish acquaintance. Other historical and doctrinal works are *De Simoniacis, De Spiritu Sancto,* and *Disputatio Christiani cum gentilli.*

Gilbert FOLIOT (b. *c.* 1110—d. Feb. 18, 1187), Anglo-Norman Cluniac monk who became bishop of Hereford and later of London; he was an unsuccessful rival of Thomas Becket for the archbishopric of Canterbury and afterward was Becket's opponent in ecclesiastical and secular politics.

Gilbert's appointment in 1139 as abbot of Gloucester was confirmed by King Stephen of England, although both previously and subsequently Gilbert supported the claim of Matilda, daughter of King Henry I, to the English throne. Still later he took the side of Henry II, son of Matilda and successor to Stephen, in the long conflict that ended in Becket's murder. Nominated to the see of Hereford in 1148, he hoped to succeed Archbishop Theobald of Canterbury (died 1161), but the King chose Becket, who also was royal chancellor and, at that time, a close friend of Henry. In 1163 Becket procured for Gilbert the see of London, but Gilbert evaded the profession of obedience to Becket as primate of the English church, apparently aspiring to make his see independent of Canterbury. On the questions of lay and ecclesiastical jurisdiction raised by the Constitutions of Clarendon (January 1164), Gilbert agreed with the views of the King, whose confessor he had become. When Becket rejected his advice to yield, Gilbert encouraged the other English bishops to repudiate the Archbishop's authority. During Becket's exile in France, Gilbert skillfully prevented Pope Alexander III from supporting Becket wholeheartedly, but he also restrained Henry from an open conflict with the papacy.

Gilbert was one of the bishops excommunicated (Dec. 25, 1170) by Becket for participating in the coronation of Henry's son, Henry the Young King (June 1170), by the Archbishop of York; he had no part in the murder (December 29) of the Archbishop by some of the King's household knights. His remaining years were uneventful.

Gilbert OF SEMPRINGHAM, SAINT, Gilbert also spelled GUILBERT (b. *c.* 1083, Sempringham, Lincolnshire, Eng.—d. Feb. 4, 1189, Sempringham; canonized 1202; feast day February 4, feast day in Northampton and Nottingham February 16), English priest, prelate, and founder of the Ordo Gilbertinorum Canonicorum or Ordo Sempringensis (Order of Gilbertine Canons, or Sempringham Order), commonly called Gilbertines, the only medieval religious order of English origin.

After studies in Paris, he was ordained priest in 1123 and became parson of Sempringham. There, in 1131, he founded a home for girls, whom he spiritually guided and to whom he assigned a rule of life fashioned after that of St. Benedict of Nursia. To perform heavy work, such as cultivation, he formed a number of labourers into a society of brothers attached to the convent. Later he added lay sisters in the domestic offices and ministering clerics and priests, who, as canons regular, followed the Rule of St. Augustine of Hippo. Thus, the Gilbertines were structured with four levels of nuns, lay sisters, canons, and lay brothers.

Similar establishments grew elsewhere, and, after failing in 1147 to incorporate them in the Cistercian order, Gilbert received encouragement from Pope Eugenius III to continue as before. In the following year, the Pope approved the new order, confirming Gilbert as its first master general. The Sempringham Canons were a double community of men and women, the property belonging to the nuns and the superior being head of the establishment. There were also houses for canons only, all under the master of Sempringham. During Gilbert's lifetime the order reached several thousand members, all associated with such institutions as orphanages, hospitals, and almshouses.

In 1165 Gilbert fell out of royal favour; he was charged by officials of King Henry II

with having assisted in the escape of Thomas Becket, archbishop of Canterbury, who had taken refuge in France from the King's wrath. Affirming ecclesiastical rights, Gilbert refused to deny the charges, and the case was eventually dropped. Subsequent revolt among his lay brothers, however, caused a scandal that was finally judged at Rome; Gilbert was vindicated of the slander he had suffered. Forced by old age (he reputedly lived 106 years) to resign his generalship, Gilbert retired to the simple rule of his order. Except for one Scottish house, the Gilbertines never spread beyond England. They were brutally dissolved (1538–40) by King Henry VIII.

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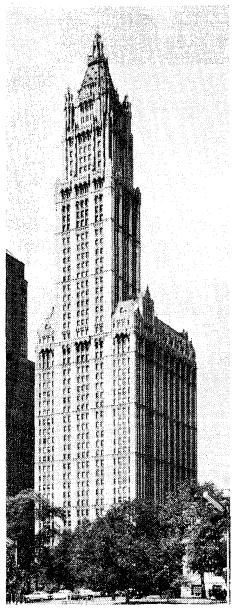
Gilbert, Cass (b. Nov. 24, 1859, Zanesville, Ohio, U.S.—d. May 17, 1934, Brockenhurst, Hampshire, Eng.), architect, designer of the Woolworth Building (1908–13) in New York City and of the United States Supreme Court Building (completed 1935), Washington, D.C. Conscientious and prosperous but not especially original, he was an acknowledged leader of the architectural profession in the United States during a period in which monumental architecture predominated.

After attending Massachusetts Institute of Technology for one year, Gilbert worked briefly as a draftsman for the noted New York City architectural firm of McKim, Mead, and White. In 1882 he entered a partnership in St. Paul, Minn. Having attracted national attention by his design for the Minnesota state



Woolworth Building, New York City, by Cass Gilbert, 1913

Wayne Andrews

capitol, St. Paul (built 1896–1903), he moved to New York City. In addition to the Woolworth Building, his major works in New York included the U.S. customhouse (1899–1905; in a Renaissance style with Germanic detail) and the federal courthouse (completed 1936). For some years the 60-story (792-foot) Woolworth skyscraper, with its lacy Gothic detail in terra-cotta over a steel frame, was regarded as a model of tall commercial building design.

In Washington, D.C., Gilbert built the U.S. Treasury Annex (1918–19), as well as the Supreme Court Building, the monumentality of which is sometimes felt to be oppressive. He also planned the campuses of the universities of Minnesota (Minneapolis) and Texas (Austin).

Gilbert, Grove Karl (b. May 6, 1843, Rochester, N.Y., U.S.—d. May 1, 1918, Jackson, Mich.), U.S. geologist, one of the founders of modern geomorphology, the study of landforms. He first recognized the applicability of

Grove Karl Gilbert, 1891

By courtesy of the National Academy of Sciences, Washington, D.C.

the concept of dynamic equilibrium in landform configuration and evolution—namely, that landforms reflect a state of balance between the processes that act upon them and the structure and composition of the rocks that compose them. Gilbert clearly expounded this concept in his geological report on the Henry Mountains, Utah, and in his other pioneering works in the western United States.

From 1863 to 1868 Gilbert worked for the Ward Natural Science Establishment, a firm that manufactured and distributed scientific equipment for schools. In 1869 he joined the second Ohio State Geological Survey as a volunteer assistant and in 1871 was assigned to the George M. Wheeler survey west of the 100th meridian. During his three-year service with the survey, he made a remarkable journey by boat up the lower canyons of the Colorado River, by pack train through central Arizona and down the valley of the Gila River, and again by boat down the Colorado to the Gulf of California. During that trip he made observations and gathered evidence that the post-Carboniferous (less than 280,000,000 years old) strata of Europe and eastern North America did not extend throughout the world. He published two papers characterizing the Basin and Range and Plateau provinces and naming and describing the Pleistocene Lake Bonneville, which was the ancestor of the Great Salt Lake in Utah.

In 1875 Gilbert was transferred to the John Wesley Powell survey, which took him to Utah. When the U.S. Geological Survey was formed in 1879, he was made one of the six senior geologists. In 1884 he was placed in charge of the Appalachian division of geology, and in 1889, upon the creation of the division of geologic correlation, he was placed at its head. After 1892 he relinquished his position as chief geologist and most of his administrative duties in order to return to deeper study of some of the problems he had investigated earlier. *The Bonneville Monograph* (1890) was regarded as his magnum opus. His *Report on the Geology of the Henry Mountains* (1877), in which the intrusive igneous structure known as a laccolith was first described, and his *History of the Niagara River* (1890) were of particular importance. He also played an important part in the planning of the U.S. Geological Survey's bibliographic work and the adoption of the principles of nomenclature and cartography that form the basis of the survey's geological map work.

W.M. Davis' book-length "Biographical Memoir, Grove Karl Gilbert, 1843–1918," in the *Biographical Memoirs, National Academy of Sciences,* vol. 21 (1926), is a thorough, well-illustrated biography.

Gilbert, Sir (Joseph) Henry (b. Aug. 1, 1817, Hull, Yorkshire, Eng.—d. Dec. 23, 1901, Harpenden, Hertfordshire), English chemist whose most important contribution was his study of nitrogen fertilizers and their effects on crops.

In 1843 Gilbert joined Sir John Bennet Lawes as co-director of agricultural research at the newly founded Rothamsted Experimental Station, Hertfordshire, the first organized agricultural experiment station in the world. Their collaboration lasted for more than half a century. In the 1840s they initiated the manufacture of superphosphate fertilizer, one of their inventions. From 1884 to 1890 Gilbert was Sibthorpian professor of rural economy at Oxford University. He was knighted in 1893.

Gilbert, Sir Humphrey (b. c. 1539—d. September 1583, at sea near the Azores), English soldier and navigator who devised daring and farseeing projects of overseas colonization. Although he was brilliant and creative, his poor leadership was responsible for his failure to establish the first permanent English colony in North America. He succeeded, however, in annexing Newfoundland.

The half brother of Sir Walter Raleigh and a cousin of Sir Richard Grenville, Gilbert studied navigation and military science at Oxford, entered the army, and was wounded at the siege of Le Havre (1563). In 1566 he wrote a *Discourse* proposing a voyage in search of a Northwest Passage between England and the Far East. But Queen Elizabeth I rejected the idea and instead sent Gilbert to Ireland (1567–70), where he ruthlessly suppressed an uprising and began to elaborate plans for a Protestant colonization of the province of Munster, in southern Ireland. He was knighted for this action in 1570. In 1572 he commanded the 1,500 English volunteers sent to assist the revolt of the Netherlands against Spain.

Sir Humphrey Gilbert by an unknown painter; in the collection of Commander W.R. Gilbert, Compton Castle, Devon

By courtesy of Commander W.R. Gilbert, Compton Castle, Devon; photograph, National Portrait Gallery, London

By the mid-1570s Gilbert began to apply his Irish colonization schemes to North America. In 1577 he put forth a plan for seizing the Newfoundland fishing fleets of Spain, Portugal, and France; occupying Santo Domingo and Cuba; and intercepting the ships carrying American silver to Spain. The Queen ignored his proposal but in 1578 granted him a six-year charter to settle "heathen lands not actually possessed of any Christian prince or people."

Straining his means to the utmost, Gilbert finally outfitted a seven-ship expedition and set sail on Nov. 19, 1578. He probably intended to cross to North America, but his ill-equipped, badly disciplined force quickly broke up, and by the spring of 1579 some of the ships had drifted to England while others

had turned to piracy. During the summer of 1579 Gilbert helped put down the rebellion of James Fitzgerald (called Fitzmaurice) in Ireland.

Gilbert then set about organizing a more ambitious colonizing expedition. He sailed from Plymouth on June 11, 1583, and on August 3 arrived at St. John's, Newfoundland, which he claimed in the name of the Queen. Moving southward with three ships, he lost the largest of them on August 29 and two days later turned homeward. He was last seen during a great storm in the Atlantic, shouting to his companion vessel, "We are as near heaven by sea as by land." Gilbert's ship was then swallowed by the sea. His career is recounted in D.B. Quinn's *Voyages and Colonising Enterprises of Sir Humphrey Gilbert*, 2 vol. (1940).

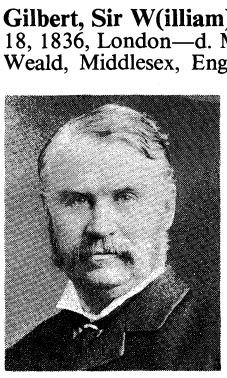
Gilbert, Sir John (b. July 21, 1817, London—d. Oct. 5, 1897, London), English Romantic painter and illustrator of literary classics, especially remembered for his woodcut illustrations for the works of Shakespeare (1859–60) and Scott. He preferred medieval chivalric subjects, and such pictures as "Sir Lancelot du Lake" (1887) earned him the epithet "the Scott of painting."

A prolific watercolourist, Gilbert was associated with the Old Water-Colour Society from 1852 and became its president in 1871, shortly after which he was knighted. He was made a member of the Royal Academy in 1876. His imaginative drawings, notable for their breadth of scale and dramatic chiaroscuro, enhanced the popularity of *The Illustrated London News*.

Gilbert, Rufus Henry (b. Jan. 26, 1832, Guilford, N.Y., U.S.—d. July 10, 1885, New York City), U.S. surgeon and transit expert who played a major role in the development of rapid transit in New York City.

Gilbert attended the College of Physicians and Surgeons in New York City and then served as a surgeon in the Federal Army in the Civil War, attaining the rank of lieutenant colonel. He became interested in rapid transit as a means of freeing people from living in the unhealthful, crowded tenements in the centres of large cities. After gaining experience as assistant superintendent of the Central Railroad of New Jersey, he incorporated the Gilbert Electric Railway Company on June 17, 1872, to build elevated lines in New York City. The cars were to be propelled by air pressure from pneumatic tubes mounted on the elevated structure. A financial depression delayed construction until 1876, however, and forced adoption of the more conventional type of elevated railroad, which employed trains drawn by steam locomotives. The Sixth Avenue line, running from Trinity Church to Central Park, was completed and began operation in April 1878, but financiers forced Gilbert from the company.

Gilbert, Sir W(illiam) S(chwenk) (b. Nov. 18, 1836, London—d. May 29, 1911, Harrow Weald, Middlesex, Eng.), English playwright and humorist best known for his collaboration with Sir Arthur Sullivan (*q.v.*) in comic operas.



W.S. Gilbert
Brown Brothers

Gilbert began to write in an age of rhymed couplets, puns, and travesty; his early work exhibits the facetiousness common to writers of extravaganza. But he turned away from this style and developed a genuinely artful style burlesquing contemporary behaviour. Many of his original targets are no longer topical—Pre-Raphaelite aesthetes in *Patience;* women's education (*Princess Ida*); Victorian plays about Cornish pirates (*The Pirates of Penzance*); the long theatrical vogue of the "jolly jack tar" (*H.M.S. Pinafore*); bombastic melodrama (*Ruddigore*)—but Gilbert's burlesque is so good that it creates its own truth. As a librettist, Gilbert is outstanding not only because of his gift for handling words and casting them in musical shapes but also because through his words he offered the composer opportunities for burlesquing musical conventions.

Gilbert's early ambition was for a legal career, and a legacy in 1861 enabled him to leave the civil service to pursue it. He was called to the bar in November 1863. In 1861, however, he had begun to contribute comic verse to *Fun,* illustrated by himself and signed "Bab." These pieces were later collected as *The Bab Ballads* (1869), followed by *More Bab Ballads* (1873); the two collections, containing the germ of many of the later operas, were united in a volume with *Songs of a Savoyard* (1898).

Gilbert's dramatic career began when a playwright, Thomas William Robertson, recommended him as someone who could produce a bright Christmas piece in only two weeks. Gilbert promptly wrote *Dulcamara, or the Little Duck and the Great Quack,* a commercial success, and other commissions followed. In 1870 Gilbert met Sullivan, and they started working together the following year. *Thespis, or the Gods Grown Old* (first performance 1871) and *Trial by Jury* (1875), a brilliant one-act piece, were followed by four productions staged by Richard D'Oyly Carte (*q.v.*): *The Sorcerer* (1877), *H.M.S. Pinafore* (1878), *The Pirates of Penzance* (1879, New York; 1880, London), and *Patience, or Bunthorne's Bride* (1881). Carte built the Savoy Theatre in 1881 for productions of the partners' work, and their works collectively became known as the "Savoy Operas"; they included *Iolanthe, or the Peer and the Peri* (1882), *Princess Ida, or Castle Adamant* (1884), *The Mikado, or the Town of Titipu* (1885), *Ruddigore, or the Witch's Curse* (1887), *The Yeomen of the Guard* (1888), and *The Gondoliers* (1889). By this time, however, relations between the partners had become strained, partly because Sullivan aimed higher than comic opera. A rupture occurred, and the two were estranged until 1893, when they again collaborated, producing *Utopia Limited* and later *The Grand Duke* (1896). Gilbert was knighted in 1907.

Gilbert had meanwhile written librettos for other composers; the music for his last opera, *Fallen Fairies, or the Wicked World* (1909), was by Edward German. His last play, *The Hooligan,* was performed in 1911. Gilbert died of a heart attack brought on by rescuing a woman from drowning in a lake on his country estate.

Gilbert, Walter (b. March 21, 1932, Boston), U.S. molecular biologist who was awarded a share (with Paul Berg and Frederick Sanger) of the Nobel Prize for Chemistry in 1980 for his development of a method for determining the sequence of nucleotide links in the chainlike molecules of nucleic acids (DNA and RNA).

Gilbert graduated from Harvard University with a degree in physics in 1953 and took a Ph.D. in mathematics from Cambridge University in 1957. He joined the Harvard faculty as a lecturer in physics in 1958 and, as his interests changed, advanced to assistant professor of physics in 1959, associate professor of biophysics in 1964, and professor of biochemistry in 1968; in 1972 he became American Cancer Society professor of molecular biology.

In 1979 Gilbert, while retaining his affiliation with Harvard, joined a group of other scientists and businessmen to form Biogen, a commercial genetic-engineering research corporation.

Articles are alphabetized word by word, not letter by letter

Gilbert, William, Gilbert also spelled GYLBERDE (b. May 24, 1544, Colchester, Essex, Eng.—d. Dec. 10 [Nov. 30, old style], 1603, London or Colchester), pioneer researcher into magnetism who became the most distinguished man of science in England during the reign of Queen Elizabeth I.

Educated as a physician, Gilbert settled in London and began to practice in 1573. His principal work, *De Magnete, Magneticisque Corporibus, et de Magno Magnete Tellure* (1600; *William Gilbert of Colchester . . . on the Great Magnet of the Earth*; 1893), gives a full account of his research on magnetic bodies and electrical attractions. After years of experiments he concluded that a compass needle points north–south and dips downward because the Earth acts as a bar magnet. The first to use the terms electric attraction, electric force, and magnetic pole, he is often considered the father of electrical studies.

In 1601 Gilbert was appointed physician to Queen Elizabeth I, and upon her death in 1603 was appointed physician to King James I. He left an unpublished work that was edited by his brother from two manuscripts and published posthumously in 1651 as *De Mundo Nostro Sublunari Philosophia Nova* ("A New Philosophy of Our Sublunar World"). He held modern views on the structure of the universe, agreeing with Copernicus that the Earth rotates on its axis. He concluded that fixed stars are not all the same distance from the Earth and believed that the planets were held in their orbits by a form of magnetism.

Gilbert Islands, formerly KINGSMILL, group of 16 coral atolls, part of Kiribati, in the west central Pacific Ocean 2,800 mi (4,500 km) northeast of Australia. The islands—Makin, Butaritari, Marakei, Abaiang, Tarawa, Maiana, Abemama, Kuria, Aranuka, Nonouti,

Pandanus trees on Arorae, Kiribati
Milt and Joan Mann from CameraMann

Tabiteuea, Beru, Nikunau, Onotoa, Tamana, and Arorae—occupy a total land area of 105 sq mi (272 sq km). Low-lying, they are covered with coconut palm and pandanus. Rainfall varies from 80 to 100 in. (2,000 to 2,500 mm) in the north to 40 in. in the south.

Spanish explorers may have sighted some of the islands as early as the 16th century. In 1765 the British commodore John Byron discovered Nikunau; in 1788 Capt. Thomas Gilbert sighted Tarawa, and Capt. John Marshall discovered Aranuka. Europeans discovered the remaining islands between 1799 and 1826. They were named the Gilbert Islands in the 1820s. In 1892 Capt. E.H.M. Davis proclaimed the group a British protectorate, and in 1916 it became part of the Gilbert

and Ellice Islands Crown Colony. The Gilbert Islands were occupied by Japanese forces in 1941, but the Japanese were driven out by U.S. troops in 1943. The Gilbert Islands, with the Central and Southern Line Islands, the Northern Line Islands, Ocean Island, and the Phoenix Islands, formed the independent republic of Kiribati (*q.v.*) in 1979.

Tarawa (*q.v.*), the capital of Kiribati, has developed into an urban community. Elsewhere on the islands the people, who are Micronesians, live in traditional villages. The economy is based mainly on farming and fishing, and the major exports are phosphate and copra. Pop. (1983 est.) 57,950.

Gilberts, Guillaume des (French actor): *see* Montdory.

Gilbreth, Frank Bunker and Lillian Evelyn, *née* MOLLER (respectively b. July 7, 1868, Fairfield, Maine, U.S.—d. June 14, 1924, Montclair, N.J.; b. May 24, 1878, Oakland, Calif.—d. Jan. 2, 1972, Phoenix, Ariz.), husband and wife who developed the method of time-and-motion study as applied to the work habits of industrial employees to increase their efficiency and hence their output.

Frank Gilbreth was a contracting engineer in New York City and Lillian Moller was a psychologist and teacher when they were married on Oct. 19, 1904. They collaborated on applying the social sciences to industrial management, emphasizing the worker rather than nonhuman factors. *Motion Study* (1911) was the first important publication of their research. Gilbreth formed a consulting business at Montclair and lectured at various universities in the United States and elsewhere. He was also the first to apply motion-picture photography to the study of surgical operations.

After his death Lillian Gilbreth assumed the presidency of the firm and remained active in research, lecturing, and writing. She held teaching positions at Purdue University, Lafayette, Ind. (1935–48), the Newark (N.J.) College of Engineering (1941–43), and the University of Wisconsin (1955). The Gilbreths' application of efficiency methods to their home was described by two of their 12 children, Frank Bunker Gilbreth, Jr., and Ernestine Gilbreth Carey, in their humorous popular reminiscences *Cheaper by the Dozen* (1949; motion-picture version, 1950) and *Belles on Their Toes* (1950; motion picture, 1952).

Gilchrist, Percy (Carlyle) (b. Dec. 27, 1851, Lyme Regis, Dorset, Eng.—d. Dec. 16, 1935, England), metallurgist who, with his better-known cousin Sidney Gilchrist Thomas, devised in 1876–77 a process (thereafter widely used in Europe) of manufacturing in Bessemer converters a kind of low-phosphorus steel known as Thomas steel. In the Thomas–Gilchrist process the lining used in the converter is basic rather than acidic, and it captures the acidic phosphorus oxides formed upon blowing air through molten iron made from the high-phosphorus iron ore prevalent in Europe. Gilchrist, a graduate of the Royal School of Mines, London, was elected a Fellow of the Royal Society in 1891.

gild (association): *see* guild.

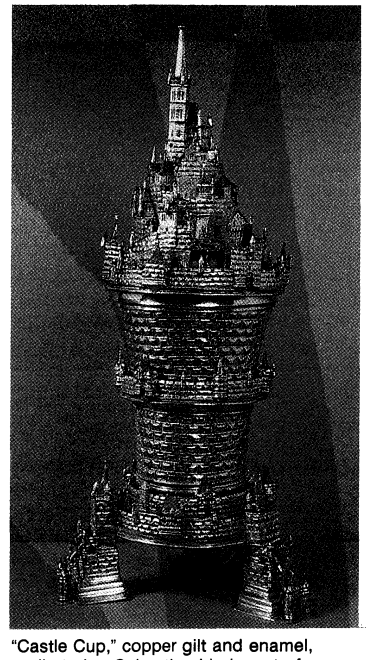
Gildas, also spelled GILDUS (d. 570?), British historian of the 6th century. A monk, he founded a monastery in Brittany known after him as St. Gildas de Rhuys. His *De excidio et conquestu Britanniae* ("The Overthrow and Conquest of Britain"), one of the few sources for the country's post-Roman history, contains the story of the British leader Ambrosius Aurelianus and the defeat of the Saxons at Mons Badonicus. Gildas then condemned the corrupt priests and noblemen who came to power in the years following the Saxon defeat.

Gilded Age, period of gross materialism and blatant political corruption in U.S. history during the 1870s that gave rise to important novels of social and political criticism. The period takes its name from the earliest of these, *The Gilded Age* (1873), written by Mark Twain in collaboration with Charles Dudley Warner. The novel gives a vivid and accurate description of Washington, D.C., and is peopled with caricatures of many leading figures of the day, including greedy industrialists and corrupt politicians. Twain's satire was followed in 1880 by *Democracy,* a political novel published anonymously by the historian Henry Adams. Adams' book deals with a dishonest Midwestern senator and suggests that the real source of corruption lies in the unprincipled attitudes of the wild and lawless West. *An American Politician,* by Francis Marion Crawford (1884), focussed upon the disputed election of Pres. Rutherford B. Hayes in 1876, but its significance as a political novel is diluted by an overdose of popular romance.

The political novels of the Gilded Age represent the beginnings of a new strain in American literature, the novel as a vehicle of social protest, a trend that grew in the late 19th and early 20th centuries with the works of the muckrakers and culminated in the proletarian novelists.

gilding, the art of decorating the whole or parts of wood, metal, plaster, glass, or other objects with gold in leaf or powder form. The term also embraces the application of silver, palladium, aluminum, and copper alloys.

The ancient Egyptians were master gilders, as evidenced by the overlays of thin gold leaf on their royal mummy cases and furniture. From early times the Chinese ornamented wood, pottery, and textiles with beautiful designs in gold. The Greeks not only gilded wood, masonry, and marble sculpture but also fire-gilded metal, by applying a gold amalgam to it



"Castle Cup," copper gilt and enamel, attributed to Sebastian Lindenast of Nürnberg, second half of the 15th century; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

and driving off the mercury with heat, leaving a coating of gold on the metal surface. From the Greeks, the Romans acquired the art that made their temples and palaces resplendent with brilliant gilding.

Certain basic procedures are pertinent to all types of gilding. For example, the ground to be gilded must be carefully prepared by priming. Flat paints, lacquers, or sealing glues are used, according to the nature of the ground material. Metals subject to corrosion may be primed, and protected by red lead or iron oxide paints. After the ground has been prepared and is thoroughly dry, the gilder lays out his design on the ground with pencil or chalk. To create an adhesive surface, the area to be gilded is sized. The type of size used depends on the kind of surface to be gilded and on whether it is desirable for the size to dry quickly or slowly. When the size has dried enough so that it just adheres to the fingertips, it is ready to receive or retain the gold leaf or powder.

Beating gold into leaves as thin as $1/280{,}000$ inch (0.00009 millimetre) is done largely by hand, although machines are used to some extent. The beaten leaves are packed between tissue leaves of small books. Gold leaf may be rolled onto the sized surface from the tissue book. Generally, however, the gilder detaches the amount needed with a pointed tool, picks it up with a gilder's brush, and transfers it to the design. The leaf is held to the tip by static electricity, which the gilder generates by brushing the tip gently over his hair. When the gilding is completed, the leaf-covered area is pounced with a wad of soft cotton to burnish the gold to a high lustre. Leaf gold may be powdered by being rubbed through a fine-mesh sieve. Powdered gold is so costly, however, that bronze powders have been substituted almost universally. Metallic powders may be pounced on a sized surface with a soft material such as velvet or may be combined with a lacquer or with a chemical base and then applied as metallic paint.

Gildo (d. 398, Thabraca), Moorish potentate who rebelled against Rome in 397–398.

In 375 Gildo helped the Romans crush his brother Firmus, who was attempting to carve out an independent kingdom from a portion of Rome's African provinces. As a reward, the Romans appointed him count of Africa and master of the soldiers. But he refused to help the emperor Theodosius I (ruled 379–395) in his struggle against the usurping emperor Eugenius, and, two years after Theodosius' death, Gildo revolted against Rome. He prevented ships from sailing from Africa to Italy with Rome's all-important grain supply. The senate declared Gildo a public enemy and in the spring of 398 sent a force to Africa under the command of his brother Mascezel. Little effort was required to crush the rebellion; Mascezel advanced and, between Theveste (modern Tébessa, Alg.) and Ammaedara (modern Haïdra, Tunisia), Gildo's 70,000-man army melted away. Gildo tried to escape by sea but he was driven ashore at Thabraca and executed.

Events in the war against Gildo are recounted in a poem entitled "The Gildonic War" by Claudian (*c.* 370–*c.* 404).

Gilead, area of ancient Palestine east of the Jordan River, corresponding to modern northwestern Jordan. The region is bounded in the north by the Yarmūk River and in the southwest by what were known in ancient times as the "plains of Moab"; to the east there is no definite boundary. Sometimes "Gilead" is used in a more general sense for all the region east of the Jordan River.

The name Gilead first appears in the biblical account of the last meeting of Jacob and Laban (Gen. 31:21–22). After Israel defeated Sihon, the tribes of Reuben, Gad, and half the tribe of Manasseh were assigned to the area. Ammon and Moab, though located to the southeast and south, sometimes expanded to include parts of southern Gilead. Tiglath-pileser III established the Assyrian province of Gal'azu (Gilead) about 733 BC.

Gilead was the scene of the battle between Gideon and the Midianites and was also the

home of the prophet Elijah. The "balm of Gilead" (Genesis 37:25; Jeremiah 8:22), used medicinally in antiquity, was the mastic obtained from *Pistachia lentiscus;* it now commonly refers to buds of a species of North American poplar (*Populus*) used to make cough syrups.

Gilels, Emil (Grigoryevich) (b. Oct. 19 [Oct. 6, Old Style], 1916, Odessa, Ukraine, Russian Empire—d. Oct. 14, 1985, Moscow), Soviet concert pianist admired for his superb technique, tonal control, and disciplined approach.

Gilels began piano studies at the age of 6 and gave his first public concert in 1929 at the age of 13. In 1933 he gained top honours in the first All-Union Musicians Contest. After graduating from the Odessa Conservatory in 1935, he moved to Moscow for further study with Heinrich Neuhaus. In 1938 he won first prize at the Ysaÿe International Festival in Brussels and was appointed professor at the Moscow Conservatory. After World War II he toured outside the Soviet Union, and his debuts in New York City (1955) and London (1959) were greatly acclaimed. Although the works of Robert Schumann, Johannes Brahms, and especially Ludwig van Beethoven came to form the core of his repertoire, Gilels also played those of Johann Sebastian Bach, Béla Bartók, and Soviet composers.

Giles OF ROME, Latin AEGIDIUS ROMANUS, also called DOCTOR FUNDATISSIMUS (Latin: "best-grounded teacher") (b. *c.* 1243, Rome—d. 1316, Avignon, Fr.), Scholastic theologian, philosopher, logician, archbishop, and general and intellectual leader of the Order of the Hermit Friars of St. Augustine.

Giles joined the Augustinian Hermits in about 1257 and in 1260 went to Paris, where he was educated in the house of his order. While in Paris from 1269 to 1272 he probably studied under St. Thomas Aquinas, whose philosophical doctrines he defended against ecclesiastical condemnation (1277). He supported the Thomistic doctrine of substance in his *Theoremata de esse et essentia* ("Essays on Being and Essence"). A storm of opposition from other theologians forced Giles to take refuge in Bayeux, Fr. (1278–80).

In 1281 he returned to Italy and was made provincial of his order in 1283 and vicar-general in 1285. That year Pope Honorius IV effected Giles' reinstatement at the University of Paris, where he taught theology until 1291. He served as general of the Augustinian Hermits from 1292 to 1295, when Pope Boniface VIII made him archbishop of Bourges, Fr. During the political conflict between Boniface and King Philip IV the Fair of France, Giles wrote, in 1301, a defense of the pope, *De ecclesiastica potestate* ("On the Church Power"); he proposed that the pope must have direct political power over the whole of mankind.

Developing in an original way Augustinian and Thomistic doctrines, Giles's vast literary production includes Aristotelian and biblical commentaries and theological and political treatises. Numerous editions of his collected and individual works appeared in the 15th, 16th, and 17th centuries. His commentaries on Aristotle's entire *Organon* (*i.e.,* the logical writings) are considered valuable by logicians.

Giles, H(erbert) A(llen) (b. Dec. 8, 1845, Oxford—d. Feb. 13, 1935, Cambridge, Cambridgeshire, Eng.), English scholar of Chinese language and culture, who helped to popularize the Wade–Giles system for the romanization of the Chinese languages.

Educated at Charterhouse school, London, Giles joined the consular service and spent the years 1867–92 in various posts in China. Upon his return, he lived in Aberdeen, Scot., until 1897, when he was appointed professor of Chinese at the University of Cambridge, succeeding Sir Thomas Francis Wade; he retained the chair until 1932.

Over the years he published a great variety of books on Chinese language and culture, which remained popular into the second half of the 20th century; these include *Chinese Without a Teacher* (1872), *Strange Stories from a Chinese Studio* (1880), *Gems of Chinese Literature* (1884), *A Chinese Biographical Dictionary* (1898), *A History of Chinese Literature* (1901), *An Introduction to the History of Chinese Pictorial Art* (1905; 2nd ed. 1918), and *The Civilization of China* (1911). His *Chinese–English Dictionary* (1892; 2nd ed. 1912) firmly established the Wade–Giles romanization system, which had been developed by Wade. Wade–Giles remained the most popular such system until the official promulgation of Pinyin in 1979.

Gilgamesh, the best-known of all ancient Mesopotamian heroes. Numerous tales in the Akkadian language have been told about Gilgamesh, and the whole collection has been described as an odyssey—the odyssey of a king who did not want to die.

The fullest extant text of the Gilgamesh epic is on 12 incomplete Akkadian-language tablets found at Nineveh in the library of the Assyrian king Ashurbanipal (reigned 668–627 BC). The gaps that occur in the tablets have been partly filled by various fragments found elsewhere in Mesopotamia and Anatolia. In addition, five short poems in the Sumerian language are known from tablets that were written during the first half of the 2nd millennium BC; the poems have been entitled "Gilgamesh and Huwawa," "Gilgamesh and the Bull of Heaven," "Gilgamesh and Agga of Kish," "Gilgamesh, Enkidu, and the Nether World," and "The Death of Gilgamesh."

The Gilgamesh of the poems and the epic tablets was probably the Gilgamesh who ruled at Uruk in southern Mesopotamia sometime during the first half of the 3rd millennium BC and who was thus a contemporary of Agga, ruler of Kish; Gilgamesh of Uruk was also mentioned in the Sumerian list of kings as reigning after the flood. There is, however, no historical evidence for the exploits narrated in poems and epic.

The Ninevite version of the epic begins with a prologue in praise of Gilgamesh, part divine and part human, the great builder and warrior, knower of all things on land and sea. In order to curb Gilgamesh's seemingly harsh rule, the god Anu caused the creation of Enkidu, a wild man who at first lived among animals. Soon, however, Enkidu was initiated into the ways of city life and traveled to Uruk, where Gilgamesh awaited him. Tablet II describes a trial of strength between the two men in which Gilgamesh was the victor; thereafter, Enkidu was the friend and companion (in Sumerian texts, the servant) of Gilgamesh. In Tablets III–V the two men set out together against Huwawa (Humbaba), the divinely appointed guardian of a remote cedar forest, but the rest of the engagement is not recorded in the surviving fragments. In Tablet VI Gilgamesh, who had returned to Uruk, rejected the marriage proposal of Ishtar, the goddess of love, and then, with Enkidu's aid, killed the divine bull that she sent to destroy him. Tablet VII begins with Enkidu's account of a dream in which the gods Anu, Ea, and Shamash decided that he must die for slaying the bull. Enkidu then fell ill and dreamed of the "house of dust" that awaited him. Gilgamesh's lament for his friend and the state funeral of Enkidu are narrated in Tablet VIII. Afterward, Gilgamesh made a dangerous journey (Tablets IX and X) in search of Utnapishtim, the survivor of the Babylonian flood, in order to learn from him how to escape death. He finally reached Utnapishtim, who told him the story of the flood and showed him where to find a plant that would renew youth (Tablet XI). But after Gilgamesh obtained the plant, it was seized by a serpent, and Gilgamesh unhappily returned to Uruk. An appendage to the epic, Tablet XII, related the loss of objects called *pukku* and *mikku* (perhaps "drum" and "drumstick") given to Gilgamesh by Ishtar. The epic ends with the return of the spirit of Enkidu, who promised to recover the objects and then gave a grim report on the underworld.

Gilgit, town in the Pakistani-held sector of Jammu and Kashmir state in the northwestern Indian subcontinent. Located about 120 miles (195 km) north-northwest of Srīnagar on the Gilgit River, the town was once a Buddhist centre, and now, as in earlier days, it serves as a frontier station for local tribal areas. Its economy is mainly agricultural, with wheat, corn (maize), and barley as the main crops. The main southwest route to Srīnagar lies through the Bābūsar Pass at 14,900 feet (4,540 m). The surrounding region lies in the northern Himalayas and is bordered on the south by the Indus River. It is drained by the Gilgit and Hunza rivers. Gilgit is the only town of any size in the region. Pop. (latest est.) 4,671.

gill, type of respiratory organ found in many aquatic animals, including a number of worms, nearly all mollusks and crustaceans, some insect larvae, all fishes, and a few amphibians. The gill consists of branched or feathery tissue richly supplied with blood vessels, especially near the gill surface, facilitating the exchange of oxygen and carbon dioxide with the surrounding water. The gills may be enclosed in cavities, through which the water is often forcibly pumped, or they may project from the body into the water.

gill, also spelled JILL, unit of volume in the British Imperial and U.S. Customary systems of measurement. It is used almost exclusively for the measurement of liquids, and, although its capacity has varied with time and geography, it is now defined as half a cup, or four fluid ounces. In the United States this equals 7.218 cubic inches, or 118.30 cubic cm; in Great Britain the gill is 8.669 cubic inches, or 142.08 cubic cm.

The gill was introduced in the 13th century to measure individual servings of wine. The term *jill* appears in the well-known nursery rhyme "Jack and Jill." When Charles I of England scaled down the "jack" (a two-ounce measure) in order to collect higher sales taxes, the jill, by definition twice the size of the jack, was automatically reduced also and "came tumbling after."

Gill, André, original name LOUIS-ANDRÉ GOSSET (b. October 1840, Paris—d. 1885, Charenton, Fr.), French caricaturist who used a style of enlarged heads dwarfing undersized bodies, often copied by later cartoonists.

After studying at the Académie des Beaux-Arts in Paris, Gill pursued a career as an illustrator, becoming famous for portrait caricatures of his illustrious contemporaries, *e.g.,* Sarah Bernhardt and Richard Wagner. His successful career was brought to an untimely end *c.* 1880 by mental illness.

Gill, Sir David (b. June 12, 1843, Aberdeen, Aberdeen, Scot.—d. Jan. 24, 1914, London), Scottish astronomer known for his measurements of solar and stellar parallax, showing the distances of the Sun and other stars from Earth, and for his early use of photography in mapping the heavens. To determine the parallaxes he perfected the use of the heliometer, a telescope that uses a split image to measure the angular separation of celestial bodies.

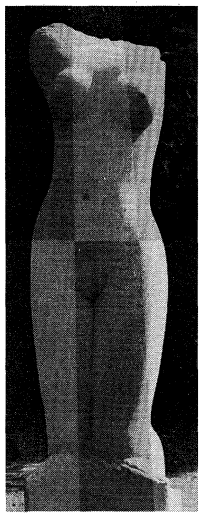
Gill was educated at the University of Aberdeen, and in 1872 he became director of James Ludovic Lindsay's private observatory near Aberdeen. From there he undertook ex-

peditions to Mauritius in 1874, to observe the transit of Venus, and to Ascension Island in 1877, when Mars was in opposition. His measurements of Mars's position as it neared the Earth enabled him to roughly calculate the solar parallax. In 1888–89 he carried out, with the cooperation of many astronomers, a program of intensive observation of selected minor planets with the heliometer. This led to the first determination (1901) of the solar parallax with modern accuracy.

As royal astronomer at the Cape of Good Hope from 1879 to 1907, he photographed the sky within 19° of the south celestial pole in great detail. From these pictures, J.C. Kapteyn compiled the *Cape Photographic Durchmusterung,* a catalog of nearly 500,000 stars. Gill was knighted in 1900.

Gill, (Arthur) Eric (Rowton) (b. Feb. 22, 1882, Brighton, Sussex, Eng.—d. Nov. 17, 1940, Uxbridge, Middlesex), British sculptor, engraver, typographic designer, and writer, especially known for his elegantly styled lettering and typefaces and the precise linear simplicity of his bas-reliefs.

Gill spent two years in an art school in Chichester and in 1899 was articled to a London architect; in 1902 he turned to letter carving after studying in his spare time at the new Central School of Arts and Crafts with Edward Johnston, a pioneer in the revival of lettering. From then until 1910, he worked



"Mankind," Hoptonwood stone torso by Eric Gill, 1928; in the Tate Gallery, London

By courtesy of the trustees of the Tate Gallery, London

as a carver of tombstones, although by 1909 he had turned to figure sculpture. "Mother and Child" (1912) brought him public notice. After 1912 his success as a sculptor was established, and he inspired an English revival of direct carving in stone rather than using preparatory clay models. He carved the stations of the cross for Westminster Cathedral (1914–18), London; these bas-reliefs and his famous torso "Mankind" (1928) were cut in Hoptonwood stone, which he helped make fashionable in the 1920s and '30s. Other major commissions included the relief "Prospero and Ariel" over the main entrance of Broadcasting House, London (1931), and the three bas-reliefs entitled "The Creation of Adam" (1935–38) in the lobby of the council hall of the Palace of Nations at Geneva.

He and Douglas Pepler founded St. Dominic's Press in 1915. Gill contributed wood engravings and lettering for the press and also began his provocative writings on the relationship of religion to the workman and to art. In 1924 he was asked to do engravings for the Golden Cockerel Press; the best remembered of his hundreds of engravings and dozens of books is the *Four Gospels* (1931), printed from type expressly designed by him for the press. At this time he formed, with his son-in-law René Hague, a private press at his home in Pigotts where in 1931 he printed his controversial essay, "Typography."

Typefaces he designed included Perpetua (1925), Gill Sans Serif (1927), Joanna (1930), and Bunyan, designed in 1934 but recut for machine use and renamed Pilgrim in 1953.

Gill was made an associate of the Royal Academy in 1937 and of the Royal Society of British Sculptors in 1938. His books include *Christianity and Art* (1927), *Work and Property* (1937), and *Autobiography* (1940).

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Gill, Irving John (b. 1870, Syracuse, N.Y., U.S.—d. Oct. 7, 1936, Lakeside, Calif.), American architect important for introducing a severe, geometric style of architecture in California and for his pioneering work in developing new construction technology.

Gill received no formal training in architecture, but in 1890 he became a draftsman in the office of the Chicago architectural firm of Adler and Sullivan, where he learned simplicity of form and unity of design. Two years later he moved to San Diego, Calif., where his designs were greatly influenced by the Spanish mission style. Gill evolved an architectural style based on simple geometric volumes of whitewashed reinforced concrete. He was among the first American architects to eliminate ornamentation from his structures, and the buildings of his mature style, such as the Wilson Acton Hotel (1908; later the Hotel Cabrillo) in La Jolla, Calif., and the Dodge House (1916) in Los Angeles, have such severity of design that even moldings are omitted. These and other structures display a play of cubic masses complemented by sharply incised windows and simplified interior details. Gill was an innovator in the construction and structural refinement of buildings using reinforced concrete. He was among the first to construct slab-tilt walls (concrete walls poured into horizontal molds and, when dry, raised into position, completely finished), seen in such projects as the Women's Club (1913) in La Jolla.

Gill, John (b. May 17, 1732, Charlestown, Mass. [U.S.]—d. Aug. 25, 1785, Boston, Mass.), patriot and publisher who was a leading advocate of American colonial independence from Britain.

Gill was the grandson of a British officer who had come to the colonies from Dover, Eng. At an early age John Gill was apprenticed to a Boston printer, Samuel Kneeland. In partnership with Benjamin Edes he went into the printing business, and they resumed publication of a former Boston paper, the second established there, the *Boston Gazette and Country Journal.* Gill (and Edes) also published pamphlets and broadsides, an occasional textbook, and religious materials. They became known for the increasingly anti-British, pro-independence stance of their publications as well as for their *Gazette.*

Gill and Edes were for some time official printers to the colonial government of Massachusetts, but their propaganda activities cost them the appointment. The participants in the Boston Tea Party are said to have assembled at their shop before setting forth on their raid. In 1775 Edes left Boston; Gill stayed on, and he was arrested by the British and charged with publishing "treason, sedition, and rebellion." After the Declaration of Independence, Gill resumed publishing a newspaper alone, under the title *Continental Journal and Weekly Advertiser.* This, however, was but a pale shadow of the radical and rambunctious *Gazette.* He also was restored as official printer, this time to the state.

gill arch (anatomy): *see* branchial arch.

gill fungi: *see* Agaricales.

Gillam, Bernhard (b. April 28, 1856, Banbury, Oxfordshire, Eng.—d. Jan. 19, 1896, Canajoharie, N.Y., U.S.), American political cartoonist noted for his influential cartoons associated with the U.S. presidential campaigns of the late 19th century.

With his parents Gillam immigrated to New York in 1866. He left school early and worked as a copyist in a lawyer's office before studying engraving. His first caricatures were published in *Leslie's Weekly* and the *New York Graphic,* and their success determined his career as a political cartoonist. After working with the cartoonist Thomas Nast on *Harper's Weekly* during the presidential campaign of James A. Garfield in 1880, he was hired by *Puck,* a pro-Democratic comic weekly, in 1881. Although he was a Republican, he contributed in part to the defeat of James G. Blaine by Grover Cleveland in the election of 1884 through a biting "tattooed man" series published in *Puck,* in which Blaine was shown tattooed with his evil deeds. The first of the series, "The National Dime Museum," caricatured many political figures in addition to Blaine and became one of Gillam's and *Puck*'s most famous cartoons.

In 1886 Gillam became part owner and director in chief of the pro-Republican comic weekly *Judge,* which he developed into a powerful political voice. During the presidential campaigns of 1888 and 1892, Gillam's cartoons depicted the dangers of the free-trade policy of the Democrats and the benefits of Republican protectionism. Gillam's career was cut short when he died of typhoid fever.

Gillars, Mildred, byname AXIS SALLY (b. 1900?, Portland, Maine, U.S.—d. June 25, 1988, Columbus, Ohio), American citizen who was a radio propagandist for the Nazi government during World War II.

Gillars was an aspiring actress who played minor parts in some American theatrical touring companies. She attended Ohio Wesleyan University but left in 1922. In 1929 she traveled to North Africa, with the intention of going on to Europe. In 1934 she arrived in Germany to study music in Dresden.

During World War II her voice became known to many thousands of U.S. servicemen who heard her on short-wave radio, playing nostalgic American songs and speculating about the fidelity of the wives and sweethearts whom the soldiers, sailors, and airmen had left behind in the United States.

Just before the Allied invasion of Normandy in 1944, Axis Sally (an American appellation; she introduced herself in her sultry voice simply as "Sally") broadcast a demoralizing and exaggerated account of the horrors awaiting any Allied soldiers foolhardy enough to invade Adolf Hitler's Fortress Europe.

In 1946 a U.S. counterintelligence agent spotted Mildred Gillars in Berlin. Eventually she was brought back to the United States, indicted on 10 counts of treason (1947), and convicted on one of them (1949), the preinvasion broadcast, tape recordings of which were played at her trial. She was fined $10,000 and was sentenced to imprisonment for 10 to 30 years. She was paroled after 12 years in 1961. On her release she entered a convent near Columbus, Ohio, of a Roman Catholic religious order and taught French, music, and German at a high school operated by the order. In 1973 she completed her undergraduate degree at Ohio Wesleyan University.

Gillen, Francis James (b. Oct. 28, 1855, Clare, near Adelaide, S.Aus., Australia—d. June 5, 1912), Australian anthropologist who did pioneering fieldwork among the Aborigines of central Australia.

Gillen's training in anthropology came not from a university but from close contact with Aborigines in his work for the Australian postal and telegraph service. He made independent studies of Aborigines, learning their languages and customs, and became especially sensitive to their feelings, trying to deal with them fairly and with understanding. The Australian government ultimately appointed him a magistrate and subprotector of Aborigines.

In 1894 Gillen met the English anthropologist Baldwin Spencer, who was traveling with the Horn Scientific Expedition through central Australia. Gillen and Spencer soon became friends and began to collaborate on Aboriginal studies. Their association extended over a period of many years and resulted in the publication of several coauthored works. Gillen's remarkable collection of photographs of Aboriginal life are now the property of the South Australian government.

Gilles LI MUISIS, also called LE MUISET (b. January 1272, Tournai, Fr.—d. Oct. 15, 1352, Tournai), French poet and chronicler whose works are important sources for the history of France.

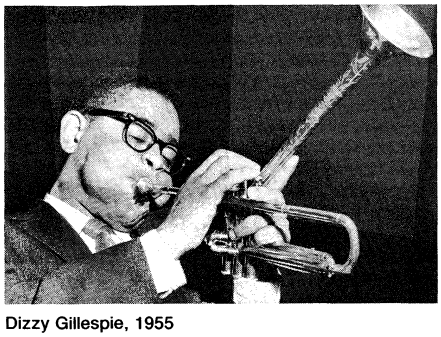
After being made prior of the Benedictine abbey of Saint-Martin in Tournai (1329), Gilles journeyed to Paris in 1330 to defend its interests against creditors. On April 30, 1331, he became abbot and, through his skill as an administrator, was able to revive some of Saint-Martin's former prosperity.

His two Latin chronicles, *Chronicon majus* and *Chronicon minus,* are reasonably trustworthy sources because he was close to political events, harboured prominent persons at his abbey, and had a critical historical view. He drew upon eyewitness testimony and was critical of reported miracles.

Toward the end of his life he composed poems in the rustic Tournaisien dialect. These are more interesting for philological study than as literature, being repetitious and lacking in elegance. They are primarily warnings against immorality, corruption, and decadence.

Gillespie, Dizzy, byname of JOHN BIRKS GILLESPIE (b. Oct. 21, 1917, Cheraw, S.C., U.S.), American trumpeter, composer, and bandleader who was a founder of the modern jazz style known as bebop.

He received early instrumental training from his father and instruction in theory at Laurinburg Institute in North Carolina. Gillespie composed, arranged, and soloed with the Teddy Hill and Cab Calloway bands in the late 1930s and with the Benny Carter and Earl Hines bands, among others, in the early 1940s. He took an active part in the jam sessions at Minton's Playhouse in Harlem, where such musicians as pianist Thelonius Monk, drummer Kenny Clarke, and saxophonist Charlie Parker were experimenting with a new style



Dizzy Gillespie, 1955
UPI—EB Inc.

of jazz composed of numerous altered chord progressions and rapid syncopated rhythms. Gillespie became co-leader of a group on 52nd Street with bassist Oscar Pettiford, which marked the birth of the bebop era. When Gillespie and Parker joined Billy Eckstine's band in 1944, it became the first big band to showcase the new style.

Gillespie took the saxophone-style lines of advanced swing-era trumpeter Roy Eldridge and executed them faster, with greater ease, and with further harmonic daring. He played his jagged melodies with abandon, reaching into the highest registers of the trumpet range and improvising into precarious situations from which he always seemed to extricate himself. He thought much like a drummer and was partly responsible for the assimilation of Afro-Cuban elements into modern jazz. Gillespie helped popularize the interval of the augmented eleventh (flat fifth) as a characteristic sound in modern jazz.

Gillespie influenced many modern jazz trumpeters, including such leading figures as Miles Davis, Thad Jones, and Kenny Dorham. His improvised lines with their abrupt changes in direction were incorporated into the improvisations of pianists, saxophonists, guitarists, bassists, and vibraphonists. Though associated mostly with small combos, especially those he co-led with Charlie Parker, Gillespie led and wrote for his own swing-era-sized big bands throughout the late 1940s and sporadically during the 1950s, launching such outstanding saxophone soloists as John Coltrane, Benny Golson, Dexter Gordon, and James Moody.

The Gillespie compositions "Night in Tunisia," "Manteca," "Con Alma," and "Birks Works" became jazz standards. His bent trumpet (originally the result of its being sat on) and his on-stage clowning became personal trademarks. His memoirs, *To Be or Not To Bop,* were published in 1979.

Gillespie, George (b. Jan. 21, 1613, Kirkcaldy, Fife, Scot.—d. Dec. 17, 1648, Kirkcaldy), leader of the Church of Scotland and polemical writer, who negotiated with the Church of England for the freedom of his church to diverge from Anglican worship and doctrine (1640).

The son of a parish minister, Gillespie was educated at the University of St. Andrews. His first work, *A Dispute Against the English Popish Ceremonies Obtruded Upon the Church of Scotland* (1637), was followed by other publications that were highly controversial and hostile toward state domination of the church. In 1638 he was ordained a minister and in the same year was a member of the Glasgow general assembly.

In 1640 he accompanied the commissioners of the peace to England and was one of the first systematically to expound Presbyterian ideals to the English Puritans. As a result he was moved to Edinburgh in 1642 and helped to frame the covenant. In 1643 he was appointed one of the four Scottish ministers to the Westminster assembly. In 1645 he drafted the Act of Assembly sanctioning the directory of public worship, and in London he also contributed to the Westminster confession of faith. Gillespie was elected moderator of the assembly in 1648 but died a short time later.

Gillespie, Thomas (b. 1708, Clearburn, near Edinburgh—d. Jan. 19, 1774, Dunfermline, Fife, Scot.), Scottish Presbyterian minister who assisted in founding the Relief Church (Oct. 22, 1761), a Presbyterian group advocating the right of a congregation to approve its minister. Gillespie was ordained in 1741 and inducted to the parish of Carnock, Fife. In 1752 he was a victim of the controversy, following the Patronage Act of 1712, over the right of congregations to approve the choice of ministers. Gillespie was deposed by the assembly for maintaining that the local presbytery was justified in refusing to act against the wish of the parish. He continued to preach at Carnock and later at Dunfermline, where a large congregation gathered around him. In 1761, with Thomas Boston of Jedburgh and Thomas Colier of Colinburgh, he formed a separate communion under the name Presbytery of Relief.

Gillette, King Camp (b. Jan. 5, 1855, Fond du Lac, Wis., U.S.—d. July 9, 1932, Los Angeles), American inventor and first manufacturer of the safety razor and blade.

Reared and educated in Chicago, Gillette was forced by his family's loss of possessions in the fire of 1871 to go to work, becoming a traveling salesman of hardware. An employer noted his predilection for mechanical tinker-

King Camp Gillette
By courtesy of the Gillette Company, Safety Razor Division

ing, which sometimes resulted in commercially profitable inventions, and advised him to invent "something that would be used and thrown away," so that the customer would keep coming back. While honing a permanent, straight-edge razor, Gillette had the idea of substituting a thin double-edged steel blade placed between two plates and held in place by a T handle. Though the proposal was received with skepticism because the blades could not be sharpened, the manufactured product was a success from the beginning. The first sale, in 1903, consisted of a lot of 51 razors and 168 blades; by the end of 1904, Gillette's company had produced 90,000 razors and 12,400,000 blades.

He then turned his intellectual energies to publicizing a view of utopian socialism in a series of books and other writings. He found competition wasteful and envisaged a planned society in which economic effort would be rationally organized by engineers. In 1910 he vainly offered former President Theodore Roosevelt $1,000,000 to act as president of an experimental "World Corporation" in the Arizona Territory. Gillette remained president of his company until 1931 but retired from active management in 1913.

Gillette, William Hooker (b. July 24, 1853, Hartford, Conn., U.S.—d. April 29, 1937, Hartford), American playwright and actor noted for his portrayal of the title role in *Sherlock Holmes,* which he adapted for the stage from Sir Arthur Conan Doyle's stories.

Gillette quit college and in 1875 joined a stock company in New Orleans and made his first appearance at the Globe Theatre in Boston the same year. Among his successful plays were a light comedy, *Esmeralda* (1881), written with Frances Hodgson Burnett; a Civil War spy story, *Held by the Enemy* (1886); *Secret Service* (1895); and his famous play *Sherlock Holmes* (1899). This play, first produced in New York and later in England, was often revived in both countries with Gillette in the leading role. His only motion-picture appearance was in 1915 as Holmes.

Gillingham, district (borough), county of Kent, England, situated on the River Medway. It is one of the three Medway towns. Before the establishment of the royal dockyard at nearby Chatham, a portion of the town (known as Grench) was an outlier of Hastings, one of the Cinque Ports. Gillingham was in-

corporated in 1903 and in 1921 was extended to include Rainham. The local economy is largely industrial, and many of the local inhabitants are employed in the royal dockyard (the greater part of which actually lies within the borough) and also in numerous light industries. The district has an area of 17 sq mi (44 sq km). Pop. (1982 est.) 95,200.

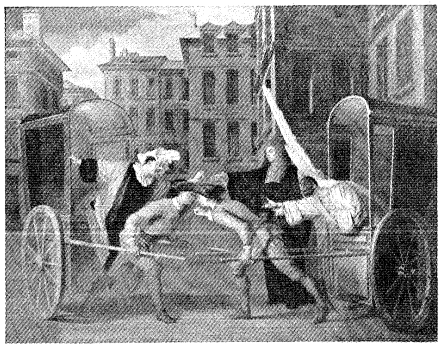
Gilliss, James Melville (b. Sept. 6, 1811, Georgetown, Md., U.S.—d. Feb. 9, 1865, Washington, D.C.), U.S. naval officer and astronomer who founded the Naval Observatory in Washington, D.C., the first U.S. observatory devoted entirely to research.

Gilliss entered the U.S. Navy in 1827 and 10 years later was put in charge of the navy's Depot of Charts and Instruments, in Washington, D.C. His responsibilities included making astronomical observations necessary for longitude determinations of newly explored country. At his recommendation, funds were provided by Congress in 1842 for founding the Naval Observatory, and he supervised its construction (1843–44).

Gilliss undertook an astronomical expedition, constructing a station (later a permanent observatory) in Santiago, Chile, to observe Mars and Venus (1847–52). During this expedition he also charted more than 23,000 stars and made earthquake, magnetic, and meteorological observations. He later led expeditions to Peru (1858) and Washington Territory (1860). From 1861 he served as director of the Naval Observatory.

Gillot, Claude (b. April 27, 1673, Langres, Fr.—d. May 4, 1722, Paris), French painter, engraver, and theatrical designer best known as the master of the great painter Antoine Watteau. Gillot directed scenery and costume design for both opera and theatre. An accomplished draftsman and a man of keen intelligence, he was in part responsible for the love of the theatre, especially Italian comedy, that figures prominently in Watteau's art.

Gillot's sportive, mythological paintings, with such titles as "Feast of Pan," gained him entry to the French Royal Academy in 1715, and he then adapted his art to the fashionable



Scene from "The Two Coaches," painting by Claude Gillot, c. 1707; in the Louvre, Paris
Giraudon—Art Resource/EB Inc.

tastes of the day. His prints depict popular scenes and courtly comic adventures. He also influenced the fashionable Rococo decorative painter Nicolas Lancret.

Gillray, James (b. Aug. 13, 1756, Chelsea, near London—d. June 1, 1815, London), English caricaturist chiefly remembered for lively political cartoons directed against George III of England and Napoleon. Often scurrilous and violent in his criticism, he brought a highly dramatic sense of situation and analogy to cartooning.

Gillray learned letter engraving and in 1778 was admitted as a student to the Royal Academy, supporting himself by engraving and perhaps by caricatures signed with fictitious names. The first caricature that is certainly his is "Paddy on Horseback," published in 1779. The name of Gillray's publisher and printseller, Miss Hanna Humphrey, is inextricably associated with his; he lived in her house during all the years of his fame, and his prints were shown in the windows of her shop.

Gillray's caricatures may be divided into two classes: political and social. The political caricatures form a historical record of the latter part of the reign of George III, whom Gillray called "Farmer George." They were widely circulated throughout Britain and Europe. In this series George III, the Queen, the Prince of Wales, Charles James Fox, Edmund Burke, William Pitt, and Napoleon are trenchantly satirized; the latter two are featured in a celebrated cartoon, "The Plum Pudding in Danger." Among Gillray's best satires on the King are companion plates of Farmer George and his wife "Frying Sprats" and "Toasting Muffins"; "The Anti-Saccharites," in which the royal pair propose to dispense with sugar to the great horror of the family; "A Connoisseur Examining a Cooper"; "Temperance Enjoying a Frugal Meal"; and "Royal Affability." After 1807 Gillray declined mentally and eventually became insane.

Like most English caricatures of his time, Gillray's plates were executed in etching with stipple and coloured by hand. They were produced in broadsheets for popular consumption, and perhaps this is one of the reasons for the spontaneity that makes them so lively and timely.

gillyflower, also spelled GILLIFLOWER, any of several scented flowering plants, espe-

Wallflower (*Cheiranthus cheiri*)
H. Smith

cially the carnation, or clove pink (*Dianthus caryophyllus*), stock (*Matthiola incana*), and the wallflower (*Cheiranthus cheiri*). The gillyflower of Chaucer, Spenser, and Shakespeare was the carnation. Other plants that utilize the word gillyflower are dame's gillyflower, also known as dame's violet (*Hesperis matronalis*); mock gillyflower, also known as soapwort or bouncing bet (*Saponaria officinalis*); feathered gillyflower, also known as the grass or garden pink (*Dianthus plumarius*); and sea gillyflower, also known as the thrift or sea pink (*Armeria maritima*).

Gilman, Charlotte Anna Perkins (Stetson), *née* PERKINS (b. July 3, 1860, Hartford, Conn., U.S.—d. Aug. 17, 1935, Pasadena, Calif.), leading theorist of the women's movement in the United States.

A great-granddaughter of the noted theologian Lyman Beecher, Gilman began her literary career in the 1890s with the publication of poetry, short stories, and social analysis. She also gained worldwide fame as a lecturer, speaking on topics concerning women, ethics, labour, and society. In *Women and Economics* (1898), the work for which she is best known, she proposed that the sexual and maternal roles of women had been overemphasized to the detriment of their social and economic abilities and that only economic independence could bring true freedom. *Women and Economics* was widely read in North America and Europe and was subsequently translated into seven languages.

In 1909 Gilman founded *Forerunner*, a magazine that she edited until 1916; it argued for the need for social reorganization. In 1915, with Jane Addams and others, she founded the Woman's Peace Party.

She was married in 1884 to Charles W. Stetson, an artist (divorced 1894), and to George H. Gilman, a lawyer (died 1934), in 1900. Gilman committed suicide while suffering from cancer. Her autobiography is *The Living of Charlotte Perkins Gilman* (1935). Among her other publications are "The Yellow Wall Paper" (1892), *The Home* (1903), and *His Religion and Hers* (1923). A biography, *Charlotte Perkins Gilman: The Making of a Radical Feminist, 1860–1896,* by Mary A. Hill, was published in 1980.

Gilman, Daniel Coit (b. July 6, 1831, Norwich, Conn., U.S.—d. Oct. 13, 1908, Norwich), U.S. educator and first president of Johns Hopkins University, Baltimore.

After graduating from Yale University in 1852, Gilman went to St. Petersburg (now Leningrad), Russia, as an attaché and then studied in Berlin (1854–55). For 17 years thereafter, he worked at Yale—as assistant librarian, professor of physical and political geography, and secretary of the governing board.

From 1872 to 1875 he headed the University of California at Berkeley. In 1875 he became first president of Johns Hopkins, remaining there until 1901, after which he served as the first president of the Carnegie Institution at Washington, D.C., until 1904.

Gilman's influence on higher education in the United States was considerable. He made Johns Hopkins an exemplar of the modern university, ridding it of denominational control, absorption in undergraduate teaching, and exclusive attention to the humanities. He brought the university under the control of a lay board, introduced the sciences into the curriculum, promoted advanced research, and created professional schools. He also helped reorganize the Johns Hopkins Hospital, of which he was made director in 1889. He also served on numerous foundations and boards and was president of the National Civil Service Reform League.

Gilmore, Patrick (Sarsfield) (b. Dec. 25, 1829, County Galway, Ire.—d. Sept. 24, 1892, St. Louis, Mo., U.S.), leading U.S. bandmaster of the 19th century and a virtuoso cornetist, noted for his flamboyant showmanship, innovations in instrumentation, and the excellence of his bands.

He immigrated to the United States at age 19, and, after leading several bands, he took over the Boston Brigade Band (subsequently known as Gilmore's Band) in 1859. During the Civil War the entire band enlisted in the Union Army. Gilmore reorganized the Massachusetts Militia bands in 1863. In 1869 (National Peace Jubilee) and 1872 (World Peace Jubilee) he organized extravaganza performances with more than 10,000 performers. The one in 1869 featured cannon fire, church bells, and 100 firemen beating anvils in Verdi's "Anvil Chorus." From 1872 until his death he led the New York 22nd Regiment Band (also called Gilmore's Band), with whom he toured Europe (150 concerts) in 1878.

Gilmore's innovations in instrumentation brought the band from the heavy reliance on brass typical of the early 19th century to the higher proportion of reeds, especially clarinets, characteristic of 20th-century concert bands. He was also one of the first U.S. bandmasters to conduct band arrangements of Mozart, Liszt, and Rossini, in addition to the popular songs, marches, and dance tunes that made up the typical band repertoire. Gilmore reputedly composed "When Johnny Comes Marching Home" (1863) under the pen name Louis Lambert.

Gilpin, Bernard, byname APOSTLE OF THE NORTH (b. 1517, Kentmere, Westmorland, Eng.—d. March 4, 1583, Houghton-le-Spring, Durham), English cleric, one of the most conscientious and broad-minded upholders of the Elizabethan church settlement, which recognized the English sovereign, rather than the pope, as head (supreme governor) of the English church.

Gilpin was educated at Queen's College, Oxford, and was ordained in 1542. He defended Roman Catholic doctrines against the Protestant bishop John Hooper and Peter Martyr and in 1552 preached a sermon, before the ailing adolescent king Edward VI of England, denouncing the expropriation of church property.

Gilpin became vicar of Norton, Durham, that same year and obtained permission to preach throughout the kingdom. Just before Mary's accession he went to study on the Continent, returning in 1556 to be rector of Easington, Durham, and archdeacon of Durham. He frankly refused to accept either Calvinism or the anti-Reformation decrees of the Council of Trent. He was defended on a heresy charge by his great-uncle, the Catholic bishop Cuthbert Tunstall of Durham, a leading conservative during the English Reformation, who endorsed royal supremacy. Gilpin succeeded in avoiding a royal warrant for his apprehension in London and was spared further harassment after the death of Mary (Nov. 17, 1558), whose persecution of the Protestants he had loathed.

He joined the majority of the lower clergy in subscribing to royal supremacy. He declined, however, several offers of promotion and concentrated on pastoral work throughout northern England—which was in great need of such work after the dissolution of the Cistercian abbeys there. That service earned him the title of Apostle of the North and the respect of the Puritans. Austere in private life, Gilpin in 1574 founded a grammar school at Houghton-le-Spring (where he was rector 1558–83), helped finance the education of poor scholars, and visited prisons. He remained celibate and retained other characteristics of the Catholic tradition, though many of his pupils became Puritans.

Gilson, Étienne(-Henry) (b. June 13, 1884, Paris—d. Sept. 19, 1978, Cravant, Fr.), French Christian philosopher and historian of medieval thought, one of the most eminent international scholars of the 20th century. He was born into a Roman Catholic family and owed his early education to Catholic schools in Paris. He began the study of philosophy in 1902 at the Lycée Henri IV and received his baccalaureate in 1906 from the Sorbonne (the University of Paris). For the next six years he taught philosophy in various lycées. In 1913 he took his doctoral degree, for which he had investigated Descartes and Scholasticism, the subject that first led him to the study of medieval thought.

In 1916, at the Battle of Verdun, he was wounded and taken prisoner. During the two years of his imprisonment, he devoted himself among other things to the study of the Russian language and of the thought of St. Bonaventure. He was later awarded the Croix de Guerre for bravery in action.

From 1919 Gilson was professor of the history of philosophy at the University of Strasbourg; in 1921 he returned to the University of Paris as professor of the history of medieval philosophy, a post he continued to hold until 1932, when he inaugurated the first chair in the history of medieval philosophy at the Collège de France. In 1926 he made the first of what later became his annual visits to the United States and Canada, lecturing at the universities of Montreal, Harvard, and Virginia. Three years later, at the invitation of the Congregation of the Priests of St. Basil, he established the Pontifical Institute of Mediaeval Studies in conjunction with St. Michael's College at the University of Toronto. From then on he divided his academic year between Paris and Toronto, a practice that was interrupted only by the war years, during which he remained in Paris. In 1951 he relinquished his chair at the Collège de France to devote full time to his post at Toronto, a position he retained until 1968.

Gilson soon came to profess himself a disciple of St. Thomas Aquinas, but, as he freely acknowledged, his own understanding of Aquinas' thought underwent considerable development. He taught his first course on Thomism in 1914, and his first book on the subject was *Le Thomisme: Introduction au systéme de saint Thomas d'Aquin* (1919; *The Christian Philosophy of St. Thomas Aquinas*). Many of his best known books resulted from lectureships. Among these are *L'Esprit de la philosophie médiévale* (1932; *The Spirit of Mediæval Philosophy*), his exposition and defense of the idea of a Christian philosophy, and *The Unity of Philosophical Experience* (1937) and *Being and Some Philosophers* (1949), perhaps the best examples of his use of the history of philosophy as though it were a laboratory for investigating ideas. He made major studies of all the great medieval thinkers, the results of which were summed up in *History of Christian Philosophy in the Middle Ages* (1955). Among his most charming books is *L'École des muses* (1951; *The Choir of Muses*), a study of writers whose works were inspired by love for a woman. He was a lover and collector of painting, on which he wrote *Painting and Reality* (1957) and *The Art of the Beautiful* (1965). His last published book was *Dante et Béatrice: Études dantesques* (1974).

Gilsonite, also called UINTAITE, lustrous, jet-black, natural bitumen (solid mixture of compounds of carbon and hydrogen), an asphaltite (*q.v.*). It is named for S.H. Gilson, one of its discoverers, and alternatively for its first known location in the Uinta Basin near the Colorado–Utah border. Gilsonite occurs as veins filling parallel vertical fractures, the largest of which are several kilometres long, thousands of metres deep, and about six metres across. Before 1950 it was used mainly in the manufacture of paint and other coating materials. Production increased after 1957, when it was mined hydraulically and transported as a water slurry in pipelines to refineries for conversion to coke and gasoline. Gilsonite is a trademark of the American Gilsonite Company, its major producer.

Gilyak, also called NIVKH, east Siberian people who live in the region of the Amur River estuary and on the nearby island of Sakhalin. They numbered 4,400 at the 1979 census and speak a Paleosiberian language unaffiliated apparently with any other language. Their name for themselves, Nivkh, means "man."

The Gilyak economy was traditionally based on fishing (especially for salmon) and the hunting of sea lions and seals. Agriculture (the cultivation of potatoes) was started in the mid-19th century. Men's occupations included fishing, hunting, and making tools and means of transportation. Women processed animal skins, prepared birch bark for various uses, made clothing and utensils, gathered plants, did housework, and cared for the dogs. Until recently dogs were the only domestic animals, used for pulling sleds and as a source of fur and meat; they were also a medium of exchange, an index of wealth, and an important part of religious ideas and rituals.

Villages usually were situated near the mouths of rivers used by spawning salmon and included as many as 20 houses. The Gilyak were divided into exogamous clans. Clan members had mutual duties in payment of blood money, bride-price, and burial expenses; they observed a common cult that included a clan fire, a storehouse for ritual objects, and the organization of a clan bear festival, usually held in honour of a dead clan kinsman.

Under Soviet administration economic activities have been collectivized and small, scattered villages unified. Tillage, gardening, and cattle breeding have been developed, and agriculture has been introduced among the Sakhalin Gilyak.

Gilyak language, isolated language spoken by the east Siberian Gilyak, who live on the island of Sakhalin and along the estuary of the Amur River in the U.S.S.R.; Gilyak is not known to be related to any other language but is usually associated with Yukaghir, the Luorawetlan languages, and the Yeniseian languages under the name of Paleosiberian languages.

Gimli, town, southern Manitoba, Canada, on the southwestern shore of Lake Winnipeg. Established in 1875 as the first permanent Icelandic settlement in Canada, the town, whose name in Norse mythology refers to the "home of the gods," fathered several other colonies (known as New Iceland) on the west side of the lake. It was at first a part of the Northwest Territories and then (1878–87) a self-governing unit with its own constitution. Gimli is now a commercial fishing port and fish-processing centre. Also a popular resort, the town holds an annual (August) Islindingadagurinn (Icelandic festival) and is connected by road and rail to Winnipeg, 50 mi (80 km) south. Inc. village, 1908; town, 1946. Pop. (1981) 1,550.

gin, flavoured, distilled liquor made from purified spirits usually obtained from a grain mash and having the juniper berry as its principal flavouring ingredient. It includes both the malty-flavoured and full-bodied Netherlands types and the dryer types, characterized by distinct botanical flavouring, produced in Britain and the United States.

The name of the beverage comes from the French name for the juniper berry, *genièvre,* altered by the Dutch to *genever* and shortened by the English to "gin." Its origin is attributed to Franciscus Sylvius, a 17th-century professor of medicine at the University of Leiden in Holland, who distilled the juniper berry with spirits to produce an inexpensive medicine having the diuretic properties of juniper-berry oil. The beverage became popular and was introduced to England by soldiers returning from the Low Countries. In the 18th century excessive consumption of the inexpensive beverage presented a social problem, depicted in Hogarth's engraving "Gin Lane."

Netherlands gins, known as Hollands, *geneva, genever,* or Shiedam, for a distilling centre near Rotterdam, are made from a mash containing barley malt, fermented to make beer. The beer is distilled, producing spirits called malt wine, with 50–55 percent alcohol content by volume. This product is distilled again with juniper berries and other botanicals, producing a final product having alcoholic content of about 35 percent. English and U.S. gins are distilled from malt wine purified to produce an almost neutral spirit, without flavour or aroma, having alcohol content of 90–94 percent by volume. This is reduced with distilled water, combined with the flavouring agents, and distilled and reduced again, producing a final product of 40–47 percent alcoholic content (80–94 U.S. proof). The dry gins have more added flavouring ingredients than Dutch types. Each producer employs a secret formula, including, in addition to the juniper berries, combinations of such botanicals as orris, angelica, and licorice roots, lemon and orange peels, cassia bark, caraway, coriander, cardamom, anise, and fennel.

United States producers sometimes age their gins, imparting pale-golden colour. Dutch gins may have similar colour, resulting from the addition of caramel colouring. Old Tom is a slightly sweetened gin, and various fruit-flavoured gins are made by adding the appropriate flavourings to finished gin. Sloe gin is not a true gin but a sweet liqueur, flavoured with sloe berries, the small, sour fruit of the blackthorn.

Dutch gins, too distinctive in taste to combine well with other beverages, are usually served unmixed or with water. The drier types, sometimes called London dry, may be served unmixed or may be combined with other ingredients to make such cocktails as the martini and gimlet and such long drinks as the Tom Collins and the gin and tonic.

Consult the INDEX *first*

Gin Rummy, card game, member of the Rummy-games family; introduced in New York in 1909, it became a nationwide fad in the U.S. in the 1940s. Two play; each is dealt 10 cards face down, one at a time, beginning with nondealer. The remainder of the pack, placed face down, forms the stock, the top card of which is turned up beside it as the first up card.

Nondealer may take the up card or refuse it; if he refuses, dealer has the same option. If both refuse, nondealer draws the top card of the stock. Thereafter, each player in turn takes either the up card or the top card of the stock, then discards one card face up on the up-card pile.

Object of play is to form melds as in Rummy—either sequences of three or more cards of the same suit or sets of three or more cards of the same rank. After drawing, a player may knock (go down) if his unmatched cards (less one discard) total 10 or less. Face cards count 10, aces 1, other cards their number value. Upon knocking, a player faces his 10 cards arranged in sets and with unmatched cards to one side, then discards his 11th card. If all his cards are matched, he is gin.

The opponent of the knocker may lay off any of his unmatched cards upon the knocker's sets, thereby reducing his count. If the knocker has the lower count of unmatched cards, he wins the difference. Should his opponent have an equal or lesser count, he has undercut the knocker and receives the difference (if any) plus a bonus of 25 points. The knocker cannot be undercut if he has gone gin—he receives, in addition to the total points of his opponent's unmatched cards, a bonus of 25 points.

First to reach 100 points wins the game and receives a 100-point bonus. Each player then adds to his score 25 points for each hand he has won, called a box. If the loser has failed to score, the game is a shutout, or schneider, and the winner's total score is doubled. Gin Rummy is frequently played with several variations and as a gambling game, often for a small amount of money per point.

Ginastera, Alberto (Evaristo) (b. April 11, 1916, Buenos Aires—d. June 25, 1983, Geneva), a leading 20th-century Latin-American composer, known for his use of local and national musical idioms in his compositions.

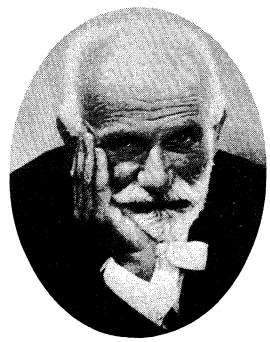
Ginastera was musically talented as a child and studied in Buenos Aires at the Conservatorio Williams and the National Conservatory. He received a Guggenheim award and lived in the United States in 1946–47.

Ginastera's music marks him as a traditionalist, despite his advanced musical vocabulary, which owes much to the great musical figures of the early 20th century. His synthesis of techniques is unique and eclectic, and he makes use of microtones (smaller than half tones), serial procedures (basing works on selected series of pitches, rhythms, etc.), and aleatoric, or chance, music as well as older established forms. Ginastera's *Piano Concerto* and *Cantata para América mágica* won great acclaim at the 1961 Interamerican Music Festival. His first opera, *Don Rodrigo* (1964), unsuccessful in its premiere in Buenos Aires, was hailed as a triumph in New York City in 1966.

Ginastera's masterpiece is the chamber opera *Bomarzo* (1967), which established him as one of the leading opera composers of the 20th century. This highly dissonant score is a reworking of a cantata of the same name for narrator, male voice, and chamber orchestra, commissioned by the E.S. Coolidge Foundation at the Library of Congress (1964). In *Bomarzo* Ginastera made use of novel and complex compositional techniques but preserved the traditional opera format of arias and recitatives in its 15 scenes. He further developed this style in his final opera, *Beatrix Cenci*, which had its debut in 1971 in Washington, D.C.

Giner de Los Ríos, Francisco (b. Oct. 10, 1839, Ronda or possibly Málaga, Spain—d. Feb. 17, 1915, Madrid), Spanish philosopher, literary critic, and educator who became the most influential exponent of *krausismo,* a liberal educational and philosophical movement prominent in Spain during the 19th century, emphasizing the development of the individual and based on the teachings of the German philosopher Karl Krause.

After taking a degree in law at the University of Granada, he went to Madrid, where he came under the influence of Julián Sanz del Río, who introduced the teachings of Krause to Spain. In 1876 Giner founded the famous Institución Libre de Enseñanza (Institution for Independent Teaching), an educational institution free from the influence of the church and the state. His works include *Estudios de literatura y arte* (1876; "Studies in Literature and Art"); *Estudios sobre educación* (1886; "Studies on Education"); *Filosofía y sociología* (1904; "Philosophy and Sociology"); and *Resumen de filosofía del derecho* (1912; "Summary of Philosophy of Law").

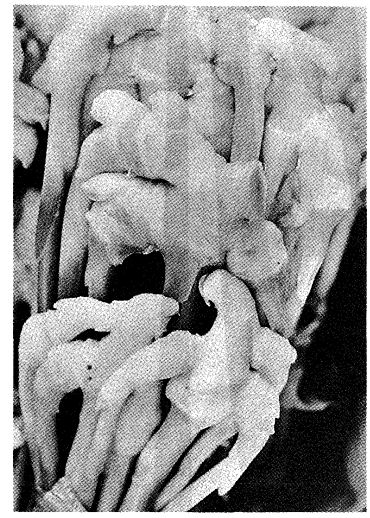


Giner de los Ríos
By courtesy of the Instituto de Cultura Hispanica, Madrid

Ginevra (Switzerland): *see* Geneva.

ginger (*Zingiber officinale*), herbaceous perennial plant of the family Zingiberaceae, probably native to southeastern Asia, or its aromatic, pungent rhizome (underground stem) used as a spice, flavouring, food, and medicine. Its generic name *Zingiber* is derived from the Greek *zingiberis*, which comes from the Sanskrit name of the spice, *singabera.* Its use in India and China has been known from ancient times, and by the 1st century AD traders had taken ginger into the Mediterranean region. By the 11th century it was well known in England. The Spaniards brought it to the West Indies and Mexico soon after the conquest, and by 1547 ginger was being exported from Santiago to Spain.

The spice has a slightly biting taste and is used, usually dried and ground, to flavour breads, sauces, curry dishes, confections, pickles, and ginger ale. The fresh rhizome, green ginger, is used in cooking. The peeled rhizomes may be preserved by boiling in syrup. In Japan and elsewhere, slices of ginger are eaten between dishes or courses to clear the palate. Ginger is used medically to treat flatulence and colic.



Ginger rhizomes (*Zingiber officinale*)
W.H. Hodge

The leafy stems of ginger grow about a metre high. The leaves are 6 to 12 inches (15 to 30 centimetres) long, elongate, alternate in two vertical rows, and arise from sheaths enwrapping the stem. The flowers are in dense, conelike spikes about 1 in. thick and 2 to 3 in. long composed of overlapping green bracts, which may be edged with yellow. Each bract encloses a single, small, yellow-green and purple flower.

Ginger is propagated by planting rootstalk cuttings and has been under this type of cultivation for so long that it no longer goes to seed. Harvesting is done simply by lifting the rhizomes from the soil, cleansing them, and drying them in the sun. The dried ginger rhizomes are irregular in shape, branched or palmate. Their colour varies from dark yellow through light brown to pale buff. Ginger may be unscraped (with all of its cork layer); partly scraped; or scraped or peeled (with all of its cork, epidermis, and hypodermis removed).

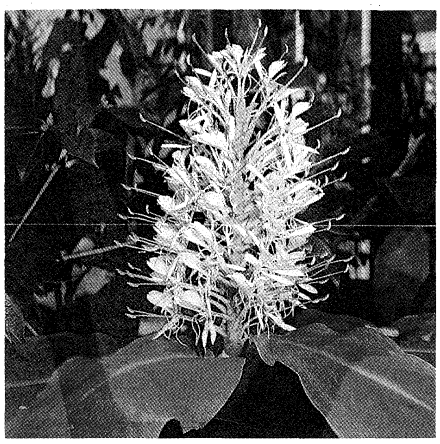
Ginger contains about 2 percent essential oil; the principal component is zingiberene and the pungent principle of the spice is zingerone. The oil is distilled from rhizomes for use in the food and perfume industries.

ginger beer, beverage popular in the United Kingdom, made by fermenting a mixture of ginger, water, sugar, cream of tartar, yeast, and water. Lemon peel and juice or citric acid may also be added. Ginger beer is bottled before fermentation is complete; it is carbonated and mildly alcoholic. There is also a soft (nonalcoholic) ginger beer; it is not as sweet as ginger ale and has a more pronounced ginger flavour. Ginger ale is a soft drink made by combining carbonated water with essence of ginger or capsicum extract, colouring, and sugar or glucose.

ginger jar, covered porcelain jar made in China and believed to be filled with candy, ginger, or tea and given as a gift during the

Chinese New Year celebration. The contents of the jar were kept by its recipient; the jar was returned to its owner. The body is globular and tapers somewhat at the base. Especially noteworthy are Ch'ing dynasty ginger jars of the period of the emperor K'ang-hsi (reigned 1662–1722) with their prunus blossom decoration reserved in white against an uneven blue ground.

ginger lily, also called GARLAND FLOWER, any ornamental plant of the genus *Hedychium,* of the ginger family (Zingiberaceae). About 50 species occur in tropical and subtropical regions (*e.g.,* Madagascar, southwestern China). The rhizomes (underground stems) are gin-



Kahili ginger (*Hedychium gardneranum*)
A.J. Huxley—EB Inc.

gerlike (*i.e.,* fleshy with a yellow or bluish interior). Two species from Malaysia are epiphytic—*i.e.,* supported by other plants and having aerial roots exposed to the humid atmosphere. The approximately 70-centimetre- (2-foot-) long leaves are green above and bluish on the underside; in one species (*Hedychium greenei*) the leaves are dark green above and red underneath. The sweetly scented flowers are borne in spirally arranged clusters.

Flowers of many *Hedychium* species are used for garlands and other decorations. The white-flowered *H. coronarium,* known as white ginger, and the yellow-flowered *H. flavum,* or yellow ginger, are among the most commonly used species in the leis of Hawaii.

gingham, plain-woven fabric, originally made completely of cotton fibres but later also of man-made fibres, which derives its colour and pattern effects from carded or combed yarns. The name comes from the Malay word *genggang,* meaning "striped," and thence from the French *guingan,* used by the Bretons to signify cloth made from striped colouring. Medium or fine yarns of varying quality are used to obtain the plain, checked, or striped effects. The warp and the weft, or filling, may be the same, even-sided and balanced.

Gingham is strong, substantial, and serviceable. It launders easily and well, but lower-textured fabric may shrink considerably unless preshrunk. Prices of gingham have a wide range; designs or patterns run from the conservative to the gaudy. Uses include dress goods, trimming, kerchiefs, aprons, children's wear, and beachwear. It is especially popular in summer dress wear for women and children.

Gingi (fortress): *see* Jinjī.

gingiva (anatomy): *see* gum.

gingivitis, inflammation of the gums (gingivae). Symptoms include tender, sometimes swollen, gums that bleed easily. Areas of tissue destruction (necrosis) or ulceration may develop, and fever and halitosis may be present in severe disease. The most common cause of gingivitis is the accumulation of dental plaque on exposed teeth surfaces. The form of gingivitis known as trench mouth (Vincent's gingivitis) is believed to be caused by a spirochete, *Borrelia,* and a bacterium, *Fusobacterium,* acting in symbiosis on previously weakened gum tissue. General infections, poor tooth alignment (malocclusion), impacted food, and faulty dentures are other causes of gingivitis.

Herpes simplex virus causes an infectious, painful gingivostomatitis, characterized by the development of white plaques and vesicles in the mouth.

Gingoog, city and port, northern Mindanao, Philippines. It lies at the head of Gingoog Bay, which is an inlet of the Mindanao Sea. It was founded in 1750 by Recollect missionaries of the order of Friars Minor. Located in an area that produces coffee and coconut, Gingoog is also an important logging and sawmilling centre for nearby commercial forest reserves. Coffee, plywood, and timber are the principal exports. Inc. city, 1960. Pop. (1980) 79,937.

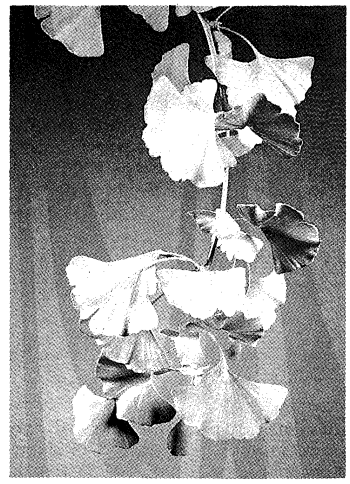
Gini, Corrado (b. May 23, 1884, Motta di Livenza, Treviso, Italy—d. Mar. 13, 1965, Rome), Italian statistician and demographer.

Gini was educated at Bologna, where he studied law, mathematics, economics, and biology. He was statistics professor at Cagliari in 1910 and at Padua in 1913. After founding the statistical journal *Metron* (1920), Gini became a professor at the University of Rome (1923). At Rome he pioneered in the teaching of sociology, treating the subject as a study of populations and their measurable characteristics, drawing on biological concepts for his view of social development. His statistical studies began with the relationship of probability to population statistics—*e.g.,* determining the sex ratio at birth.

Demography remained one of Gini's chief interests, and he later advanced a cyclical theory of population. He developed the theory of dispersion in *Variabilita e Mutabilita* (1912) and the concentration ratio. This led to his most famous contribution, the Gini coefficient, which is used in a mathematical formula to determine the measure of dispersion in a concentration.

ginkgo, also called MAIDENHAIR TREE (*Ginkgo biloba*), tree that is the only living representative of the order Ginkgoales. This order included a group of gymnosperms composed of the family Ginkgoaceae, which comprised approximately 15 genera that date from the Permian period of the Paleozoic era, some 286 million to 245 million years ago. Extinct genera, such as *Ginkgoites* and *Baiera,* are known from fossilized leaves that are similar to those of the present-day tree. The ginkgo, native to China, is often termed a living fossil because it is unclear whether uncultivated groups of ginkgo can be found in the wild. It has been planted since ancient times in Chinese and Japanese temple gardens and is now valued in many parts of the world as an attractive, fungus- and insect-resistant ornamental tree. It tolerates cold weather and, unlike most gymnosperms, can survive the adverse atmospheric conditions of urban areas.

A ginkgo tree is pyramidal in shape, with a columnar, sparingly branched trunk up to 30 m (100 feet) tall and 2.5 m (8 feet) in diameter. The fissured bark is grayish, deeply furrowed on older trees and has a corky texture. The light-coloured wood, soft and weak, has little economic value. Fan-shaped ginkgo leaves resemble the leaflets of the maidenhair fern and are borne on short, spurlike but greatly thickened shoots. The leathery leaves are up to 8 cm (3 inches) long and are sometimes twice as broad. Two parallel veins enter each blade from the point of attachment of the long leafstalk and fork repeatedly toward the leaf edges. Most leaves are divided into two lobes by a central notch. Dull gray-green to yellow-green in summer, they turn golden yellow in autumn, remaining on the tree until late in the season, and then fall rapidly.



Ginkgo (*Ginkgo biloba*)
Grant Heilman—EB Inc.

Male microsporangia (pollen-forming structures) and female ovules are borne on separate trees. Pollen grains are carried to the female trees by the wind.

Female trees bear paired ovules, which, when fertilized, develop into yellowish, plumlike seeds about 2.5 cm (1 inch) long, consisting of a large nut surrounded by a fleshy outer covering. The nut is silvery in colour (the word ginkgo is derived from the Chinese and Japanese words for silver nut or silver apricot) and when roasted is considered a delicacy. The ripened fleshy covering has a very disagreeable odour, making the female tree less popular for garden planting.

Several varieties are available for landscape use, including columnar types and others favoured for finer growth habit, better fall colour, and other desired qualities.

Ginsberg, Allen (b. June 3, 1926, Newark, N.J., U.S.), American poet whose epic poem *Howl* (1956) is considered to be one of the most significant products of the Beat movement (*q.v.*).

Ginsberg grew up in Paterson, N.J., where his father, Louis Ginsberg, himself a poet, taught English. Allen Ginsberg's mother, whom he mourned in his long poem *Kaddish* (1961), was confined for years in a mental hospital. Ginsberg was influenced in his work by another Paterson resident, William Carlos Williams, particularly toward the use of natural speech rhythms and direct observations of unadorned actuality.

While at Columbia University, where his anarchical proclivities pained the authorities, Ginsberg became close friends with Jack Kerouac and William Burroughs, who were later to be numbered among the Beats. After leaving Columbia in 1948, he traveled widely and worked at a number of jobs from cafeteria floor mopper to market researcher. *Howl,* his first published book, laments what Ginsberg believed to have been the destruction by insanity of the "best minds of [his] generation." Dithyrambic and prophetic, owing something to the romantic bohemianism of Walt Whitman, it also dwells on homosexuality, drug addiction, Buddhism, and Ginsberg's revulsion from what he saw as the materialism and insensitivity of post-World War II America.

Empty Mirror, a collection of earlier poems, appeared along with *Kaddish and Other Poems* in 1961, followed by *Reality Sandwiches* in 1963. *Kaddish,* one of Ginsberg's most important works, is a long confessional poem in which the poet laments his mother's in-

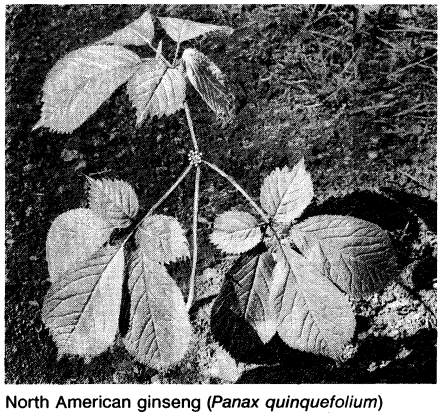
sanity and tries to come to terms with both his relationship to her and with her death. In the early 1960s Ginsberg began a life of ceaseless travel, reading his poetry at campuses and coffee bars, traveling abroad, and engaging in left-wing political activities. He became an influential guru of the American youth counterculture in the late 1960s. He acquired a deeper knowledge of Buddhism, and increasingly a religious element of love for all sentient beings entered his work.

His later volumes of poetry included *Planet News* (1968); *The Fall of America: Poems of These States, 1965–1971* (1972), which won the National Book Award; *Mind Breaths: Poems 1972–1977* (1978); and *White Shroud: Poems 1980–1985* (1986). His *Collected Poems 1947–1980* appeared in 1984.

Ginsburg, Christian David (b. Dec. 25, 1831, Warsaw—d. March 7, 1914, Palmers Green, Middlesex, Eng.), Hebrew and biblical scholar, who was the foremost authority in England on the Masorah (authoritative Jewish tradition concerning the correct text of the Hebrew Bible).

Ginsburg, who was born a Jew, emigrated to England not long after his conversion to Christianity in 1846. While working there as a missionary among the Jews (until 1863), he made a name as a biblical scholar, publishing translations with commentaries on the Song of Solomon, Ecclesiastes, and Leviticus, as well as brief treatises on the Karaites, the Essenes, and the Kabbalah. He republished Jacob ben Chajim's introduction to the Rabbinic Bible (first printed in 1524–25) with an English translation (1867); edited the Masorah, without the biblical text (4 vol., 1800–86); and wrote an *Introduction to the Massoretico-Critical Edition of the Hebrew Bible* (1897), which served as an introduction to his critical edition of the text of the Hebrew Bible according to the Masoretic tradition (1894). A further edition began to appear in 1911, but publication was finished only after his death.

ginseng, Chinese (Wade–Giles) JEN SHENG, or (Pinyin) REN SHENG ("root of heaven"), either of two herbs of the family Araliaceae, *Panax quinquefolium* and *Panax schinseng,* or their roots. The root has long been used as a drug in China and as a stimulating tea. *P. quinquefolium* is the North American ginseng, which is native from Quebec and Manitoba southward to the Gulf Coast. The roots of most ginseng cultivated in America are dried and exported to Hong Kong, from where the spice is distributed to Southeast Asia. *P. schinseng,* Asian ginseng, is native to Manchuria and Korea and is cultivated in Korea and Japan. Ginseng has been cultivated in America since about 1870 and in Korea since ancient times. Wild ginseng root was first exported from America to the Orient in the early 1700s. The ginseng plant requires 5–7 years to mature from seed and needs rich soil with adequate natural or artificial shade.



North American ginseng (*Panax quinquefolium*)
John H. Gerard

Ginseng has a sweetly aromatic flavour. Its root has long been regarded by the Chinese as a panacea for illness, though it was usually used by them in a prophylactic (preventive) rather than a curative manner. Pharmacologically, ginseng is an innocuous substance that causes minimal physiological disorder, is nonspecific in its effects, and is capable of a normalizing action irrespective of the pathological situation. Ginseng's effects include improved mental performance, learning, and memory and sensory awareness. The basis of ginseng's action is believed to be due to certain chemical agents in it that increase the brain's adrenocorticotropic hormone (ACTH) activity without involving the adrenal glands. A generalized mental arousal is thereby effected.

Ginza, commercial zone, Chuo Ward, Tokyo, the main shopping area of the city. The name comes from the words *gin* meaning "silver" and *za* meaning "guild"; in 1612 the Japanese government transferred its silver mint to this area. It is the most glamorous shopping district in Tokyo and one of the best known in the world. The Ginza extends from the Kyō Bridge near the Imperial Palace grounds southwest to the New Bridge, a distance of less than 1.5 miles (2.4 km); in this space are packed together shops and department stores that attract tourists and shoppers from Japan and around the world. At night the Ginza's bars and restaurants and their myriad lighted signs attract the patrons of numerous nearby hotels and neighbouring theatres.

Ginzberg, Louis (b. Nov. 28, 1873, Kovno, Lithuania [now Kaunas, Lithuanian S.S.R.]—d. Nov. 11, 1953, New York City), Lithuanian-born American Judaic scholar and the author of comprehensive works on Jewish law and biblical lore.

Ginzberg studied the Talmud at several rabbinical schools, as well as philosophy, history, and Oriental languages at three universities, and received his Ph.D. from the University of Heidelberg in 1898. Moving to the United States in 1899, he served as editor of rabbinical literature for the *Jewish Encyclopedia* from 1900 to 1903. From 1902 until his death, Ginzberg was professor of Talmud at the Jewish Theological Seminary of America.

Ginzberg's best-known works are his seven-volume *Legends of the Jews* (1909–38) and his monumental three-volume *Commentary on the Palestinian Talmud* (1941; in Hebrew). Into the first he gathered all the folklore in Jewish tradition bearing on Scripture and traced these legends to their sources. The second work, of which only the commentary on the first treatise of the Talmud was completed, discusses the scope and development of rabbinic theology and ritual. In addition, the *Commentary* demonstrates the influence of sociological and economic factors on the evolution of the Halakha, or Jewish religious law.

Ginzburg, Natalia, née LEVI (b. July 14, 1916, Palermo, Italy), Italian novelist who, in her writing, dealt unsentimentally with family relationships.

Ginzburg was the widow of Italian literary figure and patriot Leone Ginzburg, who operated a publishing house for a time, was arrested for antifascist activities, and died in prison in 1944. (She later remarried.) Her literary career began with publication of short stories in the Florentine periodical *Solaria.* Her first novella, *La strada che va in città* (1942; 2nd ed., including three other stories, 1945; *The Road to the City*), is the story of a young peasant girl who, lured by the excitement of the city, is seduced by and marries a man she does not love. A second novella, *È stato così* (1947; "The Dry Heart," in *The Road to the City*), also deals with an unhappy marriage; the heroine, a former teacher, explains the circumstances that impelled her to murder her husband. In *Tutti i nostri ieri* (1952; U.K. title, *Dead Yesterdays;* U.S. title, *A Light for Fools*) and *Lessico famigliare* (1963; *Family Sayings*), Ginzburg portrayed the crises of the Italian younger generation during the fascist period. Her novels of the 1970s and '80s explore the dissolution of family ties in modern society.

She also wrote several dramas, notable among which are *Ti ho sposato per allegria* (performed 1966) and *L'inserzione* (performed 1968; *The Advertisement*); several collections of critical essays, including *Mai devi domandarmi* (1970; *Never Must You Ask Me*); and a biography of the poet and novelist Alessandro Manzoni, *La famiglia Manzoni* (1983).

Ginzburg, Vitaly Lazarevich (b. Oct. 4 [Sept. 21, Old Style], 1916, Moscow), Soviet physicist and astrophysicist whose research ranged over superconductivity, theories of radio-wave propagation, radio astronomy, and the origin of cosmic rays.

After graduating from Moscow University (1938), Ginzburg was appointed to the Lebedev Physical Institute of the U.S.S.R. Academy of Sciences in 1940. He also taught at Gorky University (1945–68) and from 1968 at the Moscow Technical Institute of Physics. Ginzburg received the State Prize of the Soviet Union in 1953 and the Lenin Prize in 1966.

One of Ginzburg's most significant theories was that cosmic radiation in interstellar space is produced not by thermal radiation but by the acceleration of high-energy electrons in magnetic fields, a process known as synchrotron radiation. In 1955 Ginzburg (with I.S. Shklovsky) discovered the first quantitative proof that the cosmic rays observed near the Earth originated in supernovae. Upon the discovery in 1969 of pulsars (believed to be neutron stars formed in supernova explosions), Ginzburg expanded his theory to include pulsars as a related source of cosmic rays.

Gio (people): *see* Dan.

Gioacchino (Italian personal name): *see under* Joachim.

Gioberti, Vincenzo (b. April 5, 1801, Turin, Piedmont [Italy]—d. Nov. 26, 1852, Paris), Italian philosopher, politician, and premier of Sardinia-Piedmont (1848–49), whose writings helped bring about the unification of the Italian states.

Gioberti was ordained a Roman Catholic priest in 1825 and soon became famous as a professor of theology at the University of Turin, though his ideas began to take on appearances of unorthodoxy. He was appointed a court chaplain on the succession of the Sardinian king Charles Albert in 1831. Gioberti's career was cut short, however, by disgrace and exile following a charge that he was involved in a republican political plot. Having already expressed radical views openly, he was arrested and briefly imprisoned in 1833. He then exiled himself to Paris and Brussels, remaining abroad as a teacher while writing his first major works, including *Introduzione allo studio della filosofia* (1839–40; "Introduction to the Study of Philosophy"), a polemic against the philosophical system propounded from 1830 by Antonio Rosmini-Serbati.

Whereas Cartesian rationalism had been well known in Italy, Gioberti introduced Kantian and post-Kantian metaphysics. His own theology, philosophy, and political views revolved around his concept of being, and his system is usually termed "ontologism." He coined the term "palingenesis" to indicate the return of human concepts to the essential centre of being from which they become divorced. This reunion of the ideal and the real provided Gioberti a means of describing the actualiza-

tion in human life of the life of the spirit, and thus palingenesis became an ethical, social, and political concept.

Despite his republican views, Gioberti never joined the revolutionary organization of Giuseppe Mazzini, and by 1840 he was firmly condemning violence as a means to Italian unity. He advocated a constitutional monarchy "as far removed from demagogy as it is from despotism." In his most celebrated work, *Del primato morale e civile degli italiani* (1843; "On the Moral and Civil Primacy of the Italian Race"), he sought to present practical methods of realizing his political ideals. Asserting the value of the unique contribution that federated Italians might make to world civilization, he recommended the creation of an Italian federation headed by the pope. Gioberti's proposal was widely praised, and when Pius IX was elected in 1846, he was referred to as "Gioberti's pope" for his alleged sympathy with the plan.

An ensuing amnesty permitted Gioberti to return to Turin in 1847. Serving as president of the newly constituted Chamber of Deputies, he was also premier briefly from 1848 to 1849, when he became ambassador to France after his cabinet dissolved. He resigned soon afterward but remained in Paris until his death, living once again in self-imposed exile, while his views came into increasing disfavour in Rome. His second important political work, *Del rinnovamento civile d'Italia* (1851; "On the Civil Renewal of Italy"), showed greater approval of total democracy, inspired by popular risings in 1848 in Venice and Milan. Gioberti's fortunes were then reversed: the papacy turned against him, and his works were placed on its Index of Forbidden Books.

Giocondo, Fra Giovanni, original name GIOVANNI DA VERONA, also called GIOCONDO DA VERONA (b. *c.* 1433, Verona, Republic of Venice—d. July 1, 1515, Rome), Italian humanist, architect, and engineer, whose designs and written works signal the transition in architectural modes from early to high Renaissance.

A learned Franciscan, Fra Giocondo is said to have received an extensive humanistic education. He made an important collection of classical inscriptions and was noted by his contemporaries for his extraordinary knowledge of architectural engineering. In 1489 Alfonso, duke of Calabria, summoned Fra Giocondo to Naples, where he conducted archaeological studies, advised on fortification and road building, and may have helped design the gardens of Giuliano's palazzo, Poggio Reale.

In 1495 Fra Giocondo went to France, where he may have helped design several chateaus and laid the foundations and supervised construction of the bridge of Notre-Dame over the Seine in Paris (1500–04). He helped introduce Italian Renaissance styles into France through his designs.

After returning to Italy, Fra Giocondo worked on fortifications and civic-engineering projects in Venice, Treviso, and Padua before being called to Rome in 1513 by Pope Leo X to aid Giuliano da Sangallo and Raphael on the building of St. Peter's. He was evidently needed for his expertise on statics, as the foundation piers of the structure were shifting and had begun to crack.

Among his written works, an annotated and illustrated edition (1511) of the Roman architect Vitruvius' treatise *De architectura* proved highly influential.

Gioia del Colle, town, Bari *provincia,* Puglia (Apulia) *regione,* southern Italy. It has machinery, textile, distilling, and cheese-making industries.

Medieval monuments include a 12th-century castle and a fortified hunting lodge built for the Holy Roman emperor Frederick II. The town has an archaeological museum, and nearby is the site of a large city that flourished between the 6th and 4th centuries BC. Pop. (1987 est.) mun., 27,653.

Giolitti, Giovanni (b. Oct. 22, 1842, Mondovì, Piedmont, Kingdom of Sardinia [now in Italy]—d. July 17, 1928, Cavour, Italy), statesman and five times prime minister under whose leadership Italy prospered. He had many enemies, however, and retained power by using the highly criticized technique called *giolittismo,* which is associated with corruption and violence on election days and with personal deals rather than with party loyalty.

After graduating in law from the University of Turin (1860), Giolitti entered the civil service and spent the next 20 years gaining experience in finance and as an administrator. Somewhat reluctantly, he became a deputy in the Italian parliament (1882), a position he held until his death.

Giolitti first came to public attention by criticizing the minister of finance, Agostino Magliani (February 1886), after whose downfall Giolitti became the minister of the treasury (March 1889). Many were surprised when Giolitti, the bureaucrat, was chosen prime minister in May 1892. He outlined a program of reform and reorganization but was soon enveloped in a bank scandal, in which many government officials were implicated. Furthermore, his moderate reaction to strikes in Sicily proved unpopular and forced him to resign in November 1893.

Viciously attacked by his successor as prime minister, Francesco Crispi, for his part in the bank scandal (1894), Giolitti presented evidence clearing himself but greatly damaging Crispi. After the eventual downfall of Crispi in March 1896, Giolitti took an influential behind-the-scenes role in forming governments. After a widespread outbreak of strikes in 1901, he delivered an important speech; in it he argued that the government should maintain order but remain neutral in labour disputes. As minister of the interior (February 1901–June 1903) and as prime minister (November 1903–March 1905), he adopted toward strikes a calm attitude that earned him both praise and criticism. He resigned his second ministry but saw to it that one of his supporters filled his place. His third ministry, formed in May 1906, was marked by useful reform and concessions to the church on education; and he resigned while still powerful (December 1909). He began a fourth ministry in March 1911, during which he bowed to nationalistic pressures and began the Italo-Turkish War (1911–12), which ended with Italian possession of Libya. He also introduced wider suffrage (1913). Nevertheless, dissatisfaction with his leadership increased, and he resigned in March 1914.

Giolitti actively opposed intervention in World War I because he knew that Italy, which had declared neutrality in August 1914, was unprepared. Italy entered the war on the side of the Allies in May 1915. As prime minister for the last time, Giolitti in June 1920 undertook the reconstruction of Italy. Shunning a repressive policy, he tolerated the Fascist *squadristi* ("armed squads") when he could have crushed them, and, as the Fascists gained strength, he welcomed their support. He resigned in June 1921. While he was waiting for the right moment to take power again, the Fascists marched on Rome (October 1922) and took over Italy. Giolitti seemed to back the new regime, but in November 1924 he formally withdrew his support. He remained in the parliament, where, shortly before his death, he spoke against the new Fascist election bill.

Giono, Jean (b. March 30, 1895, Manosque, Fr.—d. Oct. 8, 1970, Manosque), French novelist, a celebrant of nature whose works are set in Provence and whose rich and diverse imagery has been widely admired.

A love of nature came to Giono from his mountain town and from the shepherd family with whom, as a boy, he spent his summers. He was largely self-taught. As an infantryman in World War I, he was one of his company's 11 survivors at Verdun. He later described the horrors of war in *Le grand troupeau* (1931; *To the Slaughterhouse*).

In 1922 he published poems in a Marseille review. His popularity grew in the late 1920s with a series of regionalist, anti-intellectual novels about the nobility of simple people. This series culminated in such works as the trilogy *Le Chant du monde* (1934; *Song of the World*), which, like most of his work, was the protest of a sensitive man against modern civilization. In 1939 Giono spent two months in jail for pacifist activities. In 1945 he was held captive by a communist band of Resistance fighters who construed pacifism as collaboration with the Nazis. French Liberationist writers blacklisted him, but a vigorous defense by author André Gide helped lift the stigma, and in 1954 Giono was elected to the Académie Goncourt.

After the war he developed a new style: concise, lean, concentrating on storytelling, and yielding a slightly more optimistic note. Among his best works of these years are *Le Hussard sur le toit* (1952; *The Horseman on the Roof*) and *Le Bonheur fou* (1957; *The Straw Man*). The later novels *Deux cavaliers de l'orage* (1965; *Two Riders of the Storm*) and *Ennemonde et autres caractères* (1968) are lyrical portrayals of the people and countryside of Giono's beloved Provence.

Consult the INDEX *first*

Giordano, Luca (b. Oct. 18, 1632, Naples—d. Jan. 3, 1705, Naples), the most celebrated and prolific Neapolitan painter of the late 17th century. His nickname *Luca fa presto* ("Luca, work quickly") is said to derive from his painter-copyist father's admonitions, which were certainly heeded. His other nickname, Proteus, was acquired as a result of his reputed skill in producing pastiches in the style of almost any artist. Because he is said to have painted a large altarpiece in one day, it is no wonder that his output, both in oil and in fresco, was enormous. His range of subject matter was equally great, although most of his pictures deal with religious or mythological themes.

Giordano's earliest dated work is of 1651. He was influenced at the beginning of his career by the work of José de Ribera. His style underwent a profound change as a result of journeys to Rome, Florence, and Venice. The lightness and brightness of Veronese's decorative works in Venice and the recent work of Pietro da Cortona in Rome and Florence induced him to abandon sober drama in favour of a more decorative approach. The influence of da Cortona's frescoes in the Pitti Palace, Florence, is particularly evident in Giordano's huge ceiling fresco in the ballroom of the Palazzo Medici-Riccardi, Florence, begun in 1682 and completed in the following year.

He went to Spain in 1692 as court painter to Charles II, returning via Genoa to Naples in 1702. The frescoes in El Escorial are often held to be his best works, but nearly 50 pictures in the Prado, Madrid, all painted in Spain, testify to his unflagging energy. His last great work in Naples was the ceiling of the Cappella del Tesoro in S. Martino, begun on his return in 1702 and completed in April 1704. Many of his frescoes in Naples were destroyed or damaged during World War II. The great St. Benedict cycle of 1677 in the abbey

"Neptune," detail from the ceiling fresco by Luca Giordano, 1682; in the Palazzo Medici-Riccardi, Florence

SCALA—Art Resource/EB Inc.

of Monte Cassino was entirely destroyed, but the "Christ Expelling the Traders from the Temple" (1684) in the Gerolomini (S. Filippo Neri) in Naples survived.

Giordano, Umberto (b. Aug. 27, 1867, Foggia, Italy—d. Nov. 12, 1948, Milan), Italian opera composer in the *verismo*, or "realist," style, known for his opera *Andrea Chénier.*

Giordano, the son of an artisan, studied music at Foggia and Naples. His early operas, among them *Mala vita* (1892; *Evil Life*), were written in the forceful, melodramatic style introduced by Pietro Mascagni in his *verismo* opera *Cavalleria rusticana* (1890). In *Andrea Chénier* (1896), based on the life of the French revolutionary poet, he tempered violence with gentler characteristics and scored a lasting success. Neither *Fedora* (1898), after Victorien Sardou, nor its successors *Siberia* (1903) and *Madame Sans-Gêne* (1915) achieved a similar popularity. In *La cena delle beffe* (1924; "The Feast of Jests") he reverted to a sensational manner with a story set in medieval Florence.

Giorgi, Giovanni (b. Nov. 27, 1871, Lucca, Italy—d. Aug. 19, 1950, Castiglioncello), Italian physicist who proposed a widely used system for the definition of electrical, magnetic, and mechanical units of measurement.

Giorgi studied civil engineering at the Institute of Technology in Rome and from 1906 to 1923 directed the Technology Office of Rome. He taught (1913–39) at the University of Rome and also held appointments at the universities of Cagliari and Palermo and at the Royal Institute for Higher Mathematics. He is best known for developing the Giorgi International System of Measurement (also known as the mksa system) in 1901. This system proposed as units of scientific measurement the metre, kilogram, second, and joule and was endorsed in 1960 by the General Conference of Weights and Measures (with the ampere instead of the joule as the unit of energy).

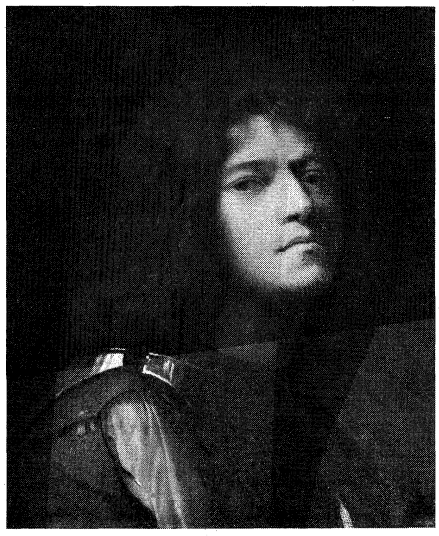
Giorgi also contributed to the development of hydroelectric installations, electric distribution networks, and urban trolley systems.

Giorgio, Francesco di: *see* Francesco di Giorgio.

Giorgione, also called GIORGIO DA CASTELFRANCO, original name GIORGIO BARBARELLI (b. *c.* 1477, Castelfranco, Veneto, Republic of Venice—d. 1510, Venice), extremely influential Italian painter who was one of the initiators of a High Renaissance style in Venetian art. His qualities of mood and mystery were epitomized in "The Tempest" (*c.* 1505), an evocative pastoral scene, which was among the first of its genre in Venetian painting.

Life. Nothing is really known about Giorgione's personal life except the legends reported by the biographer and Mannerist artist Giorgio Vasari in the two editions (1550 and 1568) of his *Vite de' più eccellenti pittori, scultori, ed architettori italiani . . .* (*Lives of the Most Eminent Italian Painters, Sculptors, and Architects . . .*). Giorgione's name is given in two surviving documents of 1507 and 1508 as Zorzi da Castelfranco (in Venetian dialect); *i.e.,* Giorgio of Castelfranco. The form Giorgione (or Zorzon), which is customarily used today, first appears in the 1528 inventory of the Grimani Collection. His name means "tall George," or "big George," implying that he was a large man. Tradition holds that he was handsome and amorous. Correspondence dated Oct. 25, 1510, between the celebrated Renaissance patron of the arts Isabella d'Este of Mantua and her agent Taddeo Albano at Venice mentions Giorgione's death as having occurred recently, probably caused by the plague that was raging in Venice at that time. Vasari's biography is the earliest. It emphasizes the artist's humble origin, his elevated mind, and his personal charm, but this characterization undoubtedly was a product of Vasari's imagination, based upon the poetic quality of Giorgione's paintings.

That the young painter went to Venice to study about 1490 under Giovanni Bellini, the greatest Venetian master of the day, is undeniable. The technique, colour, and mood of Giorgione's pictures are clearly related to Bellini's late style.



Giorgione, self-portrait, oil painting; in the Herzog Anton Ulrich-Museum, Braunschweig, Ger.

By courtesy of the Herzog Anton Ulrich-Museum, Braunschweig, Germany

Works. The commission of 1507 for a painting or paintings to be placed in the Audience Hall of the Ducal Palace at Venice was perhaps never completed, since no further notice of the work is recorded. Giorgione's principal public commission was the execution of frescoes on the exterior of the Fondaco dei Tedeschi (the German Exchange), where he painted the figures on the facade over the canal. The frescoes over the street were carried out by the young Titian, perhaps under Giorgione's direction. These works, documented in 1508, are lost, except for fragments that contain faint outlines of figures.

Aside from the works mentioned in specific documents, the notes on the art collections of Venice (*Notizie d'opere del disegno*), written between 1520 and 1543 by the Venetian patrician Marcantonio Michiel, contain references to pictures by Giorgione. This information occurs so shortly after the master's death that it is considered generally reliable. Of the 12 paintings and one drawing listed, five works have survived: "The Tempest," "The Three Philosophers," "Sleeping Venus," "Boy with an Arrow," and "Shepherd with a Flute."

"The Tempest" is a milestone in Renaissance landscape painting with its dramatization of a storm about to break. Here is the kind of poetic interpretation of nature that the Renaissance writers Pietro Bembo and Jacopo Sannazzaro evoked. This feeling for nature is probably also intimately related to, though not directly derived from, the philosophical "naturalism" of the contemporary Venetian and Paduan Humanists grouped around the important Renaissance philosopher Pietro Pomponazzi. The meaning of the two people seated in the foreground of "The Tempest" has been the subject of numerous interpretations, none of them definitive. Michiel called them a soldier and a Gypsy. Some literary source of a romantic, Arcadian nature is generally assumed, since no Renaissance artist would include two mysterious figures devoid of meaning. The same kind of evocative literary theme involves the "Pastoral Concert" (*c.* 1510), the attribution of which is much debated.

The "Sleeping Venus" (*c.* 1510) was left unfinished at Giorgione's death. Michiel stated that the task of adding the landscape background fell to Titian. The picture itself validates this statement, for the landscape with buildings in the right distance is repeated in other works of Titian. Giorgione's "Sleeping Venus" inaugurates a long series of paintings of the goddess of love in Venetian art, particularly those of Titian. None, however, achieved so fully the expression of remoteness and unselfconscious beauty as this majestic and ideally conceived figure. "Judith" (*c.* 1505), though undocumented, evokes the same concept of universal beauty; she is more of a goddess than the avenger of her people.

Few religious paintings are mentioned in the early documentary sources. The panels representing the "Trial of Moses" and the "Judgment of Solomon" are generally agreed to number among the artist's first works (*c.* 1495–1500). Although the figures look slightly archaic, the beauty of the landscape setting with its soft melting distances unmistakably reveals the hand of the painter of "The Tempest." Most celebrated of his religious pictures is the "Madonna and Child with SS. Francis and Liberale" (*c.* 1504; Castelfranco). The composition of this painting forms an equilateral triangle in conformance with the search for geometric solutions characteristic of the Renaissance mind. Thoroughly in the

spirit of the master are the landscape and the dreamy mood of the figures, who seem lost in a religious reverie. "The Holy Family" (*c.* 1508) and the "Adoration of the Shepherds" (*c.* 1508) are of equally fine quality. The latter is particularly noteworthy for its exquisitely adjusted colour.

"The Three Philosophers" (*c.* 1510) is one of the works Michiel saw and specifically identified as being by Giorgione. He stated, however, that it was completed by the Venetian painter Sebastiano del Piombo after the master's death. The composition and colour are so fully Giorgione's that Sebastiano could only have added a few finishing touches. In addition, the dreamy melancholy of the three men—who represent youth, maturity, and old age—embodies the spirit of the master. Though the notion of three ages of man is surely implied, little agreement prevails among critics as to whether the three magi, three philosophers, or a literary source in ancient Roman legend is really intended.

The "Christ Carrying the Cross" (Scuola Grande di San Rocco, Venice) is widely disputed even today. Nevertheless, Vasari in 1568 specifically stated that the painter was Titian, correcting an error that he made in the edition of 1550 in attributing the picture to Giorgione. The canvas, much restored and repainted, has no more than archaeological interest. Other questioned paintings that seem to many 20th-century critics to be the works of Giorgione rather than Titian are "The Adulteress Brought Before Christ" (*c.* 1500), the "Madonna and Child with SS. Roch and Anthony of Padua" (*c.* 1505), and the "Madonna and Child in a Landscape" (*c.* 1504).

Influence and significance. In portraiture Giorgione made a most profound and far-reaching impression. Venetian painters such as Titian, Palma Vecchio, and Lorenzo Lotto so closely imitated him in the early 16th century that it is at times virtually impossible to distinguish between them. Nevertheless, the portrait of a "Youth" (*c.* 1504) is universally considered to be by Giorgione. The indescribably subtle expression of serenity and the immobile features, added to the chiselled effect of the silhouette and modelling, combine to make the "Youth" an unforgettable expression of Renaissance man. The same sort of exquisite refinement and sensibility characterizes the disputed portrait supposedly of the poet "Antonio Broccardo" (*c.* 1506). Accepted by all critics is the portrait of the so-called "Laura," on the back of which is an inscription giving the date as June 1, 1506, and Zorzi of Castelfranco as the painter. "La Vecchia" ("The Old Woman") bears an inscription "*col tempo*" ("with time") that clearly indicates an allegorical significance of the devastating effects of the passage of time. Despite the singularity of subject in Giorgione's career, the compositional formula and the mention of the picture in the 1569 inventory of Gabriele Vendramin's collection reinforce the attribution.

Giorgione's "Self Portrait as David" (*c.* 1510), recorded in an engraving of 1650 by the well-known German engraver Wenzel Hollar, can safely be considered a much damaged original that has been drastically cut down in size. The artist gave his own portrait more dramatic force by the frown upon his face and by turning the body inward at an angle to the parapet. Titian adopted the same arrangement in his portrait of a gentleman in blue (*c.* 1512; National Gallery, London), where the initials "TV" (Tiziano Vecellio) establish him as the painter rather than Giorgione, as was formerly believed. Despite considerable recent research, the short-lived master from Castelfranco still remains one of the most enigmatic of Renaissance painters. Yet the quality and charm of his paintings have made him as highly esteemed today as he was in his own time—a Venetian master of poetic mood created through idealized form, colour, and light.

(H.E.W.)

MAJOR WORKS. "Judgment of Solomon" and "Trial of Moses" (*c.* 1495–1500; Uffizi, Florence); "The Adulteress Brought Before Christ" (cut down at the right; *c.* 1500; Museum and Art Gallery, Glasgow); "Madonna and Child in a Landscape" (*c.* 1504; Hermitage, Leningrad); "Madonna and Child with SS. Francis and Liberale" (*c.* 1504; Cathedral, Castelfranco, Italy); "Portrait of a Youth" (*c.* 1504; Staatliche Museen Preussischer Kulturbesitz, Berlin); "Boy with an Arrow" (*c.* 1505; Kunsthistorisches Museum, Vienna); "Fugger Youth" (*c.* 1505; Alte Pinakothek, Munich); "Judith" (*c.* 1505; Hermitage); "Madonna and Child with SS. Roch and Anthony of Padua" (*c.* 1505; Prado, Madrid); "Shepherd with a Flute" (*c.* 1505; Hampton Court Palace, Surrey, Eng.); "The Tempest" (*c.* 1505; Accademia, Venice); "Antonio Broccardo" (*c.* 1506; Museum of Fine Arts, Budapest); "Laura" (1506; Kunsthistorisches Museum); "Adoration of the Shepherds" ("Allendale Nativity," *c.* 1508; National Gallery of Art, Washington, D.C.); "Epiphany" (*c.* 1508; National Gallery, London); "The Holy Family" (*c.* 1508; National Gallery of Art, Washington, D.C.); "Nude Woman" (1508; fragment from the German Exchange; Accademia); "Portrait of a Young Man" (1508?; Fine Arts Gallery of San Diego, San Diego, Calif.); "Pastoral Concert" (*c.* 1510; Louvre, Paris); "Self Portrait as David" (*c.* 1510; Herzog Anton Ulrich-Museum, Braunschweig, Ger.); "Sleeping Venus" (*c.* 1510; Gemäldegalerie, Dresden, Ger.; landscape by Titian); "The Three Philosophers" (*c.* 1510; Kunsthistorisches Museum); "La Vecchia" ("The Old Woman," *c.* 1510; Accademia).

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Giotto DI BONDONE (b. 1266–67/1276, Vespignano, near Florence—d. Jan. 8, 1337, Florence), the most important Italian painter of the 14th century, whose works point to the innovations of the Renaissance style that developed a century later. He is believed to have been a pupil of the Florentine painter Cimabue and to have decorated chapels in Assisi, Rome, Padua, Florence, and Naples with frescoes and panel paintings in tempera. Because little of his life and few of his works are documented, attributions and a stylistic chronology of his paintings remain problematical and often highly speculative.

Early life. Much of Giotto's biography and artistic development must be deduced from the evidence of surviving works (a large portion of which cannot be attributed to him with certainty) and stories that originate for the most part from the late 14th century on. The date of Giotto's birth can be taken as either 1266/67 or 1276, and the 10 years' difference is of fundamental importance in assessing his early development and is crucial to the problem of the attribution of the frescoes in the church of S. Francesco, in Assisi, which, if indeed by Giotto, are his great early works. It is known that Giotto died on Jan. 8, 1337 (1336, old style); this was recorded at the time in the Villani chronicle. In about 1373, a rhymed version of the Villani chronicle was produced by Antonio Pucci, town crier of Florence and amateur poet, in which it is stated that Giotto was 70 when he died. This fact would imply that he was born in 1266/67, and it is clear that there was 14th-century authority for the statement (possibly Giotto's original tombstone, now lost). Giorgio Vasari, however, gives 1276 as the year of Giotto's birth, and it may be that he was copying one of the two known versions of the *Libro di Antonio Billi,* a 16th-century collection of notes on Florentine artists. In the *Codex Petrei* version, a statement that Giotto was born in 1276 at Vespignano, the son of a peasant, occurs at the very end of the "Life" and may have been added much later, even, conceivably, from Vasari. In any case, whether Vasari or "Antonio Billi" first made the statement, it cannot have the same authority as that attached to Antonio Pucci, who was about 27

"Lamentation," fresco by Giotto, *c.* 1305–06; in the Arena Chapel, Padua, Italy

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when Giotto died. Certainty of the date of Giotto's birth, if settled by new documents, could help to solve the problem of his work at Assisi, as well as the question of the origins of his style.

Giotto has always been assumed to have been the pupil of Cimabue; two independent traditions, each differing on the particular circumstances, assert this, and it is probably correct. Furthermore, Cimabue's style was, in certain respects, so similar to Giotto's in intention that a connection seems inescapable. Cimabue was the most outstanding painter in Italy at the end of the 13th century; he tried, as no artist had before, to break through, with the power of reality and imaginative force, the stylized forms of medieval art. He did not fully succeed, but it seems almost certain that Giotto began his remarkable development with him, inspired by his strength of drawing and his ability to incorporate dramatic tension into his works. On the other hand, whatever Giotto may have learned from Cimabue, it is clear that, even more than the sculptor Nicola Pisano about 30 years earlier, he succeeded in an astonishing innovation that originated in his own genius—a true revival of classical ideals and an expression in art of the new humanity that St. Francis had in the early 13th century brought to religion.

In Giotto's works human beings are the exclusive subject matter, and they act with dedicated passion their parts in the great Christian drama of sacrifice and redemption. By comparison, all his predecessors and most of his immediate successors painted a puppet show with lifeless manikins tricked out in the rags of the splendid, hieratic, and impersonal art of Byzantium, which was to be entirely superseded by the urgent emotionalism of the Franciscan approach to Christianity.

The Assisi Problem. The central problem in Giotto studies, the attribution of the Assisi frescoes, may be summed up as the question whether Giotto ever painted at Assisi and, if so, what? There can be no reasonable doubt that he did work at Assisi, for a long literary tradition goes back to the *Compilatio chronologica* of Riccobaldo Ferrarese, who wrote in or before 1319, when Giotto was alive and famous. Later writers down to Vasari expanded this and made it clear that Giotto's works were in the great double church of S. Francesco. By Vasari's time, several frescoes in both upper and lower churches were attributed to Giotto, the most important being the cycle of 28 scenes from the life of St. Francis of Assisi in the nave of the upper church and the "Franciscan Virtues" and some other frescoes in the lower church.

The majority of these scenes, mostly narrative, are revolutionary in their expression of reality and humanity. In these frescoes, the emphasis is on the dramatic moment of each situation, and, with details of dress and background at a minimum, the inner reality of human emotion is intensified through crucial gestures and glances. In the 19th century, however, it was observed that all these frescoes, though similar in style, could not be by the same hand, and the new trend toward skepticism of Vasari's statements led to the position that rejected all the Assisi frescoes and dated the St. Francis cycle to a period after Giotto's death. This extreme view has been generally abandoned, and, indeed, a dated picture of 1307 can be shown to derive from the St. Francis cycle. Nevertheless, many scholars prefer to accept the idea of an otherwise totally unknown Master of the St. Francis legend, on the grounds that the style of the cycle is irreconcilable with that of the later Arena Chapel frescoes in Padua, which are universally accepted as Giotto's. This involves the idea that the works referred to (in Giotto's lifetime) by Riccobaldo cannot be identified with anything now extant and must have perished centuries ago, so that the early 15th-century sculptor Lorenzo Ghiberti, Vasari, and others mistakenly transferred the existing St. Francis cycle to Giotto. Five hundred years of tradition are thus written off.

Still more difficult, if Giotto did not paint the St. Francis frescoes, major works of art, then they must be attributed to a painter who cannot be shown to have created anything else, whose name has disappeared without trace, although he was of the first rank, and, odder still, was formed by the combined influences of Cimabue, the Florentine sculptor Arnolfo di Cambio, and the Roman painter Pietro Cavallini—influences which coalesce at Assisi and may be taken as the influences that formed Giotto himself.

Arising out of the fusion of Roman and Florentine influences in the Assisi frescoes, there was later a tendency to see the hand of Giotto, as a very young man, in the works of the Isaac Master, the painter of two scenes of "Isaac and Esau" and "Jacob and Isaac" in the nave above the St. Francis cycle. If this theory is accepted, it is easy to understand that Giotto, as a young man, made such a success of this commission that he was entrusted with the most important one, the official painted biography of St. Francis based on the new official biography written around 1266 by St. Bonaventura. In fact, the whole of today's mental picture of St. Francis stems largely from these frescoes. Clearly, a man born in 1276 was less likely to have received such a commission than one 10 years older, if, as was always thought, the commission was given in 1296 or soon after by Fra Giovanni di Muro, general of the Franciscans. The works in the Lower Church are generally regarded as productions of Giotto's followers (there are, indeed, resemblances to his works at Padua), and there is real disagreement only over the "Legend of St. Francis." The main strength of the non-Giotto school lies in the admittedly sharp stylistic contrasts between the St. Francis cycle and the frescoes in the Arena Chapel at Padua, especially if the Assisi frescoes were painted 1296–*c.* 1300 and those of the Arena *c.* 1303–05; for the interval between the two cycles is too small to allow for major stylistic developments. This argument becomes less compelling when the validity of the dates proposed and the Roman period *c.* 1300 are taken into account. As already mentioned, the Assisi frescoes may have been painted before 1296 and not necessarily afterward, and the Arena frescoes are datable with certainty only in or before 1309, although probably painted *c.* 1305–06; clearly, a greater time lag between the two cycles can help to explain stylistic differences, as can the experiences that Giotto underwent in what was probably his second Roman period.

Roman period. Three principal works are attributed to Giotto in Rome. They are the great mosaic of "Christ Walking on the Water" (the "Navicella"), over the entrance to St. Peter's; the altarpiece painted for Cardinal Stefaneschi (Vatican Museum); and the fresco fragment of "Boniface VIII Proclaiming the Jubilee," in S. Giovanni in Laterano (St. John Lateran). Giotto is also known to have painted some frescoes in the choir of old St. Peter's, but these are lost.

These Roman works also pose problems in attribution and criticism. The attribution of the "Navicella" is certain; it is known that Cardinal Stefaneschi commissioned Giotto to do it. The mosaic, however, was almost entirely remade in the 17th century except for two fragmentary heads of angels, so that old copies must be used for all stylistic deductions. The fresco fragment in S. Giovanni in Laterano was cleaned in the 20th century and was tentatively reattributed to Giotto on the basis of its likeness to the Assisi frescoes, but the original attribution can be traced only as far back as the 17th century. The "Stefaneschi Altarpiece," with its portrait of the Cardinal himself, must be one of the works commissioned by him. The fact that he commissioned Giotto to do the "Navicella" might suggest that this work is by Giotto as well, but the altarpiece is so poor in quality that it cannot be by Giotto's own hand. It may be observed that several works bearing Giotto's signature, notably the "St. Francis of Assisi" (Louvre, Paris) and the altarpieces in Bologna and Florence (Sta. Croce), are generally regarded as school pieces bearing his trademark, whereas the "Ognissanti Madonna," unsigned and virtually undocumented, is so superlative in quality that it is accepted as entirely by his hand.

During this period Giotto may also have done the "Crucifix" in Sta. Maria Novella and the "Madonna" in S. Giorgio e Massimiliano dello Spirito Santo (both in Florence). These works may be possibly identifiable with works mentioned in very early sources, and if so they throw light on Giotto's early style (before 1300). It is also possible that, about 1305, Giotto went to Avignon, in France, but the evidence for this is slender.

Paduan period. There is thus no very generally agreed picture of Giotto's early development. It is some relief, therefore, to turn to the fresco cycle in the chapel in Padua known as the Arena or Scrovegni Chapel. Its name derives from the fact that it was built on the site of a Roman amphitheatre by Enrico Scrovegni, the son of a notorious usurer mentioned by Dante. The founder is shown offering a model of the church in the huge "Last Judgment," which covers the whole west wall. The rest of the small, bare church is covered with frescoes in three tiers representing scenes from the lives of Joachim and Anna, the life of the Virgin, the Annunciation (on the chancel arch), and the life and Passion of Christ, concluding with Pentecost. Below these three narrative bands is a fourth containing monochrome personifications of the Virtues and Vices. The chapel was apparently founded in 1303 and consecrated on March 25, 1305. It is known that the frescoes were completed in or before 1309, and they are generally dated *c.* 1305–06, but even with several assistants it must have taken at least two years to complete so large a cycle.

The frescoes are in relatively good condition, and all that has been said of Giotto's power to render the bare essentials of a setting with a few impressive and simple figures telling the story as dramatically and yet as economically as possible is usually based on the narrative power that is the fundamental characteristic of these frescoes. These dominating figures, simple and severe, similar to those in the Assisi cycle but placed in settings of more formal abstraction and rendered with more grandeur, are the quintessence of his style, and anatomy and perspective were used—or even invented—by him as adjuncts to his narrative gifts. He never attained to the skill that so often, in fact, misled the men of the 15th and 16th centuries. In the Padua frescoes the details are always significant, whereas it is a characteristic of the Assisi cycle that there occurs from time to time a delighted dwelling on details that are not absolutely essential to the story.

Sta. Croce frescoes. Documents show that Giotto was in Florence in 1311–14 and 1320; and it was probably during these years, before going to Naples (*c.* 1329), that he painted frescoes in four chapels in Sta. Croce belonging to the Giugni, Tosinghi-Spinelli, Bardi, and Peruzzi families. The Giugni Chapel frescoes are lost, as are all the Tosinghi-Spinelli ones, except for an "Assumption" over the entrance, not universally accepted as by Giotto. The Bardi and Peruzzi chapels contained cycles of St. Francis, St. John the Baptist, and St. John

the Evangelist, but the frescoes were whitewashed and were not recovered until the mid-19th century, when they were damaged in the process of removing the whitewash and then heavily restored. Much the same happened to a portrait of Dante in the Bargello, also in Florence, for which there is a traditional attribution to Giotto. Writers tended to take more or less account of these additions and restorations according to the view they held of the Assisi problem, but a prolonged cleaning and re-restoration of both chapels in the mid-20th century has demonstrated that the Bardi Chapel has few but splendid figures remaining, painted in true fresco, whereas the Peruzzi Chapel figures are now largely ghosts, since they were painted in a different technique. The older view, that the two cycles were contemporary, is no longer necessarily valid, and there is no evidence for the date of either cycle, except that both are probably later than the Arena Chapel frescoes.

Naples and the last Florentine period. In January 1330, King Robert of Naples promoted Giotto to the rank of "familiar" (member of the royal household), which implies that he had been in Naples for some while, possibly since 1329, and he remained there until 1332–33. All the works he executed there have been lost, but traces of his style may be distinguished in the local school. On April 12, 1334, he was appointed *capomastro,* or surveyor, of the Duomo in Florence and architect to the city. This was a tribute to his great fame as a painter and not on account of any special architectural knowledge. On July 19 of the same year he began the campanile, or bell tower, of the Duomo. It was later altered but is known, in part at least, from a drawing in Siena. He may have designed some of the reliefs carved by Andrea Pisano on the campanile; certainly the bronze doors of the baptistery by Andrea show clear traces of Giotto's frescoes in Sta. Croce. Indeed the whole course of painting in Tuscany was dominated by his pupils and followers—by Taddeo Gaddi, Bernardo Daddi, Maso di Banco, Andrea Orcagna, and Pietro and Ambrogio Lorenzetti in Siena—but none of these really understood all of his innovations.

Assessment. Giotto achieved great personal fame in his own lifetime; in the *Divine Comedy,* Dante says of his relation to his reputed teacher, the Florentine artist Cimabue, that "Cimabue thought to hold the field in painting, but now Giotto has the cry, so that the fame of Cimabue is obscured." The mere fact that he was mentioned in Dante, whether or not in a particularly flattering context, was sufficient to establish and maintain this fame in 14th- and 15th-century Italy, and legends soon began to crystallize around his name. When, in 1550, the artist and biographer Giorgio Vasari published *Le vite de' più eccellenti pittori, scultori, ed architettori italiani . . .* (*Lives of the Most Eminent Italian Painters, Sculptors, and Architects . . .*), he naturally began his history of Italian art with Giotto as the man who, even more than Cimabue, broke away from the Middle Ages and ushered in the "good modern manner." It was not until the Renaissance, with Masaccio and Michelangelo, that his true successors arose. (P.J.Mu.)

MAJOR WORKS. The only works universally accepted as Giotto's are the fresco cycle in Padua, firmly datable in the first decade of the 14th century, and the two chapels in Sta. Croce, Florence, which used to be dated around 1320 but, since their cleaning in the 1950s and 1960s, are now placed anywhere in the second or third decade. The only panel painting universally accepted as Giotto's own work is "The Madonna in Glory" ("Ognissanti Madonna"; Uffizi, Florence), usually dated *c.* 1305–10.

The most controversial attribution is the fresco cycle at Assisi, but other important works in this category are the "Crucifix" in Sta. Maria Novella, Florence (*c.* 1295–1300); the "Dormition of the Virgin" (Staatliche Museen Preussischer Kulturbesitz, Berlin); and the polyptych now in the Museo dell'Opera, Sta. Croce, Florence.

Works that are certainly from Giotto's shop, not necessarily painted by his own hand, include panels in Bologna Pinacoteca Nazionale and the Vatican, and others in Boston (Isabella Stewart Gardner Museum) and the galleries of London, Munich, New York, and Washington. A fragment of the original mosaic from St. Peter's is now in the church at Boville Ernica, near Rome, and another is in the Vatican Museum.

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Giovanna (Italian personal name): *see under* Joan.

Giovanni (Italian personal name): *see under* John, except as below.

Giovanni, BISHOP OF SABINA (pope): *see* Sylvester III.

Giovanni ACUTO: *see* Hawkwood, Sir John.

Giovanni DA BOLOGNA: *see* Giambologna.

Giovanni DA FIESOLE (painter): *see* Angelico, Fra.

Giovanni DA GAETA (pope): *see* Gelasius II.

Consult the INDEX *first*

Giovanni DA PIAN DEL CARPINI, English JOHN OF PLANO CARPINI (b. *c.* 1180, Pian del Carpine?, near Perugia, Umbria—d. Aug. 1, 1252, Antivari [Bar], Dalmatia?), Franciscan friar, first noteworthy European traveller in the Mongol Empire, to which he was sent on a formal mission by Pope Innocent IV. He wrote the earliest important Western work on Central Asia

Giovanni was a contemporary and disciple of St. Francis of Assisi. By 1220 he was a member of the Franciscan order and subsequently became a leading Franciscan teacher in northern Europe; he held successively the offices of custos ("warden") in Saxony and of minister ("subordinate officer") in Germany and afterward in Spain (perhaps also in Barbary and Cologne). He was in Cologne at the time of the great Mongol invasion of eastern Europe and of the disastrous Battle of Liegnitz (April 9, 1241).

Fear of the Mongols had not abated when four years later Pope Innocent IV dispatched the first formal Catholic mission to them, partly to protest against their invasion of Christian territory and partly to gain reliable information about their numbers and their plans; there may also have been the hope of alliance with a power that might be invaluable against Islām. At the head of the mission the Pope placed Giovanni, then already more than 60 years of age.

On Easter day, 1245, Giovanni set out. He was accompanied by Stephen of Bohemia, another friar, who was subsequently to be left behind at Kiev. After seeking counsel of Wenceslaus, king of Bohemia, the friars were joined at Breslau (now Wrocław) by Benedict the Pole, another Franciscan appointed to act as interpreter. The mission entered the Mongol posts at Kanev and thereafter crossed the Dnepr, the Don, and the Volga. On the Volga stood the *ordu,* or "camp," of Batu, the supreme commander on the western frontiers of the Mongol Empire and the conqueror of eastern Europe. Giovanni and his companions, with their presents, had to pass between two fires before being presented to Batu at the beginning of April 1246. Batu ordered them to proceed to the court of the supreme khan in Mongolia, and accordingly, on Easter day, April 8, 1246, they began the second and more formidable part of their journey. Their bodies were tightly bandaged to enable them to endure the excessive fatigue of their great ride through Central Asia. Their route was across the Ural (Yaik) River and north of the Caspian Sea and the Aral Sea to the Syr Darya (Jaxartes) and the Muslim cities, which then stood on its banks, then along the shores of the Dzungarian lakes and thence to the imperial camp of Sira Ordu (*i.e.,* the "yellow pavilion") near Karakorum and the Orkhon River. They reached their destination on July 22, after a ride of about 3,000 miles in just over 106 days.

On arriving at Sira Ordu, the Franciscans found that the interregnum that had followed the death of Ögödei, the supreme khan, or imperial ruler, had ended. His eldest son, Güyük (Kuyuk), had been designated to the throne; his formal election in a great *kuriltai,* or general assembly of shamans, was witnessed by the friars along with more than 3,000 envoys and deputies from all parts of the Mongol Empire. On August 24 they were present at the formal enthronement at the nearby camp of the "Golden" Ordu and were presented to the supreme khan. They were detained until November and were then dismissed with a letter for the Pope; this letter, written in Mongol, Arabic, and Latin, was little more than a brief imperious assertion of the khan's role as the scourge of God. The friars suffered greatly on their long winter journey homeward, and not until June 9, 1247, did they reach Kiev, where they were welcomed by the Slavic Christians as risen from the dead. Subsequently they delivered the khan's letter and made their report to the Pope, who was still at Lyon.

Immediately after his return, Giovanni recorded his observations in a large work variously styled in the manuscripts extant as *Historia Mongalorum quos nos Tartaros appellamus* ("History of the Mongols Whom We Call the Tartars") and *Liber Tartarorum* ("Book of the Tartars"), or *Tatarorum.* He divided his treatise into eight chapters on the country of the Mongols, their climate, customs, religion, character, history, policy and tactics, and on the best way of resisting them; in a ninth chapter he described the regions traversed. He added four name lists: of the peoples conquered by the Mongols, of those who had successfully to his time (1245–47) remained unconquered, of the Mongol princes, and of witnesses to the truth of his *Historia,* including several merchants trading in Kiev. His *Historia* discredited the many fables concerning the Mongols current in Western Christendom. Its account of Mongol customs and history is probably the best treatment of the subject by any medieval Christian writer, and only on geographical and personal detail is it inferior to one written a few years later by the papal envoy to the Mongols William of Rubruquis, or Rubrouck. Giovanni's companion, Benedict the Pole, also left a brief account of the mission, taken down from his dictation. Not long after his return, Giovanni was installed as archbishop of Antivari in Dalmatia and was sent as legate to Louis IX.

For a long time the *Historia* was only par-

tially known through an abstract in the great compendium of Vincent of Beauvais (*Speculum historiale*), made a generation after Giovanni's own and first printed in 1473. R. Hakluyt (1598) and P. Bergeron (1634) published portions of the text, but the complete work was not printed until 1839: M.A.P. d'Avezac (ed.) in *Recueil de voyages et de mémoires,* vol. 4, Geographical Society of Paris.

(E.M.J.C.)

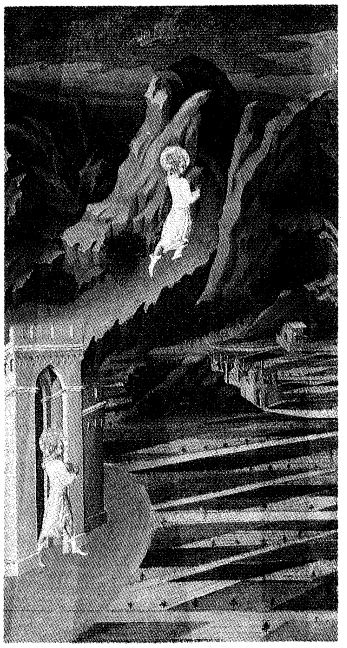
BIBLIOGRAPHY. Christopher Dawson (ed.), *The Mongol Mission* (1955, reprinted 1980), includes information on other 13th- and 14th-century missionaries to Mongolia and China.

Giovanni DI FIDANZA: *see* Bonaventure, Saint.

Giovanni DI PAOLO (DI GRAZIA) (b. *c.* 1403, Siena, Republic of Siena [Italy]—d. 1482, Siena), painter whose religious paintings maintained the mystical intensity and conservative style of Gothic decorative painting against the trend, progressively dominant in the art of 15th-century Tuscany, toward scientific naturalism and classical humanism. One of the last practitioners of the tradition of medieval painting, he did little to influence the course of art over the four centuries after his death. In the 20th century, however, his tense, often highly dramatic works aroused increasing interest.

Giovanni probably was a pupil of the painter Taddeo di Bartolo, whose style is reflected in his earliest dated work, the "Madonna and Child with Angels" (1426). In that year Giovanni fell under the influence of the decorative and courtly paintings of Gentile da Fabriano, as can be seen in Giovanni's "Madonna" of 1427. During the 1440s and early 1450s Giovanni produced his most important works, including the monumental altarpiece of the "Presentation of Christ in the Temple" (1447–49) and six scenes from "The Life of St. John the Baptist." The brooding "Madonna" altarpiece of 1463 in the Pienza Cathedral marks the beginning of Giovanni's late period, of which the coarse "Assumption" polyptych of 1475 from Staggia constitutes the last important work.

Giovanni never left his native Siena, and his work reveals his persistent disdain of Tuscany's progressive painters. He was long considered an inferior artist; his tormented spirituality and expressionist style were little appreciated before about 1920, but from that time his nervous draftsmanship and expressive distortions were considered to have heralded 16th-century Mannerist art and the painting of 20th-century Expressionism. Not only the colouristically and formally attractive figures and landscapes of the painter's early and middle periods but also the harsh, ugly forms of the 1460s and especially the 1470s are of interest, as they illustrate the artist's changing vision of the world during the course of his development.



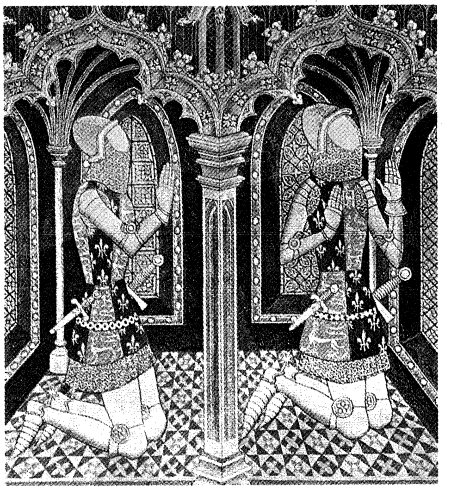
"The Life of St. John the Baptist: St. John in the Wilderness," tempera on panel by Giovanni di Paolo, *c.* 1450 or 1460; in the Art Institute of Chicago (68.7 × 36.3 cm)

The Art Institute of Chicago, Mr. and Mrs. Martin A. Ryerson Collection (1933.1010), © 1990 The Art Institute of Chicago, all rights reserved

Giovanni, Agostino di: *see* Agostino di Giovanni.

Giovine Italia (political movement): *see* Young Italy.

gipon, tunic worn under armour in the 14th century and later adapted for civilian use. At first a tight-fitting garment worn next to the shirt and buttoned down the front, it came down to the knees and was padded and waisted.



Sons of Edward III wearing heraldic gipons, detail of a copy of a wall painting from St. Stephen's Chapel, Westminster Abbey, England, 14th century; in the Society of Antiquaries of London

By courtesy of the Society of Antiquaries of London

Later in the century the gipon became shorter, and it was replaced by the doublet in the 15th and 16th centuries. For a time it was called a pourpoint.

Gipp, George, byname THE GIPPER (b. Feb. 18, 1895, Laurium, Mich., U.S.—d. Dec. 14, 1920, South Bend, Ind.), American football player at the University of Notre Dame (South Bend, Ind.; 1917–20), who became a school legend.

Gipp entered Notre Dame on a baseball scholarship, but he was recruited for football by the coach Knute Rockne, who saw Gipp drop-kicking and passing a football on a field adjacent to the practice field. Gipp played 32 consecutive games for Notre Dame and scored 83 touchdowns. In one 1917 game he was apparently going to punt but instead drop-kicked a 62-yard field goal. In 1920 he led Notre Dame, down 14–7 at the half, to a 27–17 victory over Army, gaining a total of 324 yards. Gipp was named captain of the team for 1920, but he was expelled from the university for cutting too many classes and frequenting off-limit establishments. He was an assistant to Rockne before being reinstated as a student. In his last season he played injured, and a persistent cold developed into the pneumonia from which he died.

At halftime during a scoreless game with Army in 1928, Rockne asked the team to "win one for the Gipper," keeping a promise that he said he had made to Gipp on his death bed, a plea that reinforced the Gipp legend. (Notre Dame won.)

Ronald Reagan (the future U.S. president) played the role of Gipp in the film *Knute Rockne—All American* (1940).

Gippius, Zinaida Nikolayevna, Gippius also spelled HIPPIUS (b. Nov. 20 [Nov. 8, Old Style], 1869, Belyov, Russia [now in Russian S.F.S.R.]—d. Sept. 9, 1945, Paris, Fr.), Russian Symbolist poet who wrote in a metaphysical vein.

The wife of the poet and novelist Dmitry Merezhkovsky, who was a leader among the Symbolists of the early 1900s, Gippius made her own place in Russian literature. In addition to her poetry, she wrote plays, novels, short stories, and critical and political essays.

During the Revolution of 1905, Gippius and her husband became zealous revolutionaries, and she wrote much political verse. With the failure of the revolution, the couple emigrated to Paris; they returned to Russia before the outbreak of World War I but took a vehemently anti-Bolshevik attitude. In late 1919 they left the Soviet Union, traveling first to Poland and working for a while with counter-revolutionaries, then settling in Paris. Gippius continued to write and produced some very bitter, angry works against the Bolsheviks. She held that matter was more significant than manner, but her later works were so subjective and capricious that they were noted more for their form than for their content.

Gippsland, region of southeastern Victoria, Australia, extending northeast from Western Port (near Melbourne) to the New South Wales border and south from the Eastern Highlands to the coast, with an area of 13,600 square miles (35,200 square km). Fertile and well watered (34 inches [860 mm] annually), Gippsland is the focus of the state's dairy industry, supplying most of Melbourne's liquid milk. Lignite (brown coal) beds in the La Trobe River valley fuel large power plants and thus form a base for industrial development; also, petroleum and natural gas are tapped from offshore wells in Bass Strait. Forested hills in the north support lumbering and tourism, which is also important in the southeast with its coastal resorts and the (Gippsland) Lakes National Park.

Angus McMillan, who made the initial European reconnaissance (1839), named it Caledonia Australis after his native Scotland. It was renamed by the Polish explorer Paul Strzelecki to honour the former New South Wales governor Sir George Gipps. The first settlers were attracted by gold finds in the 1850s. Farmers arrived after the completion of a rail line from Melbourne (1887).

gipsite, a variety of the mineral gypsum (*q.v.*).

Gipstein, Yaacov: *see* Agam, Yaacov.

Gipsy: *see* Gypsy.

Gīr Forest National Park, national park in Gujarāt state, west-central India, located about 37 miles (60 km) south-southwest of Junāgadh town in a hilly region of dry scrubland. It has an area of about 500 square miles (1,295 square km). Vegetation consists of teak with an admixture of deciduous trees, including sal (*Shorea*), dhak (*Butea frondosa*), and thorn forests.

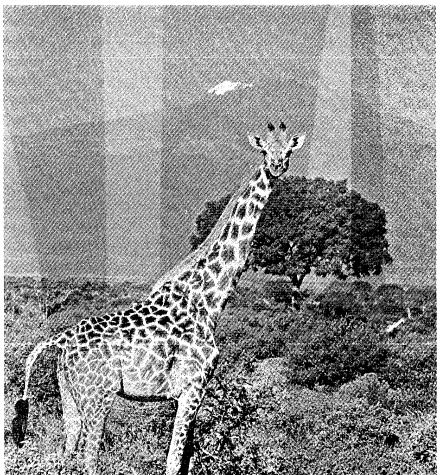
The Gīr Forests Reserve, created in 1913 to protect the largest of the surviving groups of Asiatic lion, was accorded sanctuary status in 1965. Several hundred Asiatic lions have been bred in the sanctuary since it was established; "lion shows" consisting of guided tours in protected vehicles are held regularly for visitors. Other fauna include leopard, wild pig,

spotted deer, nilgai, four-horned antelope, and chinkara (a type of gazelle). A large central water hole contains a few crocodiles. The park also has a small temple dedicated to Krishna near the Tulsī-Śyām Springs.

Gīr Range, low mountain range in western Gujarāt state, west-central India, on the southern Kāthiāwār Peninsula. The range is extremely rugged with a steep slope seaward to the south and a gradual slope inland to the north. From it to the north runs a low, narrow, dissected range rising to Gorakhnāth (3,665 feet [1,117 m], believed to be an extinct volcano) in the broad mass of the Gīrnār Hills. The Gīr Range is considered to be sacred because of the ancient Jaina temple of Gīrnār (historically called Raivata, or Ujjayanta) situated on one of the hills; the temple is a major place of pilgrimage. The range is covered by forests, including sal (*Shorea*) and dhak trees.

The Bhādar, Rohza, Shatarant, and Ghelo rivers flow west and east from the Gīrnār Hills. The hills are inhabited mainly by the Bhīl and Dubla peoples. The economy of this sparsely populated region is dominated by subsistence agriculture; crops include cereals, peanuts (groundnuts), and cotton. A few large-scale industries manufacture textiles and iron and steel furniture. Cottage industries include carpentry, wood carving, lacquer ware, embroidering (particularly the widely known Kāthiāwarī pattern), and wool weaving. The Gīr Forest National Park, noted for its Asiatic lion, is located in the region. Khambalia, Dhāri, Visvadar, Mendarda, and Adityana are the important towns.

giraffe (species *Giraffa camelopardalis*), cudchewing hoofed mammal, which, with the okapi, constitutes the family Giraffidae (order Artiodactyla). Many subspecies have been described, based on coat pattern and the size and number of horns.



Giraffe (*Giraffa camelopardalis*)
© Animals Animals, 1971

To the Romans, the giraffe was "camelopardalis" ("spotted camel"), a term that survived in English as "camelopard."

Tallest of all mammals, the giraffe attains an overall height of 5.5 m (18 feet) or more. An unmistakable animal, it has a comparatively short body and very long legs and neck. The back slopes downward to the hindquarters, and the neck, despite its length, contains only the seven vertebrae typical of most mammals. The tail is tufted, and there is a short mane on the neck. Two to four short, skin-covered horns are present in both sexes and there is a central swelling, between the eyes, which in northern giraffes is almost as long as the horns. The coat is pale buff, covered to a greater or lesser extent with reddish brown spots that range from regular and geometric in some forms to irregular and blotchy, or leaf-shaped, in others.

The giraffe lives in herds on savannas and in open bush country and is native to most of Africa south of the Sahara. It feeds primarily on acacia leaves. To reach the ground or to drink, it must bend or spread its forelegs. The gait of the giraffe is a pace (both legs on one side move together), and, because of its long stride, is swifter than it appears; about 48 km (30 miles) per hour may be reached at a full gallop. One young is usually produced at a birth; gestation is about 14 to 15 months. The calf can follow its mother within one or two hours of its birth.

The giraffe possesses keen sight, smell, and hearing. Its principal predator, other than man, is the lion. When defending itself, the giraffe kicks with its heavy hooves. Males fight among themselves by swinging their heads at one another. The voice of the giraffe has so rarely been heard that the animal is popularly supposed to be voiceless, but it is capable of producing low call notes and moans. Still numerous in East Africa, where it is protected, the giraffe elsewhere has dwindled in number or has been exterminated because of hunting by man.

Giraffe River (The Sudan): *see* Baḥr az-Zarāf.

Consult the INDEX *first*

Giraldi, Giambattista, also called CYNTHIUS, Italian CINZIO, or CINTHIO (b. 1504, Ferrara [Italy]—d. Dec. 30, 1573, Ferrara), Italian novelist, poet, and dramatist who wrote the first modern tragedy on classical principles to appear on the Italian stage (*Orbecche*), and who invented tragicomedy. He studied under Celio Calcagnini and succeeded him in the chair of rhetoric at Ferrara (1541), later moving to the universities of Turin and Pavia.

Giraldi was influenced by the revival of Aristotelian literary principles after the publication of the original text of Aristotle's *Poetics* in 1536. In his poem *Ercole* (1557) he tried to reconcile the Aristotelian rules with modern taste. In his *Discorso delle comedie e delle tragedie* (1543; "Discourse on Comedy and Tragedy") he reacted against the austerity of the classical tragedies. In his own tragedies—*Orbecche* (1541), his only strictly Senecan tragedy; *Didone* (1542); *Altile* (1543); *Cleopatra* (1543); *Selene; Eufimia; Arrenopia; Epitia,* from which Shakespeare's *Measure for Measure* derives; and *Antivalomeni* (1549)—he included new dramatic elements while conforming to the Aristotelian rules.

Writing for a popular audience, he gave them horror and violence, but he altered the Senecan model to provide a happy ending, thus producing tragicomedy. He tried to renew the pastoral drama with his *Egle* (1545). His *Ecatommiti* (1565), 112 stories collected according to the pattern of Boccaccio's *Decameron,* aimed at stylistic distinction and showed a liking for direct narrative, in the manner of Matteo Bandello. They are moralistic in tone and were translated and imitated in France, Spain, and England: Shakespeare's *Othello* derives from Giraldi's story of the Moor of Venice.

Giraldus CAMBRENSIS, also called GERALD OF WALES, or GERALD DE BARRI (b. *c.* 1146, Manorbier Castle, Pembrokeshire, Wales—d. *c.* 1223), archdeacon of Brecknock, Brecknockshire (1175–1204), and historian, whose accounts of life in the late 12th century stand as a valuable historical source. His works contain vivid anecdotes about the Christian church, particularly in Wales, about the growing universities of Paris and Oxford, and about notable clerics and laymen.

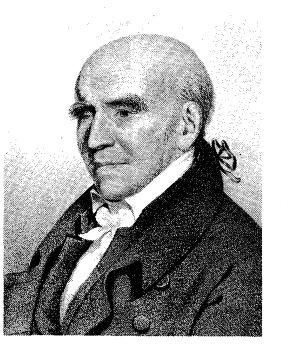
Of noble birth, Gerald was educated in Paris, and, on returning to Wales (1175), he was appointed archdeacon of Brecknock. The following year, after he was nominated (but not elected) as bishop of the ancient see of St. David's, Pembrokeshire, he returned to Paris to study canon law and theology.

Gerald entered the service of King Henry II of England probably in July 1184. Two journeys during that period led to the compilation of his important books on Ireland and Wales. He visited Ireland on a military expedition (1185–86) with Henry's son, the future King John, and as a result wrote *Topographia Hibernica* (*c.* 1188; "Topography of Ireland") and *Expugnatio Hibernica* (*c.* 1189; "Conquest of Ireland"). Gerald's Welsh tour in 1188 with Archbishop Baldwin of Canterbury, undertaken to raise soldiers for the Third Crusade, prompted his *Itinerarium Cambriae* (1191; "Itinerary of Wales") and *Cambriae descriptio* (1194; "Description of Wales"). He left the king's service in 1195, retiring to Lincoln to study theology.

From 1199 to 1203 Gerald's life was clouded by his frustrated ambition to become bishop of St. David's and to make it independent of Canterbury, thereby restoring the see's ancient power of exercising metropolitan rights over much of southern Wales as it had done prior to the Anglo-Norman penetration into Wales. This ambition led him to reject four Irish and two Welsh bishoprics. He was again nominated for St. David's in 1199, but the archbishop of Canterbury promoted a rival candidate; Pope Innocent III quashed both elections in 1203. Gerald explained his career and especially his struggle over St. David's in his autobiography, *De rebus a se gestis* (*c.* 1204–05; "Concerning the Facts of My History"; Eng. trans. *The Autobiography of Giraldus Cambrensis*). Gerald resigned his archdeaconry the following year. After revisiting Ireland (1205–06), he made a pilgrimage to Rome in 1207.

Girard, Stephen (b. May 20, 1750, Bordeaux, Fr.—d. Dec. 26, 1831, Philadelphia, Pa., U.S.), American financier and philanthropist whose purchase of government bonds during the War of 1812 provided economic support for continuation of U.S. military campaigns.

Girard shipped out to sea at the age of 14 and by 1774 was captain of a ship involved in U.S. coastal trade with the West Indies. Stymied by British blockades of U.S. seaports during the Revolutionary War (1775–83), he settled in Philadelphia but resumed maritime trading after the war. He developed a worldwide trading fleet and scrupulously efficient business methods that laid the foundation of

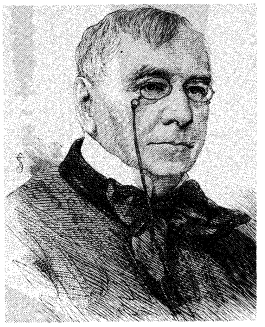


Stephen Girard, lithograph by A. Newsam after a portrait by B. Otis
By courtesy of the Library of Congress, Washington, D.C.

his fortune. In 1812 he bought out the Bank of the United States, renaming it the Bank of Stephen Girard, which became known as the "sheet anchor" of government credit during the War of 1812. Toward the end of the war, when U.S. credit was at its lowest ebb, his subscription for 95 percent of the government war loan issue enabled the United States to carry on the war.

Girard bequeathed nearly his entire fortune to social welfare institutions, including an endowment for a Philadelphia college for male orphans, founded as the Stephen Girard College in 1833.

Girardin, Émile de (b. June 21, 1806, Paris—d. April 27, 1881, Paris), popular French journalist, called the Napoleon of the press for his success in publishing inexpensive newspapers with massive circulations.



Girardin, engraving 1881, after a photograph
The Illustrated London News

The illegitimate son of Count Alexandre de Girardin by the wife of a Parisian lawyer, he took his father's name upon the publication of his first work, an autobiographical novel *Émile* (1827). In 1828 he founded his first periodical, *Le Voleur,* a monthly review of arts and science, and soon became an important figure in Parisian society, marrying, in 1831, the writer Delphine Gay. His reputation was enlarged by numerous other publishing successes—including an atlas, an almanac, and several journals—and he was elected to the Chamber of Deputies in 1834.

Girardin's great triumph, however, was the founding of *La Presse* (1836), a basically conservative newspaper that sold for less than half the cost of competing newspapers. Through excellent publicity, the paper attained a large circulation and became profitable.

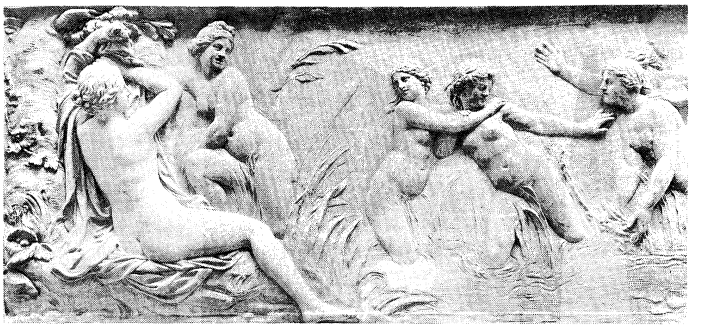
After a private and political dispute with Armand Carrel, publisher of the journal *Nationale,* Girardin killed Carrel in a duel (July 22, 1836), and his popularity declined for several years. He was excluded from the Chamber of Deputies in 1839 because his nationality was in some dispute, and, even though his French birth was established within a few weeks, he was not reelected to the chamber until 1842.

Girardin's political attitudes shifted with changes in public opinion; he was a middle-class conservative who occasionally showed progressive tendencies. In 1848 he advised Louis-Philippe to abdicate and hand over the regency to the Duchess of Orleans. At first he supported the Second Republic, but after the risings of June 1848 he declared his support for Louis-Napoléon. His waverings persisted under the Second Empire. After six years away from *La Presse*, he returned in 1862, joined the liberal party, and urged war against Prussia. In 1866 he revived an obscure journal, *La Liberté.* Several years later he became a Republican, bought the *Petit Journal* (1872), and increased its circulation to 500,000; in 1874 he also became political editor of *La France.* Both journals played a great part in the Republican triumph in the elections of 1877.

Girardon, François (baptized March 17, 1628, Troyes, Fr.—d. Sept. 1, 1715, Paris), the most representative sculptor employed on the great sculptural project of decorating Versailles during the period of Louis XIV.

Giradon attracted the attention of Chancellor Pierre Séguier, who brought him to Paris to study under François Anguier and afterward sent him to Rome. He returned to France about 1650, becoming a member of the Royal Academy of Painting and Sculpture in 1657. He worked for Nicolas Fouquet at Vaux-le-Vicomte and, after the Minister's fall, was extensively employed in the decoration of the royal palaces. In 1663 he was working under Charles Le Brun on the Galerie d'Apollon at the Louvre and in 1666 received the commission for his most famous work, the "Apollo Tended by the Nymphs," for the Grotto of Thetis at Versailles. The inspiration for this pictorial sculptural work (later moved and its grouping altered) seems to derive partly from Hellenistic sculpture (particularly the "Apollo Belvedere") and partly from Nicolas Poussin's paintings. Of his other works for Versailles, the most notable are the relief of the "Bath of the Nymphs" (1668–70), perhaps inspired by Jean Goujon's Fontaine des Innocents, and "The Rape of Persephone" (1677–79; pedestal completed 1699), in which he challenges comparison with Giambologna's "Rape of the Sabines." The effect of this group is marred by its present situation in the centre of the colonnade at Versailles, where it can be seen from all sides instead of from a fixed viewpoint as originally intended.

Although superficially a Baroque artist, Girardon's deep-seated classical tendencies also emerge in the serene solemnity of his two principal works outside Versailles: the equestrian statue of Louis XIV in the Place Vendôme (1683–92), which was destroyed in 1792 during the French Revolution, and his tomb of Richelieu (*see* gisant) in the church of the Sorbonne (begun 1675). Although influenced by Bernini and the Roman Baroque school, Girardon's works are less vigorous and more restrained than most Baroque sculpture.



"Bath of the Nymphs," bas-relief by Girardon; in the gardens of Versailles, France
Giraudon—Art Resource/EB Inc.

The classical bent of his mind and his abilities as a decorator made him the ideal collaborator with Charles Le Brun, just as Antoine Coysevox was with Le Brun's successor, Jules Hardouin Mansart. As Coysevox's star rose, that of Girardon sank, and he received few royal commissions after 1700.

Girardot, river port, Cundinamarca department, central Colombia, at the confluence of the upper Magdalena (there bridged) and Bogotá rivers, opposite Flandes. The site, once a canoe outpost named Pastor Montero, was donated for the creation of San Miguel parish in 1844. Under a provincial ordinance (1852) this became a district that was named after Atanasio Girardot, hero of the Battle of Bárbula (1813).

Coffee and hides are the main commodities shipped in riverboats; the city has an airport. Pop. (1973) 60,882.

girasole (vegetable): *see* Jerusalem artichoke.

Giraud, Henri(-Honoré) (b. Jan. 18, 1879, Paris—d. March 11, 1949, Dijon, Fr.), army officer and one of the leaders, in World War II, of the French Committee of National Liberation.

Giraud
By courtesy of the Bibliotheque Nationale, Paris

After graduating from Saint-Cyr in 1900, Giraud first served in Morocco and was captured by the Germans during World War I. Returning to North Africa in 1922, he participated in the Rif War. Early in World War II, he commanded an army but was again captured in May 1940. Escaping in April 1942, he negotiated with the Allies and was brought to North Africa in the wake of the Anglo-American landings (November 1942), where he became commander in chief of the French forces rallied to the war against Germany and Italy. Co-president with Charles de Gaulle of the French Committee of National Liberation from June to October 1943, Giraud retired in April 1944 over differences with de Gaulle. After the war he was elected to the Constituent Assembly and served as vice president of the Supreme War Council.

Giraudoux, (Hyppolyte-) Jean (b. Oct. 29, 1882, Bellac, Fr.—d. Jan. 31, 1944, Paris),

Giraudoux
H. Roger-Viollet

French novelist, essayist, and playwright who created an impressionistic form of drama by

emphasizing dialogue and style rather than realism.

Giraudoux was educated at the École Normale Supériéure and made the diplomatic service his career. He became known as an avant-garde writer with a group of early poetic novels, such as *Suzanne et le Pacifique* (1921). Although those works were generally considered difficult, farfetched, and precious, other works soon appeared. In *Siegfried et le Limousin* (1922), Giraudoux depicts in silhouette, as it were, the hostility between two enemies, France and Germany, as a background to his story of a man who suffers from amnesia; *Bella* (1926) is a love story behind which can be glimpsed the rivalry between two statesmen, a nationalist and an internationalist. Thus, what was to become the central theme of Giraudoux's plays was made clear: a pair of opposites, whatever they might be—man and God in *Amphitryon 38* (1929), man and woman in *Sodome et Gomorrhe* (1943), or the world of paganism and the world of the Old Testament in *Judith* (1931).

Giraudoux's theatrical career began in 1928 with *Siegfried,* a dramatization of his own novel, which introduced the distinguished actor and director Louis Jouvet, with whom Giraudoux was associated until World War II. It is notable that apart from *Intermezzo* (1933), in which a timid ghost revolutionizes a small provincial town until a romantic little schoolteacher restores order, Giraudoux never worked on an original subject: he sought inspiration in classical or biblical tradition as in *Électre* (1937) and *Cantique des cantiques* (1938; "Song of Songs"). He adapted Margaret Kennedy's novel *The Constant Nymph* in *Tessa, la nymphe au coeur fidèle* (1934) and La Motte-Fouqué's fairy tale of a water sprite who loves a mortal man as *Ondine* (1939).

Among Giraudoux's other important works combining tragedy, humour, and fantasy rendered in a style of exceptional virtuosity are *La Guerre de Troie n'aura pas lieu* (1935; Eng. adaptation by Christopher Fry, *Tiger at the Gates,* 1955) and *La Folle de Chaillot* (1946, Eng. adaptation by Maurice Valency, *The Madwoman of Chaillot,* 1949), in which a tribunal of elderly, eccentric Parisian ladies, assisted by a ragpicker, wipe out a world of speculators. He also wrote the scripts to two films: *La Duchesse de Langeais* (1942) and *Les Anges du péché* (1944).

Giraudoux served in World War I and was awarded the Légion d'Honneur. From 1939 to 1940 he served as commissioner of information.

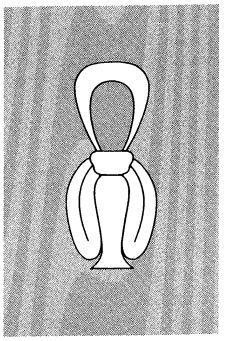
girder, in building construction, a horizontal main supporting beam that carries a vertical concentrated load. *See* beam.

To make the best use of the Britannica, consult the INDEX *first*

girdle-tailed lizard, any of various south and east African and Madagascan lizards belonging to the family Cordylidae. They are live-bearers, having as few as one to four young per litter.

Their name is derived from the rings of spiny scales that encircle the tail, and sometimes the body, in a series of whorls. In some species the armoured girdles serve effectively as protection when the lizard, threatened by a predator, grabs its tail in its mouth and forms a ring with the sharp spines projecting outward.

girdle tie, also called BLOOD OF ISIS, in Egyptian religion, protective amulet formed like a knot and made of gold, carnelian, or red glazed ware. Most samples of the girdle tie have been found tied around the necks of mummies; the amulets were intended to protect the dead from all that was harmful in the afterlife.



Girdle tie

Giresun, also spelled KERESUN, city and seaport, capital of Giresun *il* (province), northeastern Turkey, on the Black Sea about 110 mi (175 km) west of Trabzon. The older parts of the city lie on a peninsula crowned by a ruined Byzantine fortress, sheltering the small natural harbour. Nearby is Giresun Adası (Giresun Island), in ancient times called Ares. Giresun was known to the ancient Greeks as Choerades or Pharnacia and to the Romans as Kerasous or Cerasus. The name for the cherry is believed to have been derived from Cerasus (Latin *cerasum,* French *cerise*). Cherries have been replaced by hazelnuts as Giresun's chief product. Other exports include walnuts, hides, and timber. An artificial harbour constructed in the early 1960s greatly increased the port's exports.

Giresun *il,* 2,951 sq mi (7,644 sq km) in area, is drained by the Harşit and Kelkit rivers. It is a densely populated province extending from the coast over high northern mountains to the upper Kelkit Valley in the south. The climate is humid, with abundant rainfall and mild winters. The northern regions are densely forested. Pop. (1980) city, 45,690; (1983 est.) *il,* 489,300.

Girga (Egypt): *see* Jirjā.

Girgenti (Sicily): *see* Agrigento.

Giri, Varahagiri Venkata (b. Aug. 10, 1894, Berhampore, India—d. June 24, 1980, Madras), statesman, president of India from 1969 to 1974.

Giri began his education at Khallikote College, Berhampur, and then went to Dublin to study law. There he became engaged in the Sinn Féin movement and was expelled from Ireland in 1916. Upon his return to India, he joined the nascent labour movement. He became general secretary and then president of the All-India Railwaymen's Federation and was twice president of the All-India Trade Union Congress, an organization closely linked with the Congress Party.

When the Congress Party formed a government in Madras in 1937, Giri became minister of labour and industries. With the resignation of the Congress governments and launching of the anti-British "quit India" movement in 1942, he returned to the labour movement and was subsequently imprisoned with his colleagues.

After India became independent he was appointed high commissioner in Ceylon and in 1952 was elected to the Lok Sabha, one of the two chambers of the Indian Parliament; he was made minister of labour in the central Indian government but resigned in 1954. After this Giri was appointed successively to the largely ceremonial governorships of Uttar Pradesh, Kerala, and Mysore. In 1967 he was elected vice president.

On the death of Pres. Zakir Husain in 1969, Giri became acting president and announced his intention to stand for the presidency. By that time the office, until then largely ceremonial, had become a prize in the developing factional struggle within the Congress Party. The party's nomination went to another candidate; Indira Gandhi, the prime minister, supported Giri, however, and he was elected by a narrow majority.

Gīrīdīh, town, administrative headquarters of Gīrīdīh district, Bihār state, northeastern India, 72 mi (115 km) northeast of Hazāribāgh town, on both banks of the Usri River. In 1871 a branch line of the Eastern Railway was built to the town, increasing its importance as a transport centre for coal mined at nearby Kuharbārie, Serampore, and Banāidīh. It is the headquarters of the country's major mica-producing firms and has a degree-granting college.

Gīrīdīh district, with an area of 2,667 sq mi (6,907 sq km), is bounded by Santāl Parganas and Dhānbād districts on the east, West Bengal state on the south, Hazāribāgh district on the west, and Nawādah and Monghyr districts on the north. It forms part of the Chota Nāgpur region, consisting of a series of plateaus with different levels of elevation, forested with sal (*Shorea*) and drumstick trees mixed with thickets of bamboo and acacia. The district's red soils are drained by the Barākar River and the tributaries of the Dāmodar River. Agriculture is the basis of the economy; cultivated lands are confined to the flat tops of the plateaus and the valley plains. Crops include rice, corn (maize), ragi (a millet), gram (chickpea), and vegetables. Industrial development in the district is limited despite the availability of abundant forest and mineral resources. Industries produce metal products, chemicals, foodstuffs, furniture, household fixtures, and electric cables and wires. Copper, apatite, kyanite, coal, mica, and other minerals are mined. The towns in the district owe their origin and growth to mining and industrial activities; railways were built primarily to exploit the mineral resources. Pop. (1981) town, 65,444; district, 1,731,462.

Girl Scouts, also called (in Great Britain and some other countries) GIRL GUIDES, worldwide organization for girls, dedicated to training them in citizenship, good conduct, and outdoor activities. Robert (later Lord) Baden-Powell founded the Girl Guides in Great Britain in 1910 in response to the requests of girls who were interested in the Boy Scout movement established by him in 1908. The first Girl Scout troop in the United States was formed in 1912 by Juliette Gordon Low of Savannah, Ga., and followed the pattern set up for the Girl Guides. The World Association of Girl Guides and Girl Scouts was formed in 1928.

Aims and activities are substantially the same in all countries in which the movement is organized. The girls promise to follow a code of behaviour; undertake community service projects; and try to develop their skills by earning proficiency badges in a wide variety of activities. In the United States, there are four age groups: Brownies, 7 and 8 years old; Juniors, 9 through 11; Cadettes, 12 through 14; and Seniors, 15 through 17. In Great Britain there are Brownie Guides (7–11), Guides (10–16), and Ranger Guides (14–20). *See also* Boy Scouts.

Gīrnār Hills, physical region on the Kāthiāwār Peninsula, Gujarāt state, west central India; at the foot of one of the hills is a rock bearing one of the Rock Edicts of Aśoka (3rd century BC). The same rock bears an inscription referring to the construction of a lake, called Sudarśana, by the Maurya emperor Candra Gupta I (late 4th century BC). In the hills surrounding these two important historical records are numerous Jaina temples built by kings of the Solaṅki dynasty (961–1242).

Girne (Cyprus): *see* Kyrenia.

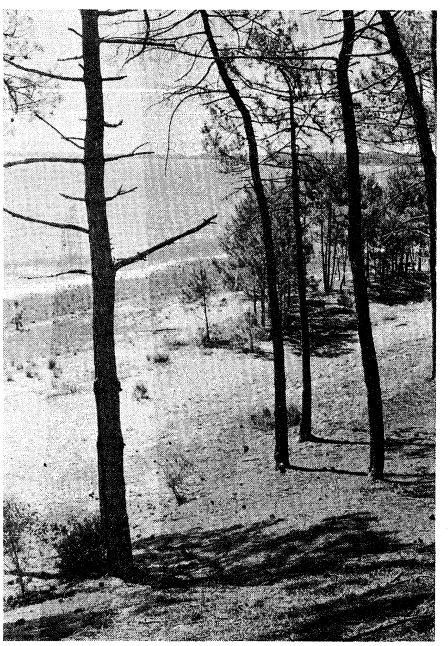
Girodet-Trioson, Anne-Louis, original name ANNE-LOUIS GIRODET DE ROUCY (b. Jan. 29, 1767, Montargis, Fr.—d. Dec. 9, 1824, Paris), painter whose works exemplify the first phase of the Romantic movement in French art.

Girodet-Trioson won the Prix de Rome (1789) for his "Joseph Recognized by His Brothers," which was influenced by the cold, sober Neoclassicism of his teacher, Jacques-Louis David. In "The Sleep of Endymion" (1792; Louvre, Paris) Girodet-Trioson displays a new emotional element akin to the troubled Romanticism of the novelist Chateaubriand. Girodet-Trioson let his literary interest take full reign in the composition of "Ossian Receiving the Generals of Napoleon at the Palace of Odin" (1801), painted for Napoleon's residence, Malmaison. He continued to paint literary subjects in such works as "Entombment of Atala" (1808; Louvre). The latter picture, together with a windswept portrait of Chateaubriand meditating before the Roman Colosseum (1809; Versailles), is most typical of his work. Upon inheriting a large fortune (1812), Girodet-Trioson ceased painting, shuttered himself from daylight, and wrote poetry, adjudged unreadable, on aesthetics.

"The Entombment of Atala," oil on canvas by Girodet-Trioson, 1808; in the Louvre, Paris

By courtesy of the Musee du Louvre, Paris; cliche des Musees Nationaux

Gironde, *département,* Aquitaine region, southwestern France, on the Atlantic coast, created from a part of the historic province of Guyenne (*q.v.*). It has an area of 3,861 sq mi (10,000 sq km), making it the largest *département* in France. In the northwest a cape lies between the sea and the estuary of the Gironde River. The Garonne River flows northwest through Bordeaux (*q.v.*), Gironde's capital, before it is joined by the Dordogne River and becomes the Gironde. Most of the western half, between the Garonne-Gironde and the coast, is flat land covered with extensive pine forests. The straight, dune-fringed coastline encloses forests, marshland, and lagoons; it is broken in the south by the Bassin de Arcachon, which is surrounded by seaside resorts, including the town of Arcachon, which is noted for its oyster beds.



Lagoon in the Bordeaux region, Gironde, France

Biraben—Rapho/Photo Researchers

The Bordeaux region, which has become one of the major commercial and industrial centres in France (wine, metalworks, chemicals, textiles, building materials, leather, foodstuffs), contains several of the world's most famous vineyards (Médoc, Sauternes, Saint-Émilion, Pomerol). The *département* has a maritime climate, with mild autumns and winters and hot, dry summers. The most important agricultural activity is viticulture, but cereals, fruit, and tobacco also are grown, and market gardening is considerable around Bordeaux.

The territory was traversed over three different routes by pilgrims to Santiago de Compostela during the Middle Ages. It contains numerous places of historic interest, including Bordeaux, Blaye, Bazas, Saint-Émilion, and the feudal castle of Labrède, home of the philosopher Montesquieu. Gironde has five *arrondissements*—Bordeaux, Blaye, Langon, Lesparre-Médoc, and Libourne—and is in the educational division of Bordeaux. Pop. (1982) 1,127,546.

Gironde, estuary on the Bay of Biscay, in Gironde *département,* Aquitaine region, southwestern France, formed by the confluence of the Garonne and Dordogne rivers (*qq.v.*). It trends southeast–northwest for about 45 mi (72 km) and is navigable for oceangoing vessels, although it has sandbanks and strong tides.

The domination of Bordeaux has hindered the development of an active outport (seaward terminal for deep-draft vessels) in the past, but the presence of petroleum refineries at Pauillac and Bec d'Ambèsmay signal change. Le Verdun-sur-Mer is the outport for passengers.

Girondin, also called BRISSOTIN, member of the moderate republicans, many of them originally from the *département* of Gironde, who controlled the Legislative Assembly from October 1791 to September 1792 during the French Revolution. Young lawyers who were basically idealists, the Girondins soon attracted a large following of businessmen, merchants, industrialists, and financiers. They were initially known as Brissotins, as followers of Jacques-Pierre Brissot (*q.v.*).

The Girondins first emerged as harsh critics of the court. Through the oratory of Pierre-Victurnien Vergniaud and Brissot, the Girondins inspired the measures taken against the émigrés and anti-Revolutionary priests in October and November of 1791. From the end of 1791, under the leadership of Brissot, they supported foreign war as a means to unite the people behind the cause of the Revolution.

The Girondins reached the height of their power and popularity in the spring of 1792. On April 20, 1792, the war that they urged was declared against Austria. Earlier, on March 23, two of the group entered the government under King Louis XVI: Étienne Clavière as finance minister and Jean-Marie Roland as interior minister. Roland's wife, Mme Jeanne-Marie Roland, held a salon that was an important meeting place for the Girondins. But throughout the summer they vacillated in their position toward the existing constitutional monarchy, which was coming under serious attack. The storming of the Tuileries Palace on Aug. 10, 1792, which overthrew the monarchy, took place without their participation and marks the beginning of their decline, as more radical groups (the Paris Commune, the Parisian working class, and the Jacobins under Robespierre) came to direct the course of the Revolution.

From the opening of the National Convention in September 1792, the Girondins united in opposition to the Montagnards (deputies of the left, mainly newly elected from Paris, who headed the Jacobin dictatorship of 1793–94). The antagonism between the two groups was partly caused by bitter personal hatreds but also by opposing social interests. The Girondins were linked to Parisian and provincial businessmen and to local government officials, while the Montagnards depended on the artisan and working class of Paris. In the ensuing struggles the Girondins were characterized by moderate political views that stopped short of economic and social equality, by economic liberalism that rejected government control of trade or prices, and, most clearly, by their reliance on the *départements* as a counterbalance to Paris. Their efforts to reduce the influence of the capital led the Montagnards to brand them as advocates of "federalism" who sought to destroy the unity of the newly formed republic. The trial of Louis XVI (December 1792–January 1793) left the Girondins, some of whom opposed the King's execution, open to the charge of royalism.

The Girondins were held responsible for defeats suffered by the army in the spring of 1793 and were made more unpopular by their refusal to provide for the economic demands of the Parisian workers. A popular rising against them in Paris, beginning on May 31, ended when the Convention, surrounded by armed insurgents, ordered the arrest of 29 Girondin deputies on June 2. The fall of the Girondins was due to their reluctance to adopt emergency measures for the defense of the Revolution and to provide for the economic demands of the Parisian workers, policies that the Montagnards carried out.

Many of the Girondins escaped to the provinces in the summer of 1793 to organize "federalist" uprisings against the Convention. These failed largely for lack of popular support. With the ruling Montagnards adopting a policy of terror, 21 of the arrested Girondins were tried, beginning on Oct. 24, 1793, and were guillotined on October 31. After the fall of the Montagnards in 1794, a number of Girondins who escaped the purge returned to the Convention and were rehabilitated.

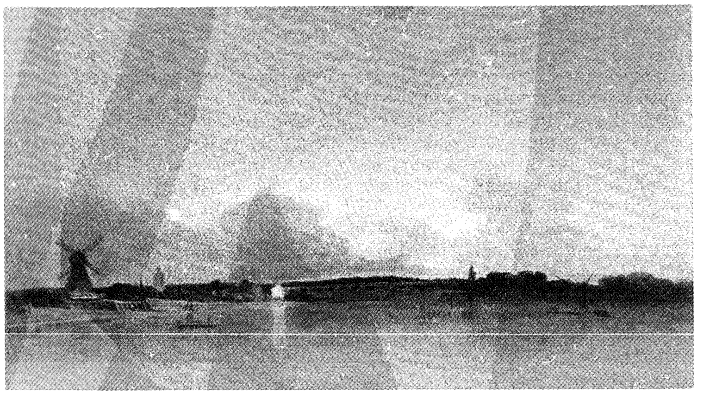
Gironella, José María (b. Dec. 31, 1917, Darnius, Gerona, Spain), Spanish author best remembered for his long historical novel *Los cipreses creen en Dios* (1953; *The Cypresses Believe in God,* 1955), in which the conflicts within a fictitious family symbolize the dissension that overtook the people of Spain during the years preceding the civil war of 1936–39. The book, which won the National Prize for Literature, was the first explanation of the origins of that war that was well received by the Spaniards themselves.

Gironella's formal education ended when he left a Catholic seminary; he worked at menial jobs until the civil war started, then joined the Nationalist army. After the fighting stopped he worked as a newspaper reporter and correspondent. In 1945 he published a volume of poetry and in 1946 his first novel, *Un hombre* (*Where the Soil was Shallow,* 1957), which won the Nadal Prize.

The chronicle begun in *Los cipreses* was continued through the 1940s in three, less successful books: *Un millón de muertos* (1961; *One Million Dead,* 1963), *Ha estallado la paz* (1966; *Peace After War,* 1969), and *Condenados a vivir* (1971; "Condemned To Live"). Gironella also wrote short stories; books based on travels to Israel, China, and Japan; and es-

says, in some of which he led protests against the censorship of literature by the Spanish government.

Girtin, Thomas (b. Feb. 18, 1775, London—d. Nov. 9, 1802, London), British artist who at the turn of the 19th century firmly established the aesthetic autonomy of watercolour (formerly used mainly to colour engravings) by employing its transparent washes to evoke a new sense of atmospheric space.



"The White House, Chelsea," watercolour by Thomas Girtin, 1800; in the Tate Gallery, London

By courtesy of the trustees of the Tate Gallery, London; photograph, A.C. Cooper Ltd.

While still boys, Girtin and his friend J.M.W. Turner were employed to wash in skies for architectural drawings and in colouring prints for a printseller. Girtin made copies and sketches from the works of a number of artists, and in 1794 he began to exhibit at the Royal Academy. He went on numerous sketching tours, chiefly in the north of England, and founded a sketching club for young artists. During 1801–02 he visited Paris and produced a series of etchings of that city. His gigantic panorama of London, the "Eidometropolis," was exhibited in 1802, before his premature death.

Girtin's earlier landscapes are in the 18th-century topographical manner, but in his last years he evolved a bold, spacious, and Romantic style—in spirit akin to the contemporary poetry of William Wordsworth—that greatly influenced English landscape painting. Girtin's increasing power and consummate mastery of the art of watercolour are evident in such late works as "The White House, Chelsea" (1800; Tate Gallery, London).

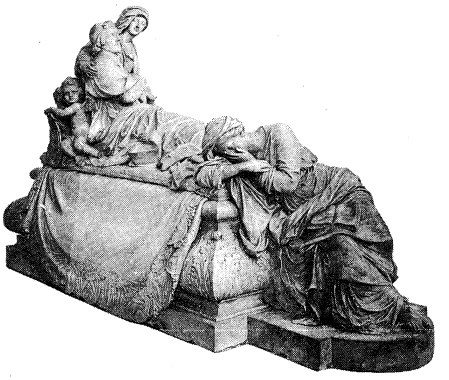
Giry, (Jean-Marie-Joseph-)Arthur (b. Feb. 28/29, 1848, Trévoux, Fr.—d. Nov. 13, 1899, Paris), French historian noted for his studies of the French Middle Ages.

After a brief career in administrative services and journalism, Giry devoted himself to scholarship. His first major work was *Histoire de la ville de Saint-Omer et de ses institutions jusqu'au XIV^e siècle* (1877). The type of research involved in this work led him to similar studies on a larger scale: *Les Établissements de Rouen,* 2 vol. (1883–85); *Documents sur les relations de la royauté avec les villes de France de 1180 à 1314* (1885); and *Études sur les origines de la commune de Saint-Quentin* (1887). His *Manuel de diplomatique* (1894), a guide to the study of ancient documents and charts, formed the basis for later studies of the documentary history of the French Middle Ages, particularly the Carolingian period, written by Giry and his students. He also wrote articles on medieval sciences, contributed to historical encyclopaedias, and edited collections of medieval texts.

Giry

J.P. Ziolo

gisant, in sepulchral sculpture, recumbent effigy representing the person in death; especially an effigy depicting the deceased in a state of advanced decomposition, as was popular particularly in the 15th and 16th centuries in northern Europe. The gisant represented as a decayed corpse was often placed below a portrait, or orant, effigy, which represented the person praying or kneeling, as in life; in that way the gisant served as a reminder of the transitory nature of earthly life. Other Renaissance gisants were idealized, reflecting the classical emphasis on commemoration of the individual rather than the Christian emphasis on man's mortality. The dramatically conceived gisant of the Baroque period is exemplified by François Girardon's tomb of the Cardinal de Richelieu (begun 1675) in the church of the Sorbonne in Paris.



The tomb of Richelieu, begun 1675, with gisant by François Girardon; in the church of the Sorbonne, Paris

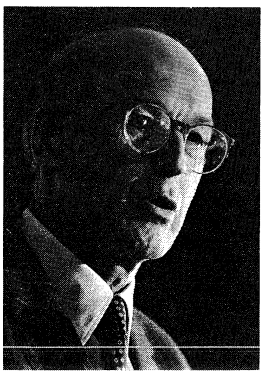
Giraudon—Art Resource/EB Inc.

Gisborne, city and port on Poverty Bay, east coast of North Island, New Zealand. It is located where the Waimata and Taruheru rivers join to form the Turanganui. It was the first area in New Zealand visited (1769) by Captain James Cook. It received its first permanent European settlers in 1852 and was surveyed in 1870 and given the name Gisborne for then colonial secretary Sir William Gisborne. It was given the status of a borough in 1877, and it was constituted a city in 1955.

Linked to Wellington by road and rail and to Auckland by road, Gisborne serves a region supporting sheep, vegetable, and dairy farming. Major industries include commercial fishing, meat freezing, dairy and food processing, wool scouring, engineering works, and hosiery, gas, lime, fertilizer, and tallow plants. Because of the shallowness of its port, tenders serve larger ships at a roadstead in Poverty Bay. Because of its proximity to the International Date Line, Gisborne claims to be the most easterly city in the world. Pop. (1987 est.) 29,800.

Gisbornian Stage, time division of the Ordovician Period in Australia and New Zealand. The Gisbornian Stage precedes the Eastonian Stage and follows the Darriwilian Stage; it is characterized by the presence of a graptolite fauna in which the genera *Nemagraptus* and *Climacograptus* are prominent.

Giscard d'Estaing, Valéry (b. Feb. 2, 1926, Koblenz, Ger.), French political leader who served as the third president of the Fifth Republic of France (1974–81).



Giscard d'Estaing, 1985

©1985 Thierry Boccon-Gibod/Black Star

The eldest son of a prominent French financier and economist and member of a patrician family, he attended the École Polytechnique and the École Nationale d'Administration in Paris and worked in the Finance Ministry after World War II.

Giscard was elected to the French National Assembly in 1956 and was a delegate to the United Nations General Assembly (1956–58). He served as the secretary of state for finance (1959–62). He was appointed finance minister (1962–66) by President Charles de Gaulle. During his first term of office as finance minister, France attained a balanced budget for the first time in 30 years. His international economic policies—among them his attempt to limit American economic influence in France—and his other conservative financial measures helped to cause a recession and brought him discredit in the business and labour sectors; he was dismissed. He then founded and served as first president of the Républicains Indépendants, a conservative party that worked in coalition with the Gaullists. From 1969 to 1974 he was again finance minister under President Georges Pompidou. Giscard was elected to the presidency in a runoff election against the leftist candidate François Mitterrand on May 19, 1974. One of the notable achievements of his presidency was France's role in the strengthening of the European Economic Community. Giscard was defeated in another runoff with Mitterrand on May 10, 1981. He returned to politics in 1982, winning election as *conseiller général* of Chamaliéres.

Gish, Dorothy (b. March 11, 1898, Massillon, Ohio, U.S.—d. June 4, 1968, Rapallo,

Dorothy Gish in *Orphans of the Storm*, 1921
Brown Brothers

Italy), U.S. motion-picture and stage actress who starred in many of D.W. Griffith's early silent-film classics.

On the stage from 1903, she was hired by Griffith, along with her sister Lillian, in 1912. Her fragile beauty and talent for comedy brought her roles in such popular films as *Hearts of the World* (1918) and *Orphans of the Storm* (1921) and in a great number of light comedies. Primarily a stage actress from 1928 to 1944 (notably in *Life with Father* and *The Magnificent Yankee*), she returned briefly to films in *Our Hearts Were Young and Gay* (1944) and made a few other pictures. Her last screen performance was in *The Cardinal* (1963). She appeared in more than 75 films.

Gish, Lillian (b. Oct. 14, 1896, Springfield, Ohio, U.S.), U.S. actress best remembered for her portrayal of sweet, fragile, and vulnerable heroines in D.W. Griffith's early silent-film classics. One of the most creative cinema artists, she was also a stage actress and a revered name in show business for more than half a century.

Gish made her stage debut at five and, with her sister Dorothy, acted on Broadway and in touring companies throughout the country. Griffith hired the sisters and featured them

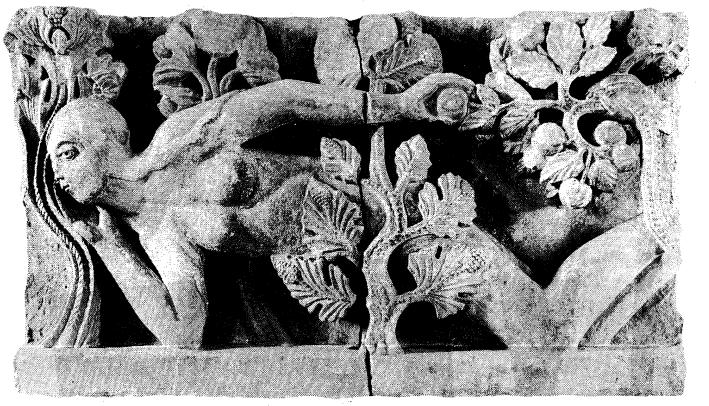
Lillian Gish in *Hearts of the World*, 1918
Brown Brothers

in Biograph Studio's *Unseen Enemy* (1912). Three years later Lillian achieved international fame in *The Birth of a Nation* (1915). In the Griffith classics that followed, such as *Intolerance* (1916), *Hearts of the World* (1918), *Broken Blossoms* (1919), *Way Down East* (1920), and *Orphans of the Storm* (1921), she was featured as the ideally innocent heroine. She also advised Griffith in many of the technical aspects of filmmaking—*e.g.*, budgets, publicity, and sets—and she directed her sister in Biograph's *Remodeling Her Husband* (1920). Leaving Biograph for M-G-M in the early 1920s, Gish starred in such pictures as *White Sister* (1923), *La Bohème* (1926), *The Scarlet Letter* (1926), and *The Wind* (1928).

Her pictures declined in popularity with the growing sophistication of cinema audiences, and in 1930 she resumed her stage career. She returned to films in *The Commandos Strike at Dawn* (1943), appearing subsequently in *Miss Susie Slagle's* (1946), *Duel in the Sun* (1947), and other pictures. She also appeared in television plays and is remembered for her portrayal of a genteel spinster in *Arsenic and Old Lace* (1969). She published *The Movies, Mr. Griffith and Me* (1969) and *Dorothy and Lillian Gish* (1973). In the 1970s she toured in Europe and the United States lecturing on films. She received an honorary Academy Award in 1971 and appeared in Robert Altman's *A Wedding* (1978).

Gísla saga, an Icelandic saga set in northwestern Iceland and written probably before the middle of the 13th century, which tells of an outlaw poet Gísli Súrsson (d. *c.* AD 980) who, by his enemies, was punished for loyally avenging his foster brother. It includes rich descriptions of nature and is said to contain many verses composed by Gísli himself. The best English translation, by G. Johnstone, was published in 1963.

Gislebertus, French GISLEBERT (b. Autun, Fr.; fl. early 12th century), French sculptor who made major contributions to the cathedral of Saint-Lazare in Autun and to several



"Eve" by Gislebertus, lintel of the north portal of the Saint-Lazare cathedral, Autun, Fr., 12th century; in the Musée Rolin, Autun, Fr.
Jean Roubier

Burgundian churches during a short but productive period from 1125 to 1135.

Gislebertus first worked at Cluny and by 1115 was probably one of the chief assistants to the Master of Cluny. In the Cluny workshop he contributed to the decoration of the Abbey of Cluny, where a few fragments of his work can still be found on the western doorway. Following his training at Cluny, Gislebertus travelled to Vézelay, where the early tympanum (decorated area within an arch or pediment) for the main doorway was once attributed to him. He arrived in Autun in 1125, with his artistic style firmly established. His early work there was on the eastern part of the church, which was finished and dedicated in 1130, and he then worked for four or five years on the west tympanum.

Among Gislebertus' most noted works is the tympanum sculpture of the western doorway of the cathedral of Autun, depicting the Last Judgment, noted for its expressionistic carving and technical proficiency; some of the figures are abstract in design, and the demon forms foreshadow 20th-century Surrealism. His sculpture for the northern doorway is a reclining, nude "Eve," a medieval masterpiece. Also at Autun the sculptor created 60 capitals in the interior and doorways, most of which illustrate biblical stories and reflect the artist's far-reaching imagination. Some of the capitals that depict Christ's infancy are gentle and tender, but the tympanum contains fierce and frightening scenes of judgment and damnation.

gismondine, also called GISMONDITE, rare mineral in the zeolite family. Many specimens have been found in Ireland and Iceland in basaltic lavas, along with the zeolites chabazite, thomsonite, and phillipsite; isolated finds have been reported in Czechoslovakia, Italy, and Hawaii. Gismondine forms colourless, bipyramidal crystals of orthorhombic symmetry; it is a hydrated calcium aluminosilicate with the formula $CaAl_2Si_2O_8 \cdot 4H_2O$.

Gisors, market town, Eure *département,* Haute-Normandie region, northwestern France, in the valley of the Epte, northwest of Paris and southwest of Beauvais. Dominated by an 11th- and 12th-century castle built by the kings of England and France, its strategic position on the frontier of Normandy caused it to be strongly contested during the 12th century. In 1193, when Richard I, king of England (Richard Coeur de Lion, or Lion-Heart), was held a prisoner in Germany on his return from a crusade, Philip II of France (Philip Augustus) seized the stronghold. Richard almost retook it after a memorable battle four years later. Surrounded by walls with 12 towers, it has a central donjon inside a big courtyard. The 13th- to 16th-century church of Saint-Gervais-et-Saint-Protais is a harmonious edifice in spite of having been built in numerous styles; it, with much of the rest of the centre of the town, was damaged during the German invasion in 1940, but it has been restored. Pop. (1982) 8,720.

Gisors, Charles (-Louis-Auguste) Fouquet, duc de: *see* Belle-Isle, Charles(-Louis-Auguste) Fouquet, duc de.

Gissing, George (Robert) (b. Nov. 22, 1857, Wakefield, Yorkshire, Eng.—d. Dec. 28, 1903, Saint-Jean de Luz, France), English novelist, noted for the unflinching realism of his novels about the middle-class poor.

Exceptionally precocious, Gissing was educated at a Quaker boarding school and at Owens College, Manchester, where his academic career was brilliant. His personal life was, until the last few years, mostly unhappy.

His two marriages—the first to a prostitute and the second to a servant girl—brought him little but misery and the life of near poverty and constant drudgery—writing, reading, and coaching—that he described in the novels *New Grub Street* (1891) and *The Private Papers of Henry Ryecroft* (1903). Before he was 21 he conceived the ambition of writing a long series of novels, somewhat in the manner of Balzac, whom he admired. The first of these, *Workers in the Dawn,* appeared in 1880, to be followed by 21 others. Between 1886 and 1895 he published one or more novels every year. He also wrote *Charles Dickens: A Critical Study* (1898), a remarkably able and perceptive piece of literary criticism.

His work is serious—though not without a good deal of comic observation—interesting, scrupulously honest, and rather flat. It has a good deal of documentary interest for its detailed and accurate accounts of lower-middle-class London life. On the social position and psychology of women he is particularly acute. He did not lack human sympathies, but his obvious contempt for so many of his characters reflects an artistic limitation. Gissing was deeply critical, in an almost wholly negative way, of contemporary society. The vulgarity, ugliness, and frustration of the life he described emerge powerfully; his delineation of character and of individual moral dilemmas is often penetrating; yet the total effect is somewhat lacking in artistic vigour. Of his novels, *New Grub Street,* considered by some critics to be his only great book, is unique in its merciless analysis of the literary life.

In the last years of his life Gissing established a happy relationship with a Frenchwoman, Gabrielle Fleury, with whom he lived.

Gist, Christopher (b. *c.* 1706, Maryland [now in U.S.]—d. 1759, South Carolina or Georgia), American colonial explorer and military scout who wrote highly informative journals describing his experiences.

Little is known about the early life of Gist, although it is probable that his surveyor father trained him in this profession. In 1750 he left his home in North Carolina with an appointment from the Ohio Company to explore territory in the Ohio Valley. That autumn he set out from western Maryland, explored the Ohio River to the mouth of the Scioto River, then crossed through the Kentucky region on his return journey to his family. He explored other portions of the Ohio–Kentucky area during the winter of 1752–53, becoming the first English colonist to explore this region.

In November 1753 Gist, then living in western Maryland, joined Major George Washington of the Virginia militia on his expedition against the French in western Pennsylvania. On two occasions he allegedly saved Washington's life, and he was with him later when Washington surrendered Fort Necessity in July 1754. The next year, Gist served as a guide in General Edward Braddock's disastrous expedition against Fort Duquesne, and he later organized and commanded a company of scouts protecting the frontier.

Gist spent his last years among the Cherokee tribes in the South, where he served as an Indian agent. His writings, published in 1893, offer excellent firsthand descriptions of the frontier environment, Indian life, and the campaigns that marked the beginning of the French and Indian War.

Gist, George: *see* Sequoyah.

Gisulph II, Italian GISULFO (b. *c.* 1040—d. after 1089), prince of Salerno, the last important Lombard ruler to oppose the Norman conquest of southern Italy; his defeat marked the end of effective resistance to the Normans.

In 1052 Gisulph's father, Gaimar V, was assassinated in a revolt. Gisulph, held captive by the assassins, was rescued with the aid of Norman knights, who were rewarded by recognition of their territorial acquisitions. In 1058 the Norman lord Robert Guiscard effected an uneasy reconciliation with Gisulph by marrying his sister, and the following year Pope Nicholas II made Robert duke of Apulia and Calabria.

In 1062, to stave off the growing Norman threat, an attempt was made to form an anti-Norman league, and Gisulph went to Constantinople to negotiate with the Byzantine emperor. When a rebellion of his uncle Guy of Sorrento, in support of the Normans, put an end to the project, Gisulph in frustration launched pirate warfare against neighbouring Amalfi. In 1072 Gisulph joined the Norman leader Richard of Aversa in an insurrection against Robert Guiscard, who was occupied in Sicily. Robert returned to the mainland, however, and put down the rebellion.

Two years later a new pope, Gregory VII, tried again to form an anti-Norman league. The allies met at Monte Cassino, but the conference was broken up by the Pisan contingent, which rioted against Gisulph, whose piracy and harsh treatment of prisoners were notorious.

In May 1076 the Normans blockaded Salerno, which yielded in December; Gisulph and a few followers held out in the citadel until the following May. In 1088, after Robert Guiscard's death, Amalfi rose against the Normans and acclaimed Gisulph their doge, but his reign lasted only a year, his name thereupon disappearing from history.

Gītagovinda (Sanskrit: "The Poem in which the Cowherd Is Sung"), lyrical poem celebrating the romance of the divine cowherd Krishna and his beloved, Rādhā, renowned both for its high literary value and for its expression of religious longing, and popular particularly among Vaiṣṇavas (followers of Lord Vishnu, of whom Krishna was an incarnation) of India. The poem was written in Sanskrit by Jayadeva, who was attached to the Bengali court of King Lakṣmaṇa Sena (late 12th century).

The highly original form of the poem, which inspired many later imitations, intersperses the recitative stanzas with 24 eight-line songs. The religious drama of the worshiper's yearning for god is expressed through the idiom of human courtship and love. The *Gītagovinda* is the earliest-known poem dealing with the

Krishna seated waiting for Rādhā, from an illustrated manuscript of the *Gitagovinda,* Rajasthani, *c.* 1620; in the collection of the late Sir Cawasji Jehangir

By courtesy of Lady Cawasji Jehangir

theme of the divine lovers, Rādhā and Krishna, and in it Rādhā is treated as the mistress, not as the wife, of Krishna. Its verses were popular with Caitanya, the 14th–15th-century Bengali saint, and continue to be sung even today at *bhajanas* and *kīrtanas* (gatherings for devotion through song) throughout India. The *Gītagovinda* was also the inspiration for many beautiful miniature paintings of the Rajasthani and Pahari schools in the 17th and 18th centuries.

Gitega, town, central Burundi. The town lies about 40 miles (65 km) east of the national capital of Bujumbura. Constituting the second largest town in the country, Gitega functions as a centre for religion and education; it has primary, secondary, technical, and vocational schools and places of worship for Muslims, Roman Catholics, and Protestants. Industrial enterprises in Gitega include a livestock market, peat exploitation, and a tannery. The National Museum, featuring exhibits on history and art, is also located there.

Gitega is situated on Burundi's central plateau. Most of the surrounding area is devoted to livestock (cattle, goats, and sheep) grazing and the growing of such crops as bananas, peanuts (groundnuts), sweet potatoes, cassava, beans, corn (maize), sorghum, and coffee. A major road links Gitega with the national capital. Pop. (1986) town, 95,274.

Githion (Greece): *see* Yíthion.

gittern, either of two medieval stringed musical instruments, the *guitarra latina* and the *guitarra morisca.* The latter was also known as the *guitarra saracenica.*

Angel playing a gittern, from Queen Mary's Psalter; in the British Library (Ms. Royal 2 B VII)

By courtesy of the trustees of the British Library

The *guitarra latina,* an ancestor of the modern guitar, usually had four strings and was plucked with a plectrum. Early drawings and the sole surviving example (*c.* 1300, Warwick Castle, Warwickshire, Eng.) suggest that the flat, waisted body and the neck and pegbox were carved from one solid block of wood. It was probably developed in Spain, spreading thence to France, England, and Germany, and was played as late as the mid-17th century. The *guitarra morisca,* a pear-shaped cousin of the lute, was popular in Spain from the 12th to the 18th century.

gittin (Judaism): *see* get.

Giuba River (Ethiopia and Somalia): *see* Jubba River.

Giudici, Francesco: *see* Franciabigio.

Giulini, Carlo Maria (b. May 9, 1914, Barletta, Italy), Italian conductor esteemed for his skills in directing both grand opera and symphony orchestras.

Giulini studied under Bernardino Molinari at Rome's Accademia di Santa Cecilia. As violist for that institution's resident orchestra, he observed the work of such notables as Wilhelm Furtwängler, Otto Klemperer, and Bruno Walter. His conducting debut took place there in 1944; that same year he was

appointed musical director for Italian Radio. In 1950 he organized the Milan Radio Orchestra, whose broadcasts brought him to the attention of Arturo Toscanini and Victor de Sabata. Three years later he succeeded Sabata as principal conductor of La Scala. Acclaimed performances of Italian opera at a series of European festivals were followed by successes in Britain in 1955 at the Edinburgh Festival and in 1958 during the centenary of the Royal Opera House, Covent Garden. In 1967 Giulini decided to devote all his time to conducting symphony orchestras. He maintained a long association with the London Philharmonia and the Chicago Symphony orchestras. From 1973 to 1976 he conducted the Vienna Symphony Orchestra and in 1978 succeeded Zubin Mehta as chief conductor of the Los Angeles Philharmonic.

Giulini's conducting style was often compared to that of Toscanini. A Romantic conductor, he performed few modern works and was best-known for his interpretations of the music of Giuseppe Verdi, Wolfgang Amadeus Mozart, Gustav Mahler, and Anton Bruckner. He also recorded extensively.

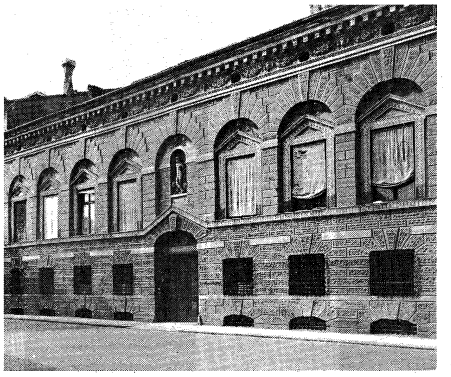
Giulio ROMANO, original name GIULIO PIPPI, in full GIULIO DI PIETRO DI FILIPPO DE' GIANUZZI (b. 1492/99, Rome—d. Nov. 1, 1546, Mantua, Duchy of Mantua [Italy]), late Renaissance painter, architect, principal heir of Raphael, and one of the initiators of the Mannerist style.

Giulio was apprenticed to Raphael as a child and had become so important in the workshop that by Raphael's death, in 1520, he was named with G. Penni as one of the master's chief heirs; he also became his principal artistic executor. After Raphael's death, Giulio completed a number of his master's unfinished works, including the "Transfiguration." In his original work from these years, such as the "Madonna and Saints" (*c.* 1523; Santa Maria dell'Anima, Rome) and the "Stoning of St. Stephen" (1523; San Stefano, Genoa), Giulio developed a highly personal, anticlassical style of painting.

In 1524 Giulio left Rome for Mantua, where he remained until his death, completely dominating the artistic affairs of that duchy. The most important of all his works is the Palazzo del Te, on the outskirts of Mantua, begun in 1525 or 1526 and built and decorated entirely by him and his pupils. This palace is almost a parody of the serene classicism of Donato Bramante while retaining the forms of Roman antiquity. The building consists of a square block around a central court with a garden opening off at right angles to the main axis—in itself characteristic of the way in which all the elements are slightly different from what would be expected. The design is particularly famous for its capricious misuse of ancient Greek and Roman ornamental motifs.

The principal rooms of the Palazzo del Te are the Sala di Psiche, with erotic frescoes of the loves of the gods; the Sala dei Cavalli, with life-size portraits of some of the Gonzaga horses; and the fantastic Sala dei Giganti. This showpiece of trompe l'oeil (illusionistic) decoration is painted from floor to ceiling with a continuous scene of the giants attempting to storm Olympus and being repulsed by the gods. On the ceiling, Jupiter hurls his thunderbolts, and the spectator is made to feel that he, like the giants, is crushed by the mountains that topple onto him, writhing in the burning wreckage. Even the fireplace was incorporated into the decoration, and the flames had a part to play. This room was completed by 1534, with much help from Rinaldo Mantovano, Giulio's principal assistant. The colour is very crude; the subject is suited to facile virtuosity and tends to bring out the streak of cruelty and obscenity that runs just below the surface in much of Giulio's painting.

In Mantua itself he did a great deal of work



Giulio Romano's house, Mantua, designed by Giulio Romano, 1544–46

Alinari—Art Resource/EB Inc.

in the huge Reggia dei Gonzaga. The decorations of the Sala di Troia are particularly noteworthy in that they look forward to the illusionistic ceiling decorations of the Baroque; this style was probably inspired by the presence in Mantua of the Camera degli Sposi by Andrea Mantegna. Giulio also built for himself a Mannerist version of the House of Raphael (1544–46) and began the rebuilding of the cathedral (1545 onward).

Giulio ROMANO (Italian composer): *see* Caccini, Giulio.

Giunta PISANO (d. *c.* 1260), Italian painter, a native of Pisa and a pioneer who, coming from Tuscany to Assisi, influenced the development of Umbrian art.

It is said that he painted in the upper church of Assisi, notably a "Crucifixion" dated 1236, with a figure of Father Elias, the general of the Franciscans, embracing the cross, but this painting no longer exists. Three large Crucifixions are ascribed to the same master, whose signature can be traced on them. One is in Santissimo Raineri e Leonardo in Pisa and was formerly in the convent of Santa Anna; another, in the Museo Civico at Pisa, is completely overpainted; and the third is in Santa Maria degli Angeli at Assisi. In these paintings Christ is represented with his head leaning on one side with an expression of pain and his body bending forward in agony—a conception differing from "the triumphant Christ" of the preceding age.

Giuochi: *see* Pesellino.

Giurgiu, *județ* (district), southeastern Romania, occupying an area of 1,471 square miles (3,810 square km) bounded on the south by the Danube River and Bulgaria. The district, consisting mostly of lowlands, was formed in 1981 from a portion of Ilfov district. Besides the eastward-flowing Danube, the district is also drained southward by the Argeș and Dimobovița rivers. At the junction of the Cîlnișțea and Neajlov rivers, which are tributaries of the Argeș, is Lake Comana. Giurgiu (*q.v.*) city, a port on the Danube, is the district capital.

Livestock raising and cereal growing are the main agricultural activities of the district. Michael the Brave (Mihai Viteazul; 1558–1601) won a battle against the Turkish army near Călugăreni in 1595, and a bronze effigy near the town commemorates the battle. Bucșani, Domnești, and Letca Nouă are other towns in the district. Forest preserves are situated along the Argeș River. Highways and railway connections extend through Giurgiu, and a highway and railway connection between Bucharest and Craiova cross the northern portion of the district. Pop. (1984 est.) 374,210.

Giurgiu, city, capital of Giurgiu *județ* (district), southern Romania. It is situated on the left (north) bank of the Danube, 40 miles (65 km) south of Bucharest. Its origins have not been clearly established, though it is probable that Genoese navigators built a citadel named San Giorgio on the island in front of the harbour and that the present name was derived from that. In historical documents, the name appears first in 1403, in a treaty renewal between Prince Mircea the Old and the Polish king Władysław II Jagiełło. In 1417 Giurgiu was conquered by the Turks and remained in Turkish hands until 1829, when the Peace of Adrianople returned it to Walachia. The church of St. Nicholas (built in 1830 by Nicholas I, tsar of Russia) commemorates the treaty.

The earliest railway line in Romania was laid from Bucharest to Giurgiu in 1869. Friendship Bridge, a bilevel highway–railway bridge over the Danube, connecting the city to Ruse, in Bulgaria, was completed in 1954. The city has become an important river port. Giurgiu has a modern shipyard; its industries include a sugar refinery, a cannery, and a rug and carpet factory. Pop. (1985 est.) 62,386.

Giuseppe (Italian personal name): *see under* Joseph, except as below.

Giuseppe, Benvenuto di (painter): *see* Cimabue.

Giuseppino, Il (Italian painter): *see* Cavalier d'Arpino.

Giusti, Giuseppe (b. May 13, 1809, Monsummano, Tuscany—d. March 31, 1850, Florence), northern Italian poet and satirist, whose satires on Austrian rule during the early years of Italy's nationalistic movement (the Risorgimento) had great influence and are still enjoyed for their Tuscan wit and lively style.

Giusti, detail of an oil painting by Ferdinando Rondoni; in the Uffizi, Florence

Alinari—Art Resource/EB Inc.

Giusti was sporadically a law student in Pisa (1826–29 and 1832–34) and led an inconspicuous life until the Revolution of 1848. He then sat as a deputy in the two Tuscan legislative assemblies and in the short-lived constituent assembly (until April 1849).

Giusti's satirical poems were at first circulated only in manuscript; the first collections of them had to be printed outside Italy without the author's name. His first notable satire, written in 1833, was *La guigliottina a vapore* ("The Steam Guillotine"), which announced that the Chinese had invented a steam guillotine that would make decapitation much more efficient for dictators. Other satires defended Italy or bemoaned its political and social state.

Giusti also wrote satires on the death (1835) of the Austrian emperor Francis I and on the crowning of the new emperor. A very moving poem, often considered his masterpiece, is *Sant'Ambrogio* (*c.* 1846), in which the poet's hostility toward Austrian troops attending a mass turns into a feeling of sympathy and solidarity with them as they join in singing a chorus by Giuseppe Verdi.

Giusti's prose works are valued for his skillful

use of the Tuscan tongue. Some poetic works were translated by William Dean Howells in *Modern Italian Poets* (1887).

Giv'atayim, city, eastern suburb of Tel Aviv–Yafo, west-central Israel, on the Plain of Sharon. The city is a union of several workers' quarters, the first of which, Shekhunat Borokhov, was founded in 1922. It was the first suburban workers' development in Jewish Palestine. The various sections now comprising Giv'atayim were united in 1942; it was incorporated as a city in 1959. The city's light industries include food processing and printing. Pop. (1987 est.) 45,800.

Givenchy, Hubert de (b. Feb. 21, 1927, Beauvais, Fr.), French dress designer noted for his designs of blouses, skirts, and slacks (separates) and his internationally operated ready-to-wear boutiques.

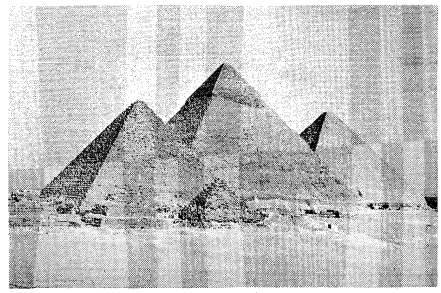
Givenchy studied art at the École des Beaux-Arts in Paris and later studied law. At 17 he was apprenticed to the Parisian designer Jacques Fath, and for the next eight years he designed for the major Parisian fashion houses of Robert Piguet, Lucien Lelong, and Elsa Schiaparelli. In 1952 he opened his own house and slashed overhead cost to lower the prices of his designs. Givenchy's first collection, featuring flawlessly detailed separates, high-style coats, and elegant ball gowns, gained immediate international recognition. His designs used imaginative accessories, silk prints, and embroidered fabrics. His "Bettina blouse" reintroduced tailored shirting into high fashion.

In 1957 he, along with the famed Spanish designer Cristóbal Balenciaga, introduced the "sack silhouette." Givenchy's designs for Audrey Hepburn in the 1961 film *Breakfast at Tiffany's* brought into vogue the high-bosomed princess dress without sleeves or a belt. His ready-to-wear boutiques, opened in the 1960s, made high fashion available to women throughout the world at prices lower than those of individual, original creations.

Giyani, new town, capital of the nonindependent black state of Gazankulu, northeastern Transvaal, South Africa. It is located on the northern bank of the Klein (Little) Letaba River west of Kruger National Park. Situated in the northern portion of Gazankulu, Giyani was established in the 1960s as the administrative centre for the Tsonga and Shangaan people. Pop. (1976) 1,968.

Giza, also called GIZAH, or EL-GIZA (Egypt): *see* Jīzah, al-.

Giza, Pyramids of, Arabic AHRĀMĀT AL-JĪZAH, three 4th-dynasty (*c.* 2575–*c.* 2465 BC) pyramids erected on a rocky plateau on the west bank of the Nile River near al-Jīzah (Giza), Egypt; they are included among the Seven Wonders of the Ancient World. The northernmost and the oldest pyramid of the group was built by Khufu (Greek: Cheops), the second king of the 4th dynasty. Called the Great Pyramid, it is the largest of the three, the length of each side at the base averaging 755¾ feet (230.4 m) and its original height being 481⅔ feet (147 m). The middle pyramid was built by Khafre (Greek: Chephren), the fourth of the eight kings of the 4th dynasty; the structure measures 707¾ feet (216 m) on each side and was originally 471 feet (143 m) high. The southernmost and last pyramid to be built was that of Menkaure (Greek: Mycerinus), the sixth king of the 4th dynasty. Each side measures 356½ feet (109 m), and the structure's completed height was 218 feet (66 m). All three pyramids were plundered both internally and externally in ancient times. Thus, most of the grave goods originally deposited in the burial chambers are missing, and the pyramids no longer reach



The Pyramids of Giza from the south

Hirmer Fotoarchiv, Munchen

their original heights because they have been almost entirely stripped of their outer casings of smooth white limestone; the Great Pyramid, for example, is now only 451⅔ feet (138 m) high. Khafre, the middle pyramid, does retain the outer limestone casing at its topmost portion, as is evident in the illustration.

Khufu is perhaps the greatest single building ever erected by mankind. Its sides rise at an angle of 51°52′ and are accurately oriented to the four cardinal points of the compass. The Great Pyramid's core is made of yellowish limestone blocks, the outer casing (now almost completely gone) and the inner passages are of finer light-coloured limestone, and the interior burial chamber is built of huge blocks of granite. Approximately 2,300,000 blocks of stone went into this stupendous structure, each weighing an average of 2.5 tons.

Khufu, like its sister pyramids, is a masterpiece of technical skill and engineering ability. The geometrical precision of its layout and the accuracy of its stonecutting are truly amazing, especially when one considers the colossal proportions of the whole and the size and weight of the blocks employed in it. The internal walls as well as those few outer-casing stones that still remain in place, some of which weigh as much as 16 tons, show finer joints than any other masonry constructed in ancient Egypt and possibly in the world.

The entrance to the Great Pyramid is on the north side, about 59 feet (18 m) above ground level. A sloping corridor descends from it through the pyramid's interior masonry, penetrates the rocky soil on which the pyramid rests, and ends in an unfinished underground chamber. From the descending corridor branches an ascending corridor that leads to a room known as the Queen's Chamber and to a great slanting gallery that is 151 feet (46 m) long. At the upper end of this gallery a long and narrow passage gives access to the burial room proper, usually termed the King's Chamber. This room is entirely lined and roofed with granite. From the chamber two narrow shafts run obliquely through the masonry and reach the exterior of the pyramid; it is not known whether they served a religious purpose or were meant for ventilation. Above the King's Chamber are five compartments separated by massive horizontal granite slabs; the purpose of these slabs is presumably to divert the immense pressure exerted by the overlying masses of masonry from the ceiling of the burial chamber.

The question of how the pyramids were built has not received a wholly satisfactory answer. The most plausible one is that the Egyptians, who lacked tackle and pulleys for lifting heavy weights, employed a sloping embankment of brick, earth, and sand, which was increased in height and in length as the pyramid rose and up which the stone blocks were hauled by means of sledges, rollers, and levers. According to the ancient Greek historian Herodotus, the Great Pyramid took 20 years to construct and demanded the labour of 100,000 men. This figure is believable given the assumption that these men, who were agricultural labourers, worked on the pyramids only (or primarily) while the Nile River was in flood and hence when there was little work to be done in the fields.

Each monument originally consisted of not only the pyramid itself, which housed the body of the deceased king, but also an adjoining mortuary temple and a sloping causeway leading from the mortuary temple to a valley temple near the Nile. Close to each pyramid were one or more subsidiary pyramids used for the burials of other members of the royal family.

To the south of the Great Pyramid near Khafre's valley temple lies the Great Sphinx. Carved out of a knoll of rock, the Sphinx has the facial features of King Khafre but the body of a recumbent lion; it is approximately 240 feet (73 m) long and 66 feet (20 m) high. (*See* sphinx.)

In 1925 a pit-tomb containing the transferred burial equipment of Khufu's mother, Queen Hetepheres, was discovered near the upper end of the causeway of Khufu. At the bottom of a deep stone-filled shaft was found the queen's empty sarcophagus, surrounded by furniture and articles of jewelry attesting to the high artistic ability and technical perfection of the 4th-dynasty craftsmen.

Surrounding the three pyramids are huge fields of flat-topped funerary structures called mastabas, used for the burials of relatives or officials of the kings. At Giza, beside the core mastabas of the 4th dynasty, arranged in a grid pattern, numerous mastabas were also found, which date from the 5th and 6th dynasties (*c.* 2465–*c.* 2150 BC), as well as several that belonged to the 3rd dynasty (*c.* 2650–*c.* 2575 BC).

gizzard, in many birds, the hind part of the stomach, especially modified for grinding food. Located between the saclike crop and the intestine, the gizzard has a thick muscular wall and may contain small stones, or gastroliths, that function in the mechanical breakdown of seeds and other foods. In this sense, the gizzard is comparable to the teeth of other animals. A few other animals, such as earthworms and some bryozoans, also have gizzardlike structures.

Gjellerup, Karl Adolph (b. June 2, 1857, Roholte, Den.—d. Oct. 11, 1919, Klotzsche, Ger.), Danish poet and novelist whose ef-

Gjellerup

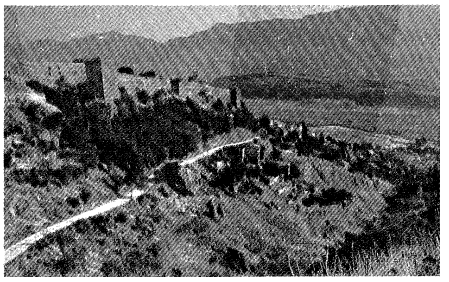
By courtesy of the Royal Danish Ministry for Foreign Affairs, Copenhagen

forts to portray his times critically, which led him frequently to caricature the narrowness of the bourgeoisie, earned him, together with his compatriot Henrik Pontoppidan, the 1917 Nobel Prize for Literature.

The son of a parson, Gjellerup studied theology, although, after coming under the influence of Darwinism and the new radical ideas of the critic Georg Brandes, he thought of himself as an atheist. This atheism, which turned out to be no more than a break with Christianity, was proclaimed in his first book *En Idealist Shildring af Epigonus* (1878; "An Idealist, A Description of Epigonus") and in his farewell to theology, *Germanernes lærling* (1882; "The Teutons' Apprentice"). The latter, however, indicated the path that was to

take him, via German idealist philosophy and Romanticism, back to a conscious search for religion, which finally found its satisfaction in his preoccupation with Buddhism and other Oriental religions. This last period is represented by two books: *Minna* (1889; Eng. trans., 1913), a novel of contemporary Germany, where Gjellerup lived in his later years, and *Pilgrimen Kamanita* (1906; *The Pilgrim Kamanita,* 1911), an exotic tale of reincarnation set in India.

Gjirokastër, Gheg dialect GJINOKASTËR, Greek ARGYRÓKASTRON, Italian ARGIROCASTRO, city, capital of Rrethi i Gjirokastrës (Gjirokastër district), in southern Albania, southeast of the Adriatic port of Vlorë. It overlooks the Drin River valley from the eastern slope



The fortress, Gjirokastër, Alb.
Paolo Koch—Rapho/Photo Researchers

of the long ridge of the Gjerë mountains. Picturesque, latticed houses sprawl upon the spurs of the mountain, nestling under the shadow of the well-preserved fortress built by Ali Paşa, the Turkish grand vizier, in 1811. A centre of 19th-century Albanian nationalism, the town was the site of a meeting of the Albanian League, in 1880, at which a resolution was passed demanding full autonomy from Ottoman rule. In the First Balkan War (1912–13), the town was claimed by Greece, and between 1939 and 1944 it was occupied in succession by the Italians, the Greeks, and the Germans. Gjirokastër is the centre of the Bektāshīyah order of Muslims. The Albanian Communist Party leader Enver Hoxha was born there in 1908 of Muslim parents; his home has been converted into a Museum of the Resistance of 1939–44. Pop. (1980 est.) city, 19,900; (1978 est.) district, 57,100.

Glaama (Norway): *see* Glåma.

Glaber, Radulfus (b. *c.* 985, near Auxerre, Bourgogne—d. *c.* 1047, Auxerre), medieval monk and chronicler whose works, though lacking critical sense and order, are useful as historical documents. He read extensively, travelled considerably, and observed and recorded major events.

Some accounts portray him as an unruly character and a wanderer. He travelled among monasteries, stopping at each to study or work. After working for a time under Abbot Helderic at Saint-Germain in Auxerre, Glaber lived at Moutiers-St. Jean between 1005 and 1010. He then stayed at Saint-Bénigne under Abbot William of Volpiano, whose life he recounted in *Vita Guillelmi.* The five books of his *Historiae,* written at Cluny from 1030 to 1035, were dedicated to Odilo, abbot of Cluny. Glaber later returned to Saint-Germain.

Glace, Mer de (glacier, Alps): *see* Mer de Glace.

Glace Bay, town, Cape Breton county, northeastern Nova Scotia, Canada, on the eastern shore of Cape Breton Island, overlooking the Atlantic Ocean, just east of Sydney. An important coal-mining town and port, it developed (along with the adjacent communities of Dominion and Reserve Mines) after major mining operations began in 1858 with a name indicative of ice (*glace*) and dating from the French period. After 1960, however, mining declined, principally because of the exhaustion of the more accessible coal seams (some are under the ocean bed), leaving the town more heavily dependent upon such industries as fishing and fish processing.

The town has a notable miners' museum and a replica of a 19th-century miners' village. The Italian inventor Marchese Guglielmo Marconi sent a transatlantic wireless message from a transmitting tower near Glace Bay in 1902, a year after the town was incorporated. Pop. (1981) 21,466.

glacial age: *see* ice age.

glacial valley, also called GLACIAL TROUGH, stream valley that has been glaciated, usually to a typical U-shaped cross section. U-shaped valleys occur in many parts of the world and are characteristic features of mountain glaciation. These glacial troughs may be several thousand feet deep and tens of miles long.

When allowed to spread out, a glacier erodes the landscape uniformly, but when confined within valley walls it tends to deepen and widen the valley floor. The commonly V-shaped stream valley is converted to a U-shaped valley because the U-shape provides the least frictional resistance to the moving glacier. Because a glacier cannot turn as a stream can, the valley becomes straighter and smoother. The valley walls may be almost vertical and may be striated by passing boulders; the floor may be covered with till or moraines.

Because thickness of the ice is the dominant factor in the deepening process, smaller tributary glaciers erode their troughs less rapidly than the main glacier does. When the glaciers melt, the tributary troughs are left as hanging valleys high on the walls of the main glacial valley. Post-glacial streams may form waterfalls from the mouths of the hanging valleys; an example is Yosemite Falls, California.

Ada Valley, near Milford Sound, Fiordland, South Island, New Zealand
By courtesy of the New Zealand Geological Survey; photograph, T. Ulyatt

The floors of some glacial valleys have irregularities of gradient causing a succession of rock basins. These steps (called a glacial stairway) may be attributed to the alternation of weak and resistant strata or to jointing of the bedrock (well-jointed rock is eroded, whereas poorly jointed rock remains). The rock basins may hold small lakes called paternoster lakes because of their resemblance to a string of beads.

glacier, any large mass of perennial ice that forms on land through the recrystallization of snow and that moves forward under its own weight. The term ice sheet is commonly applied to a glacier occupying an extensive tract of relatively level land and exhibiting flow from the centre outward.

A brief treatment of glaciers follows. For full treatment of their physical characteristics, *see* MACROPAEDIA: Ice and Ice Formations. For a detailed discussion of glacial processes and the landforms produced by such erosional and depositional actions, *see* Continental Landforms.

Glaciers occur where snowfall in winter exceeds melting in summer, conditions which presently prevail only in high mountain areas and polar regions. They occupy only about 11 percent of the Earth's land surface but hold roughly three-fourths of its freshwater. Approximately 99 percent of this glacier ice is concentrated in Antarctica and Greenland, while the remainder is widely scattered on all the continents, except Australia, and on many islands in high latitudes. It is thought that as many as 70,000 to 200,000 glaciers exist throughout the world.

Variations in the amount of glacier ice are highly critical to man because appreciable changes, either increases or decreases, would adversely affect the distribution of people and their economic relationships. For example, if all existing glacier ice were to melt, the resulting rise in sea level of about 60 metres (197 feet) would submerge virtually every major coastal city in the world.

Glacier types. Glaciers can be classified into three basic types: continental, mountain, and piedmont. These varieties differ both in size and shape.

The continental glaciers are the largest; they cover enormous areas and in many cases are thick enough to bury entire mountain ranges except for the highest peaks. Practically all of Antarctica, an area of more than 14,000,000 square kilometres, is covered by an ice sheet that averages nearly 1,980 m thick. The Greenland ice sheet covers more than 1,800,000 sq km and has a maximum measured thickness of about 3,350 m. Smaller continental ice sheets, often called ice caps or ice fields, are found on Iceland, Spitsbergen, and various other Arctic islands.

Mountain glaciers, also called valley glaciers, are ice streams that flow down mountain valleys, usually in the form of narrow ribbons. The Alps, Rockies, Himalayas, and other high mountain ranges of the world contain many glaciers of this kind. The smallest mountain glaciers are thin patches of ice covering only a fraction of a square kilometre. At the other extreme is the Beardmore Glacier in central Antarctica, which measures about 190 km long and 40 km wide. Many large mountain glaciers are roughly 300 to 900 m thick.

Piedmont glaciers are intermediate between continental and mountain glaciers. In a sense, they are mountain glaciers that spread laterally over the lowland at the foot of a mountain range. In cases where the lowland is a coastal plain and the ice mass extends into the sea, the term ice shelf is frequently applied. The Malaspina and Bering glaciers in Alaska, each covering approximately 3,890 sq km, are typical examples of piedmont glaciers.

Formation of glaciers. Glaciers originate in snow fields. The lower limit of perennial snow fields is called the snow line. The snow line is at sea level in polar regions and rises gradually toward the Equator. The maximum altitude of the snow line (about 6,100 m) occurs not at the Equator but rather in the dry horse latitudes between 20° and 30° north and south of the Equator. Climatic conditions, which are determined by geographic position and altitude, affect both winter snowfall and summer melting and, thus, are the major factors affecting locations of snow fields and glaciers. It is for this reason that some very cold but dry areas have no glaciers, whereas other warmer areas with abundant snowfall support large glaciers.

As snow fields grow in thickness, solid ice is formed through gradual recrystallization of the accumulated snow. During the initial stage, melting, evaporation, and compaction

transform fluffy flakes of newly fallen snow into a porous mass of small, rounded granules called firn or névé. The weight of the snow that accumulates year after year buries firn of previous years to greater and greater depths. The increasing pressure causes melting and recrystallization at the edges of the grains until all air space is gone, and solid crystalline ice is formed.

The thickness of snow, firn, and ice can continue to increase only until the strength of ice is exceeded by the pressure exerted by the weight of the accumulation, at which point movement begins. As a result of the pressure from above, ice at the bottom moves in much the same way that cold molasses or tar flows. Ice in small pieces is a brittle substance incapable of flowing, but large masses of ice under sufficient pressure behave as a plastic material and flow readily, albeit quite slowly. The thickness required to initiate movement varies somewhat, depending on slope of the land surface, temperature of the ice, and certain other factors.

Flowage causes a glacier to move downward or laterally into a zone where losses exceed annual accumulation of snow. If the glacier descends below the snow line, losses are due primarily to melting and evaporation, but where a glacier extends into the sea much of the wastage may result from the calving (breaking off) of icebergs. Accordingly, the size of a glacier as well as variations in its size depend on the degree of balance between accumulation and wastage rates.

Most glaciers move so slowly that the motion cannot be seen, but the speed of movement can be estimated in various ways. For example, the movement of large rocks or other objects on a glacier surface can be determined by successive observations or measurements from some fixed point off the ice. Somewhat more precise methods of measuring glacier speeds include drilling deep holes in the ice and inserting pipes that are progressively deformed, or setting up rows of stakes and measuring their dislocation by means of surveying techniques.

The various parts of a glacier move at different rates. Movement of a valley glacier is similar to the flow of a river in that velocities are greater in the centre than near the edges. Ordinarily flow is more rapid in the middle of a glacier than near its head or terminus. The upper 30 to 60 m of a glacier is composed of rigid, brittle ice that does not flow but which is carried along by the mobile ice underneath. This brittle zone fractures quite easily and is characterized by long cracks called crevasses, which are produced by forces that result from different flow rates in various parts of the underlying ice. The upper surface of the glacier may be broken into a jumbled maze of ice pinnacles known as séracs at places where the gradient of the bedrock floor changes abruptly.

The majority of glaciers move only a few centimetres per day and follow a regular pattern of advance and retreat in response to a slowly varying climate. A vastly different behaviour pattern, however, has been exhibited by glaciers in areas of the Soviet Union, Iceland, the Alaska Range, and certain other parts of the world. Such glaciers may, after a period of quiescence lasting 10 to 100 years, suddenly begin to move very rapidly—as much as five metres per hour. This rapid flow, which continues for only a year or two, causes a sudden depletion of the upper portion of the glacier, which is accompanied by a swelling and advance of its lower part. Ice masses manifesting unusual characteristics of this sort are commonly called surging or galloping glaciers.

Effects of glaciation. Glaciers are the most powerful of all erosional agencies, and their effects on land features are distinctive. Glaciated mountains are much more rugged than nonglaciated ones. Sharp pointed peaks such as the Matterhorn in Switzerland and deep, U-shaped valleys such as Yosemite in the Sierra Nevada of California owe their form largely to glaciation. The fjords of Norway are glaciated valleys now partially submerged by the sea.

A glacier abrades and polishes the bedrock floor over which it passes. Rocks and sand particles pushed along by the ice have the effect of a giant rasp or piece of sandpaper. Frost action, landsliding, and avalanching carry rock debris onto a glacier surface from the land protruding above it. The material transported by a glacier ranges from house-sized boulders to clay particles. When the glacier melts, all of this material is laid down as an unsorted deposit called till or boulder clay. At the terminus of a glacier the melting ice drops its load in the form of mounds and ridges referred to as a terminal moraine. Mountain glaciers also commonly have lateral moraines between the edges of the ice and the valley walls, and medial moraines formed by the confluence of tributary glaciers that have lateral moraines. Elongate hills known as drumlins parallel the direction of ice movement and are found near the margins of continental glaciers. Most drumlins consist largely of till and occur in clusters.

Much of the material deposited by glaciers is reworked by meltwater streams, which build outwash plains and terraces composed of stratified sand and gravel. Kettles are depressions on outwash plains formed by the melting of ice blocks buried in the outwash deposits. Eskers are winding ridges of stratified gravel and sand presumably deposited by subglacial streams.

Past periods of glaciation. Present-day glaciers are to a degree remnants of the glacial ice that covered nearly a third of the Earth's surface at various times during the Pleistocene Epoch, which ended about 10,000 years ago. Exactly when Pleistocene glaciation began is not known, but it was probably less than 1,000,000 years ago. Available evidence indicates that there were at least four significant glacial periods, separated by intervals when the climate was warmer than at present.

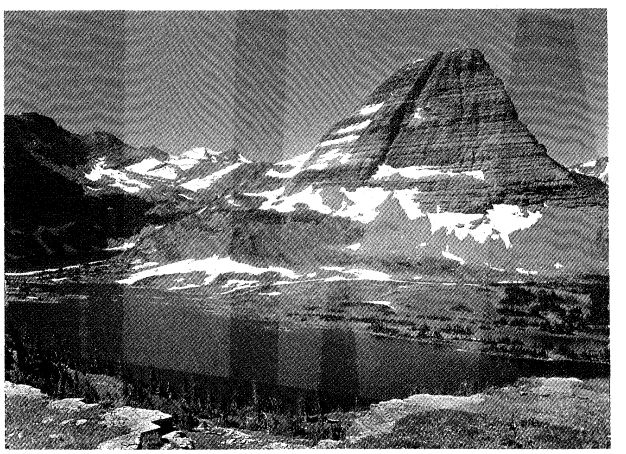
It has been determined that two major glaciations occurred prior to the Pleistocene. Both of these occupied large areas in belts which are now tropical. One glaciation occurred during late Precambrian time (about 600,000,000 years ago) and the other during the Permian Period (approximately 225,000,000 years ago). These glacial periods appear to have been rather brief, and during the long intervals between them, glaciers were not present even in high mountain and polar regions.

Glacier Bay, scenic indentation, about 50 mi (80 km) long, on the coast of southeastern Alaska, U.S., about 100 mi northwest of Juneau. It contains a spectacular display of 16 active tidal glaciers that descend from the lofty ice-draped St. Elias Range to the east and the Fairweather Range to the west. The bay, which is studded with many largely treeless islands that are used as rookeries by thousands of seabirds, has fjordlike inlets, which terminate at ice cliffs or sheer faces of the glaciers. Muir Glacier, perhaps the most famous of the ice rivers, rises 265 ft (81 m) above the water and is nearly 2 mi wide. Glacier Bay was the descriptive name given to the striking locality by Capt. Lester A. Beardslee of the U.S. Navy in 1880.

Glacier Bay National Park and Preserve, formerly GLACIER BAY NATIONAL MONUMENT, national park and preserve in southeastern Alaska, U.S., on the Gulf of Alaska. Proclaimed a national monument in 1925, with boundary alterations in 1939, 1955, 1978, and 1980, it was renamed in 1980. The area covers 4,135,269 ac (1,674,198 ha). The park includes the northwestern slope of Mt. Fairweather (15,300 ft [4,663 m]) and the U.S. portion of the Alsek River. Among the notable features of the park are great tidewater glaciers, a dramatic range of plant life, and an unusual variety of wildlife that includes brown and black bears, mountain goats, whales, seals, and eagles.

Glacier National Park, park in southeastern British Columbia, Canada, lying in the heart of the Selkirk Mountains, within the great northern bend of the Columbia River, east of Revelstoke. Established in 1886, it occupies an area of 521 sq mi (1,349 sq km). Majestic snowcapped peaks, such as Hermit, Cheops, Grizzly, Sifton, Grant, Avalanche, and Sir Donald, flanked by immense ice fields and glaciers, form an impressive Alpine panorama, with canyons, turbulent rivers, waterfalls, and flower-filled meadows. Outstanding features are the Illecillewaet Glacier, which has an area of 10 sq mi and falls more than 3,500 ft (1,100 m) from its névé (partially compacted snow at its upper end), and the Nakimu Caves in the Cougar Valley. The park is crossed by the Canadian Pacific Railway and the Trans-Canada Highway.

Glacier National Park, national park set in a scenic Rocky Mountain wilderness in northwestern Montana, U.S., adjoining the Canadian border and Canada's Waterton Lakes National Park. The two parks together compose the Waterton–Glacier International Peace Park, dedicated in 1932. Glacier National Park was established in 1910 and encompasses 1,013,595 ac (410,187 ha). The park has many active glaciers. Mountains, lakes,



Bear Hat Mountain above Hidden Lake on a crest of the Continental Divide in Glacier National Park, Montana

Ray Atkeson—EB Inc.

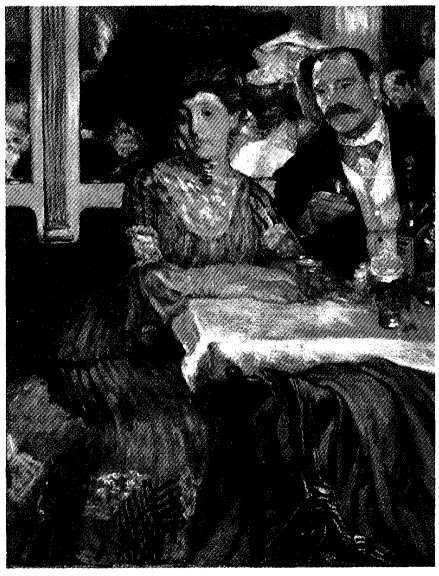
cirques, and valleys all show the effects of the ice sheet that formerly covered the region. The park straddles the Continental Divide (great ridge of the Rocky Mountains that marks the boundary between westward Pacific drainage and eastward Atlantic drainage), with the forests concentrated on the western slopes because of the heavier rainfall there. Alpine meadows that blossom with wildflowers in summer are common at higher elevations.

glaciology, scientific discipline concerned with all aspects of ice on landmasses. It deals with the structure and properties of glacier ice, its formation and distribution, the dynamics of ice flow, and the interactions of ice accumulation with climate. Glaciological research is conducted with a variety of methods. The internal structure of glaciers, for example, is studied by means of radar sounding, while glacier movement is monitored by measuring the deformation of vertical boreholes or lateral tunnels dug into the ice. Estimates of ice accumulation over large areas are made with data secured by remote sensing (*e.g.,* with satellite-borne infrared and multispectral scanners), and the successive annual layers in glacier ice are commonly differentiated by measuring oxygen isotope ratios.

Glackens, William (James) (b. March 13, 1870, Philadelphia—d. May 22, 1938, Westport, Conn., U.S.), American artist, whose paintings of street scenes and middle-class urban life rejected 19th-century academic art and introduced a matter-of-fact realism into the art of the United States.

Glackens studied at the Pennsylvania Academy of the Fine Arts and at the same time worked as an illustrator for the *Philadelphia Record,* the *Public Ledger,* and *The Press.* In 1895 he spent a year in Paris and then settled in New York, where he worked as an illustrator for *The New York Herald* and the *New York World. McClure's Magazine* sent him to Cuba in 1898 to cover the Spanish-American War. At about the turn of the century he took up painting seriously. "Hammerstein's Roof Garden" (1901), a cabaret scene, was his first important picture.

He joined a group of artists who were also interested in depicting contemporary life. Robert Henri was the leader of this group,



"Chez Mouquin," oil painting by William Glackens, 1905; in the Art Institute of Chicago

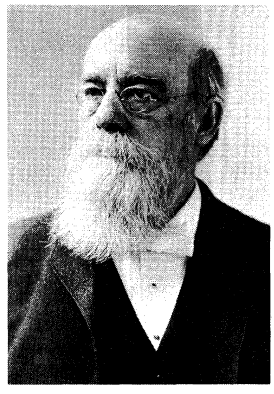
By courtesy of the Art Institute of Chicago, Friends of American Art Collection

which included John Sloan, George Luks, and Everett Shinn as well as the more Romantic painters Ernest Lawson, Maurice Prendergast, and Arthur B. Davies. Known as The Eight, they held one memorable exhibition in 1908, but, because of diversity of viewpoints, they disbanded.

Among Glackens' major early paintings, "Chez Mouquin" (1905) shows a gay New York restaurant in a vivid and robust manner. Later, he became interested in Impressionism and was particularly influenced by Pierre-Auguste Renoir.

Gladbeck, city, North Rhine-Westphalia *Land* (state), western Germany, situated in the Ruhr industrial region. First documented in 1019, Gladbeck was a small rural village until the first coal mine was opened in 1873. Thereafter it developed rapidly, its economy resting almost exclusively on coal, and was chartered in 1919. It suffered heavy damage in World War II, but the moated castle of Wittringen survived (along with its museum), in 247 acres (100 hectares) of municipally owned woodland. After 1948, while mining remained the leading industry, the city made a deliberate effort to diversify its economy by expanding into ironworking and the production of chemicals and textiles. Pop. (1989 est.) 79,187.

Gladden, Washington (b. Feb. 11, 1836, Pottsgrove, Pa., U.S.—d. July 2, 1918, Columbus, Ohio), American Congregational minister, crusading journalist, author, and prominent early advocate of the Social Gospel movement.



Gladden

By courtesy of the Library of Congress, Washington, D.C.

Gladden grew up on a farm, worked in a small-town newspaper office, and attended Williams College, Williamstown, Mass. After serving as religious editor of the *New York Independent* (1871–75), he held pastorates at Springfield, Mass. (1875–82), and Columbus (1882–1918). He aided in the exposure of the "Tweed Ring" (politicians who seized control of New York City's treasury and subsequently plundered it of millions of dollars), while serving as acting editor of the *Independent.*

Gladden opposed both socialism and classical economic theory and sought to apply "Christian law" to social problems; some consider him the first American clergyman of note to approve of unionization. In 1904 he was elected moderator of the National Council of Congregational Churches and soon afterward made the startling proposal that the denomination's foreign mission board should reject John D. Rockefeller's gift of $100,000 on the ground that it was "tainted money." Gladden, who stressed the simple and direct nature of the gospel as well as its practicality, wrote some 40 books, among them *Applied Christianity* (1887) and *Social Salvation* (1901). His poem "O Master, Let Me Walk with Thee" became a familiar hymn. His autobiography, *Recollections,* was published in 1909.

gladiator (Latin: "swordsman," from *gladius,* "sword"), professional combatant in ancient Rome. The gladiators originally performed at Etruscan funerals, no doubt with intent to give the dead man armed attendants in the next world; hence the fights were usually to the death. At shows in Rome these exhibitions became wildly popular and increased in size from three pairs at the first known exhibition in 264 BC (at the funeral of a Brutus) to 300 pairs in the time of Julius Caesar (d. 44 BC). Hence the shows extended from one day to as many as a hundred, under the emperor Titus; while the emperor Trajan in his triumph (AD 107) had 5,000 pairs of gladiators. Shows were also given in other towns of the Roman Empire, as can be seen from the traces of amphitheatres.

There were various classes of gladiators, distinguished by their arms or modes of fighting. The *Samnites* fought with the national weapons—a large oblong shield, a visor, a plumed helmet, and a short sword. The *Thraces* ("Thracians") had a small round buckler and a dagger curved like a scythe; they were generally pitted against the *mirmillones,* who were armed in Gallic fashion with helmet, sword, and shield and were so called from the name of the fish that served as the crest of their helmet. In like manner the *retiarius* ("net man") was matched with the *secutor* ("pursuer"); the former wore nothing but a short tunic or apron and sought to entangle his pursuer, who was fully armed, with the cast net he carried in his right hand; if successful, he dispatched him with the trident he carried in his left. There were also the *andabatae,* who are believed to have fought on horseback and to have worn helmets with closed visors—that is, to have fought blindfolded; the *dimachaeri* ("two-knife men") of the later empire, who carried a short sword in each hand; the *essedarii* ("chariot men"), who fought from chariots like the ancient Britons; the *hoplomachi* ("fighters in armour"), who wore a complete suit of armour; and the *laquearii* ("lasso men"), who tried to lasso their antagonists.

The shows were announced several days before they took place by bills affixed to the walls of houses and public buildings; copies were also sold in the streets. These bills gave the names of the chief pairs of competitors, the date of the show, the name of the giver, and the different kinds of combats. The spectacle began with a procession of the gladiators through the arena, and the proceedings opened with a sham fight (*praelusio, prolusio*) with wooden swords and javelins. The signal for real fighting was given by the sound of the trumpet, and those who showed fear were driven into the arena with whips and red-hot irons. When a gladiator was wounded, the spectators shouted "*Habet*" ("He is wounded"); if he was at the mercy of his adversary, he lifted up his forefinger to implore the clemency of the people, to whom (in the later times of the Republic) the giver left the decision as to his life or death. If the spectators were in favour of mercy they waved their handkerchiefs; if they desired the death of the conquered gladiator they turned their thumbs downward. (This is the popular view; another view is that those who wanted the death of the defeated gladiator turned their thumbs toward their breasts as a signal to stab him, and those who wished him to be spared turned their thumbs downward as a signal to drop the sword.) The reward of victory consisted of branches of palm, and sometimes of money.

If a gladiator survived a number of combats he might be discharged from further service; he could, however, reengage after discharge.

On occasion gladiators became politically important, because many of the more turbulent public men had bodyguards composed of them. This of course led to occasional clashes with bloodshed on both sides. Gladiators acting on their own initiative, as in the rising led

by Spartacus (*q.v.*) in 73–71 BC, were considered still more of a menace.

Gladiators were drawn from various sources but were chiefly slaves and criminals. Discipline was strict, but a successful gladiator not only was famous but, according to the satires of Juvenal, enjoyed the favours of society women. A curious addition to the ranks of gladiators was not uncommon under the Empire: a ruined man, perhaps of high social position, might engage himself as a gladiator, thus getting at least a means of livelihood, however precarious. One of the peculiarities of the emperor Domitian was to have unusual gladiators (dwarfs and women), and the half-mad Commodus appeared in person in the arena, of course winning his bouts.

To be the head of a school (*ludus*) of gladiators was a well-known but disgraceful occupation. To own gladiators and hire them out was, however, a regular and legitimate branch of commerce.

With the coming of Christianity, gladiatorial shows began to fall into disfavour. The emperor Constantine I actually abolished gladiatorial games in AD 325, but apparently without much effect since they were again abolished by the emperor Honorius (393–423) and may perhaps even have continued for a century after that.

Gladiolus, also called GLADIOLA, plural GLADIOLI, GLADIOLUS, or GLADIOLUSES, genus of about 300 species of flowering plants of the iris family (Iridaceae) native to Europe, Africa, and the Mediterranean area and widely cultivated for cut flowers. The flowering spike, which springs from a bulblike structure, the

Gladiolus
Franklin Photo Agency

corm, reaches 60–90 centimetres (2–3 feet) in height with numerous funnel-shaped flowers all clustered on one side of the stem. There are six petallike floral parts and sparse, swordlike leaves.

Cultivated gladioli, which come in all colours, have been developed mostly from South and East African species. The fragrant, white *G. tristis* from South Africa is more delicate than the cultivated hybrids. Several species of gladiolus are native in Europe, including the magenta field gladiolus (*G. segetum*) that grows in grainfields.

Gladkov, Fyodor Vasilyevich (b. June 21 [June 9, old style], 1883, Chernavka, near Saratov, Russia—d. Dec. 20, 1958, Moscow), Russian writer best known for *Tsement* (1925; *Cement*, 1929), the first postrevolutionary

Gladkov
Novosti Press Agency

novel to dramatize Soviet industrial development. Although crudely written, this story of a Red Army fighter who returns to find his hometown in ruins and dedicates himself to making industry thrive again anticipated in two important ways the future trends of Soviet literature. Its theme of reconstruction was to become commonplace in Soviet fiction following an official demand for "five-year-plan novels" in 1928; and its positive hero, whose confidence overcomes apathy and despair, became a model for the heroes of Socialist Realism.

A later novel, *Energiya* (1932–38; "Energy"), described the building of the Dneprostroi Dam but was overburdened with technical information. Outstanding among his later works is his volume of personal reminiscences, *Povest o detstve* (1949; "Story of Childhood"), which was awarded the Stalin Prize in 1950.

Gladstone, city, eastern Queensland, Australia, on Port Curtis, an inlet of the Coral Sea. Originally settled in 1847 as a colony by the New South Wales government, it was abandoned in 1848 but was resettled by squatters in 1853. It became a municipality in 1863 and was named for W.E. Gladstone, the British statesman. A tourist centre for the Great Barrier Reef, it is located in a cattle and dairy region. Its fine natural harbour, with anchorages of up to 70 ft (20 m), was a mustering place for convoys during World War II. Rapid postwar development was based on the export of coal to Japan (from the Kiang-Moura field), aluminum (reduced from bauxite deposits at Weipa), sulfuric acid, and meat products. Pop. (1981) 22,083.

Gladstone, Herbert John Gladstone, 1st Viscount (b. Jan. 7, 1854, London—d. March 6, 1930, Dane End, near Ware, Hertfordshire, Eng.), English statesman, son of William Ewart Gladstone; he was the first governor general and high commissioner of the Union of South Africa.

Educated at Eton and at University College, Oxford, Gladstone lectured on history at Keble College for three years (1877–80) and then entered on a parliamentary career, representing Leeds from 1880 to 1910.

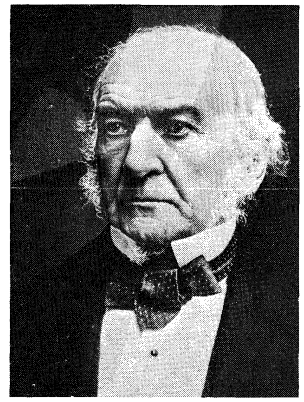
From 1880 to 1881 he acted as private secretary to his father and in 1881 became a lord of the Treasury. His other political offices were financial secretary to the War Office (1886); under secretary at the Home Office (1892–94); first commissioner of works (1894–95); chief whip to the Liberal Party (1899–1906); and secretary of state for home affairs (1905–10).

In 1910 he was created a viscount and was appointed the first governor general and high commissioner for South Africa, a post which he held until July 1914, winning the appreciation of both the Boers and the English. During World War I he became treasurer of the War Refugees Committee, especially devoted to the charge of Belgian refugees in Britain. He wrote *W.E. Gladstone* (1918) and *After Thirty Years* (1928).

Gladstone, William Ewart (b. Dec. 29, 1809, Liverpool—d. May 19, 1898, Hawarden, Flintshire, Wales), statesman and four-time prime minister of Great Britain (1868–74, 1880–85, 1886, 1892–94).

Early life. Gladstone was of purely Scottish descent. His father, John, made himself a merchant prince and was a member of Parliament (1818–27). Gladstone was sent to Eton, where he did not particularly distinguish himself. At Christ Church, Oxford, in 1831 he secured first classes in classics and mathematics.

He originally intended to take orders in the Church of England, but his father dissuaded him. He mistrusted parliamentary reform; his speech against it in May 1831 at the Oxford Union, of which he had been president, made a strong impression. One of his Christ Church friends, the son of the Duke of Newcastle, persuaded the Duke to support Gladstone as



Gladstone
Culver Pictures

candidate for Parliament for Newark in the general election of December 1832; and the "Grand Old Man" of Liberalism thus began his parliamentary career as a Tory member.

His maiden speech on June 3, 1833, made a decided mark. He held minor office in Sir Robert Peel's short government of 1834–35, first at the treasury, then as undersecretary for the colonies.

In July 1839 he married Catherine, the daughter of Sir Stephen Glynne of Hawarden, near Chester. A woman of lively wit, complete discretion, and exceptional charm, she was utterly devoted to her husband, to whom she bore eight children. This marriage gave him a secure base of personal happiness for the rest of his life. It also established him in the aristocratic governing class of the time.

The influence of Peel. Gladstone's early parliamentary performances were strongly Tory; but time after time contact with the effects of Tory policy forced him to take a more liberal view. His conversion from conservatism to liberalism took place in prolonged stages, over a generation. Peel made Gladstone vice president of the Board of Trade, and Gladstone's application astonished even hardworking colleagues.

He embarked on a major simplification of the tariff and became a more thoroughgoing free trader than Peel. In 1843 he entered the Cabinet as president of the Board of Trade. His Railway Act of 1844 set up minimum requirements for railroad companies and provided for eventual state purchase of railway lines. Gladstone also much improved working conditions for London dock workers. Early in 1845, when the Cabinet proposed to increase a state grant to the Irish Roman Catholic college at Maynooth, Gladstone resigned—not because he did not approve of the increase but because it went against views he had published seven years before. Later in 1845 he rejoined the Cabinet as secretary of state for the colonies, until the government fell in

1846. While at the Colonial Office, he was led nearer to Liberalism by being forced to consider the claims of English-speaking colonists to govern themselves.

Private preoccupations. The Glynne family estates were deeply involved in the financial panic of 1847. For several years Gladstone was concerned with extricating them. He began charitable work, which was open to a great deal of misinterpretation; he often tried to persuade prostitutes to enter a "rescue" home that he and his wife maintained or in some other way to take up a different way of life.

Several of Gladstone's closest Oxford friends were among the many Anglicans who converted to Roman Catholicism under the impact of the Oxford Movement. Gladstone had moved to a High Anglican position in Italy just after leaving Oxford. The suspicion that he was Catholic was used against him by his adversaries, of whom he had many in the University of Oxford, for which he was elected MP in August 1847. He scandalized many of his new constituents at once by voting for the admission of Jews to Parliament.

Gladstone made his first weighty speech on foreign affairs in June 1850, opposing foreign secretary Lord Palmerston in the celebrated Don Pacifico debate over the rights of British nationals abroad. That autumn he visited Naples, where he was appalled by the conditions that he found in the prisons. In July 1851 he published two letters to Lord Aberdeen describing the conditions, and appealing to all conservatives to set an iniquity right. The Neapolitan prisoners were treated even worse than before, and most conservatives, all over Europe, were deaf to his appeal. But Palmerston circulated the letters to all the British missions on the Continent, and they delighted every liberal who heard of them.

Financial policy. For nine years after Peel's death in 1850, Gladstone's political position was seldom comfortable. As one of the most eminent of the dwindling band of Peelites, he was mistrusted by the leaders of both parties and distrusted some of them—particularly Palmerston and Disraeli—in his turn. He refused to join Lord Derby's government in 1852. At the end of that year, a brilliant attack on Disraeli's budget brought the government down and Gladstone rose in public estimation. He then joined Aberdeen's coalition as chancellor of the Exchequer. In his first budget speech he put forth a bold and comprehensive plan for large reductions in duties, proposed the eventual elimination of the income tax, and carried a scheme for the extension of the legacy duty to real property.

His budget provided the backbone of the coalition's success in 1853, a year in which he spent much time devising a scheme for a competitive civil service system. He defended the Crimean War as necessary for the defense of the public law of Europe; but its outbreak disrupted his financial plans. Determined to pay for it as far as possible by taxation, he doubled the income tax in 1854. When Aberdeen fell in January 1855, Gladstone agreed to join Palmerston's Cabinet; but he resigned three weeks later, with two other Peelites, rather than embarrass his party by accepting a committee of inquiry into the conduct of the Crimean War. He was, as a result, unpopular in the country; and he made himself more unpopular still by speeches in Parliament in the summer of 1855, in which he held that the war was no longer justified.

Gladstone helped to defeat Palmerston in the Commons by a speech on China in March 1857. He twice refused to join Derby's government in 1858, in spite of a generous letter from Disraeli. In June 1859 Gladstone cast a vote for Derby's Conservative government on a confidence motion and caused surprise by joining Palmerston's Whig Cabinet as chancellor of the Exchequer a week later. His sole, but overwhelming, reason for joining a statesman he neither liked nor trusted was the critical state of the Italian question. The triumvirate of Palmerston, Russell, and Gladstone did indeed help, over the next 18 months, to secure the unification of almost all Italy.

Gladstone was constantly at issue with his prime minister over defense spending. By prolonged efforts, he managed to get the service estimates down by 1866 to a lower figure than that for 1859. A further abolition of import duties was achieved by his budget of 1860. His support of an Anglo-French trade treaty doubled the value of trade. He proposed the abolition of the duties on paper, which the House of Lords declined to do. In 1861 Gladstone included the abolition with all the other budget arrangements in a single finance bill that the Lords dared not amend, a procedure that has been followed ever since. Another useful step was the creation of the post office savings bank. These measures brought him increased popularity with the leaders of working class opinion, as did journeys around the main centres of industry.

In the general election of July 1865, Gladstone was defeated at Oxford but secured a seat in South Lancashire. When Palmerston died in October and Russell became prime minister, Gladstone took over the leadership of the House of Commons, while remaining at the Exchequer.

Convinced of the need for a further reform of Parliament, he introduced a bill for the moderate extension of the franchise in March 1866, but it foundered in June, and the whole government resigned. Next year Disraeli introduced a stronger Reform Bill that gave a vote to most householders in boroughs. Disraeli became prime minister early in 1868. Russell had resigned from active politics, and Gladstone was the Liberal mentor during the general election at the end of the year. Though Gladstone lost his Lancashire seat, he was returned for Greenwich; and the Liberal Party won handsomely in the country as a whole. His abilities had made him its indispensable leader, and when Disraeli resigned Queen Victoria called on him to form a government.

First administration (1868–74). Gladstone's first Cabinet (1868–74) was perhaps the most capable of the century. Its prime minister tried to supervise the work of each department, devoting his main efforts to Irish and foreign policy. The Irish Protestant church was successfully disestablished in 1869, and a first attempt to grapple with oppressive landlordism in Ireland was made unsuccessfully in 1870; abroad, an attempt to promote disarmament in 1868 failed when Bismarck refused to consider it. The Franco-German War took the government completely by surprise, and the Cabinet would not allow Gladstone to propose to Prussia the neutralization of Alsace and Lorraine. The principal achievements of 1871 and 1872—a London declaration by the great powers that they would not in future abrogate treaties without the consent of all the signatories, and the settlement by arbitration of the "Alabama" claim of the United States—look well in retrospect but were thought pusillanimous at the time. The most useful reforms at home were administrative, except for the Education Act of 1870 and the Ballot Act of 1872. When an Irish University Bill failed to pass the Commons in March 1873, Gladstone resigned but was forced back into office by Disraeli's refusal to form a government. In August he reshuffled his Cabinet and again took on the chancellorship of the Exchequer himself. He dissolved Parliament in January 1874, but his party was heavily defeated and his government resigned. Gladstone gave up the party leadership (though he remained MP for Greenwich) and retired to Hawarden to write pamphlets attacking papal infallibility and articles on Homer.

Bulgarian atrocities. The indifference of Disraeli's government to the brutality of Turkish reprisals against risings in the Balkans, in 1875–76, brought Gladstone back to active politics. He published a pamphlet, "Bulgarian Horrors and the Question of the East," which demanded that the Turkish irregulars should remove themselves from the peninsula. London society and the London mob, the Queen, and the Whiggish elements in his own party all opposed him. Only some radicals really supported him; yet he triumphed. He gave up his Greenwich seat and stood for the Scottish county of Midlothian. In two tremendous outbursts of oratory, in November 1879 and March 1880, Gladstone secured his own return to Parliament, overthrew a government, and secured a large Liberal majority. The Conservative government had to resign.

Second administration (1880–85). Gladstone foolishly combined again for two and a half years the duties of prime minister and chancellor of the Exchequer. His large apparent majority in the Commons was unruly. Not until 1884 could he introduce a third Reform Act that nearly doubled the electorate by giving votes to householders in country districts. On the Eastern question, he and Granville, the foreign secretary, managed by a brusque naval threat to compel Turkey to cede Thessaly to Greece. Still graver troubles arose in Ireland. The Irish Land Act of 1881, largely Gladstone's own work, in the long run promoted the prosperity of the Irish peasant; but violent crime continued. No alternatives to strong police powers were left, and measures to restrict the freedom of Irish members to obstruct the work of the Commons had to be taken.

In 1882 the Cabinet was compelled to authorize the occupation of Egypt. Gladstone's settlement of the Egyptian debt question (1885) was honourable to his belief in the concert of Europe but had the unintended effect of tying British foreign policy to that of the Germans. When he allowed Gen. C.G. Gordon to go to Khartoum in Sudan and then failed to rescue him, his death cost Gladstone much popularity. Firm handling of a dispute with Russia over the border of Afghanistan somewhat restored his prestige; but when the government was defeated on the budget in June 1885, he was glad to resign. He refused an offer of an earldom from the Queen.

Irish Home Rule. Gladstone appreciated the full force of Irish nationalism. He had for years favoured Irish Home Rule in the form of a subordinate parliament in Dublin. In 1885 a combination of Irish with Conservative votes had defeated him in June, and he waited silently to see what an Irish–Conservative combination would produce. The general election of November–December 1885 returned a Parliament in which the Liberal members exactly equalled the total of Conservatives plus Irish. At this moment, Gladstone's conversion to Home Rule was revealed, and most Conservatives therefore turned against it. Lord Salisbury's government was defeated, and Gladstone formed his third Cabinet in February 1886. His Home Rule Bill was rejected in Parliament in June by a large secession of Whigs, and in the country at a general election in July, and Gladstone resigned office.

He had kept his Midlothian seat, unopposed, and carried with him into the new Parliament a personal following 190 strong, supported by the National Liberal Federation, the most powerful political machine in the country. He devoted the next six years to an effort to convince the British electorate that to grant Home Rule to the Irish nation would be an act of justice and wisdom. He spoke at many meetings and cooperated with the Irish leader Charles Stewart Parnell. But in 1890 he had a dangerous quarrel with Parnell about the political consequences of the O'Shea divorce.

(Gladstone had not believed the rumours about Parnell's liaison, holding that Parnell would never "imperil the future of Ireland for an adulterous intrigue.") He never sought to correct the stories Parnell spread about him in Ireland. He sanctioned an extensive program of Liberal reforms drawn up at Newcastle in 1891, because it was headed by Home Rule, and on this platform the Liberals won a majority of 40 in the general election of 1892.

Gladstone formed his fourth Cabinet in August 1892. Its members were held together only by awe of him. He piloted another Home Rule Bill through 85 sittings of the Commons in 1893; the Lords rejected it by the largest majority ever recorded there to that time, 419–41. The Cabinet rejected Gladstone's proposal to dissolve.

He disagreed with his colleagues on a large increase in naval expenditure and finally resigned—ostensibly because sight and hearing were failing—on March 3, 1894. He was much mortified by the coolness of his last official interview with the Queen, who by now so frankly detested him that she could hardly conceal her feelings. He retired to Hawarden and busied himself with an edition of the works of Bishop Joseph Butler (3 vol., 1896). Humanitarian to the end, in his last great speech, at Liverpool in September 1896, he denounced Turkish atrocities in Armenia. After a painful illness, he died of cancer of the palate at Hawarden. He was buried in Westminster Abbey. (M.R.D.F./Ed.)

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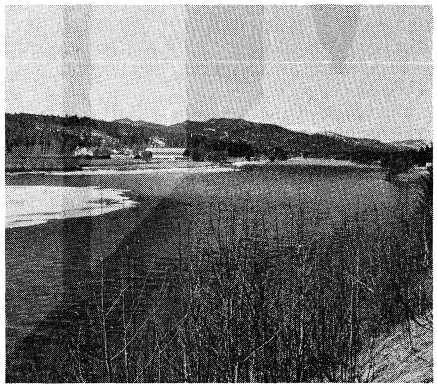
Gladys Porter Zoo, also called BROWNSVILLE ZOO, zoological park in Brownsville, Texas, U.S., which has one of the world's finest reptile collections. Opened in 1971, the 12-hectare (30-acre) park is owned by the city and operated by a local zoological society. Except for the herpetarium, the zoo's exhibit area is divided according to continent, with tropical America, Indo-Australia, Asia, and Africa as the focal points. Many of the animals are housed and displayed on islands or in large open enclosures behind moats or electrically charged wire fences. Part of the world's herd of endangered Arabian oryx is maintained at the zoo.

Glagolitic alphabet, script introduced into the Slavic-speaking Balkan communities in the late 9th century AD, together with the Slavonic liturgy of the Roman Catholic Church. Glagolitic script was used by Roman Catholic Slavs, while the Cyrillic alphabet was used by Eastern Orthodox Slavs; and although the origin of Glagolitic is not clear, it is probably closely related to the Cyrillic alphabet. Slavic tradition is generally inconsistent as to which script to attribute to the Eastern Orthodox "apostle to the Slavs," St. Cyril (or Constantine). Although dissimilar to Cyrillic in letter form, Glagolitic had approximately the same number of letters as Cyrillic and identical sound values for the letters; this implies a common origin for the two systems.

The oldest extant secular materials in Glagolitic date from 1309. The script flourished in the 16th and 17th centuries but since then has been displaced by Cyrillic in Greek or Russian Orthodox areas and by the Latin alphabet elsewhere. It is still used, however, in the Slavonic liturgy in some Dalmatian and Montenegrin communities. *See also* Cyrillic alphabet.

Glåma, also spelled GLAAMA, English GLOMMA, river, eastern Norway. Rising in a series of small lakes and streams that drain into Aursunden (lake) about 80 mi (130 km) southeast of Trondheim, near the Swedish–Norwegian border, the Glåma flows out of the lake southward through Østerdalen (Eastern Valley) to Kongsvinger, then westward and



The Glåma where it flows through Østerdalen (Eastern Valley), Norway
Ola Sorhus

southwestward into Øyeren (lake). From there it continues southward to Sarpsborg and enters Oslofjorden at Fredrikstad, after a course of 372 mi. The longest river in Scandinavia, it drains an area of 16,236 sq mi (42,051 sq km). Its chief tributaries are the Atna, Rena, and Vorma.

The Glåma flows through Norway's richest timber forests to Sarpsborg, which has extensive sawmills and paper mills to handle the logs that are floated downstream. The river is a major source of hydroelectric power. Flumes (artificial channels) bypass the falls and power plants, and the Glåma is navigable from its mouth up to the Sarpsfoss (Sarps Falls) at Sarpsborg.

Glamis, castle and village in the district of Angus, Tayside region, Scotland. The present castle, a fine example of Scottish Baronial architecture, dates from the late 17th century, though the site is believed to have been occupied since the 11th century, when the Scottish monarch Macbeth was thane (ruler) of Glamis. In 1372 the castle became the seat of the earls of Strathmore.

The castle contains fine collections of paintings, tapestries, and weapons. Pop. (1981) 790.

Glamorgan (Wales): *see* Morgannwg.

Glamorgan, Edward Somerset, earl: *see* Worcester, Edward Somerset, 2nd marquess of.

Glamorgan, Mid (Wales): *see* Mid Glamorgan.

Glamorgan, South (Wales): *see* South Glamorgan.

Glamorgan, Vale of (Wales): *see* Vale of Glamorgan.

Glamorgan, West (Wales): *see* West Glamorgan.

Glan-y-gors, Jac: *see* Jones, John.

gland, in animals, cell or tissue that removes specific substances from the blood, alters or concentrates them, and then either releases them for further use within or on the body or eliminates them. Typically, a gland consists of either cuboidal or columnar epithelium resting on a basement membrane and is surrounded by a plexus, or meshwork, of blood vessels. Endocrine, or ductless, glands (*e.g.,* pituitary, thyroid, adrenal) secrete substances known as hormones directly into the bloodstream rather than through ducts. Exocrine glands (*e.g.,* salivary, sweat, digestive) discharge their products through ducts.

glanders, also called FARCY, specific infectious and contagious disease of solipeds (the horse, ass, and mule); secondarily, humans may become infected through contact with diseased animals or by inoculation while handling diseased tissues and making laboratory cultures of the causal bacillus. In 1882 the bacteriologists Friedrich Löffler and Wilhelm Schütz in Germany isolated and identified the causal agent, which they named the *Bacillus mallei,* now designated technically as the *Pfeifferella mallei* or *Malleomyces mallei.* After infection, the disease usually follows a chronic course with a variable period of incubation extending from several weeks to several months.

Clinical cases in solipeds are manifested by a chronic nasal discharge from one or both nostrils, with or without visible ulceration of the nasal septum; chronic enlargement and hardening of the submaxillary lymph glands without outward discharge of pus; or the presence of pustules and ulcers (farcy buds) on the skin of the hindlegs or other parts of the body. Nonclinical, or latent, cases are essentially pulmonary in type, and the lesions remain in a concealed state (occult) in the lungs as tubercle-like nodules and suppurating foci. In many latent cases, the affected animal shows slight signs of lung trouble (altered breathing).

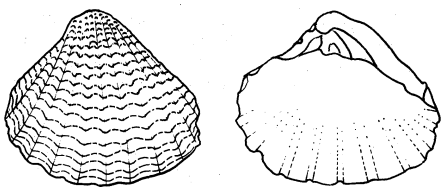
The only effective policy for the control of the disease is slaughter of infected animals and proper cleaning and disinfection of the affected premises. Under this policy, glanders was almost completely eradicated in the U.S., Great Britain, and Canada. The disease is still known to prevail in some parts of Europe, Asia, and Africa.

Glanders in man most frequently occurs through occupational contact with diseased horses, from making an autopsy on a diseased animal, or from making laboratory cultures of the bacteria. The treatment of human glanders has included the use of many drugs, largely tonic and palliative, combined with surgical treatment. In selected cases, the use of certain antibiotics has shown promising results.

glandular fever: *see* infectious mononucleosis.

Glanford, district (borough), county of Humberside, England, south of the Humber Estuary and east of the River Trent. Formerly part of Lincolnshire, it has an area of 224 sq mi (580 sq km). The largely rural district completely surrounds Scunthorpe district. Manufacturing has been associated with local agriculture, though petroleum refining has begun at Killingholme, and there is iron-ore mining around Scunthorpe. Pop. (1982 est.) 67,300.

Glans, genus of small pelecypods (clams) especially characteristic of the Miocene Epoch (between 7,000,000 and 26,000,000 years ago). The ornamentation of the shell includes prominent ribbing that extends from the apex to the broadly expanding margin. The ribs are broken up into a nodose pattern by fine lines, perpendicular to their axis of growth. Internally, the margin of the shell has a den-



Glans decemcostata

From C. Dunbar and K. Waage, *Historical Geology* (copyright 1969); by permission of John Wiley & Sons, Inc.

ticulate pattern formed by alternating ridges and troughs.

Glanvill, Joseph, Glanvill also spelled GLANVIL (b. 1636, Plymouth, Devon, Eng.—d. Nov. 4, 1680, Bath, Somerset), English self-styled Skeptic and apologist for the Royal Society who defended the reality of witchcraft and ghosts and the preexistence of the soul. Thereby, according to some, he initiated psychical research.

Glanvill was educated at Exeter and Lincoln Colleges, Oxford, and served as rector of Frome Selwood and Streat before transferring (1666) to the Abbey Church, Bath. In 1678 he was installed prebendary of Worcester and acted as chaplain to Charles II from 1672.

The Vanity of Dogmatizing, or Confidence in Opinions (1661) attacked scholastic dogmatism, to which Glanvill opposed the experimental method. He admitted that universal laws could not be established in this way, but for him a scientific approach was the best available method for gaining knowledge and control over nature. His *Plus Ultra or the Progress and Advancement of Knowledge Since the Days of Aristotle* (1668) defended the Royal Society's experimental method as religious in nature because it revealed the workings of God. Glanvill's effort to prove scientifically that witches and ghosts exist was viewed as a refutation of atheism. *Essays on Several Important Subjects* (1676) contains some of his more mature thinking on religion and reason.

Glanville, Ranulf de, Glanville also spelled GLANVIL, or GLANVILL (b. Stratford St. Andrew, Suffolk, Eng.—d. October?, 1190, Acre, Palestine), justiciar or chief minister of England (1180–89) under King Henry II who was the reputed author of the first authoritative text on the common law, *Tractatus de legibus et consuetudinibus regni Angliae* (*c.* 1188; "Treatise on the Laws and Customs of the Kingdom of England"). This work greatly extended the scope of the common law at the expense of canon law and local law, and in English legal history the period is known as the Age of Glanville. The actual author of the *Tractatus,* however, may have been either of two later justiciars: Hubert Walter (also archbishop of Canterbury and Glanville's nephew) or Geoffrey Fitzpeter.

As justiciar, Glanville was, in effect, viceroy of England while Henry II was fighting in France. During his tenure a permanent royal court (Curia Regis) began to sit at Westminster, and the inquest (a forerunner of the jury trial) came to be widely used in cases involving land. Removed from office by Henry's son and successor, Richard I, Glanville subsequently accompanied Richard on the Third Crusade.

Glareanus, Henricus, original name HEINRICH LORIS (b. June 1488, Mollis, Swiss Confederation—d. March 27/28, 1563, Freiburg im Breisgau, Breisgau), Swiss Humanist, poet, and music theorist known especially for his publication *Dodecachordon* (Basel, 1547).

Crowned poet laureate by the Habsburg emperor Maximilian at Cologne (1512), Glareanus established himself briefly at Basel in 1514, where he came under the influence of the Dutch Humanist Erasmus. He became a champion of the new Humanism but, though initially affected by the Reformation, subsequently rejected it and consistently opposed such Swiss Reformers as his erstwhile friends Huldrych Zwingli and John Oecolampadius.

After living for a time in Paris (1517–22), Glareanus again took up residence in Basel, only to leave once more when the city accepted the Reformation (1529). From 1529 until his death he taught at Freiburg im Breisgau. His works include commentaries on Greek and Roman writers, mathematical and descriptive geography, and some musical treatises.

His *Dodecachordon* was the first work to grant full theoretical recognition to the modern major and natural modes. In it Glareanus proposed a system of 12 independent modes, scale formulas corresponding loosely with the modes of ancient Greek music as then understood. This was an expansion of the previously recognized system of eight modes. His system of 12 modes was widely accepted by later writers. A rich source for the music historian, *Dodecachordon* also contains valuable examples and discussions of the music of the noted composer Josquin des Prez (Glareanus' favourite composer) as well as of works by Jakob Obrecht, Jean d'Okeghem, and other prominent composers of the period.

Glarus (German), French GLARIS, town, capital of Glarus canton, eastern Switzerland, on the left bank of the Linth River, at the northeastern foot of the Glärnisch Massif (with four peaks, rising above 8,900 ft [2,700 m]), east of Lake Lucerne (Vierwaldstätter See). In 1861 practically the entire town was destroyed by a fire fanned by a violent *föhn* (south) wind rushing along the Linth Valley. Since rebuilt, it has an art gallery, a natural history museum, and the cantonal library and archives. The ancient Landsgemeinde (open-air democratic assembly) meets there annually. The parish church is used by both Roman Catholics and Protestants. Manufactures include textiles, furniture, skis, and cigars. The population is German speaking and predominantly Protestant. Pop. (1980) 5,969.

Glarus (German), French GLARIS, canton, east central Switzerland, comprising the deep, level upper valley of the Linth River, which rises in the southwest in the glaciers of the Tödi (11,857 ft [3,614 m]), highest of the Glarus Alps, and flows north and northeast to the Walensee (lake). It occupies an area of 264 sq mi (685 sq km), of which about 190 sq mi are classed as productive, including more than 50 sq mi of forest. The Linth Valley is almost completely surrounded by high mountains, rising to 10,361 ft at the Hausstock and 9,560 ft at the Glärnisch.

The Linth Valley inhabitants are said to have been converted to Christianity in the 6th century by the Irish monk St. Fridolin, founder of the Benedictine convent of Säckingen on the Rhine, east of Basel. From about the 9th century, the district was owned by the convent, over which the Habsburgs gradually claimed all rights by 1288, leading Glarus to join the Swiss Confederation in 1352. The reformer Huldrych Zwingli was priest in Glarus from 1506 until 1516, and it early adopted the Reformation, but the Zwinglians were eliminated by 1564.

There were many struggles between Protestants and Catholics, and to secure peace it was arranged that, besides the common Landsgemeinde (democratic open-air assembly), each party should have its separate Landsgemeinde (1623) and tribunals (1683). After being part of Linth canton (1798–1803), the old government was restored in 1814. In 1836 a new constitution retained only one Landsgemeinde. Under the present cantonal constitution of 1887, the original open-air assembly still meets annually.

In the 18th century Glarus' traditional woollen spinning industry was augmented by the introduction of cotton spinning and cotton printing. Other industries include slateworks (since the 17th century), hydroelectric plants, metal and machinery factories, and paper and cardboard mills. Cattle breeding and dairying are important on the mountain pastures. The canton is served by a railway line running north to south, past Glarus (*q.v.*) the capital, to Linthtal village, and by a line from Schwanden to Elm. The population is mainly German speaking and about two-thirds Protestant. Pop. (1983 est.) 36,209.

Glarus Alps, German GLARNER ALPEN, segment of the Central Alps lying north of the Vorderrhein River mainly in Glarus canton of east central Switzerland. The mountains extend east to the Rhine River and north to the Wallensee (lake) and Klausen Pass. Many of the peaks are glacier-covered, including the highest, Tödi (11,857 ft [3,614 m]). Along the northern slopes are pastures used for cattle raising and dairying. There are also popular health resorts and winter sports areas within the region.

Glas, John, Glas also spelled GLASS (b. Sept. 21, 1695, Auchtermuchty, Fife, Scot.—d. Nov. 2, 1773, Perth), Scottish Presbyterian clergyman denounced by his church for opposing the concept of a national religious establishment. He was founder of the Glasites (Sandemanians, *q.v.*).

Glas became minister of Tealing Church, Dundee, Angus, in 1719. Some of his parishioners led him to question the scriptural basis for the national Presbyterian Church to which he had been loyal, and he soon concluded that the New Testament provided no evidence to support foundation of such a church. He viewed the kingdom of Christ as an essentially spiritual one and considered national covenants and civil magistrates as having no valid ecclesiastical function. He particularly opposed the maintenance of the church of Christ by political and secular weapons. These arguments are expounded in his major work, *The Testimony of the King of Martyrs* (1727). After organizing a society of independent Presbyterians within his own church and neighbouring parishes, Glas was summoned before his presbytery in 1726, suspended in 1728, and deposed in 1730. Known as the Glasite Church, his society soon moved to Dundee.

In 1733 Glas began working in Perth, where he was joined by his son-in-law Robert Sandeman (*q.v.*). In 1738 Glas returned to Dundee and the following year was restored to his function as minister, though without official status as a minister of the established Church of Scotland. Most of his works were collected in a five-volume edition (1782–83). Through Sandeman his teachings survived to form the basis of sects founded in England and the United States, though most Glasites eventually were absorbed by other denominations; the last of the Sandemanian churches in America ceased to exist in 1890.

Glaser, Donald A(rthur) (b. Sept. 21, 1926, Cleveland), U.S. physicist, winner of the Nobel Prize for Physics in 1960 for his invention and development of the bubble chamber (*q.v.*), a research instrument used to observe the behaviour of subatomic particles.

After graduating from Case Institute of Technology, Cleveland, in 1946, Glaser attended California Institute of Technology, Pasadena, where he received his Ph.D. in physics in 1949, then began teaching at the University of Michigan, where he was professor of physics until 1959. There he conceived the idea for the bubble chamber, which has become a widely used instrument because it allows precise measurement of the paths of subatomic particles. At the age of 34, Glaser was one of the youngest scientists ever to be awarded a

Nobel Prize. In 1959 he joined the staff of the University of California at Berkeley, where he became professor of physics and molecular biology in 1964.

Glasgow, Celtic GLAS GHU ("Green Glen"), city and district, Strathclyde region, southwestern Scotland. The district was created by the reorganization of 1975 and includes the former county of the city of Glasgow and a small part of the former county of Lanark. Glasgow city is Scotland's largest city. It is situated along both banks of the River Clyde, 20 miles (32 km) from that river's mouth on the western, or Atlantic, coast. The city occupies much of the Clyde valley, and its suburbs extend into surrounding districts. Most of the city's important commercial and administrative buildings lie north of the Clyde, which is lined with shipyards and engineering industries. The notorious slum tenement areas (particularly the Gorbals) are disappearing under redevelopment schemes. New building on the city's periphery and the planned development of such peripheral new towns as East Kilbride, Cumbernauld, Glenrothes, and Livingstone have significantly helped to reduce inner-city congestion.

There is evidence of a fortified prehistoric village on the site, but Glasgow did not begin to develop until the arrival, about 550, of St. Kentigern, who established a religious community there. The present cathedral, dedicated to St. Mungo and begun in the 12th century, was built on the site of the chapel. The first stone bridge over the Clyde was built in 1350. Glasgow was created a royal burgh in 1450, and its university was founded in 1451. Glasgow prospered as a market centre because it was well-situated between Highland and Lowland Scotland and also between Edinburgh (the capital; 45 miles [72 km] east) and the west. Yet it was not until after the union of the Scottish and English crowns (1603) that Glasgow grew significantly. When trade with the Americas developed in the 18th century, Glasgow was already exporting coal, plaid (wool cloth), and herring to Europe. Trade in the Americas' tropical produce (tobacco, sugar, and rum) then made fortunes for the Glasgow merchants, as the Clyde was dredged and deepened and eventually made navigable to the heart of the city. In 1745, however, Glasgow was almost ruined by the levies imposed by the army of the insurgent Charles Edward Stuart, "the Young Pretender," which occupied the city. A greater blow followed in 1775 with the revolt of the American Colonies and the end of the tobacco trade. Cotton manufacture, which was well-suited to Glasgow's damp climate, succeeded the trade in tobacco. Textiles were exported, sugar from the West Indies was processed, and Glasgow's fortunes revived until supplies of raw cotton were cut off during the American Civil War (1861–65).

With the Industrial Revolution came coal mining, iron founding, chemical manufacturing, and, especially, shipbuilding, which developed in Glasgow early in the 19th century.

The prosperity of Glasgow's shipbuilding and of heavy industry was badly shaken after World War I, and its industry has since tended toward greater variety. Its manufactures now include textiles, food and beverages, tobacco, and chemicals; engineering and printing are also important in the economy. New industrial estates house many small firms, and others have moved to Glasgow's new towns.

Few ancient buildings have survived the industrial era, apart from the cathedral and Provand's Lordship (1471), Glasgow's oldest house. The city is well-endowed with parks and cultural amenities, including Kelvingrove Art Galleries and Museum. Glasgow's main museum (the Hunterian, established 1807) is housed in the grounds of the University of Glasgow. Glasgow is a notable education centre, and schools and colleges of all kinds abound, including the University of Glasgow and the Glasgow School of Art.

Glasgow district, area 76 square miles (197 square km), is situated on the River Clyde and covers the city of Glasgow as well as Rutherglen, adjacent to the city on the southeast. Pop. (1986 est.) 725,130.

Glasgow, Ellen (Anderson Gholson) (b. April 22, 1873, Richmond, Va., U.S.—d. Nov. 21, 1945, Richmond), American novelist whose realistic depiction of life in her native Virginia awoke Southern literature from a long sleep of sentimentality and nostalgia. She received the Pulitzer Prize in 1942.

Ellen Glasgow, miniature by an unknown artist; in the collection of the Virginia Historical Society
By courtesy of the Virginia Historical Society

Glasgow came from a prosperous and socially prominent family. She was irregularly schooled because of delicate health but otherwise lived the life of a Southern belle except for her intense seriousness about becoming a novelist of stature. Her first two novels were apprentice work, revealing a narrative energy and a determination to shock. In *The Voice of the People* (1900) she began a planned social history of Virginia from 1850. The finest of the five novels she produced for the project was *Virginia* (1913), which covered the years 1884 to 1912 and provided a tragicomic portrait of a girl groomed for a mindless way of life then on the point of extinction.

Glasgow was past 50 when she first gained serious attention from the critics with *Barren Ground* (1925), a story of the Piedmont countryside of Virginia. She then published a trilogy of ironic novels of manners set in Richmond (disguised as "Queenborough"): *The Romantic Comedians* (1926), *They Stooped to Folly* (1929), and *The Sheltered Life* (1932), the last often linked with *Barren Ground* as her best work. Glasgow never married, but her posthumously published memoirs, *The Woman Within* (1954), reveal that there were two men with whom she had long-lasting emotional involvements. Her *Letters* appeared in 1958 and *The Collected Stories* in 1963.

Glasgow, University of, state-supported university in Glasgow. The university was founded in 1451 by a bull of Pope Nicholas V on the petition of King James II of Scotland. From 1460, lands granted by Lord Hamilton on High Street formed the site of the university until its removal to the west end of Glasgow in 1870. The Reformation caused the university to decline until Andrew Melville, the great Presbyterian scholar, revived it and drew up a new constitution for it that was confirmed in 1577. In the 18th century the university had among its teachers such eminent men as the economist Adam Smith and the scientist Joseph Black; James Watt of steam-engine fame and the famous printer-scholars Robert and Andrew Foulis were assistants there. In the 19th century the university's medical school became internationally famous with such teachers as Joseph Lister, professor of surgery, who did his pioneering work in antisepsis there. William Thomson (Lord Kelvin), the celebrated physicist, was professor of natural philosophy at the university in 1846–99. There are six faculties: arts, divinity, law, medicine, science, and engineering. The rector, often chosen apart from academic considerations, is elected triennially by the students.

Glashow, Sheldon Lee (b. Dec. 5, 1932, New York City), American theoretical physicist who, with Steven Weinberg and Abdus Salam (*qq.v.*), received the Nobel Prize for Physics in 1979 for their complementary efforts in formulating a theory that encompasses both the electromagnetic interaction and the so-called weak interaction of elementary particles (*see* fundamental interaction).

Glashow and Weinberg were members of the same classes at the Bronx High School of Science, New York City (1950), and Cornell University (1954). Glashow received his Ph.D. from Harvard University in 1959 and then worked briefly at the Nordic Institute for Theoretical Atomic Physics in Copenhagen, the California Institute of Technology, and Stanford University. He joined the faculty of the University of California at Berkeley in 1961 and moved to Harvard in 1967.

Glasite (sect): *see* Sandemanian.

Glaspell, Susan (b. July 1, 1882, Davenport, Iowa, U.S.—d. July 27, 1948, Provincetown, Mass.), American dramatist and novelist who, with her husband, George Cram Cook (*q.v.*), founded the influential Provincetown Playhouse (*q.v.*) in 1915.

After graduating from Drake University in Des Moines, Iowa, Glaspell worked as a reporter for the Des Moines *News* for almost two years before devoting all her time to the writing of short stories, some of which were collected in *Lifted Masks* (1912). Her first novel was *The Glory of the Conquered* (1909). Cook, whom she married in 1913, influenced her toward socialist ideas, which figured in her next novel, *The Visioning* (1911).

While Glaspell and her husband were summering in Provincetown in 1915, they launched the Provincetown Players there, initially to produce the one-act play they wrote, *Suppressed Desires* (performed 1915), a satire on psychoanalysis. This and her one-act *Trifles* (published 1916) have been frequently performed by little-theatre groups. Two of her full-length plays—*Inheritors* (performed 1921) and *The Verge* (1921)—were produced by the Provincetown group when it expanded operations and moved to a theatre in New York City's Greenwich Village.

After Cook's death in 1924, Glaspell settled permanently in Provincetown. In *The Road to the Temple* (published 1926), she gives a romantic account of her husband's life. She wrote no plays after her notable Pulitzer Prize-winning *Alison's House* (performed 1930), which is about the impact of a great poet (said to be patterned on Emily Dickinson) on her family 18 years after her death. Her later novels include *The Fugitive's Return* (1929) and *The Morning Is Near Us* (1940).

glass, an inorganic, hard substance, usually transparent or translucent, which from a fluid condition at a high temperature has passed to a solid condition with sufficient rapidity to prevent the formation of visible crystals.

A brief treatment of glass follows. Glass is treated in detail in a number of articles in the MACROPAEDIA. Stained glass and the aesthetic aspects of glass design are described in Decorative Arts and Furnishings. The properties and industrial production of glass are covered

in Industrial Glass and Ceramics. The physical and atomic characteristics of glass are treated in Matter: Its Properties, States, Varieties, and Behaviour; *Solid State.*

There are many varieties of glass differing widely in chemical composition and in physical qualities. Most varieties, however, have certain qualities in common. They pass through a viscous stage in cooling from a state of fluidity; they develop effects of colour when the glass mixtures are fused with certain metallic oxides; they are, when cold, bad conductors both of electricity and heat; most types are easily fractured by a blow or shock and show a conchoidal fracture; they are but slightly affected by ordinary solvents but are readily attacked by hydrofluoric acid.

Commercial glasses may be divided into soda–lime–silica glasses and special glasses, most of the tonnage produced being of the former class. Such glasses are made from three main materials—sand (silicon dioxide, or SiO_2), limestone (calcium carbonate, or $CaCO_3$), and sodium carbonate (Na_2CO_3). Fused silica itself is an excellent glass, but, as the melting point of sand (crystalline silica) is above 1,700° C (3,092° F) and as it is very expensive to attain such high temperatures, its uses are restricted to those in which its superior properties—chemical inertness and the ability to withstand sudden changes of temperature—are so important that the cost is justified. Nevertheless the production of fused silica glass is quite a large industry; it is manufactured in various qualities, and when intended for optical purposes the raw material used is rock crystal rather than quartz sand.

In order to reduce the melting point of silica, it is necessary to add a flux; this is the purpose of the sodium carbonate (soda ash), which makes available the fluxing agent sodium oxide. By adding about 25 percent of the sodium oxide to silica, the melting point is reduced from 1,723° to 850° C (3,133° to 1,562° F) and thus the melting difficulty is very considerably reduced. However, such glasses are easily soluble in water (their solutions are known as water glass; *q.v.*). The addition of lime (calcium oxide, or CaO), supplied by the limestone, renders the glass insoluble once again, but too much lime makes a glass prone to devitrification—*i.e.,* the precipitation of crystalline phases in certain ranges of temperature. The optimum composition is approximately 75 percent silica, 10 percent lime, and 15 percent soda, but even this is too liable to devitrification during certain mechanical forming operations to be satisfactory.

In making sheet glass it is customary to use 6 percent of lime and 4 percent of magnesia (magnesium oxide, or MgO), and in bottle glass about 2 percent alumina (aluminum oxide, or Al_2O_3) is often found to be present. Other materials are also added, some being put in to assist in refining the glass (*i.e.,* to remove the bubbles left behind in the melting process), while others such as selenium and traces of cobalt oxide are added to improve its colour. For example, sand always contains iron as an impurity, and, although the material used for making bottles is specially selected for its low iron content, the small traces of impurity still impart an undesirable green colour to the container; by the use of selenium and cobalt oxide together with traces of arsenic trioxide and sodium nitrate, it is possible to neutralize the green colour and produce a so-called white (decolourized) glass.

Glasses of very different, and often much more expensive, compositions are made when special physical and chemical properties are necessary. For example, in optical glasses, a wide range of compositions is required to obtain the variety of refractive index and dispersion needed if the lens designer is to produce multi-component lenses that are free from the various faults associated with a single lens, such as chromatic aberration.

Another disadvantage of ordinary glass is that when it is subjected to a sudden change of temperature, stresses are produced in it that render it liable to fracture; however, by reducing its coefficient of thermal expansion it is possible to make it much less susceptible to thermal shock. The glass with the lowest expansion coefficient is fused silica. Another well-known example is the borosilicate glass used for making domestic cookware, which has an expansion coefficient only one-third that of the typical soda–lime–silica glass. In order to effect this reduction, much of the sodium oxide added as a flux is replaced by boric oxide (B_2O_3) and some of the lime by alumina. Another familiar special glass is the lead crystal glass used in the manufacture of superior tableware; by using lead monoxide (PbO) as a flux, it is possible to obtain a glass with a high refractive index and, consequently, the desired sparkle and brilliance.

Little is known about the actual cause of colour in glass beyond the fact that certain materials added to and melted with certain glass mixtures will in favourable circumstances produce effects of colour. The colouring agents are generally metallic oxides. The same oxide may produce different colours with different glass mixtures, and different oxides of the same metal may produce different colours. The purple-blue of cobalt, the chrome green or yellow of chromium, the dichroic canary colour of uranium, and the violet of manganese are constant. Ferrous oxide produces an olive green or a pale blue according to the glass with which it is mixed. Ferric oxide gives a yellow colour but requires the presence of an oxidizing agent to prevent reduction to the ferrous state. Lead gives a pale yellow colour. Silver oxide, mixed as a paint and spread on the surface of a piece of glass and heated, gives a permanent yellow stain. Finely divided vegetable charcoal added to a soda-lime glass gives a yellow colour. Selenites and selenates give a pale pink or pinkish yellow. Tellurium appears to give a pale pink tint. Nickel with a potash–lead glass gives a violet colour, and a brown colour with a soda–lime glass. Copper gives a peacock-blue, which becomes green if the proportion of the copper oxide is increased.

An important class of materials is the chalcogenide glasses, which are selenides, containing thallium, arsenic, tellurium, and antimony in various proportions. They behave as amorphous semiconductors. Their photoconductive properties are also valuable.

Glass has many affinities with both the liquid and the crystalline states. The atomic or molecular structure of glasses is similar to that of the liquids from which they come. Whereas liquid is characterized by rapid motions of individual molecules, these motions are much smaller in glass. Many liquids, even water, will supercool (cool below the freezing point without crystallization, an attribute of glass) if sufficiently slowly cooled without impurities, inhomogeneities, or shocks; it is possible for some materials to exist at the same temperature and pressure in two different forms, one glassy and one crystalline.

Many different useful and decorative articles have been made from glass over the centuries. The history of glass as a creative art has been determined partly by technical advances in its manufacture and decoration and partly by the history of taste and fashion.

Glass was first made in the ancient world, but its earliest origins are obscure. Egyptian glass beads are the earliest glass objects known, dating from about 2500 BC. Later in Egyptian civilization, a type of glass characterized by feathery or zigzag patterns of coloured threads on the surface of the glass vessel was made.

The real origins of modern glass were in Alexandria during the Ptolemaic period and, later, in ancient Rome. Alexandrian craftsmen perfected a technique known as mosaic glass in which slices of glass canes of different colours were cut crossways to make different decorative patterns. Millefiori glass, for which the canes are cut in such a way as to produce designs reminiscent of flower shapes, is a type of mosaic glass.

Molded glass was also developed early, glass being pressed into a mold to form a particular shape. Various types of decoration involving engraving and colour were also possible.

Glassblowing was probably developed during the 1st century BC by glassmakers in Syria. With this technique the possibilities of shaping glass into desired forms were endless. Glass could be blown into a mold or shaped completely free-form. The Romans perfected cameo glass, in which the design has been produced by cutting away a layer of glass to leave the design in relief.

The next major developments in the history of glass came during the 15th century in Venice. As early as the 13th century the Venetian island of Murano had become the centre for glassmaking. At first, Venetian glassmakers made use of many of the ancient and medieval decorative techniques to produce richly coloured and ornamental pieces having motifs characteristic of the Italian Renaissance.

Later the Venetians made original contributions to the art of glassmaking. They developed a clear glass similar to crystal, called *cristallo,* which was to form the basis for a thriving export trade and spread throughout Europe. Simple blown glasses of this type were much in demand in the 16th century. Such glass lent itself to decoration by the engraving of delicate designs; used from the early 16th century, the technique remained popular well into the 18th century throughout Europe. Diamond-point engraving was practiced in particular in The Netherlands and in Germany.

Late in the 17th century Bohemia became an important glass-producing area, and it remained important until early in the 20th century.

By the 17th century England was making glass in the Venetian tradition which was notable for its simplicity. The glassmaker George Ravenscroft discovered in about 1675 that the addition of lead oxide to Venetian-type glass produced a solid, heavier glass. Lead crystal, as it was known, thereafter became a favourite type of glass for fine tableware.

Enameling came into fashion in the middle of the 18th century in England, leading to the development of the type of glass sometimes called Bristol glass. In the 18th century glass cutting came into fashion. As this technique was perfected, great richness of effect became possible. Eventually, by the end of the 18th century, when the technique was further developed in Ireland, the whole surface of glass was being deeply cut to reflect light. This English and Irish cut lead crystal was imitated in Europe and in the United States and has remained popular to the present day. Waterford crystal is an important example of this type.

By the late 19th century some glassmakers moved away from the highly decorated (coloured or cut) pieces toward a style that emphasized the intrinsic beauty of glass itself.

The Art Nouveau period saw some important changes. The Favrile glass invented by Louis Comfort Tiffany, with its flowing shapes derived from naturalistic forms and its lustrous surface, was much-admired and particularly influenced glassmakers in central Europe. The French glassmaker Émile Gallé and the firm of Daum Frères were also important designers in the Art Nouveau epoch.

René Lalique, one of the leaders of French glass art, made glass characterized by relief decoration. The Steuben Glass Company of New York produced clear glass objects, really crystal sculptures, often with engraved or

incised designs. Their products have become classics of 20th-century glassmaking. In the 20th century Scandinavian glass gained fame for its elegance and simplicity of design, which was admired worldwide.

Glass, Carter (b. Jan. 4, 1858, Lynchburg, Va., U.S.—d. May 28, 1946, Washington, D.C.), American politician who became a principal foe in the Senate of President Franklin D. Roosevelt's New Deal in the 1930s.

In the main self-educated, having left school at the age of 13, Glass followed his father's path into journalism, finally becoming proprietor of the *Lynchburg Daily News* and the *Daily Advance*. A lifelong Democrat, he served in the U.S. House of Representatives (1902–18), where his most notable contribution was the framing and sponsoring of the Federal Reserve Act (1913). President Woodrow Wilson appointed him secretary of the treasury in 1918, and he supported Wilson's fight for U.S. adherence to the League of Nations.

Carter Glass

By courtesy of the Library of Congress, Washington, D.C.

In 1920 Glass accepted an interim appointment as senator from Virginia and thereafter won election and reelection until his death. As senator his main role was one of opposition. He was a leader of the conservative Southern Democratic bloc in the Senate. He supported Roosevelt for president in 1932 but soon became one of his sharpest critics. His bitterest assault on Roosevelt came during the controversy over "packing" the U.S. Supreme Court (1937). One of the greatest experts on monetary matters ever to serve in Congress, Glass was the principal author of the Glass-Steagall Act (1933), which established the Federal Deposit Insurance Corporation and helped curb bank speculation. He wrote one book, *An Adventure in Constructive Finance* (1927).

Glass, John: *see* Glas, John.

Glass, Philip (b. Jan. 31, 1937, Baltimore), American composer of innovative instrumental, vocal, and operatic music.

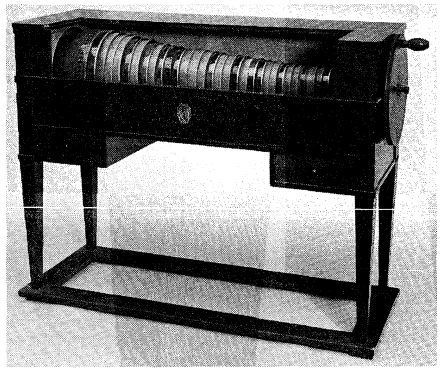
Glass studied flute as a boy and enrolled at age 15 at the University of Chicago, where he studied mathematics and philosophy and graduated in 1956. His interest in atonal music drew him on to study composition at the Juilliard School of Music (M.S., 1962) in New York City and then to Paris to study under Nadia Boulanger. His acquaintance there with the Indian sitarist Ravi Shankar decisively affected Glass' compositional style, and he temporarily jettisoned such traditional formal qualities as harmony, tempo, and melody in his music. Instead he began creating ensemble pieces in a monotonous and repetitive style; these works consisted of a series of syncopated rhythms ingeniously contracted or extended within a stable diatonic structure. Such Minimalist music, played by a small ensemble using electronically amplified keyboard and wind instruments, earned Glass a small but enthusiastic following in New York City by the late 1960s.

Glass's opera *Einstein on the Beach* (1976), composed in collaboration with Robert Wilson, earned him broader acclaim; this work showed a renewed interest in classical Western harmonic elements, though Glass' interest in startling rhythmic and melodic changes remained the most dramatic feature of the work. Glass's opera *Satyagraha* (1980) was a more authentically "operatic" portrayal of several incidents from the early life of Mohandas K. Gandhi. In this work, the dronelike repetition of symmetrical sequences of chords attained a haunting and hypnotic power that was well-attuned to the religio-spiritual themes of the libretto, adapted from the Hindu scripture known as the *Bhagavadgītā*.

glass garden: *see* terrarium.

glass harmonica, musical instrument consisting of a set of graduated, tuned glass bowls sounded by the friction of wetted fingers on their rims. It was invented by Benjamin Franklin and was derived from the *vérillon* (musical glasses), a set of glasses, holding different amounts of water and thus yielding different notes, placed on a soundboard and rubbed by moistened fingers or, rarely, struck with rods. The German composer Christoph Willibald Gluck performed his concerto for this instrument in London in 1746.

In 1761 Franklin, impressed by the playing of the Irish virtuoso Richard Pockrich, produced his armonica, or harmonica, in which hemispherical glasses were suspended on a treadle-operated spindle, overlapping so that only their rims were visible. A trough of water



Glass harmonica, 18th century; in the Metropolitan Museum of Art, New York City

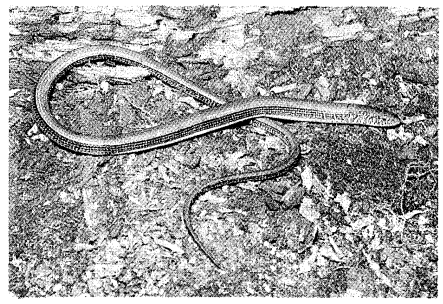
By courtesy of the Metropolitan Museum of Art, New York City, the Crosby Brown Collection of Musical Instruments, 1889

beneath the glasses moistened them as they rotated through it. The diatonic notes (those of the seven-note scale) were progressively coloured the hues of the spectrum, the sharps being black, as on a piano. The compass was ultimately extended to four octaves up from the C below middle C. Long in vogue in Europe, it was an expressive instrument, and Mozart and Beethoven wrote for it.

Glass House Mountains, group of 10 principal peaks, the highest of which is Beerwah (1,759 feet [536 m]), in southeastern Queensland, Australia, 45 miles (70 km) north of Brisbane. Composed of volcanic trachyte, they rise abruptly from the coastal plain, and each of the peaks is a national park. Sighted in 1770 by the English navigator Captain James Cook, who supposedly named them because of their resemblance to glass furnaces in Yorkshire, Eng., they were explored in 1799 by Matthew Flinders. The town of Glass House Mountains, the region's tourist base, is on the Bruce Highway from Brisbane; it is also a commercial centre for lumbering and tobacco and pineapple farming.

glass print (printmaking): *see* cliché-verre.

glass snake, also called GLASS LIZARD (*Ophisaurus*), any lizard of the family Anguidae, so named because the tail is easily broken off. The Eastern glass lizard, *Ophisaurus ventralis,* occurs in southeastern North America and grows to about 105 cm (41 inches). It has no legs but is easily distinguished from a snake by its ears, movable eyelids, nonexpandable jaws, and the fact that the scales on the lower and upper sides of the body are of equal size. It closely resembles the



Glass snake (*Ophisaurus ventralis*)

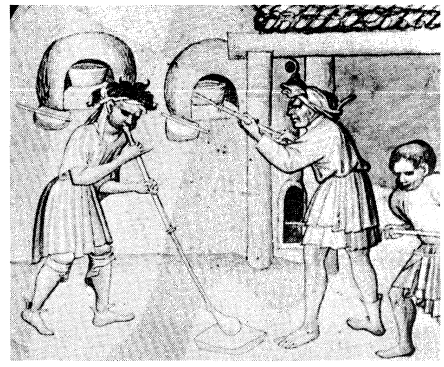
Hal H. Harrison from Grant Heilman—EB Inc.

slender glass lizard, *O. attenuatus,* which has a broader distribution in southeastern North America northwestward into the upper Mississippi River valley. Unlike *O. ventralis,* which has a broad band along each lower side, *O. attenuatus* has narrow dark lines.

Both species live in loose soil, among leaves and grass, or under roots or stones. *O. apodus,* found over much of southeastern Europe, southwestern Asia, and northern Africa, grows to about 120 cm (47 inches) long.

glass sponge, any of a class (Hyalospongiae, also called Hexactinelida, or Triaxonia) of sponges characterized by a skeleton that consists of silica spicules (needlelike structures) often united into a delicate geometric network—*e.g.,* that of Venus's flower basket (*q.v.*). Glass sponges occur mainly on muddy sea bottoms at great depths.

glassblowing, the practice of shaping a mass of glass that has been softened by heat by blowing air into it through a tube. Glassblowing was invented by Syrian craftsmen in the area of Sidon, Aleppo, Hama, and Palmyra in the 1st century BC, where blown vessels for everyday and luxury use were produced commercially and exported to all parts of the Roman Empire. At first, glass was blown into decorative molds; vessels shaped as shells, clusters of grapes, and human heads were common



Glassblowing, detail of a painting from *The Travels of Sir John Mandeville,* 15th century; in the British Museum

Culver Pictures

early Syrian products, but later Syrian gaffers (blowers) executed natural, spherical forms, without the use of molds.

The technique has remained basically the same to the present day. The "metal" (molten glass having the consistency of molasses) is gathered on the end of a hollow pipe, inflated to a bubble, and formed into a vessel by blowing, swinging, or rolling on a smooth stone

or iron surface (marver). Additions, such as stems, feet, or handles, are attached by welding. While still soft, the glass can be manipulated by hand tools or cut with shears. In the 17th century the gaffer's "chair," a bench with two extended arms on which the pipe is trundled to preserve the symmetry of the molten glass, came into use. The chair has been extended to include the glassmaking crew, the gaffer and two or three assistants.

Glassboro, borough, Gloucester County, southwestern New Jersey, U.S., 17 mi (27 km) south of Camden. Hollybush (1849), the home of the president of Glassboro State College (1923), was the site of a meeting in 1967 between Pres. Lyndon B. Johnson and Chairman Aleksey Kosygin of the U.S.S.R. Settlement began in 1775 when a German widow, Catherine Stanger, and her seven sons built a glass factory, utilizing local greensand and silica deposits. Although the borough owes its name to the glassworks, the industry, which reached its peak in the 1780s, has declined. Truck farming and the production of hosiery and plastics are mainstays of Glassboro's economy. Inc. 1920. Pop. (1980) 14,574.

glasses: *see* eyeglasses.

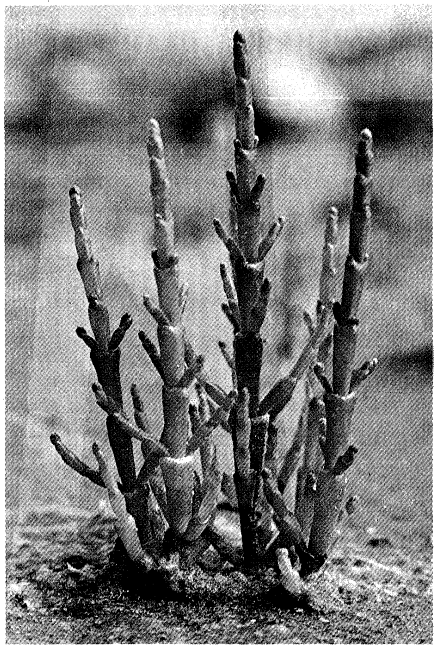
glassfish, also called GLASS PERCH, any of about 24 small Indo-Pacific fishes of the family Ambassidae (or Chandidae, order Perciformes) most of which have more or less transparent bodies. Glassfishes, placed by some authorities with the snooks and Nile perch in the family Centropomidae, are found in fresh water and in the sea along coasts and river mouths. They are rather deep-bodied and have a deep cleft between the spiny anterior and the soft-rayed posterior portions of the dorsal fin.

The genus *Chanda* includes most of the glassfishes. Three are familiar to home aquarists: *C. ranga* (or *C. lala*), sometimes called Indian glassfish, a popular Asian species 5 centimetres (2 inches) long with blue-edged fins; *C. buruensis,* a 5-cm East Indian species; and *C. nama,* a 10-cm fish of India and Asia.

The name glassfish is also given to certain other unrelated, semitransparent fishes, including the icicle fish (*q.v.*) of the order Salmoniformes.

glasshouse: *see* greenhouse.

glasswort, common name for plants of the genus *Salicornia,* of the goosefoot family (Chenopodiaceae). They are annual plants native to salt marshes around the world. The jointed, bright-green stems turn red or purple in the fall. Glasswort ashes contain large amounts of potash, and the plants were formerly used in glassmaking.



Glasswort (*Salicornia herbacea*)
Ingmar Holmasen

Glastonbury, parish (town), Mendip district, county of Somerset, England, lying on slopes that rise from the Brue Valley to a tor (peak) of 522 ft (159 m).

In 1892, low mounds 1½ mi (2.5 m) north of Glastonbury were found to contain remains of prehistoric Iron Age dwellings. These, along with two other famous groups of mounds at Meare (3¾ mi northwest of Glastonbury), were excavated early in the 20th century. At the time of habitation the dwellings stood on low-lying ground of peat bogs and watercourses. The types of pottery found indicate occupation from *c.* 60 BC until about the time of the Roman invasions of the 1st century AD; the site of Meare was reoccupied during the 4th century. The Abbot's Tribunal, Glastonbury, houses some of the objects discovered during excavation.

Legend asserts that the abbey church was first built in AD 166 by missionaries from Rome, who came at the request of King Lucius, perhaps the first Christian king in Britain. Built of timber and wattles, the church lasted until 1184 and claimed to house the tomb of St. Patrick of Ireland. The Anglo-Saxon

The ruined Benedictine abbey of St. Mary at Glastonbury, Somerset
Woolverton—Shostal/EB Inc.

Chronicle states that Ine, king of Wessex, founded the abbey itself; but other evidence points to its establishment at an earlier date, and a Celtic monastery definitely existed before the Saxon conquest. By the 10th century the abbey (already the burial place of three kings) was of great importance, and Domesday Book (1086) indicates its wealth, which by that time included lands in five counties. After the disastrous fire of 1184, rebuilding of the abbey and construction of the new St. Mary's Chapel were undertaken; construction—halted at times by disputes within the church—continued into the 14th century. After the dissolution of the monasteries (1536–39), the abbey eventually became a quarry for building and roadstone; but the ruins of St. Mary's Chapel and of parts of the abbey remain.

In 1191 it was claimed that the grave of King Arthur and Queen Guinevere, the legendary rulers of post-Roman Britain, had been discovered at Glastonbury; and the bones were reinterred at the abbey.

Other legends, dating from the mid-13th century, claim that the early Christian St. Joseph of Arimathea came to the town, bringing the chalice of the Last Supper or phials holding blood of the crucifixion; the Chalice Well became a place of pilgrimage early in the 16th century. It was later asserted that the Glastonbury thorn (*Crataegus monogyna praecox*) sprang from St. Joseph's staff.

The dissolution of the monasteries impoverished the town, and the worsted and silk spinning industries were not strong. Prosperity improved in the 19th century, with better land drainage and enclosure of moors that were previously held in common. The chief modern local industry, apart from dairy farming, is the processing of sheepskins and manufacture of sheepskin goods. Pop. (1981 prelim.) 6,773.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Glatigny, (Joseph-)Albert-Alexandre (b. May 21, 1839, Lillebonne, Fr.—d. April 16, 1873, Sèvres), French poet of the Parnassian school, known for his small poems of satirical comment and for his peripatetic life as a strolling actor and improvisationalist.

"Glatigny the Improviser," pen and ink caricature by André Gill; in the Musée Carnavalet, Paris
By courtesy of the Musee Carnavalet, Paris; photograph, Bulloz

A poor boy apprenticed to a printer, Glatigny wrote a historical drama at 16 and a year later ran off to join a travelling theatre company. While he was on the road the barbed language of Théodore de Banville's *Odes funambulesques* ("Fantastic Odes") inspired him to write his first book of poems, *Les Vignes folles* (1860; "The Mad Vines"). Later collections included *Les Flèches d'or* (1864; "The Golden Barbs") and *Gilles et Pasquins* (1872).

Even after publishing he continued his theatrical travels; stories of his many loves and his adventures became as widely known as his poems. His one-act comedy in verse, *L'Illustre Brizacier* (1873; "The Illustrious Brizacier"), was based on his own imprisonment in Corsica when he was mistaken for a wanted criminal. His other plays are *Le Singe* (1872; "The Monkey") and *Les Folies-Marigny* (1872; "The Marigny Madnesses"). His fame was aggrandized by his fellow Parnassian Catulle Mendès, who wrote a play, *Glatigny, drame funambulesque* (1906; "Glatigny, a Grotesque Drama"), and a book about his life.

Glatz (Poland): *see* Kłodzko.

Glauber, Johann Rudolf (b. 1604, Karlstadt, Bavaria—d. March 10, 1668, Amsterdam), German-Dutch chemist, sometimes called the German Boyle; *i.e.,* the father of chemistry.

Settling in Holland, he made his living chiefly by the sale of secret chemicals and medicinals. He prepared hydrochloric acid from common salt and sulfuric acid and pointed out the virtues of the residue, sodium sulfate—*sal mirabile,* or Glauber's salt; he also noted the formation of nitric acid from potassium nitrate and sulfuric acid.

Glauber prepared many substances, made useful observations on dyeing, and described

Glauber, engraving
Bavaria-Verlag

the preparation of tartar emetic. He urged that Germany's natural resources be developed and gave examples of such developments. His writings were reissued as *Glauberus Concentratus* (1715).

Glauber's salt, colourless crystalline sulfate of sodium (*q.v.*).

glaucochroite, manganese-rich variety of the mineral monticellite (*q.v.*).

glaucoma, disease caused by an increase in pressure within the eye as a result of blockage of the flow of aqueous humour, a watery fluid produced by the ciliary body. (The ciliary body is a ring of tissue directly behind the outer rim of the iris; besides being the source of aqueous humour, it contains the muscle that flattens the curvature of the lens for far vision.) The normal flow of the aqueous humour is (1) from the ciliary body into the posterior chamber, a narrow space bounded in front by the iris, on its outer side by the ciliary body, and in back by the lens and the vitreous body, a jelly-like substance that occupies a major part of the eyeball; (2) from the posterior chamber through the pupil into the anterior chamber, the space in front of the lens and the iris and in back of the transparent window formed by the cornea; and (3) from the anterior chamber through a sievelike layer of tissue in the lining of the eyeball at the outer periphery of the iris into a circular channel, the canal of Schlemm, from which the aqueous humour flows (by way of vessels called aqueous veins) into blood vessels. Blockage of the aqueous humour flow causes increased pressure in the posterior chamber, and this pressure is transmitted by way of the vitreous to the optic nerve head and the retina. Abnormally high intraocular pressure that is unrelieved causes vision impairment.

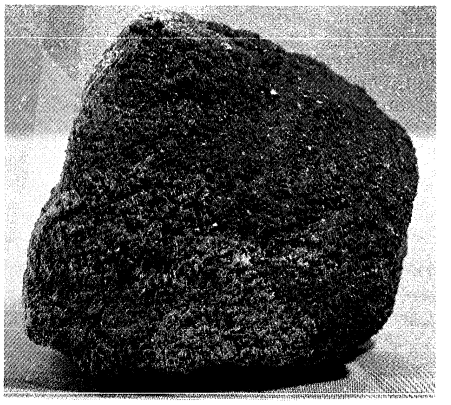
There are two types of blockage that result in glaucoma. (1) The blockage may occur in the porous tissue between the anterior chamber and the canal of Schlemm, in the canal itself, or in the aqueous veins. This blockage is continuous, and the effect is chronic glaucoma. (2) In persons in whom the angle at the periphery of the anterior chamber is acute—*i.e.,* in whom the outer rim of the iris is close to the wall of the eyeball—the pressure of aqueous humour upon the back of the iris may force the outer part of the iris against the wall, so as to cover the outlet into the canal of Schlemm. Glaucoma caused by this type of obstruction is called acute or narrow-angle glaucoma. When the pupil contracts, as during sleep, it tends to pull the iris away from the entrance into the canal of Schlemm and allow passage of aqueous humour, so that the high intraocular pressure may be intermittent in this type of blockage.

Chronic glaucoma does not cause symptoms in its early stages, and it is diagnosed by observation of the abnormally high intraocular pressure or the physical effects of abnormal pressure upon the optic disk (the point where the optic nerve leaves the eyeball). Treatment is primarily medical—the reduction of intraocular pressure by means of drugs that contract the pupil (miotic drugs) and allow greater outflow of the aqueous humour.

Narrow-angle glaucoma causes pain in the eye, headaches, and sometimes nausea and vomiting. The affected person may see halos around lights. Treatment of an acute attack is similar to that of chronic glaucoma, but permanent elimination of the high pressure requires surgery; *i.e.,* an opening is cut through the iris at its outer periphery to allow passage of the aqueous humour.

glauconite, greenish ferric-iron silicate mineral with micaceous structure, characteristically formed on submarine elevations ranging in depth from 30 to 1,000 metres (100 to 3,300 feet) below sea level. Glauconite is abundant only in sea-floor areas that are isolated from large supplies of land-derived sediment.

Glauconite forms by three principal processes: alteration of the fecal pellets of bottom-dwelling organisms; modification of particles of illitic and biotitic clays by seawater; and direct precipitation from seawater. Particles of glauconite are generally sand-sized or finer.



Glauconite from Argentina
By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard—EB Inc.

glaucophane, common amphibole mineral, a sodium, magnesium, and aluminum silicate that occurs only in crystalline schists formed from sodium-rich rocks by low-grade metamorphism. It also forms from sedimentary rocks by the introduction of sodium oxide (Na_2O). Glaucophane typically occurs in folded rocks associated with epidote amphibolites and greenschists. Both ferrous and ferric iron are replaced by magnesium and aluminum in the crystal structure to form magnesioriebeckite and riebeckite. For chemical formula and detailed physical properties, *see* amphibole (table).

glaucophane schist facies, one of the major divisions of the mineral facies classification of metamorphic rocks, the rocks of which, because of their peculiar mineralogy, suggest formation conditions of high pressure and relatively low temperature; such conditions are not typical of the normal geothermal gradient in the Earth. The minerals that occur include soda amphibole (glaucophane), soda pyroxene (jadeite), garnet, lawsonite, and pumpellyite; quartz, muscovite, chlorite, epidote, and plagioclase may also be present. This mineralogy suggests a close connection with the eclogite facies of regional metamorphism, although lower temperatures are indicated. The low water content of these rocks is noteworthy. A classic area of occurrence is western California.

Glaucus (Greek: Gleaming), name of several figures in Greek mythology, the most important of whom were the following:

Glaucus, surnamed Pontius, was a sea divinity. Originally a fisherman and diver of Boeotia, he once ate a magical herb and leaped into the sea, where he was changed into a god and endowed with the gift of prophecy. Another version made him spring into the sea for love of the sea god Melicertes, with whom he was often identified. In art he was depicted as a merman covered with shells and seaweed.

Glaucus of Potniae near Thebes was the son of Sisyphus (king of Corinth) by his wife Merope and father of the hero Bellerophon. According to one legend, he fed his mares on human flesh and was torn to pieces by them.

Glaucus, the son of the Cretan king Minos and his wife Pasiphae, fell into a jar of honey, when a child, and was smothered. The seer Polyeidus finally discovered the child but on confessing his inability to restore him to life was shut up in a vault with the corpse. There he killed a serpent and, seeing it revived by a companion that laid a certain herb upon it, brought the dead Glaucus back to life with the same herb.

Glaucus, grandson of Bellerophon, was a Lycian prince who assisted Priam, king of Troy, in the Trojan War. When he found himself opposed in combat to his friend Diomedes, they ceased fighting and exchanged armour. Since the equipment of Glaucus was golden and that of Diomedes bronze, the expression "gold for bronze" (*Iliad,* vi, 236) came to be used proverbially for a bad exchange.

glaze, ice coating that forms when supercooled rain, drizzle, or fog drops strike surfaces that have temperatures at or below the freezing point; the accumulated water covers the surface and freezes relatively slowly. Glaze is denser (about 0.85 gram per cubic centimetre, or 54 pounds per cubic foot), harder, and more transparent than other forms of accumulated ice. Rime, a white or milky granular type of accumulated ice, forms when small supercooled droplets striking an object freeze quickly, trapping air bubbles in the ice. It has a density of about 0.25 gram per cubic centimetre (17 pounds per cubic foot).

Glazov, city and administrative centre of Glazov *rayon* (district) in Udmurt Autonomous Soviet Socialist Republic of the Russian Soviet Federated Socialist Republic. Founded in 1780 as a point of Udmurt settlement, it is on the Cheptsa River. Industrial activities include timber milling, woodworking, metal working, and food processing. Glazov has a teacher-training and an agricultural college. Pop. (1983 est.) 89,000.

Glazunov, Aleksandr (Konstaninovich) (b. Aug. 10, 1865, St. Petersburg, Russia—d. March 21, 1936, Paris), the major Russian symphonic composer of the generation that followed Tchaikovsky.

Glazunov
C. Cauboue—J.P. Ziolo

Glazunov's mother, a piano pupil of M.A. Balakirev, took her obviously talented son to her teacher, and on his advice the boy in

1880 began study with Rimsky-Korsakov. In 1882 his *First Symphony* was performed by Balakirev. A revised version of it was printed in 1886 by M.P. Belyayev, a millionaire timber merchant and founder of the famous music-publishing firm that bore his name and that Glazunov later helped direct. Glazunov, having next written two string quartets, two overtures on Greek folk tunes, and the symphonic poem *Stenka Razin,* in 1886 finished his *Second Symphony.* At that time he was the recognized heir of the nationalist group and composed in their styles; he also absorbed the influence of Liszt, whom he visited at Weimar in 1884. Other influences, notably Wagner's and Tchaikovsky's, later made themselves felt. Most of his best works—the fourth, fifth, and sixth symphonies and his ballets *Raymonda, Ruses d'amour,* and *Les Saisons* ("The Seasons")—date from the 1890s. He finished his *Violin Concerto in A Minor* in 1904 and last complete symphony, the eighth, in 1906. In 1905 he became director of the St. Petersburg Conservatory, where he had taught since 1899. He wrote few large-scale works after 1906: two piano concerti (1911 and 1917), two string quartets (1920 and 1930), the *Concerto-Ballata for Cello and Orchestra* (1931), and the *Concerto for Saxophone, Flute, and Strings* (1934). After the Revolution of 1917 he remained at his post until 1928, when, feeling isolated, he left the Soviet Union. After an unsuccessful tour of the United States (1929–30) he lived in Paris.

Gleann Dá Loch (Ireland): *see* Glendalough, Vale of.

glee (from Old English *gléo:* "music" or "entertainment"), vocal composition for three or more unaccompanied solo male voices, including a countertenor. It consists of several short sections of contrasting character or mood, each ending in a full close. In style it is homophonic; *i.e.,* based on chords rather than on interwoven melodies. The glee flourished from about 1740 to about 1830. The term is also loosely applied to various vocal compositions of the 17th–19th centuries that do not conform to these characteristics; *e.g.,* the instrumentally accompanied part-songs by Sir Henry Bishop (1786–1855).

The glee is a purely English form and together with the catch, or round, it made up the greater part of the repertory of the glee clubs once prominent in English musical life. The most famous was the Glee Club (1783–1857). Others, still in existence, include the Noblemen and Gentlemen's Catch Club (founded 1761) and the City Glee Club (founded 1853). Among the finest examples of glees are "Glorious Apollo" by Samuel Webbe the Elder (1740–1816), "Music All-Powerful" by Thomas Forbes Walmisley (1783–1866), and "Great Bacchus" by Charles Evans (1778–1849).

Gleichen, Melchior, Graf von Hatzfeldt und: *see* Hatzfeldt, Melchior, Graf von Gleichen und.

Gleim, Johann Wilhelm Ludwig (b. April 2, 1719, Ermsleben, near Halberstadt, Saxony—d. Feb. 18, 1803, Halberstadt), German Anacreontic poet.

Gleim studied law at Halle and was successively secretary to Prince William of Brandenburg-Schwedt at Berlin, to Prince Leopold of Dessau, and secretary (1747) of the cathedral chapter at Halberstadt. "Father Gleim" was the title accorded him throughout literary Germany on account of his generosity to young poets. Although he looked with some suspicion on their revolutionary tendencies, he helped them none the less. Gleim himself wrote feeble imitations of Anacreon, Horace, and the minnesingers, a dull didactic poem entitled *Halladat oder das rote Buch* (1774), and collections of fables and romances. Of higher merit is his *Preussische Kriegslieder von einem Grenadier* (1758), inspired by the campaigns of Frederick II.

Gleiwitz (Poland): *see* Gliwice.

Glen Eagles, Gaelic GLEN EAGLAIS (Glen of the Church), narrow glen, district of Perth, Tayside region, Scotland, running south through the Ochil Hills. Within the glen are the remains of Gleneagles Castle (14th century), which was superseded in 1624 by Gleneagles House as the home of the Haldane family. The track of a Roman road and an old drover road, linking the north with the Falkirk cattle fairs, also lie within the glen. About 2 mi (3 km) northwest of the glen, unconnected with the Gleneagles estate, stands Gleneagles Hotel (opened 1923), with three well-known golf courses.

Glen Ellyn, residential village, western suburb of Chicago, Du Page County, northeastern Illinois, U.S. Its phases of development were marked by seven name changes: Babcock's Grove (1833) for the first settlers, Ralph and Morgan Babcock; DuPage Center (1834); Stacy's Corners (1835); Newton's Station (1849); Danby (1851); Prospect Park (1882); and Glen Ellyn (1889), "Ellyn" being for the wife of Thomas E. Hill, the village president. Maryknoll College was established there in 1949, and the College of DuPage in 1966; the village also has a campus of Lewis University College of Law. The bones of a mastodon, discovered by construction workers while enlarging a nearby lake (1963), are on exhibit in Breyer Laboratory, at nearby Wheaton College. Inc. 1892. Pop. (1980) 23,649.

Glen Innes, town, northeastern New South Wales, Australia, in the New England district on the Northern Tableland south of the Queensland border. Founded in 1851 on Furracabad stock station, it became a municipality in 1872. Glen Innes serves a region of dairy and mixed farming and tin, bismuth, and sapphire mining. It lies at the junction of the Gwydir and New England highways and has air and rail connections to Sydney (290 mi [470 km] southwest) and Brisbane. Industries include concrete-pipe and brick factories, tanneries, sawmills, and vegetable quick-freezing plants. Pop. (1981) 6,052.

Glen More, national forest park in the foothills of the Cairngorm Mountains, district of Inverness, Highland region, Scotland. Established in 1948 and comprising 12,000 ac (5,000 ha), the park extends upward from 1,100 ft (335 m) near the town of Aviemore to include the summit of Cairn Gorm (4,084 ft [1,245 m]), with a road and chairlift providing access to within 400 ft of the summit. The park offers the best skiing in Britain, excellent climbing and walking, and sailing on Loch Morlich (1,000 ft above sea level).

Glen More nan Albin, also called GREAT GLEN OF ALBIN, or GREAT GLEN, valley extending for about 60 mi (97 km) from the Moray Firth at Inverness to Loch Linnhe at Fort William. It includes Lochs Ness, Oich, and Lochy and is crossed by the Caledonian Canal.

Glencairn, Alexander Cunningham, 5th earl of (d. Nov. 23, 1574), Scottish Protestant noble, an adherent of John Knox and a sometime supporter of Mary, Queen of Scots.

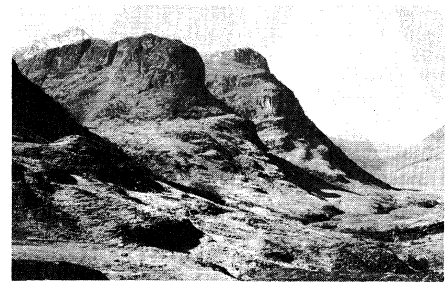
He was a more pronounced reformer than his father, the 4th earl, whose English sympathies he shared, and was among the intimate friends of John Knox. In March 1557 he signed the letter asking Knox to return to Scotland; in the following December he subscribed the first "band" of the Scottish reformers; and he anticipated Lord James Stewart, afterward the regent Moray, in taking up arms against the regent, Mary of Guise, in 1558. Then, joined by Stewart and the lords of the congregation, he fought against the regent and took part in the attendant negotiations with Elizabeth I of England, whom he visited in London in December 1560.

When in August 1561 Mary, Queen of Scots, returned to Scotland, Glencairn was made a member of her council; he remained loyal to her after she had been deserted by Moray, but in a few weeks rejoined Moray and the other Protestant lords, returning to Mary's side in 1566. After the Queen had married the Earl of Bothwell she was again forsaken by Glencairn, who fought against her at Carberry Hill and at Langside. The Earl was always to the fore in destroying churches, abbeys, and other "monuments of idolatry," and his short satirical poem against the Grey Friars is printed by Knox in his *History of the Reformation.*

Glencairn, William Cunningham, 4th earl of (b. *c.* 1490—d. 1547), Scottish conspirator during the Reformation.

An early adherent of the Reformation, he was during his public life frequently in the pay and service of England, although he fought on the Scottish side at the Battle of Solway Moss (1542), where he was taken prisoner. Upon his release early in 1543 he promised to adhere to Henry VIII, who was anxious to bring Scotland under his rule, and in 1544 he entered into other engagements with Henry, undertaking inter alia to deliver Mary, Queen of Scots, to the English King. However, he was defeated by James Hamilton, earl of Arran, and the project failed; Glencairn then deserted his fellow conspirator, Matthew Stewart, earl of Lennox, and came to terms with the queen-mother, Mary of Guise, and her party.

Glencoe, glen in Argyll and Bute district, Strathclyde region, Scotland. From a relatively low watershed and pass to Glen Etive (1,011 ft [308 m]) it runs east for about 5 mi (8 km) as a steep-sided, glacier-scoured trough about ½ mi wide, bounded by towering mountains



Glencoe, Argyll and Bute district, from the east, overlooked by lava hills
A.F. Kersting

of 3,000 ft or more, before turning northwest as a broader glen amid softer hills until the River Coe reaches the Atlantic coast at Loch Leven.

In February 1692 it was the site of a treacherous clan massacre involving the Macdonalds of Glencoe. The glen is now almost completely uninhabited.

Glencoe, Massacre of (Feb. 13, 1692), in Scottish history, the treacherous slaughter of the MacDonalds of Glencoe by soldiers under Archibald Campbell, 10th earl of Argyll. Many Scottish clans had remained loyal to King James II after he was replaced on the British throne by William III in 1689. In August 1691 the government offered an indemnity to all chiefs who should take an oath of allegiance before Jan. 1, 1692. "Letters of fire and sword," authorizing savage attacks upon recalcitrants, were drawn up in anticipation of widespread refusals; the chiefs, however, took the oath. Alexander MacDonald of Glencoe

postponed his submission until Dec. 31, 1691, and was then unable to take his oath until January 6 because there was no magistrate at Ft. William to receive it. An order for military punishment was thereupon issued under William III's signature. More than 100 soldiers from Ft. William who had been quartered amicably upon the MacDonalds for more than a week suddenly attacked them; many of the clan escaped, but the chief, 33 men, 2 women, and 2 children were killed. John Campbell, earl of Breadalbane, a neighbour and enemy of the MacDonalds, was widely suspected of planning the attack but was not its main instigator; his imprisonment in 1695 was for earlier involvement with the Jacobites.

Glendale, city, Maricopa County, south central Arizona, U.S., in the Salt River Valley, just west of Phoenix. Founded in 1892, it is an agricultural trading centre (fruits, vegetables, cotton). It is the seat of Glendale Community College (1965), and the American Graduate School of International Management, which trains employees of U.S. firms for work abroad, is nearby. Luke Air Force Base is also in the locality. Inc. 1910. Pop. (1980) 96,988.

Glendale, city, Los Angeles County, California, U.S., in the Verdugo Hills, at the southeastern end of the San Fernando Valley. Laid out in 1886, the site was part of Rancho San Rafael (1784); Casa Adobe de San Rafael (1864–72) stands in a city park. Connection to Los Angeles by the Pacific Electric Railroad in 1904 ensured its residential growth. Aircraft, optical instruments, and pharmaceuticals are among its manufactures. The city's Forest Lawn Memorial Park is a cemetery publicized for its elaborate statuary (including reproductions of famous shrines and works of art). Glendale Community College was established in 1927. Inc. 1906. Pop. (1980) 139,060.

Glendalough, Vale of, Irish GLEANN DÁ LOCH (Glen of the Two Lakes), valley, County Wicklow, Ireland. When St. Kevin settled there in the 6th century, Glendalough became an important monastic centre and, until 1214, the centre of a diocese. The series of churches in the valley, all in ruins except for the small church known as St. Kevin's Kitchen, date

Vale of Glendalough, in the Wicklow Mountains, County Wicklow, Ire.
By courtesy of Irish Tourist Board; photograph, Bord Failte Photo

from the 11th and 12th centuries. The original monks settled in a wild and desolate place but one of great beauty. The valley has two lakes and limited farmland. Extensive areas on the valley sides are covered with natural and plantation woodlands.

Glendive, city, seat of Dawson County, eastern Montana, U.S., on the Yellowstone River. It was founded in 1881 after the arrival of the Northern Pacific Railway and named for nearby Glendive Creek (said to be a corruption of "Glendale"). It developed as a farming and livestock town. Following the discovery of oil, gas, and coal in the vicinity, it became headquarters of Montana–Dakota Utilities Co. (electric power and gas) and supply centre for the Williston Basin oil fields. Glendive is the seat of Dawson College (1940). Makoshika ("hell cooled over") State Park containing badlands rock formations and the Frontier Gateway Museum are nearby. Inc. city, 1902. Pop. (1980) 5,978.

Glendower, Owen, Welsh OWAIN GLYNDWR, or OWAIN AP GRUFFUDD (b *c.* 1354—d. *c.* 1416), self-proclaimed prince of Wales whose unsuccessful rebellion against England was the last major Welsh attempt to throw off English rule. He became a national hero upon the resurgence of Welsh nationalism in the 19th and 20th centuries.

A descendant of the princes of Powys, Glendower inherited several manors in northern Wales. He studied law in London and then served with the forces of Henry Bolingbroke, an opponent of King Richard II and afterward King Henry IV. When he returned to Wales, he found that England's oppressive rule had crippled the Welsh economy and aroused popular resentment. In September 1400, a year after Bolingbroke usurped the throne, Glendower's violent feud with a neighbour, Reynold, Lord Grey of Ruthin, touched off an uprising in northern Wales. The insurgency quickly became a national struggle for Welsh independence. Glendower formed an alliance with Henry's most powerful opponents, and by 1404 he had control of most of Wales. Styling himself prince of Wales, he established an independent Welsh Parliament and began to formulate his own foreign and ecclesiastical policies. In 1405, however, the tide of battle turned against him. He was twice defeated by Henry IV's son, Prince Henry (later King Henry V), and his allies in England were crushed. Reinforcements sent by France could not save his cause. By 1408–09 Prince Henry had captured Glendower's main strongholds, but the rebel was active in guerrilla fighting as late as 1412.

Glenelg River, river in southwestern Victoria, Australia, rising on Mt. William in the Grampians east of Balmoral and flowing west and south to join its chief tributary, the Wannon River, at Casterton. It empties into Discovery Bay, where sand dunes have deflected its mouth, near the South Australian border, after a course of more than 280 mi (450 km). The river, although frequently dried up, is dammed to form Rocklands Reservoir (272,000 ac-ft, or 336,000,000 cu m), a part of the Wimmera-Mallee Stock and Domestic Supply System. Surveyed (1836) by Thomas Mitchell, former surveyor general of New South Wales, the river was originally called Nangeela. It was renamed to honour Lord Glenelg, British secretary of state for the colonies in 1836.

Glenn, John H(erschel), Jr. (b. July 18, 1921, Cambridge, Ohio, U.S.), the first U.S. astronaut to orbit the Earth (1962).

Glenn joined the U.S. Marine Corps in 1943 and flew 59 missions during World War II and 90 missions during the Korean War. He was a test pilot from 1954 and in 1959 was promoted to lieutenant colonel. Of the seven astronauts selected in that year for Project Mercury space-flight training, he was the oldest. Glenn served as a backup pilot for Alan B. Shepard, Jr., and Virgil I. Grissom, who made the first two U.S. suborbital flights into space. Glenn was selected for the orbital flight, and on Feb. 20, 1962, his space capsule, "Friendship 7," was launched from Cape Canaveral, Florida. Its orbit ranged from approximately 99 to 162 miles (159 to 261 kilometres) in altitude, and Glenn made three

Glenn
By courtesy of the National Aeronautics and Space Administration

orbits, landing in the Atlantic Ocean near the Bahamas.

Glenn retired from both the space program and the Marine Corps in 1964 to enter private business and to pursue his interest in politics. In 1970 he campaigned for the nomination as the Democratic candidate for the U.S. Senate in Ohio, losing by a narrow margin in the primary election. He was elected U.S. senator from that state in 1974 and was reelected in 1980. Glenn was unsuccessful, however, in his bid to become the Democratic candidate for president in 1984.

Glenrothes, Scotland's second new town (target population of 70,000), established in 1948 in the central part of the present district of Fife to provide housing for coal miners near the experimental Rothes Colliery. When the coal-mining industry declined, new industries were developed, including the manufacture of electronic components, computers, plastics, and mining machinery. Pop. (1982 est.) 34,900.

Glens Falls, city, Warren County, east central New York, U.S., on the Hudson River, 45 mi (72 km) north of Albany. Part of the Queensbury Patent (1759, now Queensbury Town [township]), it was settled in the 1760s by Quakers as Wing's Falls (for Abraham Wing) and was renamed (1788) for Col. Johannes Glen, who built mills there. Based on waterpower (generated by the 60-ft [18-m] falls), lumbering, paper, and clothing industries developed. James Fenimore Cooper described the falls, which the Indians called Chepontuc (meaning "difficult place to get around") in a graphic scene from his *Last of the Mohicans;* and Cooper's Cave, where Hawkeye took refuge with his party, is beneath the bridge that links the city with South Glens Falls. The Hyde Collection, a community trust collection founded in 1952, includes works by Picasso, Rembrandt, and El Greco. Adirondack Community College was established at Glens Falls in 1960. Storytown USA, which brings to life dozens of storybook settings, and West Mt. Ski Center are nearby. Inc. village, 1839; city, 1908. Pop. (1980) 15,897.

Glenview, village, northwestern suburb of Chicago, Cook County, northeastern Illinois, U.S. Glenview Road follows one of the oldest known Indian trails leading from the Des Plaines River to Lake Michigan. The original farming settlement (1833) was successively called Hutchings, The Grove, Oak Glen, Barr, and Glen before adopting its present name in 1895. The establishment in 1940 of the Glenview Naval Air Station stimulated the community's growth. Nearby Peacock Prairie, a 5-ac (2-ha) tract, is one of the state's few remaining undisturbed black-soil prairies and is a valuable subject for botanical research. Glenview has acquired some light industry, notably publishing, food processing, and tool making. Inc. 1899. Pop. (1980) 30,842.

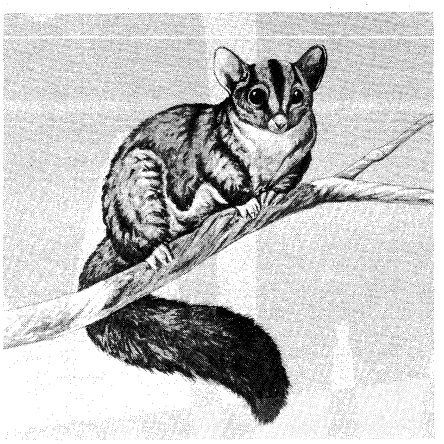
Glenwood Springs, city, seat of Garfield County, west central Colorado, U.S., at the

confluence of Roaring Fork and Colorado rivers. It lies in a canyon at an altitude of 5,758 ft (1,755 m) surrounded by the White River National Forest of which it is the headquarters. The curative value of the local hot springs and vapour caves was known to the Indians. In 1882 Isaac Cooper of the Defiance Town and Land Company laid out the site which he named after Glenwood, Iowa. With the arrival of the Colorado Midland Railway in 1885, the place developed as a health spa and year-round resort; it also became a distributing point for local mineral and farm products. A nearby dam diverts water from the Colorado through a 2.7-mi tunnel and supplies power, via the Shoshone Hydroelectric Plant (7 mi [11 km] above the city), to Denver (159 mi east). The Colorado Mountain College (West Campus) was opened in Glenwood Springs in 1966. There are oil shale deposits in the vicinity. The Sunlight Ski Area is nearby. In Glenwood Springs Doc Holliday, the famous gunman, according to his marker, died "in his bed" (1887). Inc. 1885. Pop. (1980) 4,637.

Glidden, Joseph Farwell (b. Jan. 18, 1813, Charlestown, N.H., U.S.—d. Oct. 9, 1906, De Kalb, Ill.), U.S. inventor of the first commercially successful barbed wire, which was instrumental in transforming the Great Plains of western North America.

Glidden attended Middlebury (Vt.) Academy and a seminary at Lima, N.Y., then taught school for several years before returning to his father's farm (1834–42) in Orleans County, N.Y. Working his way west as an itinerant thresher, he settled in De Kalb, Ill., where he acquired his own farm. After seeing a sample of barbed wire at a fair in 1873, he devised improvements upon it. Shortly after receiving patents on the wire in 1874, Glidden joined Isaac L. Ellwood in forming the Barb Fence Company of De Kalb, to manufacture their product, widely used to protect crops, water supplies, and livestock from uncontrolled movement of cattle. The validity of Glidden's patents was upheld during long litigation, and he prospered from the sale of his share of the business to a manufacturing firm in Massachusetts.

glider, also called FLYING PHALANGER or FLYING POSSUM, any of about six small phalangers—marsupial mammals of Australasia—that volplane from tree to tree like flying squirrels. Most have well-developed flaps of skin along the flanks; these become sails when the limbs are extended. An eastern Australian species, which feeds on nectar and insects,

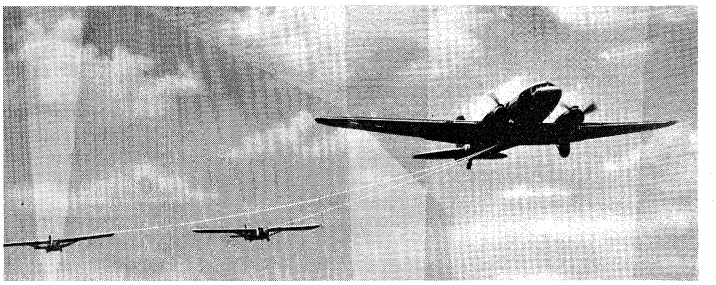


Short-headed glider (*Petaurus breviceps*)
Painting by Richard Ellis

is the pygmy glider, or feathertail (*Acrobates pygmaeus*), only 15 centimetres (6 inches) in total length; it has narrow side flaps, and its 8-cm tail is stiffly haired laterally—a "feather" that helps it to navigate. The 25-cm pen-tailed phalanger (*Distoechurus pennatus*) of New Guinea lacks the flaps; its tail is furry at the base but otherwise featherlike.

The three species of lesser, or sugar, gliders (*Petaurus*) are 25 to 80 cm long. An example is the short-headed glider (*P. breviceps*) found from New Guinea to Tasmania; it is blue-gray with a dark centre stripe, and it has a long bushy tail. These animals can glide 55 metres (180 feet). The greater glider (*Schoinobates volans*) of eastern Australia may be 105 cm long; it often glides 100 m or more. Adapted to eating leaves, it is sometimes classified with ring-tailed possums and the koala in a separate family, Phascolarctidae.

glider, nonpowered heavier-than-air craft capable of sustained flight. Though many men contributed to the development of the glider, the most famous pioneer was Otto Lilienthal (1848–96) of Germany, who, with his brother Gustav, began experiments in 1867 on the



Gliders being towed aloft by an airplane
By courtesy of U.S. Army Air Forces

buoyancy and resistance of air. Lilienthal also investigated camber and wing sections and studied ways to increase the stability of the gliders he built, finally incorporating stabilizing tail surfaces. In 1891 he built his first man-carrying craft, with which he could take off by running downhill into the wind.

In 1896 Octave Chanute, French-born American engineer, began designing gliders that were flown by others under his supervision. He discarded Lilienthal's method of securing control by a fixed rear fin with the horizontal tail parts freely hinging upward and substituted a rudder and articulated (segmented) wings. Chanute's gliders were so stable that they made 2,000 flights without an accident.

Orville and Wilbur Wright built their most successful early glider in 1902. Following experimentation they decided to use a vertical rudder, movable in flight. They then added a horizontal elevator and combined their adjustable vertical rudder with a wing-warping mechanism that permitted them to move the trailing edges of the wings up and down. This perfect control made their gliding safe and allowed them to proceed to the powered airplane.

To fly, a glider must be accelerated to flying speed, the speed at which wings generate enough lift to overcome the force of gravity. In most of the early gliders, flying speed was very low; normal practice was to fly into a wind so that the actual acceleration required was not great. Today's favoured launching techniques are the airplane tow and the automobile tow. The tow rope normally used is about 200 feet (60 metres) long with a steel ring attached at each end, fitting the tow hooks of the towing vehicle and the glider. Gliders are also launched by shock-cord launching, which works on the principle of a slingshot, or by winch tow, which works like a giant fishing reel, with the glider attached to one end like a fish. While hang gliders usually are launched from a high point and descend, sailplane gliders can soar for hours on the lift from thermals and rising air due to rising terrain.

Since 1935, gliders have gained in reputation as tools for aeronautical and meteorological research. Gliders equipped with radio and recording instruments have been flown into the core of thunderstorms to collect data on the strength and nature of cumulonimbus clouds. Gliders were widely used in World War II to carry troops. They, and sailplanes in particular, have become increasingly popular for recreational purposes and as vehicles for sports competition.

gliding (sport): *see* soaring.

gliding bacteria, microorganisms of the orders Myxobacterales and Cytophagales which exhibit creeping or gliding motility. They are found in soil, fresh or salt water, or decomposing organic matter. Many species apparently live only in the presence of hydrogen sulfide or dissolved sulfides.

All gliding bacteria are short rods typically embedded in slime, forming strands of cells that move over surfaces in a gliding motion.

Glière, Reinhold (Moritsevich) (b. Jan. 11, 1875, Kiev—d. June 23, 1956, Moscow), composer prominent in Soviet music and noted for his works incorporating elements of the folk music of Russia, the Ukraine, and surrounding republics.

Of Belgian descent, Glière was the son of a musician and instrument maker. He heard his early compositions performed by visitors to his father's house and as a youth received his musical training in Kiev. In 1900 he graduated from the Moscow Conservatory, where he studied violin, composition, and music theory. After teaching for a while in Moscow, he studied conducting in Berlin (1905–07), first appearing in Russia as a conductor in 1908, the same year his tone poem *The Sirens* was enthusiastically received. Glière taught at the Kiev Conservatory and was appointed director in 1914. He returned to Moscow in 1920, taught at the conservatory there, and became involved in studying Russian folk music, travelling widely to collect material. The opera *Shah Senam* (first performed 1934) resulted from his study of Azerbaijan national music, and Uzbek elements appear in the music drama *Hulsara* (1936).

Glière achieved a high place in Soviet musical activity after the Revolution, largely because of his interest in national styles. He organized workers' concerts and directed committees of the Moscow Union of Composers and Union of Soviet Composers. For this work he was decorated by the government.

Glière's music today is principally performed in Communist countries, although his ballet *The Red Poppy* (1927) won international popularity for a time. Also well regarded were the ballet *The Bronze Horseman* (1949) and his *Symphony No. 3* (*Ilya Muromets;* composed 1909–11). Although he was highly respected by Soviet writers, Glière's often politically motivated works—*e.g.,* the overture *Twenty-five Years of the Red Army* (1943) and *Solemn Overture for the 20th Anniversary of the October Revolution* (1937)—were criticized by

others for lack of depth and originality. Nevertheless, his influence on younger Soviet composers was profound. Among his pupils were Sergey Prokofiev, Nikolay Myaskovsky, and Aram Khachaturian.

Glinka, Mikhail (Ivanovich) (b. June 1 [May 21, Old Style], 1804, Novospasskoye, Russia [now in Russian S.F.S.R.]—d. Feb. 15 [Feb. 3], 1857, Berlin, Ger.), the first Russian composer to win international recognition and the acknowledged founder of the Russian nationalist school.

Glinka's interest in music was aroused when he was 10 or 11 years old by hearing his uncle's private orchestra. From 1818 to 1822 he studied at the Chief Pedagogic Institute at St. Petersburg, also taking piano lessons from John Field and Charles Mayer. From 1824 to 1828 he served in the Ministry of Communications but was too indolent and unambitious for an official career. As a dilettante he composed songs and a certain amount of

Glinka
H. Roger-Viollet

chamber music. Three years in Italy brought him under the spell of the composers Vincenzo Bellini and Gaetano Donizetti, though ultimately homesickness led him to the idea of writing music "in Russian."

First he studied composition seriously for six months with Siegfried Dehn in Berlin, where he began a *Sinfonia per l'orchestra sopra due motive russe* (1834; "Symphony for Orchestra on Two Russian Motifs"). Recalled to Russia by his father's death, he married and settled down to the composition of the opera that first won him fame, *Life for the Tsar* (since the Russian Revolution, renamed *Ivan Susanin*); this was produced at St. Petersburg (1836) in the presence of the tsar. At this period Glinka composed some of his best songs, and in 1842 his second opera, *Ruslan and Lyudmila,* was produced. The fantastic-Oriental subject and often boldly original music of *Ruslan* won neither imperial favour nor popularity, though the composer Franz Listz was at once struck by the novelty of the music.

Disgruntled, and with his marriage broken, Glinka left Russia in 1844. He had the satisfaction of hearing excerpts from both his operas performed in Paris under Hector Berlioz (1845, as the first performance of Russian music in the West) and other conductors. From Paris he went to Spain, where he stayed for two years (until May 1847) collecting the materials used in his two "Spanish overtures," the capriccio brillante on the *Jota aragonesa* (1845; "Aragonese Jota") and *Summer Night in Madrid* (1848). Between 1852 and 1854 he was again abroad, mostly in Paris, until the outbreak of the Crimean War drove him home again. He then wrote his highly entertaining memoirs (first published in St. Petersburg, 1887), musical, social, and amorous, which give a remarkable self-portrait of his indolent, amiable, hypochondriacal character. His last notable composition was *Festival Polonaise* for Tsar Alexander II's coronation ball (1855).

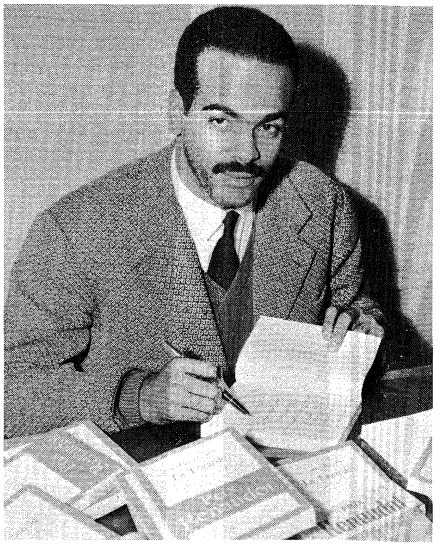
Glinka has been described as a dilettante of genius. His work, small in bulk, is considered the foundation of practically all later Russian music of any value. *Ruslan and Lyudmila* provided models of lyrical melody and colourful orchestration on which Mily Balakirev, Aleksandr Borodin, and Nikolay Rimsky-Korsakov formed their styles. Glinka's orchestral composition *Kamarinskaya* (1848) was said by Peter Ilich Tchaikovsky to form the foundation of later Russian symphonic music.

glioma, plural GLIOMAS, or GLIOMATA, a cancerous growth or tumour composed of cells derived from neuroglial tissue, the material that supports and protects nerve cells. Gliomas may form in the retina of the eye, in the brain, in the heart, in the nerve sheath (schwannoma), and occasionally in the sinus, where the tumour has been derived from the olfactory bulb of the brain. Gliomas can occur almost anywhere in connection with nerve tissue and may appear with other cancerous tissue, such as that of blood vessels, bone, or cartilage. They are of variable malignancy.

glissade (French: "sliding"), in ballet, a sliding step beginning and ending in the fifth position (feet turned out and pressed closely together, the heel of the right foot against the toe of the left, and vice versa). Used primarily as a preparation for jumps and leaps, the glissade begins when the dancer extends one leg along the floor to the front, side, or back from a fifth position with the knees slightly bent. He transfers his weight to the working leg and slides the other foot next to the first leg.

Glissant, Édouard (b. Sept. 21, 1928, Le Lamentin, Martinique), black French West Indian poet and novelist who belonged to the literary Africanism movement, which found several of its members in the Antilles.

A disciple and fellow countryman of the poet Aimé Césaire, who founded the Negritude movement to promote an African culture free of all colonial influences, Glissant recorded the awakening of the colonized people, bringing to the epic tone of his poetry the accents of revolt and liberation in *Un Champ d'îles* (1953; "An Expanse of Islands") and *Les Indes* (1956; "The Indies"). His novel *La Lézarde* (1958; "The Crack"; Eng. trans. *The Ripening*) won him the Prix Théophraste Renaudot (1958). In *Le Quatrième Siècle* (1962; "The Fourth Century"), he retraced the history of slavery in Martinique and the rise of a generation of young West Indians, trained in European universities, who would reclaim



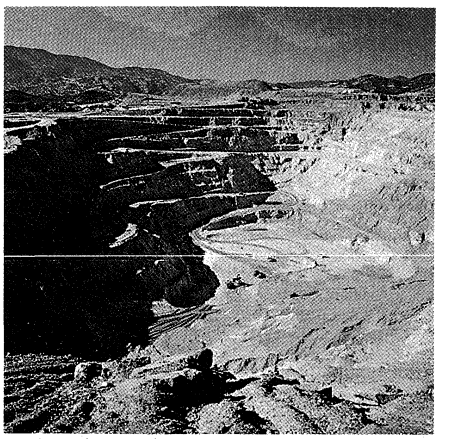
Glissant, 1958
Keystone

their land. The narrative structure of his novel *Malemort* (1975) interweaves the colonial history of Martinique with an examination of contemporary experience, a technique he used again in *La case du commandeur* (1981; "The Commander's Cabin"). Other verse collections include *Boises* (1977; "Woods") and *Pays rêvé, pays réel* (1985; "Countries Dreamed, Countries Real"). His play *Monsieur Toussaint* (published 1961) is about the Haitian hero Toussaint-Louverture.

Gliwice, German GLEIWITZ, town, Katowice *województwo* (province), southern Poland. An old settlement of Upper Silesia, Gliwice was chartered in 1276 and became capital of the Gliwice principality in 1312. It passed first to Bohemia, then to the Habsburgs, and in 1742 was incorporated (as part of Silesia) with Prussia. It was not returned to Poland until after World War II, during which it was moderately damaged.

Gliwice is a centre of heavy industry, located on the Wrocław–Kraków rail line. Industrial development began with the building of an iron foundry (1794) and a coke furnace (1798). Gliwice's foundry became famous for specialized artistic castings. Chemical production and food processing are other activities. The town's inland port on the Gliwice Canal, Poland's busiest, allows Silesian export via the Oder (Odra) River to the Baltic Sea. The town has a polytechnical institute (1945) and a fine museum and is noted for its parks and landscape. Pop. (1988 est.) 211,300.

Globe, city, seat (1881) of Gila county, east-central Arizona, U.S., situated on Pinal Creek



Copper mine, Globe, Ariz.
Herb and Dorothy McLaughlin

in foothills between the Pinal and Apache mountains. Miami, its sister city, is 6 miles (10 km) west. It originated as a mining camp at Ramboz Peak and was moved to the present site (which was a better distribution point) after the discovery, in 1875, of silver on the nearby San Carlos Apache Indian Reservation; the town was supposedly named for a globe-shaped piece of high-grade silver. Copper found beneath the silver formed the basis for economic development and remains the major source of income. Other economic factors are milling, lumbering, cattle raising, and tourism.

Nearby are the pre-Columbian Besh-bagowah (Metal Camp) pueblo ruins, the Southwestern Archeological Center (at Gila Pueblo), Tonto National Monument and Forest, Theodore Roosevelt Lake and Dam (1911), San Carlos Lake and Coolidge Dam (1929), and the Salt River Canyon. Inc. 1907. Pop. (1986 est.) 6,870.

globe, sphere or ball that bears a map of the Earth on its surface and is mounted on an axle that permits rotation. The ancient Greeks, who knew the Earth to be a sphere, were the first to use globes to represent the surface of the Earth. Crates is said to have made one in 150 BC. The earliest surviving terrestrial globe was made in Nürnberg in 1492 by Martin Behaim, who almost undoubtedly influenced

Christopher Columbus to attempt to sail west to the Orient. In ancient times, globes also were used to represent the constellations; the earliest surviving globe is the marble Farnese globe, a celestial globe dating from about AD 25.

Today's globe, typically hollow, may be made of almost any light, strong material, such as cardboard, plastic, or metal. Some are translucent. They may also be inflatable. Terrestrial globes are usually mounted with the axis tilted 23.5° from the vertical, to help simulate the inclination of the Earth relative to the plane in which it orbits the Sun. Terrestrial globes may be physical, showing natural features such as deserts and mountain ranges (sometimes molded in relief), or political, showing countries, cities, etc. While most globes emphasize the surface of the land, a globe may also show the bottom of the sea. Globes also can be made to depict the surfaces of spherical bodies other than the Earth, for example, the Moon. Celestial globes are also still in use.

globe amaranth (*Gomphrena globosa*), ornamental garden plant of the family Amaranthaceae, native to the Old World tropics. Globe amaranth is a short annual with dense, cloverlike flower clusters that often are dried and preserved. The flowers lack petals but exhibit red, pink, orange, or white bracts on long stalks.

Globe and Mail, The, daily newspaper published in Toronto, the most prestigious and influential journal in Canada.

The paper's origins can be traced to a liberal newspaper, *The Globe,* founded in 1844 by a Scottish immigrant, George Brown, and to *The Mail,* later the *Mail and Empire,* a conservative paper founded by John A. Macdonald in 1872. The two papers competed until 1936, when George McCullagh bought *The Globe.* Less than a month later, he bought the *Mail and Empire* and merged the two as the independent newspaper, *The Globe and Mail.*

The Globe and Mail sees its role as "independent but not neutral." It is Canada's national newspaper, in effect, and its publication of the texts of speeches, parliamentary debates, and other documents has made it the Canadian newspaper of record. Its large staff of foreign correspondents and its foreign news bureaus have given *The Globe and Mail's* international coverage great strength. For more than a decade from 1958, its Peking bureau was the source of China news preferred by most U.S. dailies.

globe lightning: *see* ball lightning.

Globe Theatre, famous London theatre in which the plays of William Shakespeare were performed after 1599. It was built by two brothers, Richard and Cuthbert Burbage, who owned its predecessor, The Theatre. The latter had closed, ostensibly for good, in 1597, and the owner of the land on which it stood threatened to pull the building down once the lease had expired. The Burbages and their associates anticipated the threat, however, and in late 1598 or early 1599 dismantled The Theatre and carried the materials to Bankside (a district of Southwark stretching for about half a mile west of London Bridge on the south bank of the River Thames), where the Swan and the Rose theatres already stood. Eastward of these, they reassembled the timbers from the old theatre, calling the new building, which was probably completed by the autumn of 1599, the Globe.

Half the shares in the new theatre were kept by the Burbages. The rest were assigned equally to Shakespeare and other members of the Chamberlain's Men (the company of players who acted there), of which Richard Burbage was principal actor and of which Shakespeare had been a leading member since late 1594. Information about the physical arrangement of the Globe is largely a matter of conjecture. It is thought to have been cylindrical in shape, with a thatched gallery roof. It is known that the Fortune Theatre, built in 1600 for a rival company, the Admiral's Men, was modeled on the Globe.

In 1613, during a performance of *Henry VIII,* the thatch of the Globe was accidentally set alight by a cannon, set off to mark the King's entrance onstage in a scene at Cardinal Wolsey's palace. The entire theatre was destroyed within the hour. By June 1614 it had been rebuilt, this time with a tiled gallery roof and a circular shape. It was pulled down in 1644, two years after the Puritans closed all theatres, to make way for tenement dwellings.

globeflower, any of about 20 species of perennial herbaceous plants constituting the genus *Trollius* of the buttercup family, Ranunculaceae, native mostly to North Temperate Zone wetlands.

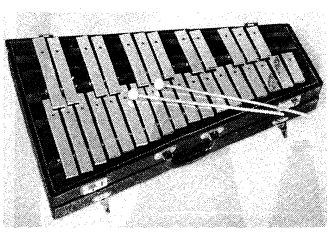
The common European globeflower (*T. europaeus*), up to 60 cm (about 2 feet) tall, is often cultivated in moist gardens and along pond edges; most of its horticultural varieties have yellow to orange ball-shaped flowers 2.5 to 5 cm (1 to 2 inches) across. Typically the dark green to bronzy leaves are three- to five-lobed, or divided, like the fingers of a hand. The American spreading globeflower (*T. laxus*), with greenish-yellow flowers, is native to the swamps of the eastern United States; *T. laxus albiflorus* is a white-flowered variety found in the northwestern United States.

globular cluster, any large group of old stars that are closely packed in a symmetrical, somewhat spherical form. *See* star cluster.

globulin, one of the major classifications of proteins, which may be further divided into the euglobulins and the pseudoglobulins. The former group is insoluble in water but soluble in saline solutions and may be precipitated in water that has been half-saturated with a salt such as ammonium sulfate. The latter group is soluble in water and has properties that resemble those of the true globulins. Globulins are an important source of protein in seed plants and are found in minute amounts in cereals. Globulins found in animal fluids are enzymes, antibodies, and fibrous and contractile proteins usually contained in the blood plasma.

Three types of globulin have been identified—alpha, beta, and gamma. Alpha and beta globulins are transport proteins, serve as substrates upon which other substances are formed, and perform other diverse functions. Gamma globulins have a vital role in natural and acquired immunity to infection. *See also* gamma globulin.

glockenspiel (German: "set of bells"), percussion instrument, originally a set of graduated bells, later a set of tuned steel bars (*i.e.,* a metallophone) struck with wood, ebonite, or, sometimes, metal hammers. The bars are arranged in two rows, the second corresponding to the black keys of the piano. The range



Glockenspiel
Boosey & Hawkes Ltd.

is 2½ or, occasionally, 3 octaves, the highest note normally the fourth C above middle C (written two octaves lower). Military bands use a portable form with a lyre-shaped frame, called a bell lyre. A glockenspiel may be fitted with a keyboard mechanism so that chords can be played. The glockenspiel became part of the orchestra in the 18th century.

The tubaphone is a softer-toned offspring of the glockenspiel. It is used in military bands and has metal tubes rather than bars.

Glockner (Austria): *see* Grossglockner.

Gloeocapsa, genus belonging to the order Chroococcales in the phylum Cyanophyta (the blue-green algae), with either single or clustered cells enclosed in concentric layers of mucilage. Largely terrestrial, they are found on rocks or moist soils. Some are symbiotic with fungi, forming lichens.

Głogów, city, Legnica *województwo* (province), southwestern Poland. Located on the Oder River in the Środkowopolski lowlands of the Głogów Proglacial Valley, it received its town rights in 1253. The modern city is the railway and road centre for the northern part of Legnica province. The city has food-processing plants and factories producing electrical machinery. It is also a centre for copper electroplating. Pop. (1987 est.) 68,500.

Glomar Challenger, oceanographic drilling and coring vessel, constructed in the late 1960s by Global Marine, Inc. The only ship of its kind in the world, it is capable of drilling in water depths up to 6,000 m (20,000 feet) and of bringing back core samples from depths as much as 750 m (2,500 feet) below the seafloor. To maintain the extreme stability required for this operation under differing current, wind, and wave conditions, the vessel is equipped with a computer-controlled roll-neutralizing system. An automatic pipe-racking device helps handle the numerous lengths of drill pipe needed. A drilling derrick 43 m (140 feet) high, mounted in the centre of the vessel, lowers the drill through an opening 6 by 6 m (20 by 20 feet) that extends through the bottom of the ship, which is 120 m (400 feet) long and 20 m (65 feet) wide. To prevent the roll and pitch of the ship from bending the string of the drill pipe too sharply, a flared structure on the ship surrounds the pipe. Living facilities are provided on board for 70 persons. Core samples gathered by the *Glomar Challenger* from 1968 to 1983 added much weight to the hypothesis of seafloor spreading, which played a pivotal role in the development of the theory of plate tectonics.

glomerulonephritis (medicine): *see* Bright's disease.

Gloriosa, genus of tuberous-rooted plants of the lily family, Liliaceae, native to tropical Africa and Asia. There are about six species, from about 1 to 2.4 m (3 to 8 feet) tall. These plants, variously known as climbing lilies or glory-lilies, are grown in greenhouses or outdoors in the summer. They have slender, vinelike stems; narrow, lance-shaped leaves; and mostly red, yellow, or purple flowers.

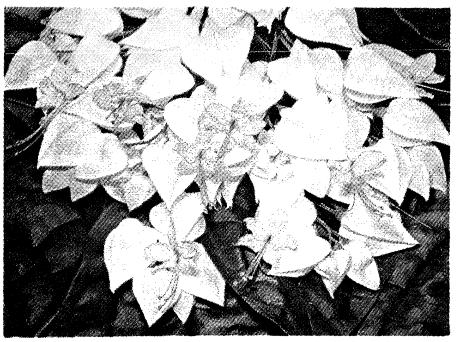
Glorious Revolution (England): *see* 1688, Revolution of.

glory (diffraction phenomenon): *see* Brocken bow.

glory-bower, the genus *Clerodendrum* (*Clerodendron*), consisting of about 400 herbs, vines, shrubs, and trees of the tropics, many of which are grown as garden plants. It belongs to the verbena family (Verbenaceae), order Lamiales. Common glory-bower (*C. speciosissimum*), from Asia, is a shrub up to about 120 cm (4 feet) tall that produces clusters of flame-orange flowers above heart-shaped bronzy leaves about 30 cm (1 foot) long.

Bleeding heart glory-bower (*C. thomsonae*), a woody vine from Africa, has sprays of blooms, resembling bleeding heart, amid glossy, dark-green, oval leaves. Scarlet glory-bower (*C.*

splendens), also an African vine, has clusters of red-orange flowers among heart-shaped leaves. Common in tropical gardens is *C. speciosum*,



Bleeding heart glory-bower (*Clerodendrum thomsonae*)
G.E. Nicholson

a hybrid between the two species above, with red-violet flowers and calyxes (united sepals) like those of *C. thomsonae*.

glossator, legal (medieval legal scholar): *see* legal glossator.

glossematics, system of linguistic analysis based on the distribution and interrelationship of glossemes, the smallest meaningful units of a language—*e.g.*, a word, a stem, a grammatical element, a word order, or an intonation. Glossematics is a theory and system of linguistic analysis proposed by the Danish scholar Louis Hjelmslev (1899–1965) and his collaborators, who were strongly influenced by the work of the Swiss linguist Ferdinand de Saussure. Glossematics has been an important component of European structuralism but has had relatively little influence in the United States, except in relation to stratificational grammar, a grammar originated by American linguist Sydney M. Lamb.

glossitis, inflammation of the tongue characterized by loss of the surface papillae, a condition that gives the affected area a smooth, red appearance. Glossitis may be the primary disease, or may be a symptom of one of several hereditary and acquired conditions (such as certain forms of anemia, pellegra, syphilis, or nutritional deficiencies). There may, however, be a mild burning sensation that can be controlled with topical anesthetics.

Geographic tongue (benign migratory glossitis) refers to the chronic presence of irregularly shaped, bright red areas on the tongue, surrounded by a narrow white zone; normal tongue epithelium may grow back in one area while new areas of glossitis develop elsewhere, making the disease seem to wander. Median rhomboid glossitis refers to a single rough, lozenge-shaped area of glossitis in the midline of the tongue; it appears to be a combination of anomalous fetal development and a yeast infection. Atrophic glossitis, in which the area of inflammation covers the anterior two-thirds of the tongue, is associated with chronic disease or malnutrition and may heal spontaneously when the underlying disease or nutritional deficiency is corrected. Though some individuals fear that glossitis is cancerous, malignancy is rarely associated with the condition.

glossolalia (religion): *see* tongues, gift of.

Glossopteris, genus of fossil plants dating to the Late Paleozoic Era (ended about 225,000,000 years ago). Long considered a fern after its discovery in 1824, it was later assigned to the gymnosperms. It is regarded by some authorities as being close to the ancestral angiosperm, or flowering plant. Certain poorly preserved reproductive structures associated with the leaves may in fact be the seed-bearing capsules of *Glossopteris*. *Glossopteris* is the key plant in a fossil assemblage called the *Glossopteris* flora, which also includes several related fossil genera (*e.g.*, *Lidgettonia* and *Gangamopteris*) in Late Paleozoic rocks of South Africa, India, Australia, and South America.

glottal stop, in phonetics, a momentary check on the airstream caused by closing the glottis (the space between the vocal cords) and thereby stopping the vibration of the vocal cords. Upon release, there is a slight choke, or coughlike explosive sound. The glottal stop is not a separate phoneme (or distinctive sound) in English, though it is one of the allophones of the *t* phoneme in some dialects (as in Cockney or Brooklynese "bo'l" for "bottle"). It functions as a phoneme in numerous other languages, however, such as Arabic and many American Indian languages. The process of momentary partial or complete closure of the glottis is known as glottalization. The closure may occur slightly before the primary articulation, simultaneously with it, or slightly after it. Several African and American Indian languages have glottalized stops and sibilants, and many languages also have glottalized vowels.

glottis, either the space between the vocal fold and arytenoid cartilage of one side of the larynx and those of the other side, or the structures that surround that space. *See* larynx.

glottochronology, the study of the rate of change occurring in the vocabularies of languages for the purpose of calculating the length of time (time depth) during which two related languages have developed independently. Glottochronology rests upon statistical comparison of the basic vocabulary shared by two or more related languages and on the assumption that the rate of vocabulary replacement is constant over sufficiently long periods of time. A number of linguists do not accept the methods or findings of glottochronology, for two reasons: the difficulty of compiling a culturally unbiased basic vocabulary list and the belief that the rate of linguistic change is not the same for all languages and is not constant for any single language.

Gloucester, city (district), county of Gloucestershire, England, lying on the River Severn between the Cotswolds (on the east) and the northern part of the Forest of Dean. A 16-mile (26-kilometre) ship canal links Gloucester to Sharpness docks in the Severn Estuary of the Bristol Channel.

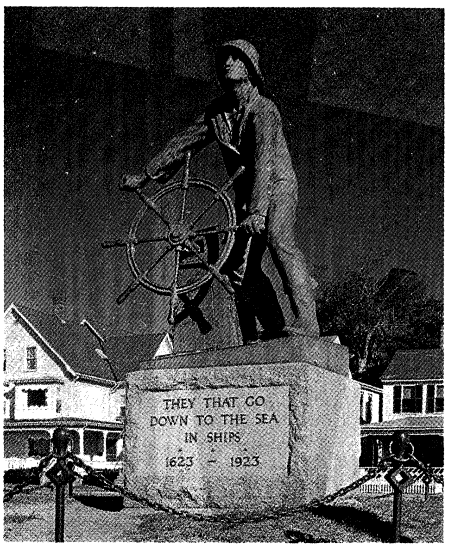
Gloucester was the Roman *colonia* of Glevum, founded by the emperor Nerva, AD 96–98. The foundation of the Abbey of St. Peter by King Osric of Northumbria in 681 favoured the town's growth, and it became the capital of the Anglo-Saxon kingdom of Mercia.

Before the Norman Conquest (1066) the community was already a borough with a royal residence and a mint. Henry II (reigned 1154–89) granted the first of many charters, and the town was incorporated in 1483, being made into a county in itself; the chartered portion dates from 1580. City status was confirmed in 1605. Gloucester had an iron trade before the Conquest, and the seaborne trade in grain and wine existed before the reign (1189–99) of Richard I. A tanning industry later developed, bell founding was introduced in the 14th century, and the cloth trade flourished from the 12th to the 16th century.

Although the cathedral originated in the abbey of 681, the present building was dedicated in 1100. The abbey was disbanded during the dissolution of the monasteries (1536–39) under Henry VIII but became the seat of a bishopric in 1541.

Gloucester's varied industries include the manufacture of railway rolling stock, aircraft and components, agricultural implements, and insulating material. There are both light and heavy engineering works and long-established timber mills. The Severn fisheries are also notable. The city covers an area of 13 square miles (34 square km). Pop. (1985 est.) 91,100.

Gloucester, city, Essex County, northeastern Massachusetts, U.S., on the southern shore of Cape Ann, facing Massachusetts Bay, 30 miles (48 km) northeast of Boston. Gloucester Harbor was first mapped by Samuel de Champlain in 1606, and the site (at Stage Fort Park) was settled by a colony from Dorchester, Eng., in 1623. Named for Gloucester, Eng., and incorporated as a town in 1642, it has flourished



Fisherman's Memorial, Gloucester, Mass.
Mark Sexton

as a maritime and fishing centre since that time. Its fishermen sailed from the Capes of Virginia to Greenland and Iceland; the Fisherman's Memorial, a bronze statue facing the harbour, honours those lost at sea (said to total 10,000). Since the late 19th century, the traditional Yankee fishermen have been reinforced by Portuguese. Gloucester's maritime heritage inspired many books, including Kipling's *Captains Courageous* and *Gloucestermen* by James B. Connolly. Longfellow wrote of the wreck of the "Hesperus" (which occurred off Cape Ann) in his famous poem.

Fisheries and fish-based industries remain the economic mainstays. With its scenic rocky coast and colonial atmosphere, the city has also developed summer resort business. Inc. city, 1873. Pop. (1986 est.) 28,259.

Gloucester, EARLS AND DUKES OF, titled English nobility, of several creations, grouped below chronologically and indicated by the symbol •.

• **Gloucester, Robert, Earl of** (b. *c.* 1090—d. Oct. 31, 1147), chief supporter of the royal claimant Matilda during her war with King Stephen of England (reigned 1135–54).

The illegitimate son of King Henry I of England (reigned 1100–35), he was made Earl of Gloucester in 1122. After the death of Henry I and usurpation of power by Stephen (December 1135), Gloucester became the leader of the party loyal to Matilda, his half sister, who had been designated heir to the throne by Henry I. He took Matilda to England in September 1139 and at the head of her forces won from Stephen most of western England and southern Wales. In February 1141 he captured Stephen at Lincoln and imprisoned him in Bristol. Later that year Gloucester was captured at Winchester, Hampshire, and exchanged for the king. He continued to be the mainstay of Matilda's cause until his death. The 12th-century chroniclers considered Gloucester an able and sagacious leader.

• Gloucester, Richard de Clare, 7th earl of, 8TH EARL OF CLARE, 6TH EARL OF HERTFORD (b. Aug. 4, 1222—d. July 15, 1262, Eschemerfield, near Canterbury, Kent, Eng.), the most powerful English noble of his time, holding estates in more than 20 English counties, including the lordship of Tewkesbury, wealthy manors in Gloucester, and the great marcher lordship of Glamorgan. He himself acquired the Kilkenny estates in Ireland and the lordship of Usk and Caerleon in south Wales, making him the greatest lord in south Wales; in Glamorgan especially he was almost an independent prince.

Son of Gilbert de Clare (the 6th earl), Richard succeeded to the earldoms in October 1230. He refused to help King Henry III on the French expedition of 1253 but was with him afterward at Paris. Thereafter he went on a diplomatic errand to Scotland and was sent to Germany to work among the princes for the election of his stepfather, Richard, earl of Cornwall, as king of the Romans. About 1258 Gloucester became a leader of the barons in their resistance to the King, and he was prominent during the proceedings which followed the Mad Parliament at Oxford in 1258. In 1259, however, he quarrelled with Simon de Montfort, earl of Leicester; the dispute, begun in England, was renewed in France, and he was again in the confidence of the King. This attitude, too, was only temporary, and in 1261 Gloucester and Leicester were again working in concord.

• Gloucester, Gilbert de Clare, 8th earl of, 9TH EARL OF CLARE, also called THE RED EARL (b. Sept. 2, 1243, Christchurch, Hampshire, Eng.—d. Dec. 7, 1295, Monmouth, Wales), Welsh nobleman whose belated support of King Henry III of England was a major factor in the collapse of the baronial rebellion led by Simon de Montfort.

Gilbert married Alice of Angoulême, niece of King Henry III, succeeded his father (Richard de Clare) in July 1262, and joined the baronial party led by Simon de Montfort. With Simon, Gloucester was at the battle of Lewes in May 1264, when the King himself surrendered to him, and after this victory he was one of the three persons selected to nominate a council. Soon, however, he quarrelled with Simon. Leaving London for his lands on the Welsh border, he met Prince Edward (afterward King Edward I) at Ludlow, just after his escape from captivity, and contributed largely to the Prince's victory at Evesham in August 1265. But this alliance was as transitory as the one with Simon. Gloucester championed the barons who had surrendered at Kenilworth in November and December 1266 and, after putting his demands before the King, secured possession of London (April 1267). Gloucester quickly made his peace with Henry III and with Prince Edward. Under Edward I he spent several years in fighting in Wales, or on the Welsh border. He was succeeded by his son, also named Gilbert de Clare (1291–1314), who was killed at the Battle of Bannockburn.

• Gloucester, Thomas of Woodstock, duke of (b. Jan. 7, 1355, Woodstock, Oxfordshire, Eng.—d. probably September 1397), powerful opponent of King Richard II of England (ruled 1377–99).

The seventh son of King Edward III (ruled 1327–77), he was created duke of Gloucester in 1385 and soon became leader of a party opposed to Richard, his young nephew. In 1386 Gloucester and his associates—later known as the appellants—took virtual control of the King's government. Gloucester defeated one of Richard's favourites, Robert de Vere, duke of Ireland, at Radcot Bridge, London, in December 1387 and then had a number of the King's friends executed. In 1389 Richard gained the upper hand and worked out a compromise with his enemies. Gloucester was made lieutenant of Ireland in 1392, but in 1397 Richard arrested him and two other leading appellants. Committed to the charge of Thomas Mowbray, earl of Nottingham (later duke of Norfolk), at the English port of Calais, Fr., Gloucester was murdered, possibly on orders from Richard. According to one of Mowbray's servants, later executed for his part in the crime, the Duke was suffocated with a feather bed.

• Gloucester, Humphrey Plantagenet, duke of (b. 1391—d. Feb. 23, 1447, London), English nobleman best remembered as the first notable patron of England's Humanists. He became known as the "good Duke Humphrey," but many historians, pointing to his unprincipled and inept political dealings, have questioned the appropriateness of the title.

Humphrey, duke of Gloucester, portrait by an unknown artist, 15th century; in the Library of St. Vaast, Arras, Fr.
Giraudon—Art Resource/EB Inc.

The fourth son of King Henry IV, Humphrey was made duke of Gloucester in 1414 by his brother King Henry V (ruled 1413–22), and from 1415 to 1420 he served in a series of campaigns in the Hundred Years' War against France.

Upon the death of Henry V in 1422, Parliament decreed that Gloucester should serve as acting regent for the infant king Henry VI while the official regent, John, duke of Bedford, was leading the troops in France. By 1425 Gloucester was embroiled in a bitter power struggle with his uncle, Henry Beaufort, chancellor and chief minister of the realm. This feud continued until, in the mid-1430s, Beaufort gained firm control over the government. On Feb. 18, 1447, Beaufort's successor as first minister, William de la Pole, earl of Suffolk, had Gloucester arrested. Five days later the Duke died, probably of natural causes. The popular belief that he had been murdered led to widespread uprisings in 1450.

Gloucester was one of the first Englishmen to appreciate classical Greek and Roman literature. He provided extensive patronage to English and Italian Humanists and presented a large part of his library to Oxford University. K.H. Vickers' *Humphrey, Duke of Gloucester,* was published in 1907.

• Gloucester, Richard Plantagenet, duke of: *see* Richard III *under* Richard (England).

• Gloucester, Henry Stuart, duke of, byname HENRY OF OATLANDS (b. July 8, 1639, Oatlands, Surrey, Eng.—d. Sept. 13, 1660, London), Protestant brother of Charles II of England.

The third son of Charles I, he visited his father the night before his execution and, for three years thereafter, was confined by the Parliamentarians. In 1652 Oliver Cromwell gave him permission to go abroad, and he joined his mother and brothers in Paris. His firm adherence to the Protestant religion, however, incensed his Catholic mother, Queen Henrietta Maria; and, after she turned him out, he joined the Spaniards at Dunkirk, fighting alongside his brother the Duke of York (afterward James II) in 1658. Having returned to England on the restoration of Charles II, he died a few months later of the smallpox, which was then ravaging London.

Gloucestershire, county of western England, at the head of the Severn Estuary on the Welsh border. With an area of 1,019 sq mi (2,639 sq km), the county is divided into the following districts: Cotswold, Forest of Dean, Stroud, the boroughs of Cheltenham and Tewkesbury, and the city of Gloucester. The administrative centre of the county is Gloucester.

The River Severn bisects the county from north to south, entering it at Tewkesbury from adjoining Hereford and Worcester. It is tidal below Gloucester. The Severn flows through the low-lying Vale of Gloucester, which varies in width from 5 to 10 mi (8 to 16 km). To the west lies the high country of the Forest of Dean, and the eastern edge of the vale is well defined by the Cotswold escarpment. Eastward lie the Cotswold Hills, which dip down to the Vale of Oxford.

Prehistoric peoples were active in the area as the numerous tumuli (burial mounds) indicate. Gloucester and Cirencester were Roman towns of note, and there were numerous villas and military camps within the county. Following the departure of the Romans the Saxon Hwicce occupied the area. Throughout the Middle Ages Gloucestershire was a battlefield. The line of imposing Norman castles—Berkeley, St. Briavels, and Gloucester—reflect the nearness of the Welsh, and between 1135 and 1154 the county was the site of many of the battles of Stephen and Matilda. The Cotswold area subsequently had a rise and fall of a domestic woollen industry and similarly the Forest of Dean of ironworking and coal mining. The last mine was closed in 1965.

Agriculture is the major land use but, with increased mechanization, employs only a small and declining proportion of the population. Traditionally the Cotswolds were famous for sheep and wool, but today these are being replaced by cattle and arable farming—principally wheat and barley. Poultry are also raised. In the northeastern corner of the county orchards of apples, pears, and plums are important. There is still considerable woodland between Lydney and Cinderford in the Forest of Dean. The only mineral resources worked today are limestone and sand and gravel, the latter principally in the area south of Cirencester. The major centres of employment are Gloucester and the former spa of Cheltenham, both of which are commercial and manufacturing centres with light engineering and electrical industries. Stroud, former centre of the woollen industry, has also attracted light industry, such as the manufacture of plastics and scientific instruments.

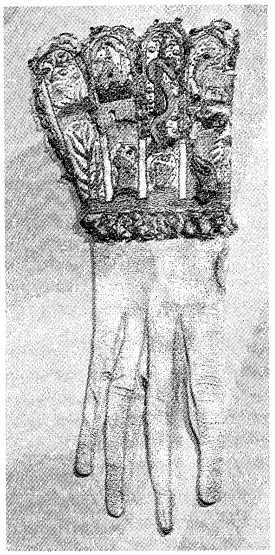
Most of the eastern half of the county is scenic, and an extensive area west and south of Cinderford forms the Dean National Forest Park. The Vale of Gloucester has long been a routeway between the Midlands and the West Country. Roman roads and, subsequently, canals and railways followed it, and today the major motorway linking the West Midlands conurbation and Greater Bristol uses the route. Cheltenham is the major educational centre of the county, with a renowned girls' public school and two major colleges of education that have merged. Pop. (1982 est.) 505,500.

glove, covering for the hand with separate sections for the fingers and thumb, and sometimes extending over the wrist or part of the arm. Fingerless gloves, called mitts in colonial America, have five holes through which the fingers and thumb extend.

Well-formed linen gloves with a drawstring closure at the wrist were found in the tomb of

the Egyptian king Tutankhamen (14th century BC). Ancient Greek and Latin literature contain many allusions to gloves. Medieval European nobles, patricians, and prelates wore both fabric and leather gloves, often richly jeweled and embroidered. By the 14th century, gloves were worn generally by upper-class men; but not until the 16th century did Catherine de Médicis, queen consort of Henry II of France, set the fashion for women. Around the beginning of the 17th century, women's gloves of soft kidskin were introduced.

Glove making, an ancient art, became an industry in 1834, when Xavier Jouvin of



English kid glove, embroidered in silk and metal thread, *c.* 1600; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, purchase, Rogers Fund, 1953

Grenoble, Fr., invented the cutting die that made possible a glove of precise fit. The kid glove has retained supremacy as the aristocrat of gloves, but other skins are utilized in modern glove manufacture, including capeskin, cabretta, pigskin, buckskin, reindeer skin, and lambskin, also called doeskin.

There are usually eight components of a leather glove: palm and back (one piece), thumb, three fourchettes (slender pieces of leather that form the sides of the fingers), and three quirks, or diamond-shaped pieces inserted at the bottom between the fingers. In cutting gloves, a single trank, or rectangular piece of leather the size of the glove, may be cut by hand to a desired pattern with shears; or a number of tranks may be cut simultaneously by a weighted, sharp steel die. The glove is closed by stitching up along the outside to the tip of the little finger; then the thumbs, quirks, and fourchettes are set in and sewed with great care. Although some sewing is done by hand, most is by machine and closely resembles hand stitching. The completed glove is dampened, tailored on an electrically heated metal model hand, and buffed.

Fabric gloves of antiquity were made of woven material, but modern fabric gloves are knit. Silk was the favoured material before World War II, but the glove industry now relies on cotton and man-made fibres such as rayon and nylon.

Glove-sized squares of finished fabric are arranged face-to-face so that the left and right hands are cut out together by the knife-sharp glove die, which is forced through the built-up layers of fabric. Gores, triangular pieces of fabric, are cut separately and attached between the fingers when the cutout glove is folded over and stitched together. Thumbs are also cut separately and attached. The fingers are given a tubular shape by seaming. Fabric gloves are tailored on electrically heated metal hands, as are leather gloves.

Gloves of wool, man-made fibres, and cotton yarns can be knit by machine with or without seams; and their colours, designs, patterns, and stitch variations rival those of gloves knit by hand. Seamed, or wrought, gloves are first machine knit as flat selvage pieces of fabric, folded so that complementing parts fall together, and then stitched. Seamless gloves also may be knit entirely on such a flat machine, or the cuff and palm may be knit on a circular machine and then the stitches carefully transferred to a flat fingering machine.

Protective gloves have been developed for special uses. Thin rubber gloves are used by surgeons. Heavy rubber gloves are used by electrical workers. Asbestos gloves protect against burns, as do gloves of heavy, twisted loop pile similar to terry cloth. Canton flannel gloves treated with polyvinyl provide plastic-coated work gloves that are heat resistant, impermeable to most fluids, and proof against acids, alkalies, industrial oils, greases, and other chemicals. Lead-impregnated gloves may be used in order to shield the hands from X rays.

Gloversville, city, Fulton county, east-central New York, U.S. It is adjacent to Johnstown, on Cayadutta Creek in the Mohawk River valley, 44 miles (77 km) northwest of Albany. Settled in the 1760s, it was first known as Stump City. Tanning and glove making (for which it was renamed in 1832) began in the colonial period and remain the most important industries. Located near Great Sacaranda Lake and major transportation lines, it is a distribution centre and a gateway to the lakes of the Adirondack Forest Preserve and State Park. Inc. city, 1890. Pop. (1988 est.) 16,602.

Glowacki, Aleksander (writer): *see* Prus, Bolesław.

glowworm, any crawling, luminous insect emitting light either continuously or in prolonged glows rather than in brief flashes as do most fireflies. Principal types of glowworms are: (1) wingless adult females of certain beetles of the family Lampyridae, particularly the common European glowworm, *Lampyris noctiluca,* (2) larvae of lampyrid fireflies (common in the Americas) and of elaterid fireflies (tropical), (3) larvae and adult females of certain beetles of the genera *Phengodes* (North America) and *Phrixothrix* (South America), and (4) larvae of certain gnats (*e.g.,* the cave-dwelling *Arachnocampa* of New Zealand and *Platyura* of the central Appalachians).

Glowworm bioluminescent organs vary widely in size, number, location, and structure, suggesting independent evolutionary origins of light-producing ability. In *Phengodes* the light is emitted by solitary giant cells; in *Arachnocampa,* by modified excretory organs; in *Platyura,* by modified salivary glands; and in *Phrixothrix, Lampyris,* and lampyrid larvae, by organs similar to, but simpler than, the "lanterns" of flashing types of fireflies. The light is usually greenish, but the "railroad worm" (*Phrixothrix*) has a red headlight in addition. In *Lampyris, Phengodes,* and *Phrixothrix* the flying male, which may itself be nonluminous, is attracted to the female's light; and in *Platyura* and *Arachnocampa,* in which the larvae spin sticky webs, food insects are attracted.

gloxinia, any plant of the genus *Sinningia,* especially *S. speciosa,* an ornamental pot plant. The 20 species of this genus, which are native to Brazil, are members of the family Gesneriaceae. They produce large, erect bell-shaped flowers in rich, velvety colours, usually violet or purple. The leaves, if pinned down to moist

Gloxinia (*Sinningia speciosa*)

Maurice B. Cook

soil, produce new plants. The genus *Gloxinia* of the same family contains six species that are not cultivated.

Glubb, Sir John Bagot, byname GLUBB PASHA (b. April 16, 1897, Preston, Lancashire, Eng.—d. March 17, 1986, Mayfield, East Sussex), British army officer who in 1939–56 commanded the Arab Legion, an army of Arab tribesmen in Transjordan and its successor state, Jordan.

The son of a British army officer, Glubb attended the Royal Military Academy and then rose steadily in the British army. He served in Europe in World War I and then volunteered for service in Iraq. In 1926 he resigned from the British army to become an administrative inspector for the Iraqi government; he left this post in 1930 and contracted to serve as a brigadier in Transjordan's Arab Legion, an internal police force employed prior to World War II. Glubb became its commander in 1939 and transformed it into a disciplined army that supported the Allies in World War II. After 1951 he raised a national guard to defend Jordan's border against Israeli raids. Arab pressure to eliminate British influence in the Middle East led to his dismissal in 1956. He was knighted in that year.

Glubb Pasha's writings include *Story of the Arab Legion* (1948), *Britain and the Arabs* (1959), *The Empire of the Arabs* (1963), *Syria, Lebanon, Jordan* (1967), *The Life and Times of Muhammad* (1970), *Peace in the Holy Land* (1971), and *Soldiers of Fortune* (1973), the last dealing with the Mamlūks. His autobiography, *The Changing Seasons of Life,* was published in 1983.

glucagon, a pancreatic hormone produced by cells in the islets of Langerhans. Glucagon, a protein of low molecular weight, strongly opposes the action of insulin; it raises the concentration of sugar (glucose) in the blood by promoting the breakdown of glycogen (the form in which glucose is stored in the liver). It also reduces the rate of glycogen synthesis, promotes the breakdown of protein, and promotes the metabolism of fat. Gastrointestinal glucagon, another form, is secreted into the blood when glucose is ingested; its only action appears to be to stimulate the secretion of insulin.

Gluck, Christoph, in full CHRISTOPH WILLIBALD, RITTER (knight) VON GLUCK (b. July 2, 1714, Erasbach, near Berching, Upper Palatinate, Bavaria [Germany]—d. Nov. 15, 1787, Vienna, Austria), German classical composer, best known for his operas, including *Orfeo ed Eurydice* (1762), *Alceste* (1767), *Paride ed Elena* (1770), *Iphigénie en Aulide* (1774), the French version of *Orfeo* (1774), and *Iphigénie en Tauride* (1779). He was knighted in 1756.

Early life. Gluck's paternal forebears, mostly foresters, were of the border territory between the Upper Palatinate and Bohemia; nothing is known of his ancestors on his mother's side. His father, Alexander Gluck, had moved to Erasbach as a ranger in 1711–12; the family then moved to Reichstadt near Böhmisch-Leipa in Bohemia. Between 1722 and 1727 they lived near Böhmisch-Kam-

Gluck, detail of a painting by Joseph Siffred Duplessis, 1775; in the Kunsthistorisches Museum, Vienna

By courtesy of the Kunsthistorisches Museum, Vienna

nitz and after this, until 1736, in Eisenberg (near Komotau), where Alexander Gluck held the post of master forester to Prince Philipp Hyazinth von Lobkowitz.

Gluck, whose father probably intended for him to continue in the family employment of forestry, at an early age showed a stong inclination toward music. In order to escape from disagreements with his father, the young Gluck left home and, supporting himself by his music, made his way to Prague, where he played in several churches, began university work (1731), and continued his musical studies. He went to Vienna in the winter of 1735–36. There he was discovered by a Lombard nobleman who took him to Milan, where Gluck, apart from fulfilling his duties in the Melzi family chapel, spent four years studying composition with the Italian organist and composer Giovanni Battista Sammartini, from whom he learned the new Italian style of instrumental music. Probably six trio sonatas, consisting of two movements with a minuet as conclusion and printed in London in 1746, were the fruits of his studies with Sammartini in Milan. Besides the six "London" sonatas, Gluck probably composed further trio sonatas under Sammartini.

On Dec. 26, 1741, in the Teatro Ducal in Milan, Gluck had his first great dramatic success with his first opera, *Artaserse,* to a libretto by P. Metastasio. Until 1745 there then followed an annual succession of operas for this theatre: *Demofoonte* (1742), *Arsace* (in collaboration with G.B. Lampugnani; 1743), *Sofonisba* (1744), and *Ippolito* (1745). In addition, Gluck wrote *Cleonice* (*Demetrio*) (1742) and *La finta schiava,* a *pasticcio* (1744) for Venice; *Il Tigrane* (1743) for Crema; and *Poro* (1744) for Turin. In these early works, of which mostly only fragments have survived, Gluck largely followed the existing Italian operatic fashion—melodic but never grand, charming without intensity. Occasional intensely passionate outbursts and the beginning of characterization, however, foreshadowed the great dramatic composer he was to become.

The middle years. In 1745 Gluck, by then well known as an operatic composer, was invited to England at the instigation of Lord Middlesex, director of Italian opera at the Haymarket Theatre, London, in order to challenge Handel's solid hold on London opera goers. The plan at first failed when, because of the political chaos caused by the Stuart rising, all theatres in London were closed before Gluck arrived in England. When the situation became calmer, theatrical activities recommenced with a performance of Gluck's opera *La caduta de' giganti* on Jan. 17, 1746; the libretto, by A.F. Vanneschi, glorified the hero of the day, the Duke of Cumberland, after his victory at Culloden over the forces of Prince Charles Edward, the Stuart claimant to the British throne. This work, as well as Gluck's second London opera, *Artamene,* produced on March 14, 1746, consisted largely of music from his own earlier works, lack of time having forced him to this device. Neither opera met with success. On March 25, shortly after the production of *Artamene,* Handel and Gluck together gave a concert in the Haymarket Theatre consisting of works by Gluck and an organ concerto by Handel, played by the composer. Gluck had won Handel's interest despite the latter's later much-quoted criticism of Gluck's lack of contrapuntal ability (Handel said that Gluck "knows no more counterpoint than my cook"). Gluck himself, according to the Irish singer Michael Kelly, tried to emulate Handel, whom he described as the "divine master of our art."

After he left England (possibly in 1746) Gluck came into contact with two travelling opera companies, one of which, on June 29, 1747, performed his opera-serenade *Le nozze d'Ercole e d'Ebe* at Pillnitz Castle, near Dresden, on the occasion of the double wedding between the electoral families of Bavaria and Saxony. By early 1748 at the latest, Gluck was back in Vienna, at work on Pietro Metastasio's *Semiramide riconosciuta,* with which, on May 14, 1748, the Burgtheater was inaugurated. It proved a brilliant success for the composer. At that time Gluck met his future wife, Marianne Pergin, the 16-year-old daughter of a rich merchant; in the same year, as conductor of the P. and A. Mingotti Travelling Opera company, he travelled via Hamburg to Copenhagen, where he composed the opera-serenade *La contesa dei Numi* in celebration of the birth of the heir to the Danish throne. During the following two winters Gluck was in Prague, where he wrote *Ezio* (1750) and *Issipile* (1751–52). On Sept. 15, 1750, he married Marianne in the Church of St. Ulrich in Vienna. Their marriage, a harmonious one, was childless. Gluck later adopted his niece, Marianne. Before the young couple set up a pemanent home in Vienna in the winter of 1752–53, Gluck took his wife to Naples for the summer of 1752, where he composed music for Metastasio's drama *La clemenza di Tito* after having rejected the text of *Arsace,* which he had already once set to music.

In Vienna, Gluck soon found a patron in the imperial field marshal Prince Joseph Friedrich von Sachsen-Hildburghausen, who engaged him first as *Konzertmeister* of his orchestra and later as *Kapellmeister.* Gluck gave successful performances of his symphonies and arias at weekly concerts in the Prince's palace and made a particular impression with his opera-serenade *Le Cinesi,* which was performed on Sept. 24, 1754, in the presence of the Emperor and Empress at a magnificent celebration at Schlosshof Castle. This success may well have contributed to the decision of the director of the court theatre to entrust the provision of the "theatrical and academic music" for the imperial court to Gluck. On May 5, 1755, Gluck's opera-serenade *La danza* was performed at the imperial Castle of Laxenburg, near Vienna, and on December 8 of the same year followed *L'innocenza giustificata.* The following year (1756) Vienna saw *Il repastore,* while the first performance of the opera *Antigono* was given during a visit to Rome. In Rome Gluck was created Knight of the Golden Spur, and after his return to Vienna he set to work to provide music for a number of French *vaudeville* comedies imported from Paris. *Tircis et Doristée* (1756) may have been a first attempt at this genre. In these Parisian comedies the dialogue was spoken or sung in the manner of street songs, so-called *timbres.* After 1758 Gluck proceeded more independently and composed for such works as *La Fausse Esclave, L'Île de Merlin* (1758), *La Cythère assiégée* (1759), *Le Diable à quatre, L'Arbre enchanté* (1759), *L'Ivrogne corrigé* (1760), and *Le Cadi dupé* (1761), which contained, in addition to the overture, a steadily increasing number of new songs in place of the stock *vaudeville* tunes. In *La Rencontre imprévue,* first performed in Vienna on Jan. 7, 1764, no *vaudeville* elements remain at all, with the result that the work is a perfect example of *opéra comique.* Gluck gave the scores of *Le Cadi dupé* and *La Rencontre imprévue* particular charm by using "oriental" instrumental effects. In many of the arias, tuneful melody and programmatic writing foreshadow later developments in Gluck's operatic style: in, for instance, the first examples of complex scene development in *L'Île de Merlin* and *L'Ivrogne corrigé.*

The late works. In February 1761 Ranieri Calzabigi, a friend of the adventurer Giovanni Giacomo Casanova, visited Vienna. His libretto for *Orfeo ed Euridice,* partly based on the theories and practices of such literary men as D. Diderot, F.M. von Grimm, Rousseau, and Voltaire, was enthusiastically greeted by Gluck's friends, who immediately brought the two together. On Oct. 17, 1761, the first performance of their first work of collaboration, the dramatic ballet *Le Festin de pierre* (Don Juan), was presented. Gluck later composed the music for the dance dramas *Semiramide* and *Iphigénie* (both 1765) to a scenario by G. Angiolini and *Achille* (*c.* 1770). The choreography for these works was created by the Viennese ballet master G. Angiolini. Together with Calzabigi, Gluck also wrote the three Italian "reform operas," *Orfeo ed Euridice* (1762), *Alceste* (1767), and *Paride ed Elena* (1770).

Gluck himself, in the foreword to *Alceste,* described his and Calzabigi's aims with the words "simplicity, truth and naturalness," demands that primarily affected the libretto. In place of involved plots in the older manner, there was to be a simple, true, and natural action in the tradition of the classical drama; in place of courtly conventions, there was to be a purely human element. The chorus, again on the classical pattern, was to have equal importance with the main characters of the action and participated directly in the dramatic events. The function of the music was, in Gluck's own words (foreword to *Alceste*), "to serve poetry by means of expression and by following the situations of the story, without interrupting the action or stifling it with a useless superfluity of ornaments." The *recitativo secco* ("unaccompanied recitative") was banished (except in *Alceste*); the *recitativo accompagnato,* arioso, aria, chorus, and pantomime were welded together with declamatory style and expressive orchestral writing to form scenes and groups of scenes as parts of a great work of architecture. As Gluck himself confessed, the impulse toward opera reform came from Calzabigi, but it must also be recognized that Calzabigi proceeded largely from the ideas put forward after 1750 by the Parisian poetic and literary circles mentioned above, while important new musical features (*e.g.,* the complex scene development) were the contributions of Gluck's own genius.

Besides the three Italian "reform operas," which were not written as the result of a particular request, there appeared a series of commissioned works, partly after librettos by Metastasio: *Il trionfo di Clelia* (Bologna, 1763), the second version of *Ezio* of 1750 (Vienna, 1763) and, after a short visit to Paris in the spring of 1764, *Il Parnaso confuso, Telemaco o sia L'isola di Circe,* and the dance drama *Semiramide,* all written for the second marriage of the Holy Roman emperor Joseph II in 1765. The opera-serenade *La corona,* written in the same year, was not performed owing to court mourning for the death of the emperor Francis I. In Florence on Feb. 22, 1767, Gluck gave performances of his festival opera

Il prologo, together with T. Traetta's *Ifigenia in Tauride; La Vestale,* the revised version of *L'innocenza giustificata* of 1755, followed in Vienna in 1768; and in Parma in 1769, he presented *Le feste d'Apollo.*

On Aug. 1, 1772, the Paris Opéra was encouraged to stage Gluck's newly completed opera, *Iphigénie en Aulide* (the text, after Racine's tragedy, was by François-Louis Leblanc, bailli Du Roullet); and, as Gluck had undertaken to transform the genial Italian style to the more serious opera cultivated by French composers as well as to provide six more similar operas, he went to Paris in the autumn of 1773. The performances of *Iphigénie* on April 19, 1774, and of the French version of *Orfeo* in the summer of the same year met with tremendous success. In Vienna, Gluck was appointed official court composer, but he soon took leave to return to Paris, where the new version of *L'Arbre enchanté* in 1775 brought him little success, and the completely rewritten *Cythère assiégée* proved a failure. The French version of *Alceste,* which was produced during his third visit to Paris on April 23, 1776, also met with disapproval. Deeply distressed by this and the death of his niece, Marianne, Gluck left Paris in May 1776 and returned to Vienna.

In Paris, Gluck left both friends and enemies, who began to form two opposing parties: his adherents, the Gluckists, under the leadership of the French writers and music critics François Arnaud and Jean-Baptiste-Antoine Suard, and his opponents, called Piccinnists after the Italian composer N. Piccinni, who had been prevailed upon to come to Paris in the summer of 1776 to write opera in opposition to Gluck's style. The struggle, which reached its full fury in 1777, never drew either Gluck or Piccinni into active participation in the dispute. Gluck, in Vienna, had completed *Armide* but had destroyed his sketches for *Roland* on hearing that Piccinni was setting the same text for Paris. At the end of May 1777, Gluck returned to Paris.

At the first performance of *Armide* on Sept. 23, 1777, the war of the theatres reached a climax, but soon after the performance of Piccinni's *Roland* on Jan. 27, 1778, the struggle abated again. Gluck retired to Vienna, and his last visit to Paris began at the end of 1778, where he arrived with his two latest completed dramatic works, *Iphigénie en Tauride* and *Écho et Narcisse.* The performance of *Iphigénie* on May 18, 1779, brought him his greatest success in Paris, but *Écho* (which was first performed on Sept. 24, 1779) met with little appreciation. Gluck, who had suffered a stroke during the rehearsals of *Écho,* left Paris for the last time at the beginning of October 1779.

Gluck's great French "reform operas" are more strongly governed by the principle of contrast than are the Italian works; the declamatory style of the vocal line is more marked than in the Viennese operas, and the power and orchestral colour are more intense. The works are constructed in shorter sections, which frequently follow each other without a break, and the spacious conception of the scenes is partly sacrificed in order to achieve a greater degree of dramatic and psychological flexibility.

Gluck spent the last eight years of his life in Vienna and in Perchtoldsdorf nearby, in the care of his wife, continuing to work tirelessly. His attention turned again to F.G. Klopstock's *Hermannsschlacht,* which had occupied him as early as 1770. Only a few years before his death he published his *Klopstocks Oden und Lieder* (seven numbers), which must have been written *c.* 1770. Also in these years he revised *Écho et Narcisse* and, together with a Viennese poet, J.B. von Alxinger, produced a German version of *Iphigénie en Tauride,* first performed in Vienna on Oct. 23, 1781, on the occasion of the visit by the Russian grand duke Pavel Petrovich, later Emperor Paul I. At this time the paths of the aging Gluck again crossed those of Mozart, as had already occurred once in Paris; they met on several occasions, but no close personal relationship developed between them. In 1781 Gluck suffered a second stroke, which partly paralyzed him, and his physical powers began to decline. On Nov. 15, 1787, Gluck had a further stroke, from which he died. Two days later he was buried in the central cemetery in Vienna amid general mourning. (G.Cr.)

MAJOR WORKS. *Operas. Artaserse* (1741); *Sofonisba* (or *Siface*) and *Ipermestra* (both 1744); *Le nozze d'Ercole e d'Ebe* (1747); *Semiramide riconosciuta* (1748); *Ezio* (1750, second version 1763); *La clemenza di Tito* (1752); *Orfeo ed Euridice* (1762); *Alceste* (1767); *Paride ed Elena* (1770); *Iphigénie en Aulide* (1774); *Orphée et Eurydice* (French version of *Orfeo ed Euridice,* 1774); *Alceste* (French version, 1776); *Armide* (1777); *Écho et Narcisse* (1779); *Iphigénie en Tauride* (1779); *Iphigenrie auf Tauris* (German version, 1781).

Comic operas (opéras comiques). L'Île de Merlin (1758); *L'Arbre enchanté* (1759, second version 1775); *La Cythère assiégée* (1759, second version 1775); *Le Cadi dupé* (1761); *La Rencontre imprévue* or *Die Pilgrime von Mekka* (1764).

Dramatic ballets and pantomimes. Don Juan ou le festin de pierre (1761); *Semiramide* (1765); *Iphigenié* (1765); *Achille* (1770?).

Odes. Klopstocks Oden und Lieder (seven odes for voice and piano with texts by Klopstock, composed *c.* 1770).

Church music. De profundis (after 1785?).

Instrumental music. Six trio sonatas; about 15 sinfonies (overtures).

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Gluckman, (Herman) Max (b. Jan. 26, 1911, Johannesburg, S.Af.—d. April 13, 1975, Jerusalem), South African social anthropologist esteemed for his contributions to political anthropology, particularly his analyses of political systems among African tribes. Examining feud and conflict, he considered their relation to cultural change in *Custom and Conflict in Africa* (1955).

After field study in Zululand (1936–38), Gluckman became assistant anthropologist with the Rhodes-Livingstone Institute of Northern Rhodesia and made studies in Barotseland (1939–41). While director of the institute (1941–47), he worked among the Ila and Tonga people (1944) and the Lamba (1946). A lecturer in social anthropology at the University of Oxford (1947–49), he later served as professor of social anthropology at the University of Manchester. The scope of Gluckman's work is reflected in the titles of his many books, which include *Rituals of Rebellion in South-East Africa* (1954); *Politics, Law, and Ritual in Tribal Society* (1965); and *The Ideas in Barotse Jurisprudence* (1965). He also was editor of *The Allocation of Responsibility* (1972).

Glücksberg, Élie, duc de (duke of): *see* Decazes (et de Glücksberg), Élie, duc de.

Glückstadt, city, Schleswig-Holstein *Land* (state), northern Germany, on the Elbe River Estuary, northwest of Hamburg. It was founded in 1616 by Christian IV of Denmark to rival Hamburg as a trading port. The fortress was demolished in 1815–16, but the huge marketplace and many old buildings remain. The palace (built in 1631–32) houses a museum of local history, handicrafts, navigation, and whaling. Glückstadt has an important trade in vegetables, especially new potatoes. Other economic activities include herring fishing, shipping, printing, and the manufacture of paper and paper products. Pop. (1989 est.) 11,329.

gluconeogenesis, also called GLUCOGENESIS, formation in living cells of glucose and other carbohydrates from other classes of compounds. These compounds include lactate and pyruvate; the compounds of the tricarboxylic acid cycle, the terminal stage in the oxidation of foodstuffs; and several amino acids.

Gluconeogenesis occurs principally in the liver and kidneys; *e.g.,* the synthesis of blood glucose from lactate in the liver is a particularly active process during recovery from intense muscular exertion. Although several of the reactions in the gluconeogenetic pathway are catalyzed by the same enzymes that catalyze the reverse sequence, glycolysis, two crucial steps are influenced by other enzymes. Because the process is controlled, among other things, by the balance among various hormones—particularly cortisol from the cortex of the adrenal glands and insulin from the pancreas—knowledge of the mechanisms of control is important in understanding such metabolic diseases as diabetes mellitus.

glucose, also called DEXTROSE, one of a group of carbohydrates known as simple sugars (monosaccharides). Glucose (from Greek *glykys;* "sweet") has the molecular formula $C_6H_{12}O_6$. It is found in fruits and honey and is the major free sugar circulating in the blood of higher animals. It is the source of energy in cell function, and the regulation of its metabolism is of great importance (*see* fermentation; gluconeogenesis). Molecules of starch, the major energy-reserve carbohydrate of plants, consist of thousands of glucose units, as do those of cellulose (*q.v.*). Also composed of glucose is glycogen (*q.v.*), the reserve carbohydrate in most vertebrate and invertebrate animal cells, as well as those of numerous fungi and protozoans. *See also* polysaccharide.

glucose-6-phosphate dehydrogenase deficiency, hereditary metabolic defect characterized by an increased tendency of the red blood

cells to break and release their hemoglobin (hemolysis), especially after the intake of certain drugs. The condition is caused, as the name indicates, by the markedly reduced activity in the red blood cells of a particular organic catalyst or enzyme called glucose-6-phosphate dehydrogenase. This low enzyme activity is associated with a decrease in the formation of certain substances that normally help to prevent the oxidative destruction of the red blood cell membrane. Under normal conditions, the affected red blood cells are only slightly more fragile than usual, but more than 40 drugs, including chloramphenicol and sulfonamides, all of which are converted in the body to oxidant compounds, have been shown to produce hemolysis in susceptible persons. There seem to be several variants of the disorder, all of which appear to be sex-linked and fully expressed in males only. The most common form is found chiefly in blacks and in persons whose ancestors inhabited the Eastern Mediterranean basin. A possible protective effect of this metabolic abnormality against malaria has been suggested.

glucose tolerance test, procedure to assess the ability of the body to metabolize glucose, the principal blood sugar. In persons with normal, or slightly elevated, blood-sugar levels, the body tolerance to sugar is measured in a stressful situation induced by administering a large amount of glucose.

The most common procedure is to take an initial blood sample from a fasting individual, have him empty his bladder, and then give him orally 50 to 100 grams of glucose (usually 1 gram of glucose per kilogram of ideal body weight) dissolved in water. Samples of blood and urine for glucose determination are obtained 30 minutes, 1 hour, 2 hours, and 3 hours later. Normally, the concentration of glucose in the blood will rise to about 140 milligrams per 100 millilitres in 45 to 60 minutes and will return in 1½ to 2½ hours to the normal range of 80–120 milligrams per 100 millilitres. The most valuable diagnostic point is 2 hours, when the value should be less than 120 milligrams per 100 millilitres. In persons suffering from an impairment of sugar metabolism, such as diabetes mellitus, a decreased tolerance to sugar is manifested by a blood-sugar-level curve that rises higher than, and returns more slowly to, normal. This type of curve may also be seen in nondiabetic persons during acute illness or after trauma or a low carbohydrate diet; it may also be observed in elderly persons with hardening of the arteries or heart disease and in middle-aged persons who are markedly overweight.

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glue, gelatin-like adhesive substance extracted from animal tissue, particularly hides and bones, or from fish, casein (milk solids), or vegetables. Glue was used as early as 3000 BC in wooden furniture construction in Egypt.

Synthetic resin adhesives such as the epoxies are replacing glue for many uses, but glue is still widely used as an adhesive in woodworking, in the manufacture of such abrasives as sandpaper, and as a colloid in industrial processes; *e.g.*, the recovery of solid particles suspended in a liquid.

Glueck, Sheldon and Eleanor, Eleanor Glueck *née* TOUROFF (respectively, b. Aug. 15, 1896, Warsaw—d. March 10, 1980, Cambridge, Mass. U.S.; b. April 12, 1898, Brooklyn, N.Y., U.S.—d. Sept. 25, 1972, Cambridge, Mass.), U.S. criminologists and researchers at Harvard Law School, a husband-and-wife team whose numerous studies of criminal behaviour and of the results of correctional treatment profoundly influenced criminal justice, both legislatively and administratively.

Sheldon Glueck came to the United States in 1903 and was naturalized in 1920. He studied at Georgetown University, National University Law School (LL.B.), and Harvard University (M.A., Ph.D.) and taught at Harvard from 1925 to 1963, becoming professor emeritus in 1963. Eleanor Touroff, of Polish ancestry, was born in Brooklyn and studied at Barnard College, the New York School of Social Work, and Harvard University (Ed.D.); she was a criminology researcher at Harvard from 1925 until her death in 1972. The Gluecks married in 1922.

For more than 40 years the Gluecks pioneered in the study of the careers of criminals and juvenile delinquents and, with their Harvard staff, produced scores of books and articles. They are especially known for the Gluecks' Social Prediction Tables, which developed from studies of delinquency and attempted to identify potential delinquents at the age of six, or even younger. One voluminous 10-year study resulted in *Unraveling Juvenile Delinquency* (1950), which compared 500 delinquent with 500 non-delinquent boys. *Delinquents and Nondelinquents in Perspective* (1968) was a 15-year follow-up of those studied in the earlier work. A final joint work was *Toward a Typology of Juvenile Offenders: Implications for Therapy and Prevention* (1970).

glutamic acid, an amino acid occurring in substantial amounts as a product of the hydrolysis of proteins. Certain plant proteins (*e.g.*, gliadin) yield as much as 45 percent of their weight as glutamic acid; other proteins yield 10 to 20 percent. Much of this content may result from the presence of a related substance, glutamine, in proteins; glutamine is converted to glutamic acid when a protein is hydrolyzed. First isolated in 1865, glutamic acid is an important metabolic intermediate. It is one of several so-called nonessential amino acids; *i.e.*, animals can synthesize it from oxoglutaric acid (formed in the metabolism of carbohydrates) and do not require dietary sources.

A salt of glutamic acid, monosodium glutamate, is widely used as a condiment for flavouring foods.

glutamine, an amino acid, the monoamide of glutamic acid, and an abundant constituent of proteins. First isolated from gliadin, a protein present in wheat (1932), glutamine is widely distributed in plants; *e.g.*, beets, carrots, and radishes. Important in cellular metabolism in animals, glutamine is the only amino acid capable of crossing readily the barrier between blood and brain and, with glutamic acid, is thought to account for about 80 percent of the amino nitrogen ($-NH_2$) of brain tissue. It is one of several so-called nonessential amino acids; *i.e.*, animals can synthesize it from glutamic acid and do not require dietary sources.

glutathione, a tripeptide (*i.e.*, compound composed of three amino acids), the chemical name of which is γ-L-glutamyl-L-cysteinylglycine. Widely distributed in nature, it has been isolated from yeast, muscle, and liver. Glutathione has a role in the respiration of both mammalian and plant tissues and protects red blood cells against hydrogen peroxide, which is a toxic by-product of many metabolic reactions, by reducing the peroxide to water. It serves as a cofactor for various enzymes; *e.g.*, glyceraldehyde-3-phosphate dehydrogenase, to which it becomes firmly bound.

gluten, a yellowish-gray powdery mixture of water-insoluble proteins occurring in wheat and other cereal grains and composed chiefly of the proteins gliadin and glutenin. Its presence in flour helps make the production of leavened, or raised, baked goods possible because the chainlike molecules form an elastic network that traps carbon dioxide gas and expands with it. Gluten is also found in special high-protein breakfast foods and other cereal foods and is used in adhesives and as meal for cattle food. It also may be used in the manufacture of certain amino acids, including glutamic acid and its salt, the seasoning agent monosodium glutamate.

The properties of gluten vary according to its composition, which differs according to the source. The variations govern the baking qualities of flours, as is shown by the properties of doughs prepared from different kinds of wheat flours; *i.e.*, the dough can be soft and extensible or tough and elastic, or have properties between the extremes.

glutethimide, also called 2-ETHYL-2-PHENYLGLUTARIMIDE, synthetic, nonbarbiturate sedative and hypnotic drug of short duration of action. Glutethimide, administered orally, is used for preoperative sedation and is widely employed to treat insomnia. It has few side effects.

gluteus muscle, any of the large, fleshy muscles of the buttocks, stretching from the back portion of the pelvic girdle (hipbone) down to the greater trochanter, the bony protuberance at the top of the femur (thighbone). These include the gluteus maximus, gluteus medius, and gluteus minimus.

The gluteus maximus is the large, wide, thick muscle at the surface of the buttocks. It originates at the ilium (the crest of the pelvic girdle, or hipbone) and at portions of the sacrum and coccyx, bones at the base of the spine. It stretches across and attaches to the iliotibial tract, a band of fibrous tissue extending from the ilium to the tibia (shinbone), and to the upper portion of the femur (thighbone). Its major action is extension of the thigh, as in rising from a sitting position, running, or climbing. It also rotates the thigh outward.

The gluteus medius is located directly under the gluteus maximus. It originates at the back of the ilium below its crest and stretches downward to the greater trochanter of the femur. The gluteus minimus is situated under the gluteus medius; it also originates at the ilium and attaches to the femur. Both these muscles abduct the thigh; *i.e.*, pull it laterally away from the midline of the body. In addition, their front portions help rotate the thigh inward, while their rear fibres aid in its extension and outward rotation. When one leg is raised off the ground (*e.g.*, in walking or running), the gluteus medius and minimus of the opposite, fixed side act from below and exert a strong pull on the hipbone, even tilting up the unsupported side, which tends to sag when the limb is raised.

Loss or paralysis of the gluteus medius results in a limp with an exaggerated sideward thrust of the hip with the resultant dropping of the opposite hip, referred to as the gluteus medius gait.

For a depiction of the gluteus medius and gluteus minimus in human anatomy, shown in relation to other parts of the body, *see* the colour Trans-Vision in the PROPAEDIA: Part Four, Section 421.

glutton (mammal): *see* wolverine.

glycan: *see* polysaccharide.

Glycas, Michael (fl. 12th century), Byzantine historian, theologian, and poet, author of a world chronicle and learned theological works.

Little is known of Glycas' life except that he probably came from Corfu, lived in Constantinople, and was blinded by order of Emperor Manuel I in 1159, apparently either for heretical views or for a political offense.

Glycas' *Biblos chronike* ("World Chronicle"), from the Creation to the death of Emperor Alexius I (1118), was written for his son; it was for popular consumption and is of little independent historical value. In addition he wrote a competent and learned commentary on the problems of Holy Scripture, as well as other theological works, a poem, and some letters.

Glycerius (fl. last quarter of 5th century), Western Roman emperor from 473 to 474.

Glycerius was made emperor on March 5, 473, by Gundobad, the nephew and successor of the powerful Western general and kingmaker Ricimer (died 472). At the time of his appointment four months had lapsed since the death of his predecessor, the emperor Olybrius (ruled April–November 472). Glycerius was not recognized as a legitimate ruler by the Eastern emperor, Leo I, who sent a fleet commanded by Julius Nepos against him. Nepos landed near Rome and proclaimed himself emperor. Glycerius surrendered without a struggle and was appointed bishop of Salonae (near modern Split, Yugos.), but in 480 he helped engineer the assassination of Nepos. The most important achievement of Glycerius' reign was the diversion to Gaul of a threatened Ostrogothic invasion of Italy.

glycerol, a clear, colourless, viscous, sweet-tasting liquid belonging to the alcohol family of organic compounds; molecular formula $HOCH_2CHOHCH_2OH$. Until 1948 all glycerol was obtained as a by-product in making soaps from animal and vegetable fats and oils, but industrial syntheses based on propylene or sugar has accounted for an increasingly large percentage of U.S. production since that time. The term glycerin is ordinarily applied to commercial materials containing more than 95 percent glycerol.

Glycerol has thousands of uses. It is a basic ingredient in the gums and resins used to make many modern protective coatings such as automotive enamels and exterior house paints. Glycerin reacted with nitric and sulfuric acid forms the explosive nitroglycerin. It is also a component of mono- and diglyceride emulsifiers, which are used as softening agents in baked goods, plasticizers in shortening, and stabilizers in ice cream. Its varied uses in the pharmaceutical and toilet goods fields include skin lotions, mouthwashes, cough medicines, drug solvents, serums, vaccines, and suppositories. Another significant use is as a protective medium for freezing red blood cells, sperm cells, eye corneas, and other living tissues. At one time, its largest single use was as automotive antifreeze; methanol and ethylene glycol have replaced it for this purpose.

Fats and oils are valued chiefly as sources of the carboxylic acids that are present, combined in the form of esters with glycerol. When the acids are set free from these compounds, glycerol remains as a solution in water and is purified by coagulating and settling extraneous matter, evaporating the water, and distilling.

glycine, the simplest amino acid, obtainable by hydrolysis of proteins. Sweet-tasting, it was among the earliest amino acids to be isolated from gelatin (1820). Especially rich sources include gelatin and silk fibroin. Glycine is one of several so-called nonessential amino acids for mammals; *i.e.,* they can synthesize it from amino acids serine and threonine and from other sources and do not require dietary sources.

glycogen, white, amorphous, tasteless polysaccharide $(C_6H_{10}0_5)_n$. It is the principal form in which carbohydrate is stored in higher animals, occurring primarily in the liver and muscles. It also is found in various species of microorganisms—*e.g.,* bacteria and fungi, including yeasts. Glycogen serves as an energy reservoir, being broken down to glucose when needed.

glycogen storage disease, also called GLYCOGENOSIS, any of a group of enzymatic deficiencies resulting in altered glycogen metabolism. They are subdivided on the basis of the specific deficiency into 13 types designated O and by successive roman numerals. The clinical manifestations fall into two groups, those associated with the liver and those involving striated muscle.

In the liver group, type O is set apart as a deficiency in UDPG-glycogen transferase, resulting in inadequate rates of glycogen synthesis. It appears in infants with a reduction in the number of feedings—the hypoglycemia resulting from the rapid depletion of stored glycogen. The other types associated with liver-related symptoms are: type I, a glucose-6-phosphatase deficiency; type III, a deficiency in amylo-1,6-glucosidase and/or oligo-1,4-glucose transferase; type IV, also known as Andersen's disease (*q.v.*), a deficiency in amylo-1,4→1,6-transglucosylase, with an abnormal structure of glycogen; type VI, a deficiency in liver phorphorylase; type IX, a deficiency in phosphorylasekinase; type XI, a deficiency in phosphoglucomutase; and type XII, a deficiency in cyclic 3′, 5′-AMP dependent kinase.

The symptoms of disease in the liver group are similar, ranging from symptomatic hypoglycemia and accompanying ketoacidosis to largely asymptomatic enlargement of the liver (hepatomegaly). Types I and III are more likely to be symptomatic, and gout is uniquely associated with type I and appears after puberty or in later years of life. The type IV defect almost invariably results in death before puberty in consequence of cirrhosis and portal hypertension. Symptoms of the other types generally disappear before or by puberty. Types I, III, and VI are also known as von Gierke's disease, Forbes' disease, and Hers' disease (*qq.v.*), respectively.

Of the muscle glycogenoses, type II, the classic Pompe's disease, is divided into subtypes IIa and IIb. In both, the enzymatic defect is lysosomal α-1,4-glucosidase; but in type IIa an enlargement of the heart occurs, and the disease is fatal in the first year of life. Type IIb disease does not have the cardiac involvement, but there may be severe muscular dystrophy early in life or a progressive myopathy in the teens or later. Other types—type V, also known as McArdle's disease (*q.v.*), a deficiency in muscle phosphorylase; type VII, a deficiency in phosphofructokinase; type VIII, a deficiency in phosphohexoisomerase; and type X, a deficiency in phosphorylasekinase—are diseases that are characterized by weakness, muscle cramps, and sometimes myoglobinuria.

The phosphorylasekinase deficiency characterizing types IX and X is associated with either the liver or muscle type of symptoms. The genetic defects underlying the enzymatic deficiencies of the glycogenoses are recessive and autosomal with the exception of type V, which is sex-linked and occurs only in males.

glycol, any of a class of organic compounds belonging to the alcohol family; in the molecule of a glycol, two hydroxyl (OH) groups are attached to different carbon atoms. The term is often applied to the simplest member of the class, ethylene glycol.

Ethylene glycol, also called 1,2-ethanediol, molecular formula $HOCH_2CH_2OH$, is a colourless, oily liquid possessing a sweet taste and mild odour. It is produced commercially from ethylene oxide, which is obtained from ethylene. Ethylene glycol is widely used as antifreeze in automobile cooling systems and in the manufacture of man-made fibres, low-freezing explosives, and brake fluid. Ethylene glycol and some of its derivatives are mildly toxic.

Propylene glycol, also called 1,2-propanediol, resembles ethylene glycol in its physical properties. Unlike ethylene glycol, however, propylene glycol is not toxic and is used extensively in foods, cosmetics, and oral hygiene products as a solvent, preservative, and moisture-retaining agent. Propylene glycol is manufactured in large amounts from propylene oxide, which is obtained from propylene.

Other important glycols include 1,3-butanediol, used as a starting material for the manufacture of brake fluids and of plasticizers for resins; 1,4-butanediol, used in polyurethanes and in polyester resins for coatings and plasticizers, and for making butyrolactone, a valuable solvent and chemical intermediate; 2-ethyl-1,3-hexanediol, an effective insect repellent; and 2-methyl-2-propyl-1,3-propanediol, made into meprobamate, a widely used tranquillizing drug.

Where the same name may denote a person, place, or thing, the articles will be found in that order

glycolipid, any member of a group of fat-soluble substances particularly abundant in tissues of the nervous system of animals. They are members of the class of sphingolipids (*q.v.*), but differ from the simpler members of that class in that their molecules contain a monosaccharide or disaccharide moiety.

glycoside, any of a wide variety of naturally occurring substances in which a carbohydrate portion, consisting of one or more sugars or a uronic acid (*i.e.,* a sugar acid), is combined with a hydroxy compound. The hydroxy compound, usually a non-sugar entity (aglycon), such as a derivative of phenol or an alcohol, may also be another carbohydrate, as in cellulose, glycogen, or starch, which consist of many glucose units.

Many glycosides occur in plants, often as flower and fruit pigments; for example, anthocyanins.

Various medicines, condiments, and dyes from plants occur as glycosides; of great value are the heart-stimulating glycosides of *Digitalis* and *Strophanthus,* members of a group known as cardiac glycosides. Several antibiotics are glycosides (*e.g.,* streptomycin). Saponins, widely distributed in plants, are glycosides that lower the surface tension of water; saponin solutions have been used as cleansing agents.

Glycosides derived from glucuronic acid (the uronic acid of glucose) and steroids are constituents of normal animal urine. Compounds (nucleosides) derived from the partial breakdown of nucleic acids are also glycosides.

Glyn, Elinor, née SUTHERLAND (b. Oct. 17, 1864, Jersey, Channel Islands—d. Sept. 23, 1943, London), English novelist and short-story writer known for her highly romantic tales with luxurious settings and improbable plots.

As a young child Glyn read widely and precociously in her family library. Although she did not have any formal education, such friends as Lord Curzon, Lord Milner, and F.H. Bradley later filled in the gaps of her knowledge.

Her first book, *The Visits of Elizabeth,* was an epistolary novel, consisting of a group of letters from a young girl to her mother, that described the foibles and philanderings of a group of European aristocrats. First serialized in the *World,* it was published in book form in 1900. Her acute powers of observation of the milieu in which she lived were evident in the work. Encouraged by the wide success of *Visits,* she wrote several more "society novels" before turning her attention to passionate romance. Although the society novels were greatly admired during her time, by later stan-

dards their main worth lies in her genuine storytelling ability.

Three Weeks (1907), the story of an adulterous relationship between a Balkan queen and an Englishman, caused a sensation. It was widely read and condemned. In it the hero dies and the woman is reborn. *His Hour* (1910), one of her best romances, was set in the court of St. Petersburg and was executed in a keenly observant style. In 1916 she wrote *The Career of Katherine Bush,* the first novel in which her heroine was not of aristocratic birth.

After 1916 Glyn was forced to write out of necessity, having fallen deeply in debt, and her husband died the following year. The novels of this period were designed to entertain her public in England and America.

In 1920 she began her career as a scriptwriter in Hollywood, where a number of her own novels were filmed, including *Three Weeks* and *It* (1927). In *It* she used an American setting for her story. Later, *It,* after being produced as a screenplay in Hollywood, for some years made the word "it" a synonym for sex appeal. Unable to manage her finances in Hollywood, she returned to England in 1929. She completed her autobiography, *Romantic Adventure,* in 1936.

Glyndebourne, site of an English opera house and festival. Glyndebourne is an Elizabethan house located in East Sussex, Eng., just northeast of Brighton. The house was added to during the 19th and 20th centuries, and a separate opera house was opened in 1934. Located nearby is Glynde Place, a 16th-century house built around a courtyard.

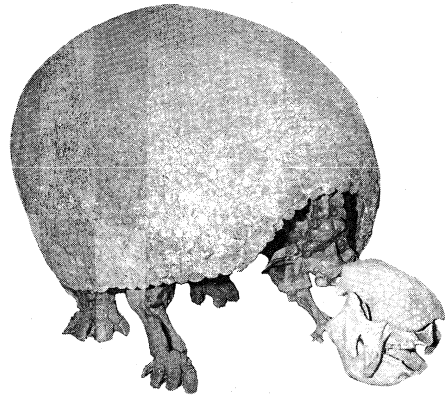
Glyndŵr, district, Clwyd County, northeastern Wales. Created in 1974 and named for the famous Welsh warrior Owen (Owain Glyndŵr) the district covers 373 sq mi (966 sq km) of mountain ranges, deep valleys, and open countryside. It is bordered by the districts of Rhuddlan and Delyn to the north; Alyn and Deeside, Wrexham Manor, and the English districts of Norwich and North Shropshire to the east; Montgomery to the south; and Merionnydd and Colwyn to the west. Denbigh castle, located in northern Glyndŵr, was a frontier post in Norman times, guarding the approach to the Hiraethog Hills and the mountainous region of Snowdonia. The castle in the neighbouring town of Ruthin can also be traced back to the Norman Conquest (1066), and Chirk Castle, located in the extreme south of Glyndŵr, was erected between 1282 and 1310. Glyndyfrdwry, a small village outside Corwen, was the home of Owen Glendower, who in the early 1400s was the last Welshman to actively challenge the supremacy of the English in Wales.

Tourism is the main industry in the district. Llangollen, nestled between the Berwyn Mountains on one side and the Ruabon and Llantysilio mountains on the other, is internationally famous for the annual International Musical Eisteddfod (festival), which was begun in 1947. The town has leather-manufacturing and wool-milling industries. Ruthin is the administrative seat of the district; its castle has been converted into a luxury hotel. Denbigh has some light industry and Corwen is primarily an agricultural market town. A highway, extending through Llangollen, traverses Glyndŵr district from east to west. Pop. (1982 est.) 40,400.

Glyndwr, Owain: *see* Glendower, Owen.

Glynebwy (Wales): *see* Ebbw Vale.

Glyptodon, genus of extinct giant armadillo-like mammals found as fossils in Pleistocene deposits in South and North America (the Pleistocene Epoch began about 2,500,000 years ago and ended about 10,000 years ago). *Glyptodon* and its relatives were heavily encased from head to tail in thick, protective



Glyptodon
By courtesy of the trustees of the British Museum (Natural History); photograph, Imitor

bony armour. The glyptodont's body shell alone was as much as 1.5 metres (5 feet) long. The tail, clad in armour, could be employed as a lethal club; indeed, in some relatives of *Glyptodon* the tip of the tail was covered with a knob of bone that was in some instances spiked. Glyptodonts ate almost anything—plants, carrion, or insects.

Glyptothek, museum in Munich that houses a collection of Greek and Roman sculpture owned by the Bavarian state. The building, commissioned by King Louis I of Bavaria and designed in the Neoclassical style by Leo von Klenze, was erected 1816–30.

It is a subsidiary of the nearby Staatliche Antikensammlungen. The parent museum specializes in Greek and Etruscan bronzes and vases and Greek and Roman glass, jewelry, and terra-cottas.

GM: *see* General Motors Corporation.

G.M., recipient of the George Medal, a British decoration for valour. *See* George Cross.

gmelinite, hydrated sodium and calcium aluminosilicate mineral in the zeolite family. Its crystal structure and chemical composition are similar to those of chabazite (*q.v.*), with which it is commonly found.

Gmunden, town, *Bundesland* Oberösterreich (federal province of Upper Austria), north central Austria, where the Traun River flows out of the Traunsee, a mountain lake. The site of Celtic and Roman settlements, Gmunden was fortified in the 12th century and chartered in the 13th. Its Baroque parish church on 13th-century foundations was consecrated in 1723, and the town hall dates from 1659. Once an important centre of the Salzkammergut (salt region), Gmunden is now a summer resort. It also has breweries and cement, ceramic, textile, electrical, shoe, and wood industries. Pop. (1981) 12,720.

Gnadenhütten Massacre (March 8, 1782), retaliatory murder of 96 Ohio Indians, mostly Delawares, by an American Revolutionary War officer, Capt. David Williamson, and his militia at Gnadenhütten Village south of what is now New Philadelphia, Ohio. The Indians, who had been converted by Moravian Brethren and were peaceful Christians, were under suspicion because of their neutrality in the war. Williamson and his 90 volunteers, seeking revenge for the many Indian raids on frontier settlements, pretended friendship and disarmed the tribe; on the following morning they slaughtered the villagers in cold blood. Two scalped boys escaped to relate the incident. A 9-acre memorial now marks the site of what has been called the greatest atrocity of that war.

Gnaeus, also spelled CNEIUS (ancient Roman personal name, or praenomen): *see under* gens or family name or honorific (*e.g.,* under Agricola for Gnaeus Julius Agricola).

gnat, any member of several species of small flies that bite and annoy humans. Several non-biting insects, such as the midges, which resemble mosquitoes, are also sometimes known as gnats.

In North America the name is often applied to the black fly, midge, fungus gnat, biting midge, fruit fly (*qq.v.*), and other small flies that hover about the eyes of humans and other animals. In Great Britain the name usually refers to mosquitoes or less commonly to crane flies (family Tipulidae).

gnat bug (insect): *see* unique-headed bug.

gnatcatcher, also called GNATWREN, family name POLIOPTILIDAE, any of about 11 species of small birds of the genus *Polioptila,* treated by many authorities as a subfamily of the Old World warbler family Sylviidae. The blue-gray

Blue-gray gnatcatcher (*Polioptila caerulea*)
Karl H. Maslowski

gnatcatcher (*P. caerulea*), 11 centimetres (4.5 inches) long, with its long white-edged tail, looks like a tiny mockingbird. It breeds locally from eastern Canada and California to the Bahamas and Guatemala and winters from the southern United States southward. The black-tailed gnatcatcher (*P. melanura*) is resident in southwestern U.S. deserts. The other species are found in Central and South America and Cuba.

gnateater, any of certain bird species (genus *Conopophaga*) usually classified with the antbirds. *See* antbird; antpipit.

Gneisenau, August (Wilhelm Anton), Graf Neidhardt von (Count Neidhardt of) (b. Oct. 27, 1760, Schildau, near Torgau, Prussia—d. Aug. 23, 1831, Posen, Pomerania), Prussian field marshal and reformer, one of the key figures in rebuilding and reorganizing the Prussian army shattered by Napoleon in 1806 and the architect of its victory during the wars of liberation (1813–15).

Of impoverished noble parentage, Gneisenau served in the Austrian army and with an Ansbach regiment under the British in Canada. Though he did not see action in Canada, he became familiar with the concepts of skirmish warfare and the civilian militia employed on the North American continent. Entering Prussian service in 1786, he was assigned to garrison duty until war broke out between Napoleon and Prussia in 1806. At the Battle

of Jena he was still a company commander, but his successful defense of the fortress of Kolberg against the French in 1807 laid the foundation for his advancement. By 1808 his functions included membership in the important rivers and development commissions, and he had become chief of fortifications and the engineer corps. Gneisenau, along with G.J.D. von Scharnhorst and H. von Boyen, remolded the Prussian army from a basically mercenary one into an instrument of modern mass warfare. He advocated the abolition of corporal punishment and of special privileges for the higher classes, the concentration on field manoeuvres rather than parade-ground drill, the promotion of officers according to merit, and the creation of military academies. The key to Gneisenau's philosophy was the transformation of a mercenary into a citizen's army. The practical results for Prussia were the introduction of universal military service, the Landwehr (first line reserve), and the Landsturm (second line reserve), which met the manpower requirements of modern warfare.

Gneisenau, detail from a portrait by Ernst Gebauer

By courtesy of the Staatlichen Schlosser und Garten, Berlin

In 1808 Napoleon forced the dismissal of the Prussian reform party, and from 1811 to 1812 Gneisenau travelled to Austria, Russia, Sweden, and England on secret missions negotiating a new war against Napoleon. When the conflict was renewed in 1813, Gneisenau and Scharnhorst served with Field Marshal G.L. von Blücher's army as staff officers. After Scharnhorst's death (June 28, 1813), Gneisenau became Blücher's chief of staff, a position in which he was largely responsible for planning Prussian, and sometimes Russian, strategy. His insistence on the decisive battle and a relentless pursuit proved successful at Waterloo. These principles were elevated into the key to military success by his friend and colleague Carl von Clausewitz in his manual of modern warfare, *On War*.

Gneisenau resigned in 1816, a liberal victim of the government policy of reaction. Not until 1825 was he made a field marshal. He died campaigning against insurgent Poland.

gneiss, metamorphic rock that has a distinct banding, which is apparent in hand specimen or on a microscopic scale. Gneiss usually is distinguished from schist (*q.v.*) by its foliation and schistosity; gneiss displays a well-developed foliation and a poorly developed schistosity and cleavage. For the casual student, it is convenient to think of a gneiss as a rock with parallel, somewhat irregular banding which has little tendency to split along planes. In contrast, schist typically is composed of platy minerals with a parallel to subparallel geometric orientation that gives the rock a tendency to split along planes; banding is usually not present.

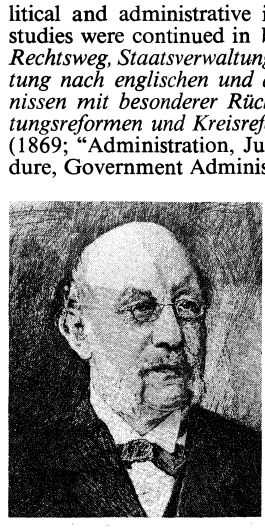
Gneiss is medium- to coarse-grained and may contain abundant quartz and feldspar, which some petrographers regard as essential components. The banding is usually due to the presence of differing proportions of minerals in the various bands; dark and light bands may alternate because of the separation of mafic (dark) and felsic (light) minerals. Banding can also be caused by differing grain sizes of the same minerals. The mineralogy of a particular gneiss is a result of the complex interaction of original rock composition, pressure and temperature of metamorphism, and the addition or loss of components.

Gneiss is the principal rock over extensive metamorphic terrains. The banding may be oriented nearly parallel to the Earth's surface (horizontal dip) or may have a steep dip. Such orientations can be interpreted in terms of the stresses that prevailed during the formation of the rock, but they also may be inherited from the rock that was metamorphosed.

Gneiss can be classified on the basis of minerals that are present, presumed formational processes, chemical composition, or probable parent material. Orthogneiss is formed by the metamorphism of igneous rocks; paragneiss results from the metamorphism of original sedimentary rocks. Pencil gneiss contains rod-shaped individual minerals or segregations of minerals, and augen gneiss contains stubby lenses of feldspar and quartz having the appearance of eyes scattered through the rock. The identification of gneiss as a product of metamorphism is usually clear, but some primary gneiss can be formed by the flow of a viscous, partially crystallized magma. In some areas, gneiss grades laterally into granitic rocks with the characteristics of typical igneous granite. This feature is one of the important factors that have led some petrologists to call upon a metamorphic process (granitization) for the development of many granite bodies.

Gneist, Rudolf von (b. Aug. 13, 1816, Berlin—d. July 22, 1895, Berlin), liberal German jurist, legal reformer, legislator, and political theoretician whose teachings and publications, based on studies of the English system of government, exercised a profound influence on the development of German administrative law.

The son of a supreme court judge, he studied at Berlin University under the philosopher G.W.F. Hegel and F.K. von Savigny, a renowned jurist. In 1841 he became an assistant judge and from 1847 served in the Berlin high court. His opposition to the reactionary policy after the 1848–49 revolution led to his resignation in 1849. Devoting himself to an academic career, Gneist began to produce the series of works in which he praised British political and administrative institutions. These studies were continued in *Verwaltung, Justiz, Rechtsweg, Staatsverwaltung und Selbstverwaltung nach englischen und deutschen Verhältnissen mit besonderer Rücksicht auf Verwaltungsreformen und Kreisreformen in Preussen* (1869; "Administration, Justice, Legal Procedure, Government Administration, and Local Administration According to English and German Conditions with Special Regard to Administrative Reforms and District Reforms in Prussia"), in which Gneist stressed the virtues of justices of the peace. His *Englische Verfassungsgeschichte* (1882) was translated as *The History of the English Constitution* (1886). His talents in the field of administrative law were recognized when he was appointed a member of Germany's first supreme administrative court (1875).



Gneist, detail from an etching by W. Krauskopf, 1894

Archiv fur Kunst und Geschichte, West Berlin

A liberal, Gneist served in the Berlin city government (1845–49, 1858–75), the Prussian Diet (1859–93, with a break in 1862), and the Reichstag (1867–84). As a member of the National Liberal Party, he sided with Bismarck against Catholics and Social Democrats. Gneist remained a partisan of the *Rechtsstaat* (state based on the rule of law) throughout his life.

Gnetaceae, a family of tropical gymnosperms in the order Gnetales, composed of one genus, *Gnetum,* with 30 or more species. Trees predominate among the African species; most of the Asian varieties are woody vines, but among the exceptions is *G. gnemon,* a tree about 20 metres (65 feet) tall that yields a useful fibre and an edible, plumlike fruit. The conspicuous, netlike veining of the broad leaves of *Gnetum* species superficially resembles that of angiosperms. The ovules (potential seeds) are enclosed, and conducting cells in the wood include open-ended pipes known as vessels; the latter condition is also characteristic of angiosperms.

Gnetales, only order of plants in the subdivision Gnetopsida, a group with characteristics of both angiosperms and gymnosperms. The order contains three families: Ephedraceae, Gnetaceae, and Welwitschiaceae (*qq.v.*), each with a single genus.

Gniezno, town, Poznań *województwo* (province), west central Poland. Located on the

Cathedral of St. Adalbert, Gniezno, Pol.

© TITUS, Torino

Poznań–Toruń rail line, Gniezno is a trade and food-processing centre. Legend attributes its origin to Lech, mythological founder of Poland, who supposedly made it his capital. Archaeological evidence indicates that a stronghold of the Polanie tribe existed there in the 8th century AD. In 1000 Gniezno became capital of the first Roman Catholic archdiocese of Poland; it received town privileges in 1240. The town survived the advance of the Teutonic Knights in the 14th century and the Swedish wars and the plague in the 17th. Gniezno retains many monuments, notably the 12th-century bronze door of its cathedral, considered an outstanding example of early medieval Polish art. Pop. (1982 est.) 63,500.

Gniloye More (Ukrainian S.S.R.): *see* Sivash.

gnome, in European folklore, dwarfish, subterranean goblin or earth spirit who guards

mines of precious treasures hidden in the earth. He is represented in medieval mythologies as a small, physically deformed (usually hunchbacked) creature resembling a dry, gnarled old man. Gob, the king of the gnome race, ruled with a magic sword and is said to have influenced the melancholic temperament of man.

Gnome (lower left) in a mine, woodcut from *Historia de gentibus septentrionalibus*, by Olaus Magnus, 1555

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

The term was popularized through works of the 16th-century Swiss alchemist Paracelsus in which gnomes were described as capable of moving through solid earth as fish move through water.

gnomic poetry, aphoristic verse containing short, memorable statements of traditional wisdom and morality. The Greek word *gnomē* means "moral aphorism" or "proverb." Its form may be either imperative, as in the famous command "know thyself," or indicative, as in the English adage "Too many cooks spoil the broth." Gnomes are found in the literature of many cultures; among the best known examples are those contained in the biblical book of Proverbs. They are found in early Greek literature, both poetry and prose, from the time of Homer and Hesiod onward. Gnomic poetry is most commonly associated with the 6th-century-BC poets Solon and Simonides and with the elegiac couplets of Theognis and Phocylides. Their aphorisms were collected into anthologies, called *gnomologia,* and used in instructing the young. One of the best known *gnomologia* was compiled by Stobaeus in the 5th century AD, and such collections remained popular in the Middle Ages.

Gnomes appear frequently in Old English epic and lyric poetry. In *Beowulf* they are often interjected into the narrative, drawing a moral from the hero's actions with such phrases as "Thus a man ought to act." The main collections of Old English gnomes are to be found in the Exeter Book (*q.v.*) and the 11th-century Cotton Psalter.

Alexander Pope's *Essay on Man* (1733–34) offers a more modern example of the use of couplets of distilled wisdom interspersed through a long poem.

Gnosticism, philosophical and religious movement prominent in the Greco-Roman world in the 2nd century AD. While Gnosticism drew from and influenced in turn many traditional religions, its effect was most clearly felt on nascent Christianity, in which it led to the formation of the canon, creed, and episcopal organization.

The designation Gnosticism, derived from the Greek *gnōstikos* (one who has *gnōsis,* or "secret knowledge"), is a term of modern scholarship. Evidence for the Gnostic phenomenon, found in the Church Fathers who opposed Gnostic teachings (Irenaeus, *c.* 185; Hippolytus, *c.* 230; Epiphanius, *c.* 375) and in the Gnostic writings themselves, reveals a diversity in theology, ethics, and ritual that defies strict classification. Yet Gnostic sects appear to have shared an emphasis on the redemptive power of esoteric knowledge, acquired not by learning or empirical observation but by divine revelation.

History. The origins of the Gnostic world view have been sought by scholars in the dualism of Iranian religion, the allegorical Idealism of the Middle Platonic philosophers, and the apocalypticism of certain Jewish mystics. There are analogies also with Egyptian and Mesopotamian thought. It was only with the rise of Christianity, however, that Gnostic syncretism came to full expression.

The first Gnostic about whom something can be said with confidence is Simon Magus (*q.v.*), a 1st-century Jewish heterodox teacher who introduced the fundamental Gnostic conception that evil resulted from a break within the Godhead. But Simon's *gnōsis* remained essentially Jewish and monotheistic, as did that of the Gnostic circles to which later parts of the New Testament allude.

The dualistic phase was reached after the expansion of Gnosticism into the Hellenistic world and under the influence of Platonic philosophy, from which was borrowed the doctrine that a lower demiurge was responsible for the creation of this world. This teaching is to be found in the *Apocryphon of John* (early 2nd century) and other documents of popular *gnōsis* discovered near Naj' Hammadi in upper Egypt in the 1940s and in the *Pistis Sophia,* a 3rd-century Gnostic work in Coptic belonging to the same school. The learned *gnōsis* of Valentinus, Basilides (*qq.v.*), and their schools presupposes this popular *gnōsis,* which, however, has been thoroughly Hellenized and Christianized and sometimes comes very near to the views of Middle Platonism.

Eastern Gnosticism took a somewhat different course. Under the influence of traditional Iranian religion, the semi-Gnostic Manichaeism developed an absolute cosmic dualism between soul and matter. Moreover, it showed the enormous influence of Syrian asceticism, but it was equally rooted in popular Gnosticism and preserved its essential doctrines.

Nature. In the Gnostic view, the unconscious self of man is consubstantial with the Godhead, but because of a tragic fall it is thrown into a world that is completely alien to its real being. Through revelation from above, man becomes conscious of his origin, essence, and transcedent destiny. Gnostic revelation is to be distinguished both from philosophical enlightenment, because it cannot be acquired by the forces of reason, and from Christian revelation, because it is not rooted in history and transmitted by Scripture. It is rather the intuition of the mystery of the self.

The world, produced from evil matter and possessed by evil demons, cannot be a creation of a good God; it is mostly conceived of as an illusion, or an abortion, dominated by Yahweh, the Jewish demiurge, whose creation and history are depreciated. This world is therefore alien to God, who is for the Gnostics depth and silence, beyond any name or predicate, the absolute, the source of good spirits who together form the *plērōma,* or realm of light.

These conceptions are expressed in various myths, which employ material from many traditional religions but serve to express a basic experience that is new, the discovery of the unconscious self or spirit in man which sleeps in him until awakened by the Saviour. The Gnostic sects of the 2nd century made use of Hebrew and Christian religious writings, employing the allegorical method to extricate Gnostic meanings from them.

Most Gnostic groups seem to have been organized as schools, in which the authoritative teaching was transmitted, interpreted, and kept secret. There was wide disagreement among groups as to the importance of rites, with some practicing quasi-Christian Eucharists and baptisms and others rejecting all aspects of conventional worship, including prayer, fasting, and almsgiving. Notions of ethics likewise varied widely.

Influence. The development of Christian doctrine was to a large extent a reaction against Gnosticism. The formulation of creedal symbols, the canonization of the New Testament Scriptures, and the emphasis on episcopal authority all were made necessary by the Gnostics' claims. Moreover, in some measure the Gnostics were the first theologians, and their systems prompted the systemization of early Christian thought. In addition, they kept alive the great issues of freedom, redemption, and grace, which for a time lost their emphasis among Christian writers. In a later period, the theology of Augustine owed a great deal to his early experience as a Manichaean.

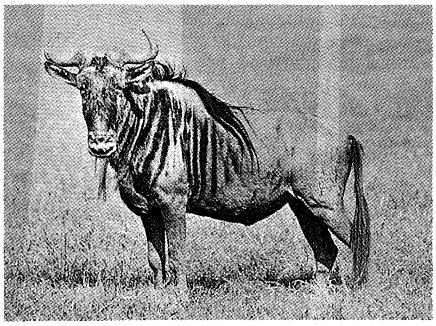
gnotobiosis (from the Greek meaning "known life"), condition of life in which only known kinds of organisms are present. Gnotobiotic organisms are of two major types: germfree, that is, free of all known contaminants; and gnotophoric, bearing a single known contaminant, usually administered as part of an experiment. The term "germfree," however, is often used loosely to indicate all organisms cultivated under laboratory conditions in the absence of any other detectable species or in the presence of species known by the investigator to be present. Gnotobiotics has made possible the study of many biological functions unhampered by normal body contamination. Its techniques are now widely used in producing disease-free laboratory and stock animals, in sterilization of space vehicles, and in the study of the origin of life. *See also* germfree life.

GNP: *see* gross national product.

gnu, also called WILDEBEEST, either of two African antelopes of the genus *Connochaetes,* family Bovidae (order Artiodactyla).

The gnu, which stands higher at the shoulder than at the rump, attains a shoulder height of 1–1.3 metres (3–4 feet). The southern African form, the white-tailed gnu, or black wildebeest (*C. gnou*), is dark brown with long black tufts on the snout, chin, throat, and chest, and it has a black mane and flowing white tail. The horns, present in both sexes, grow forward and downward, turning up at the tips. Now extinct in the wild, the white-tailed gnu is preserved in a number of national parks and reserves. The brindled gnu, or blue wildebeest

(*C. taurinus*), is reasonably abundant over much of central and southeastern Africa, from northern South Africa to Kenya. It is silvery gray with dark vertical bands on the sides and has a black mane, tail, and face; whitish cheeks; and a tuft of dark hair on chin and

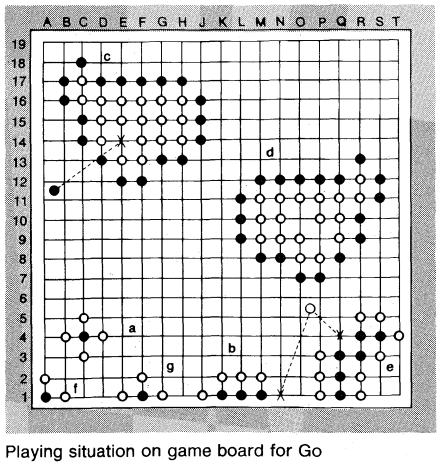


White-bearded gnu (*Connochaetes taurinus albojubatus*)
Leonard Lee Rue III

throat. The horns of the brindled gnu, present in both sexes, spread sideways and turn up at the tips. The white-bearded gnu is a subspecies (*C. t. albojubatus*).

Gnu live in herds, often of large size, and graze on the grasses and scrub of open plains. Their herds are on the move almost continually as the animals seek pastures that have been renewed by the rains. They are the most abundant of all the wild grazing animals in eastern Africa. When gnu are disturbed, they dash away for a short distance and wheel around to gaze at whatever has frightened them. In flight, they toss their heads, prance about, and throw up their heels in a wild, erratic manner that is ludicrous to the human onlooker. They stay within 20–30 miles (32–48 km) of water sources, which they visit every two or three days. A single gnu calf is born after a gestation of eight to nine months. Virtually all the calves are born within a few days of each other once a year. This ensures the survival of the majority of them because lions, hyenas, and other predators can kill and eat only so many of the calves in the short span of time before the calves themselves become fast runners.

Go (Japanese), also called I-GO, Chinese (Wade–Giles romanization) WEI-CH'I, Pinyin WEIQI, game for two players, probably Japan's most popular board game. Go originated either in India or in China as early as 2356 BC, according to some sources, and was brought to Japan about AD 500. Go is played with 181 black and 180 white *go-ishi* (flat, round pieces



Playing situation on game board for Go
Adapted from R.C. Bell, *Board and Table Games from Many Civilizations* (two volumes), Oxford University Press

called stones) on a square wooden board (*goban*) checkered by 19 vertical lines and 19 horizontal lines to form 361 intersections. Each player in turn (black moves first) places a stone on the point of intersection of any two lines, after which that stone cannot be moved. Players try to conquer territory by completely enclosing vacant points with boundaries made of their own stones. Two or more stones are "connected" if they are adjacent to each other on the same horizontal or vertical line, as are the black stones in group *e* in the Figure. A stone or a group of stones belonging to one player can be captured and removed from the board if it can be completely enclosed by his opponent's stones, as black is by white in groups *a, f,* and *g* and prospectively in groups *b* and *e* in the Figure. A stone or group of stones is "live" (not captured) as long as it is connected to a vacant intersection, as are the white stones in groups *c* and *d* and the black stones in *b* and *e*. A stone cannot be placed on a point completely surrounded by enemy stones unless it makes a capture by so doing, as black does in group *c*. Groups of stones are in effect invulnerable if they contain an "eye," which consists of two or more vacant points arranged such that the opposing player cannot place his stone on one of the points without that stone itself being captured. The white stones in group *d* possess such an eye. The white stones in group *c* in the Figure unfortunately do not possess an eye, however, and a black stone placed on the indicated point would result in the complete enclosure and thus the capture of the white stone group. A player's final score is his number of walled-in points less the number of his stones lost by capture.

Go demands great skill, strategy, and subtlety and is capable of infinite variety; yet the rules and pieces are so simple that children can play. Special handicap rules allow players of unequal skill to play together. The game was given special status in Japan during the Tokugawa period, when four highly competitive Go schools were established and supported by the government. A Japanese Go Association, founded in 1924, supervises tournaments and rules and ranks players, both professional and amateur. The European Go Federation was founded in 1950. The first annual world Go championship was held in 1979, and in 1982 an International Go Federation was established in Tokyo.

Go-Daigo: *see* Daigo, Go-.

Go-Sanjō (emperor of Japan): *see* Sanjō, Go-.

Go-Shirakawa: *see* Shirakawa, Go-.

Go-Toba (emperor of Japan): *see* Toba, Go-.

Goa, constituent state (1987) of the Republic of India, situated on the west coast, 250 miles (400 km) south of Bombay; the capital is Panaji. Bordered by Mahārāshtra and Karnātaka states, it has an area of 1,430 square miles (3,702 square km). Goa consists of 62 miles (100 km) of coastline, extends 40 miles (64 km) inland, and also includes the offshore island of Goa. Its chief cities are Panaji (formerly Panjim), Old Goa (Velha Goa), and Margão (formerly Mormugão). Goa's eastern part is dominated by the Sahyādri Hills of the Western Ghāts, which rise to 3,392 feet (1,034 m) at Sonsāgar. The hills give way in the west to an undulating area dissected by rivers, and the coastal plain itself consists of beaches fringed with coconut palms. The climate is tropical, with abundant rainfall. Goa's two largest rivers are the Mandāvi and the Zuari, which together encircle the offshore island of Goa. That island's apex (called the cape) is a rocky headland that separates the harbour of Goa into two anchorages.

Goa was formerly the capital of Portuguese India. With Portuguese-held Daman and Diu, Goa formed a single administrative unit that was ruled by a governor-general and a single ecclesiastical province. In 1987 statehood was conferred on Goa, and Daman and Diu formed a new union territory.

The city of Old Goa, which lies along the left bank of the Mandāvi estuary, is now largely a city of ruins. The chief surviving buildings include the cathedral, founded by Affonso d'Albuquerque in 1511, rebuilt in 1623, and still used for public worship; the convent of St. Francis (1517), which is a converted mosque rebuilt by the Portuguese in 1661; the chapel of St. Catherine (1551); the Basilica Bom Jesu (1594–1603), in which lies the mummified body of St. Francis Xavier, the 16th-century Jesuit missionary; and the convents of St. Monica and St. Cajetan.

Panaji, originally a suburb of Old Goa, is also built along the left bank of the Mandāvi estuary. It is a modern town and contains government offices and many educational institutions. It became the capital of Portuguese India in 1843. Margão, which lies to the south of Old Goa and Panaji, has a modern breakwater and quay and the best harbour between Bombay and Kozhikode (Calicut).

Goa is predominantly agricultural. Rice is the main crop, and coconuts, mangoes, and cashew nuts are also grown. Fishing is important, and iron ore and manganese are mined, processed, and exported on a large scale. The area is also a popular tourist resort. About two-fifths of its inhabitants are Christians. Many Goanese bear Portuguese names and are partly of Portuguese descent as a result of intermarriage between early Portuguese settlers and the local inhabitants.

Goa's early history is entwined in legend, being mentioned in the Hindu *Mahābhārata* epic as Gomantak and referred to in the *Purāṇas* as Govapuri, or Gove, the Paradise of India. It was ruled by a succession of Hindu dynasties until 1472, when it fell to the Muslims. It was conquered by Portuguese forces led by Affonso d'Albuquerque in 1510, and Franciscan and Jesuit missionaries, including Francis Xavier, arrived soon afterward and converted many of the inhabitants to Christianity. The settlement of Old Goa soon became the capital of the whole Portuguese empire in the east, and the city reached a climax of trading prosperity and architectural splendour between 1575 and 1600. But in the following years Dutch blockades of the city and raids by Marāṭhā raiders caused the city's decline, and the seat of government of Portuguese India was moved to Panaji in 1759. Cholera and other epidemics caused Old Goa's population to continue to dwindle, and by 1835 it was inhabited only by a few priests, monks, and nuns.

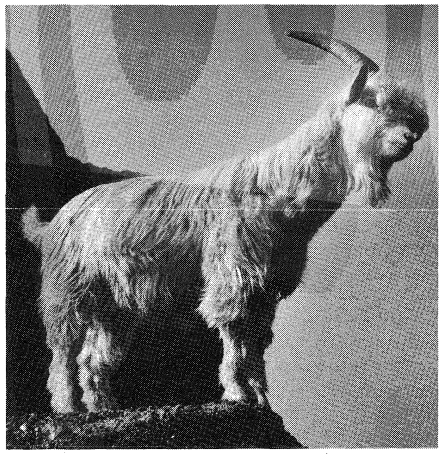
After India attained independence in 1947, the Indian government began demanding that Portugal cede Goa to India. After years of border tensions and guerrilla warfare, Indian troops invaded and occupied Goa in December 1961. It was incorporated into India in 1962. Pop. (1981) 1,007,749.

Goajiro, Indian people of the Guajira Peninsula in northern Colombia and adjacent Venezuela. Numbering about 127,000, they speak an Arawakan language and are linguistically and culturally distinct from their neighbours to the south, the Arhuaco. The Goajiro are mainly a pastoral people, growing only a little corn (maize) to make chicha (beer). Besides raising cattle, they keep poultry, horses, mules, sheep, goats, and pigs. Their diet consists almost entirely of meat and milk products, and cattle are equated with wealth. They are nomadic or seminomadic, living mostly in temporary shelters; even in the more permanent settlements, houses are widely scattered.

Goalundo Ghāt, also called GOALUNDO, town, central Bangladesh. It is situated near the confluence of the Padma and Jamuna rivers. Goalundo Ghāt is linked by road

with Farīdpur and Kushtia and is an important river-steamer and rail-spur terminus. Its principal transshipment commodities are rice, jute, oilseeds, sugarcane, and fish. Industries include rice milling and ice and candle manufacturing. Pop. (1981) 38,645.

goat, any ruminant and hollow-horned mammal belonging to the genus *Capra.* Related to



Common goat (*Capra hircus*)
Authenticated News

the sheep, the goat is lighter of build, has horns that arch backward, a short tail, and straighter hair. Male goats, called rams or billys, usually have a beard. Females are called does or nannys, and immature goats are called kids. Wild goats include the ibex and markhor.

Domesticated goats (*see* table) are descended from the pasang (*Capra aegagrus*), which is probably native to Asia, the earliest records being Persian. In China, Great Britain, Europe, and North America the domestic goat is primarily a milk producer, with a large portion of the milk being used to make cheese. One or two goats will supply sufficient milk for a family throughout the year and can be maintained in small quarters, where it would be uneconomical to keep a cow. For large-scale milk production, goats are inferior to cattle in the temperate zone but superior in the torrid and frigid zones. Goat flesh is edible, that from young kids being quite tender and more delicate in flavour than lamb, which it resembles. Some breeds, notably the Angora and Cashmere, are raised for their wool (*see also* wool; cashmere; Angora goat); young goats are the source of kid leather.

Breeds of domesticated goats

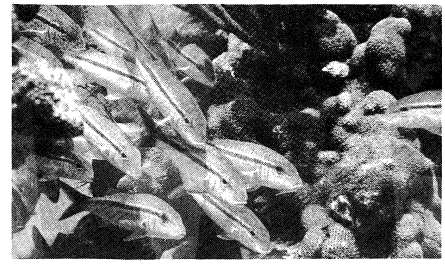
name and type	distribution	appearance	characteristics
Angora (wool)	Turkey, South Africa, U.S.	small body; thick, flat fleece	thrives in temperate regions
Cashmere (wool, milk, and meat)	mountain areas of China, Iran, Kashmir	small body; large ears, small horns	wool obtained from its undercoat
French-Alpine (milk)	originally Swiss Alps, now Switzerland, France, U.S.	large body; medium-sized, erect ears	short-haired
Nubian (milk)	India, Middle East, North Africa, U.K., U.S.	long legs, long ears, large noses	several varieties
Saanen (milk)	originally Saanen Valley, Switzerland	white or cream-coloured; short hair	consistent milk producer
Toggenburg (milk)	originally Switzerland, now also U.K., U.S.	light to dark brown	important dairy goat

Goat, The (constellation): *see* Capricornus.

goat nut (shrub): *see* jojoba.

goatfish, also called SURMULLET, any of about 50 species of elongated marine fishes of the family Mullidae (order Perciformes).

Goatfishes are characterized by two well-separated dorsal fins and by a pair of long, sensory chin barbels. The barbels are used to find the small, bottom-living invertebrates on which the fishes feed; when not in use, the barbels are flattened into a groove on the



Yellow goatfish (*Mulloidichthys martinicus*)
W.H. Longley—U.S. Fish and Wildlife Service

throat. Inhabitants of shallow water, goatfishes are found in warm and tropical regions, along reefs or over mud or sand. They are often brightly coloured, in shades of red and yellow; some are able to change their colours.

The largest goatfishes are about 60 cm (2 feet) long, but most are much smaller. Many species are edible and valued as food. One of the best known of these is the red surmullet, or red mullet (*Mullus barbatus*), of the Mediterranean, which was one of the most highly prized food fishes of the ancient Romans. Very similar is another European species, *M. surmuletus.*

goatsbeard (species *Aruncus dioicus* or *A. sylvester*), herbaceous perennial plant, of the rose family (Rosaceae), native to the North Temperate Zone. It occurs most commonly in rich woods, especially in mountainous regions. The plant grows 1.2 to 1.8 m (4 to 6 feet) tall and has pinnately compound (*i.e.,* feather-formed) leaves up to 50 cm (20 inches) long. Eight to 10 small, stalkless, white flowers are borne on leafless branches 10–25 cm (4–10 inches) long. It is often cultivated as a border plant.

Goatsbeard (*Aruncus dioicus*)
W.H. Hodge

goatsucker, alternative name of birds of the family Caprimulgidae (*q.v.*), otherwise known as nightjars. The name goatsucker is sometimes applied to the order, Caprimulgiform.

Gobabis, town, eastern Namibia. It lies on the edge of the Kalahari (Desert) on the intermittent Black Nossob River at an elevation of 4,740 feet (1,445 m). It is a rail terminus and cattle-marketing centre. Tribal reserves (homelands) for the Herero are situated north and southeast of Gobabis. Pop. (1988 est.) 6,500.

Gobat, Charles-Albert (b. May 21, 1834, Tramelan, Switz.—d. March 16, 1914, Bern), Swiss politician, administrator, philanthropist, and author, cowinner of the Nobel Prize for Peace in 1902. He shared the prize with Élie Ducommun (d. 1906), whom he succeeded as director of the International Peace Bureau (Bureau International de la Paix), which received the Nobel Prize for Peace in 1910.

Gobat, detail of an engraving
By courtesy of the Bibliotheque Nationale Suisse, Bern

Gobat first practiced law in Bern and then in Delémont, Bern canton. He also lectured on French civil law at the Sorbonne. In the 1880s he was active in cantonal and national politics and public administration.

From its inception in 1888, Gobat worked with the Inter-Parliamentary Union, founded by William Randal Cremer, recipient of the Nobel Prize for Peace in 1903. In 1892 Gobat was president of the union's fourth conference, which was held in Bern and which founded the Bureau Interparlementaire. He served as general secretary of the bureau, an information office dealing with peace movements, international conciliation, and communication among national parliamentary bodies. The third conference of the union, held in Rome in 1891, established the International Peace Bureau, of which Gobat was director when it was awarded the peace prize.

Among Gobat's books on international affairs and history is *Le Cauchemar de l'Europe* (1911; "The Nightmare of Europe").

Gobel, Jean-Baptiste-Joseph (b. Sept. 1, 1727, Thann, Alsace, Fr.—d. April 14/26, 1794, Paris), archbishop of Paris whose resignation doomed him to association with the Hébertists, followers of the extremist journalist Jacques-René Hébert, who, during the French Revolution, pursued an anti-Christian policy in a program of "worship of Reason."

Educated at the German College, Rome, Gobel became in 1755 vicar-general of the diocese of Basel, Switz. In 1789 he was a deputy to the Estates General, meeting outside Paris. On Jan. 3, 1791, he took the oath of the Civil Constitution of the Clergy and was consecrated archbishop of Paris, but on Nov. 7, 1793, he resigned his episcopal functions, for he had accepted the principles of the Revolution, including marriage of the clergy. The Hébertists then claimed Gobel as one of themselves, an identity for which he was condemned to the guillotine with the anti-Roman Catholic revolutionary Pierre-Gaspard Chaumette and with Hébert and Anacharsis Cloots, one of the founders of the cult of Reason.

Gobelin FAMILY, French family of dyers and clothmakers whose factory became world-famous for its tapestries. Jehan Gobelin (d. 1476), who ran a factory in the Faubourg Saint-Marcel just southeast of Paris, discov-

ered a scarlet dyestuff and spared no expense to exploit his creation. His descendants seem to have given up dyeing by the end of the 16th century; some of them bought titles of nobility and offices in the financial administration or in royal councils, as did Balthasar Gobelin (d. 1617), seigneur de Brie-Comte-Robert from 1601. The factory, lent to King Henry IV in 1601 and only then devoted to making tapestries, was purchased for King Louis XIV in 1662 and devoted to general upholstery till its closing in 1694. Reopened for tapestry in 1697, it was temporarily closed during the Revolutionary period but was reopened again by Napoleon.

Carpets as well as tapestry have been produced since 1826.

Gobi (Desert), great desert and semidesert region of Central Asia stretching across vast lands in the Mongolian People's Republic and the Inner Mongolian Autonomous Region of China.

The following article summarizes information about the Gobi (Desert); for full details, *see* MACROPAEDIA: Asia.

The Gobi (from Mongolian *gobi*, meaning "waterless place") occupies a large arc-shaped area oriented east–west that is approximately 1,000 mi (1,600 km) long, 300 to 600 mi (480 to 965 km) wide, and concave to the north. Its total area is about 500,000 sq mi (1,300,000 sq km). The region is roughly defined as lying between the mountains of the Altai and Hangayn Nuruu ranges to the north, the eastern Tien Shan (mountains) to the west, and the A-erh-chin Shan-mo, Pei Shan-mo, and Yin-shan Shan-mo ranges to the south.

The Gobi may be subdivided into the Ka-shun, Dzungarian, and Trans-Altai Gobi basins in the west; and the Eastern, or Mongolian, Gobi in the centre and east. The chalky plateaus that comprise the regional terrain are largely bare rock with small masses of shifting sands. Climatic conditions are acutely continental and dry; winter is severe, spring dry and cold, and summer hot. Temperatures range from −40° F (−40° C) in January to 113° F (45° C) in July. The annual total precipitation varies from 2.7 in. (69 mm) in the west to more than 8 in. (200 mm) in the northeast, with the greatest amounts of rainfall occurring in the summer.

Drainage in the Gobi is largely underground and subterranean water is widespread and of sufficient quality to allow cattle raising in some areas. Vegetation on the dry grayish-brown and brown soils is sparse; small bushlike plants grow on the plateaus and plains beneath the mountains. Halophytic vegetation, adapted to lowland salt marshes, and desert-grass cover the basins and lower mountain slopes. Animal life is varied and includes such large mammals as wild camel, Asiatic wild ass, Przevalski's wild horse, gazelle, and antelope.

The region supports fewer than 3 persons per sq mi (1 per sq km), most of whom are nomadic herders. Herds of sheep, goats, cattle, and two-humped camels are moved up to 10 times a year, migrating as much as 120 mi between pasturelands at extreme points. Agriculture is developed only along the river valleys. Future prospects for development of the Gobi depend upon the industrial development of its small petroleum reserves, its salt and light metal ore, and on cattle and sheep breeding.

Gobind Singh, original name GOBIND RĀI (b. 1666, Patna, Bihār, India—d. Oct. 7, 1708, Nānded, Mahārāshtra), 10th and last Sikh Gurū, known chiefly for his creation of the Khālsā (*q.v.*), the military brotherhood of the Sikhs.

Gobind Singh inherited his grandfather Gurū Hargobind's love of the military life and was also a man of great intellectual attainments. He was a linguist, familiar with Persian, Arabic, and Sanskrit as well as his native Punjabi; he further codified Sikh law, wrote poetry, and was the reputed author of the Sikh work called the *Dasam Granth* ("Tenth Volume").

Giving the Sikhs a firm military basis was Gobind Singh's greatest achievement. According to one tradition, one morning after services, he sat in meditation before a great number of Sikhs. Suddenly he rose and said, "My sword wants a head. Who will come forward and sacrifice himself for the faith?" Fear, anxiety, and disbelief spread through the crowd. Finally one man stepped out. The Gurū and his victim disappeared into a tent. A few minutes later Gobind Singh appeared with dripping sword, calling for another sacrificial volunteer. This ceremony continued until five men had volunteered. All then reappeared alive. Gobind Singh had merely tested their faith. Given the title *pañc-piāra* (the five beloved), they formed the nucleus of the great Sikh military brotherhood known as the Khālsā, founded in 1699.

Every move Gobind Singh made was calculated to instill a fighting spirit in his Sikhs. He created a body of martial poetry and music. He developed in his people a love of the sword—his "sacrament of steel." With the Khālsā as the guiding spirit of the reconstituted Sikh army, he moved against the enemy on two fronts: one army against the Mughals and the other against the hill tribes. His troops were totally devoted and totally committed to Sikh ideals, willing to risk everything in the cause of Sikh religious and political freedom. He paid a heavy price for this freedom, however. In one battle near Ambāla, he lost all four of his sons. Later the struggle claimed his wife, mother, and father. He himself was killed by a Pashtun tribesman in revenge for the death of his father.

Gobind Singh proclaimed that he was the last of the personal Gurūs. From that point forward, the Sikh Gurū was to be the holy book, the *Ādi Granth.* Gobind Singh stands today in the minds of Sikhs as the ideal of chivalry, the Sikh soldier-saint.

Gobineau, Joseph-Arthur, comte de (count of) (b. July 14, 1816, Ville-d'-Avray, Fr.—d. Oct. 13, 1882, Turin, Italy), French diplomat, writer, ethnologist, and social thinker whose theory of racial determinism had an enormous influence upon the subsequent development of racist theories and practices in western Europe.

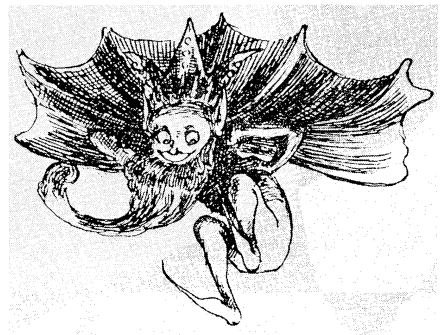
Gobineau was a member of an aristocratic royalist family. He went to Paris in 1835, held a succession of minor clerical posts, and began to frequent aristocratic literary circles. Well educated in languages and Oriental culture, he was secretary to the writer and statesman Alexis de Tocqueville during the latter's brief term as foreign minister in 1849. He then embarked on his own diplomatic career, which took him to posts in Bern, Hanover, Frankfurt, Tehrān, Rio de Janeiro, and Stockholm.

Gobineau was also known as a writer of stories, history, and literary criticism. His fictional works included the famous *Pléiades* (1874; *The Pleiads,* 1928), *Souvenirs de voyage* (1872; *The Crimson Handkerchief,* 1929), and *Les Nouvelles Asiatiques* (1876; *The Dancing Girl of Shamakha,* 1926, and *Tales of Asia,* 1942). Such scholarly works as his *Histoire des Perses,* 2 vol. (1869; "History of the Persians"), *Religions et philosophie dans l'Asie Centrale* (1865; "Religions and Philosophy in Central Asia"), and *La Renaissance* (1877; *The Renaissance,* 1913) established his intellectual reputation, but it was his *Essai sur l'inégalité des races humaines,* 4 vol. (1853–55; *Essay on the Inequality of Human Races,* new ed. 1967), that was by far his most influential work.

In the *Essai* he advanced the theory that the fate of civilizations is determined by racial composition, that Aryan societies flourish as long as they remain free of black and yellow strains, and that the more a civilization's racial character is diluted through miscegenation the more likely it is to lose its vitality and creativity and sink into corruption and immorality.

Gobineau's theories, now discredited, were the product of years of historical, anthropological, and ethnological studies and were part of a general European interest in biological and sociological determinism. The *Essai* had a marked effect on the thinking of such men as the Germans Richard Wagner and Friedrich Nietzsche, and, in time, a movement called Gobinism developed. In the 20th century, racist politicians such as Houston Stewart Chamberlain, an English disciple of Wagner, and Adolf Hitler turned to Gobineau for inspiration. It should be noted, however, that Gobineau himself was concerned with a scholarly examination of the mechanics of human social life rather than with racial political programs.

goblin, in Western folklore, wandering sprite, usually mischievous but often malicious. Goblins supposedly live in grottoes but attach themselves to households, where they are believed to bang upon pots and pans, snatch nightclothes off the bodies of sleeping people,



Goblin, drawing by Olive Cockerell from *Queen of the Goblins*, by A. Pickering, 1892

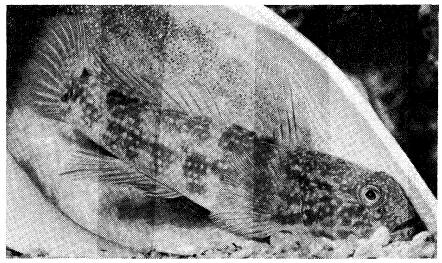
By courtesy of the trustees of the British Museum; photograph, R.B. Fleming

move furniture at night, and flee after rapping on walls and doors. They are thought to help parents discipline children by rewarding them with presents when they are good and punishing them when they are disobedient. The word goblin derives from the Greek *kobalos* ("rogue").

goblin shark, rare shark belonging to the family Mitsukurinidae (order Lamniformes). Only one extant species (*Mitsukurina owstoni*) is known, on the basis of a few specimens, although fossils of extinct species have been found. The goblin shark is closely related to the sand shark. Most specimens have been taken from deep marine waters near Japan. They have a long, protruding snout and an extended tail similar to that of the thresher sharks (genus *Alopias*), to which they are also related. Lengths of 3.4 metres (11 feet) have been recorded.

goby, any of the more than 800 species of fishes of the suborder Gobioidei (order Perciformes). Gobies are carnivorous, usually small in size, and found throughout the world. Especially abundant in the tropics, they are primarily marine in habit. Most species are bottom-dwellers and are characterized by a weak suction cup formed by the fusion of their pelvic fins.

The majority of species (more than 700) belong to the family Gobiidae. These are typically elongated, sometimes scaleless fishes found along shores and among reefs in tropical and temperate seas. Among their characteristics are two dorsal fins, the first with



Male frillfin goby (*Bathygobius soporator*) guarding eggs attached to an empty conch shell
W.N. Tavolga

several weak spines; lack of a lateral line (series of small sense organs along the head and sides); and, usually, a rounded tail. Many are brightly coloured, and some, such as the crystal goby (*Crystallogobius nilssoni*) of Europe, are transparent. Most adult gobiids are 10 centimetres (4 inches) long or less; the Philippine *Pandaka pygmaea,* one of the the smallest living vertebrates, grows no longer than about 13 millimetres (3/8 inch).

Many gobies, such as the longjaw mudsucker (*Gillichthys mirabilis*) of the eastern Pacific, inhabit burrows in sand or mud, and some share burrows with other animals. An example of the latter is the blind goby (*Typhlogobius californiensis*), a small, pink fish native to California that lives in burrows dug by certain shrimp. Another form of association between gobies and other animals is typified by the neon goby (*Elecatinus oceanops*), a small Caribbean species brilliantly banded with blue. It is one of several members of the genus that function as "cleaners," picking and eating the parasites from the bodies of larger fishes. The gobiids, like other members of the suborder, are egg-laying fishes and commonly guard their eggs, each of which is attached to a shell, rock, or other such site.

The suborder includes several families other than the Gobiidae: the Eleotridae and Periophthalmidae, including, respectively, the sleeper and the mud skipper (*qq.v.*).

God, Church of any of several Pentecostal churches that developed in the U.S. South from the late 19th- and early 20th-century Latter Rain revival, based on a belief that a second rain of the gifts of the Holy Spirit would occur similar to that of the first Christian Pentecost. They adhere to an ultraconservative theology, by which they regard the state of holiness as a work of grace subsequent to conversion or justification, and practice "speaking in other tongues as the Spirit gives utterance."

The revival began in the Great Smoky Mountains (northwest Georgia and eastern Tennessee) in 1886 under the leadership of R.G. Spurling and his son, who were Baptists, and W.F. Bryant, a Methodist. Members of the revival were organized into the Christian Union, changed their name to the Holiness Church (1902) and later to the Church of God (1907). In 1909 A.J. Tomlinson, an American Bible Society agent, was elected general overseer.

Splits began to occur in 1917, when the Chattanooga congregation seceded and took the name of the Original Church of God, Inc. Other divisions followed and numerous independent groups were formed.

When Tomlinson died in 1943, disputes between his sons led to further schisms. Homer A. Tomlinson set up the Church of God, World Headquarters, at Queens Village, N.Y.; and his brother Milton became head of the Cleveland, Tenn., group. Another branch in Cleveland became known as the Church of God of Prophecy.

God (Anderson Ind.), Church of, Christian fellowship that considers itself a "reformation movement" among Christians and not a church or sect; it accepts its title for identification purposes only. Its members believe that they have organized themselves to carry on the work of the church, but they do not believe they have organized the church, which is made up of all Christians and cannot be limited to human organizations.

The fellowship developed from the work of Daniel Sidney Warner, a minister of the Churches of God in North America (general eldership). In 1881 Warner and five others left that church and began the new movement, an open fellowship of a community of believers not restricted by creeds or organizations. The fellowship, Warner believed, reestablished the situation of the very early Christians. The movement in its early days opposed all human organization, but this hampered its growth. Gradually it was realized that the work of the church, but not the Church of God, must be organized.

In theology Warner and his associates were essentially followers of John Wesley and the early Methodists. The use of tobacco and alcoholic beverages and participation in "worldly pleasures," such as dancing and the theatre, were forbidden. It is considered to be one of the Holiness Churches, which stress the doctrine of sanctification, a postconversion experience that allows the person to live a sinless life.

Despite the movement's stated beliefs, it functions essentially as a denomination. It has a congregational system of church government, and ministers belong to state and regional assemblies. A general ministerial assembly and an annual convention meet annually at Anderson, Ind., the headquarters of the movement.

God, Death of: *see* Death of God movement.

God, Kingdom of, also called KINGDOM OF HEAVEN, in Christianity, the spiritual realm over which God reigns as king, or the fulfillment on Earth of God's will. The phrase occurs frequently in the New Testament, primarily used by Jesus Christ in the first three Gospels. It is generally considered to be the central theme of Jesus' teaching, but widely differing views have been held about Jesus' teaching on the Kingdom of God and its relation to the developed view of the church.

Though the phrase itself rarely occurs in pre-Christian Jewish literature, the idea of God as king was fundamental to Judaism, and Jewish ideas on the subject undoubtedly underlie, and to some extent determine, the New Testament usage. Behind the Greek word for kingdom (*basileia*) lies the Aramaic term *malkut,* which Jesus may have used. *Malkut* refers primarily not to a geographical area or realm nor to the people inhabiting the realm but, rather, to the activity of the king himself, his exercise of sovereign power. The idea might better be conveyed in English by an expression such as kingship, rule, or sovereignty.

To most Jews of Jesus' time the world seemed so completely alienated from God that nothing would deal with the situation short of direct divine intervention on a cosmic scale. The details were variously conceived, but it was widely expected that God would send a supernatural, or supernaturally endowed, intermediary (the Messiah or Son of Man), whose functions would include a judgment to decide who was worthy to "inherit the Kingdom," an expression which emphasizes that the Kingdom was thought of as a divine gift, not a human achievement.

According to the first three Gospels, most of Jesus' miraculous actions are to be understood as prophetic symbols of the coming of the Kingdom, and his teaching was concerned with the right response to the crisis of its coming. The nationalistic tone of much of the Jewish expectation is absent from the teaching of Jesus.

Scholarly opinion is divided on the question as to whether Jesus taught that the Kingdom had actually arrived during his lifetime. Possibly, he recognized in his ministry the signs of its imminence, but he nevertheless looked to the future for its arrival "with power." He may well have regarded his own death as the providential condition of its full establishment. Nevertheless, he seems to have expected the final consummation in a relatively short time (Mark 9:1). Thus, Christians were perplexed when the end of the world did not occur within a generation, as Paul, for example, expected. Christian experience soon suggested, however, that, as the result of Christ's Resurrection, many of the blessings traditionally reserved until the life of the age to come were already accessible to the believer in this age. Thus, though the phrase Kingdom of God was used with decreasing frequency, that for which it stood was thought of as partly realized here and now in the life of the church, which at various periods has been virtually identified with the Kingdom; the Kingdom of God, however, would be fully realized only after the end of the world and the accompanying Last Judgment. The Johannine writings in the New Testament played a large part in the transition to this traditional Christian understanding of the Kingdom of God.

God, Lamb of: *see* Agnus Dei.

God, Peace of, Latin PAX ECCLESIAE, a measure by the medieval Roman Catholic Church to end private warfare and to limit violence against certain persons and property.

The Peace of God is first heard of in the year 990 at three synods held in different parts of southern and central France—at Charroux, Narbonne, and Puy. It enlisted the immediate support of the regular clergy and of William V of Aquitaine, the most powerful lord of southern France, who urged its adoption at the councils of Limoges (994) and Poitiers (999). The peace decrees of these various synods differed considerably in detail, but in general they forbade, under pain of excommunication, every act of private warfare or violence against ecclesiastical buildings and their environs, against certain persons, such as clerics, pilgrims, merchants, women, and peasants, and against cattle and agricultural implements. All laymen and clerics in the areas adopting the Peace of God were required to take a solemn oath to observe and enforce the peace. At the Council of Bourges (1038), the archbishop decreed that every Christian 15 years and older should take such an oath and enter the diocesan militia.

To make the best use of the Britannica, consult the INDEX *first*

God, Truce of, Latin TREUGA DEI, or TREVA DEI, a measure by the medieval Roman Catholic Church to suspend warfare during certain days of the week and during the period of certain church festivals and Lent.

It is traceable to at least the Synod of Elne (1027), which suspended all warfare from Saturday night until prime on Monday. By 1042 the truce extended from Wednesday evening to Monday morning in every week and also, in most places, lasted during the seasons of Lent and Advent, the three great vigils and feasts of the Blessed Virgin, and those of the 12 apostles and a few other saints. The Truce of God was decreed for Flanders at the Synod of Thérouanne (1063) and was instituted in southern Italy in 1089, probably through Norman influence. The bishop of Liège introduced it in Germany in 1082, and three years later a synod held at Mainz in the presense of the emperor Henry IV extended it to the whole empire. It did not extend to

England, where the strength of the monarchy made it unnecessary. The popes took its direction into their own hands toward the end of the 11th century; and the first decree of the Council of Clermont (1095) proclaimed a weekly truce for all Christendom. The Truce of God was reaffirmed by many councils, such as that held at Reims in 1119 and the Lateran councils of 1123, 1139, and 1179. The Council of Clermont prescribed that the oath of adherence to the truce be taken every three years by all men above the age of 12, whether noble, burgess, villein, or serf. The results of these peace efforts were perhaps surprisingly mediocre, but it must be borne in mind that not only was the military organization of the dioceses always very imperfect, but Continental feudalism, so long as it retained political power, was inherently hostile to the principle and practice of private peace. The Truce of God was most powerful in the 12th century, but with the 13th its influence waned as the kings gradually gained control over the nobles and substituted the king's peace for that of the Church.

God and Saints of Christ, Church of, religious sect founded in 1896 by Prophet William S. Crowdy. He passed his mantle of leadership to Bishop William Plummer, who announced himself as "Grand Father Abraham." This group believes that all Jews were originally black and that Negroes are descendants of the "lost tribes of Israel." Their beliefs centre around the "Seven Keys," the "Stone of Truth," and the Ten Commandments. They cultivate 1,000 acres of land in Virginia, operate several industries, a school, and a home for orphans and the aged.

God in Christ, Church of, predominantly black Pentecostal church that originated as an outgrowth of the Holiness movement. The date and place of the group's establishment is disputed between two member bodies, but the founding role of a dynamic preacher named Charles H. Mason is acknowledged by both. During the late 19th century, Mason led Holiness churches in Jackson, Miss., and Memphis, Tenn. When news of the outpouring of Pentecostal blessing at the Apostolic Faith Gospel Mission in Los Angeles reached him, he travelled there himself and received Spirit baptism. He returned to his congregation and began to preach the need for a charismatic experience. Tensions developed, and a non-Pentecostal faction withdrew. Mason proceeded to convene a General Assembly and to declare that the Church of God in Christ was henceforth Pentecostal. At that first Assembly, which met in Memphis, *c.* 1907, Mason was elected general overseer of about 12 churches located principally in Tennessee, Arkansas, Mississippi, and Oklahoma.

For decades, Mason almost single-handedly supervised the activities of the denomination. In 1933, however, after his administrative responsibilities had apparently become too burdensome for him, Mason, who held the titles "Chief Apostle," "Bishop," and "Elder," relinquished some of his authority to four assistant bishops and later to state overseers. This form of church government, with its adherence to Episcopal authority, is not characteristic of most contemporary Pentecostal groups, which combine elements of Congregational and Presbyterian polity. In doctrinal matters, however, there is little difference between the Church of God in Christ and other charismatic groups, especially the Churches of God and the Pentecostal Holiness Church, which stress perfectionism. *See* Holiness movement; Pentecostalism.

God Save the Queen, also called (during a kingship) GOD SAVE THE KING, British royal and national anthem. The origin of both the words and the music is obscure. Of the many candidates for authorship—including John Bull (*c.* 1562–1628), Thomas Ravenscroft (*c.* 1583–*c.* 1633), and Henry Purcell (*c.* 1639–95)—the most likely is Henry Carey (*c.* 1687–1743), the author of hundreds of popular songs, most of them lost. The earliest copy of the words appeared in *Gentleman's Magazine* in 1745; the tune appeared about the same time in an anthology, *Thesaurus Musicus*—in both instances, without attribution. In the same year "God Save the King" was performed in two London theatres, one the Drury Lane; and in the following year George Frideric Handel used it in his *Occasional Oratorio*, which dealt with the tribulations of the Jacobite Rebellion of '45. Thereafter, the tune was used frequently by composers making British references, notably by Ludwig van Beethoven, who used it in seven variations.

From Great Britain the melody passed to continental Europe, becoming especially popular in Germany and Scandinavia, with a variety of different lyrics. Later, in the United States, Samuel F. Smith (1808–95) wrote "My Country 'Tis of Thee" (1832), to be sung to the British tune; it became, next to "The Star-Spangled Banner," the nation's most popular semiofficial anthem.

God Save the Queen

God save our gracious Queen,
Long live our noble Queen,
God save the Queen:
Send her victorious,
Happy and glorious,
Long to reign over us:
God save the Queen.

O Lord our God arise,
Scatter her enemies,
And make them fall:
Confound their politics,
Frustrate their knavish tricks,
On Thee our hopes we fix:
God save us all.

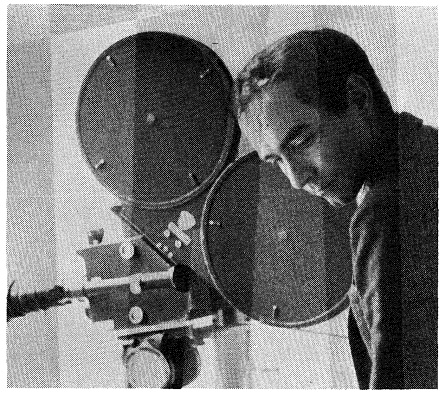
Thy choicest gifts in store,
On her be pleased to pour;
Long may she reign:
May she defend our laws,
And ever give us cause
To sing with heart and voice
God save the Queen.

Godard, Benjamin(-Louis-Paul) (b. Aug. 18, 1849, Paris—d. Jan. 10, 1895, Cannes, Fr.), French composer of operas, light piano pieces, and songs.

Godard was a child prodigy on the violin, studied composition, and in his youth composed symphonies, chamber works, concerti, and piano music. His best known opera, *Jocelyn* (1881), is remembered for its famous "Berceuse." Other works included the operas *Pédro de Zalaméa* (1884) and *La Vivandière* (1895) and his *Symphonie Légendaire*, Opus 100 (1886). Godard's music, slender and sentimental, at its best shows an affinity with Chopin and Schumann.

Godard, Jean-Luc (b. Dec. 3, 1930, Paris), French film director who came to prominence with the Nouvelle Vague, or New Wave, group in France during the late 1950s and the 1960s. His first feature film, *Breathless* (1960), shot without a script, won the Prix Jean Vigo.

Life. Godard spent his formative years on the Swiss side of Lake Geneva, where his father directed a clinic. His higher education consisted of study for a degree in ethnology at the University of Paris, interminable student café conversations, and a labouring job on a dam, which inspired his first short film, *Opération Béton* (1954). His ethnological interests link with the influence on his work of Jean Rouch, an anthropologist who became the first practitioner and theoretician of the documentary-like film style *cinéma vérité* ("cinema truth"). Filmmakers of this school employ lightweight television equipment in order to observe their subject with the utmost informality and so completely without preconceived bias that the theme and motifs of the film emerge only while shooting, or even later, at the editing stage. Godard (often writing under the pseudonym of Hans Lucas) also evinced a then unfashionable devotion to such studio-bound German expressionist filmmakers as Fritz Lang.



Jean-Luc Godard

By courtesy of The Museum of Modern Art Film Stills Archive, New York City

Godard's first feature film, *Breathless* (1960), which was produced by François Truffaut, his colleague on the journal *Cahiers du Cinéma,* won the Prix Jean Vigo. It inaugurated a long series of features, all celebrated for the often drastic nonchalance of Godard's improvisatory filmmaking procedures. *Breathless* was shot without a script; Godard sketched the dialogue overnight and revised it between and during rehearsals. In subsequent films he even resorted to speaking the characters' replies to the actors from behind the camera during takes. Thus, he used improvisatory techniques sometimes to observe reality, sometimes to impose his own vision, and often to interrelate the two so as to create a strangely abstract effect.

His 1963 film *Contempt,* based on a story by the Italian novelist Alberto Moravia, marked his only venture into orthodox and comparatively expensive filmmaking. Afterward, he maintained an almost unique position as an absolute, independent creator, using extraordinarily cheap alfresco production methods and enjoying repeated success on the international "art cinema" circuit.

Breathless recounts the misadventures of a petty crook (played by Jean-Paul Belmondo, often Godard's alter ego on screen) who admires Humphrey Bogart and is betrayed to the police by an American girl. Being uncertain whether or not she loves him, she informs on him simply to see if she can. For some years, Godard's work showed an increasingly desperate obsession with themes of fickleness (both male and female), indignity, caprice, and the impossibility of distinguishing a meaningful reality from the imposture perpetrated by others, by one's own mind, by ideology, and by art. Godard used the face of the actress who was then his wife, Anna Karina, as a sphinx-like icon representing this existential duplicity in several films, notably *The Little Soldier* (1960), an ironically flip tragedy, banned for many years, about torture and countertorture. *My Life to Live* (1962), a study of a young Parisian prostitute, used, with ironical solipsism, pastiches of documentary form, and clinical jargon. And on the strength of *Pierrot le fou* (1965), he was asked to direct what was to be an immensely successful U.S. film, *Bonnie and Clyde* (he refused it because of his suspicion of the Hollywood system).

Godard offered his visual and verbal images as delusive counterfeits for a life whose meaning has become irretrievably lost, or perhaps

was always intrinsically absurd. These images are endowed with additional depth by his extensive culture. Increasingly, his films came to include shots of books brandished or read from and suggestive street signs or posters and dialogue that is delivered as if the performers were alienated from their roles, merely reading texts. Historically impossible or subtly fantastic settings are juxtaposed, and his films compel disrupting awareness of the medium itself. Thus, in two of his films, Belmondo, as the hero, addresses the audience directly, through the camera, while driving. His allusions to other films in themselves constitute an intricate maze. The heroine of *The Little Soldier,* for instance, is surnamed "Dreyer" after Carl Dreyer, a director whom Godard admires; an extract from one of Dreyer's films is watched by the heroine of *My Life to Live. Alphaville* (1965) features scenes from *Metropolis* (1926), whose director, Fritz Lang, plays a film director in *Contempt.* In these ways, Godard's films become intellectual essays: in them, the acted, experienced fictions of earlier motion pictures are transformed into the illustrative ideological cinema of the late 1960s. In 1966 two features—*Made in U.S.A.,* devoted to America, and *Two or Three Things I Know About Her,* devoted to Paris—marked a nadir of Godard's generalized despair, which by then was aimed at society as well as at interpersonal relationships. An increasing interest in left-wing thought was implicit in *La Chinoise* (1967; its title is slang for Parisian Maoists) and was confirmed by Godard's active participation in the Paris student riots of 1968 and other demonstrations. *Weekend,* also made in 1967, was a hard-hitting denunciation of modern French society.

By then married to the actress Anne Wiazemsky, he moved from fiction and aesthetic preoccupation to the Marxism of Herbert Marcuse, Che Guevara, Frantz Fanon, and others. *Le Gai Savoir* (1968) is a flatly illustrated text spoken by two students named Émile Rousseau and Patricia Lumumba. His texts for the next decade exhibited a complete indifference to their appeal to the public and were intended as intellectual agitprop (*i.e.,* agitation-propaganda): in Godard's own words, they are "not a show, a struggle." With this ideological twist Godard disconcerted those who had admired him, whether their particular enthusiasm was for the dexterity of his film form, for his reputation as a second creator of the intellectual cinema (as adumbrated by the Soviet director Sergey Eisenstein a generation earlier), for his skill in posing complex cultural riddles, or for his cool but sad recording of Western man's crises of identity. His evolution posed a problem, also, for his detractors, whether they criticized him for solipsism, for nihilism, or for his suspiciously complacent celebration of the ignominies of bourgeois man under the shadow of revolution. Even the minority that declared his earlier films to be honourable failures, or exercises in intellectual tedium, had to agree that, of all directors, he remained the most recklessly volatile, and his development the most fascinatingly unpredictable. During the 1970s he became more involved with politically militant television. *Numéro Deux,* for example, was a video experiment about family life in contemporary France and the power of ideology and the media—and was commercially unsuccessful.

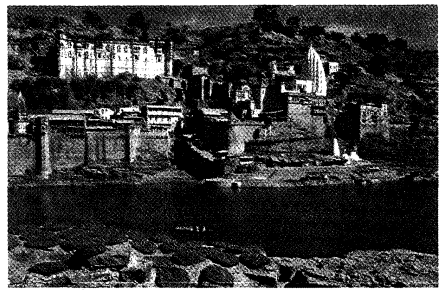
Godard began making successful narrative feature films again in 1979 with *Every Man for Himself,* a story of three young Swiss people and their problems of work and love. In the early 1980s he was involved in film projects at home as well as in California and Mozambique.

Assessment. Of all the former critics of *Cahiers* who, in the late 1950s, became the major French filmmakers of the New Wave, none has had a more prolific or more controversial career than Godard. No less boldly radical in his political views than in his aesthetic convictions, he has written and directed highly personal films that are fascinating in expressing so forcefully his readiness to sacrifice both his art and his way of life to a tortuous conscience. Although Godard's films have provoked a wide range of critical responses, it is indisputable that they have exercised an immense influence on filmmaking throughout the world. (R.Du.)

MAJOR WORKS. *À bout de souffle* (1959; *Breathless*); *Le Petit Soldat* (1960; *The Little Soldier*); *Une Femme est une femme* (1961; *A Woman Is a Woman*); *Vivre sa vie* (1962; *My Life to Live*); *Les Carabiniers* (1963; *The Soldiers*); *Le Mépris* (1963; *Contempt*); *Une Femme mariée* (1964; U.S., *The Married Woman;* British, *A Married Woman*); *Alphaville* (1965); *Bande à part* (1965; U.S., *Band of Outsiders;* British, *The Outsiders*); *Pierrot le fou* (1965; *Crazy Pete*); *Masculin-féminin* (1966); *Made in U.S.A.* (1966); *Deux ou trois choses que je sais d'elle* (1966); *La Chinoise* (1967); *Weekend* (1967); *Le Gai Savoir* (1968); *One Plus One* (1969; alternate title, *Sympathy for the Devil*); *British Sounds* (1969); *Le Vent d'est* (1969; *A Wind from the East*); *Pravda* (1970); *Numéro Deux* (1975); *Sauve qui peut la vie* (1979; *Every Man for Himself*).

BIBLIOGRAPHY. The English bibliography is dominated by two collections of essays: *The Films of Jean-Luc Godard,* 2nd ed. by Ian Cameron (1970); and *Jean-Luc Godard: A Critical Anthology,* ed. by Toby Mussman (1968). Other English material includes Richard Roud, *Jean-Luc Godard,* 2nd ed. (1970); and the following scripts: *Le Petit Soldat, The Married Woman, Alphaville, Pierrot le fou, Masculin-féminin,* and *Made in U.S.A.*

Godarpura, also called MANDHATA, or OMKARJI, pilgrimage centre, East Nimār (formerly Khandwa) district, Madhya Pradesh



Raja's palace and temples on an island in the Narmada River at Godarpura, Madhya Pradesh, India

Christina Gascoigne

state, central India, situated on the Narmada River. Godarpura has noted Śaivite, Vaiṣṇavite, and Jaina temples, mostly of the 14th and 18th centuries. The Omkar temple, on an island in the river, contains one of the 12 great Śiva (Shiva) phallic symbols, or *liṅgas*; another stands outside the Gaurī Somnāth temple. The temples on the island are Śaivite, but there are Vaiṣṇavite and Jaina temples on the north bank, and on the south stands one of the few Brahmā temples. The raja's palace stands on a terraced hillside of the island. Godarpura's annual fair was, until 1824, the scene of the self-immolation of religious devotees, who threw themselves from the high cliffs into the river.

Godarz (kings of Parthia): *see* Gotarzes I; Gotarzes II.

Godāvari River, sacred river of central India. It rises in the Western Ghāts 50 mi (80 km) from the Arabian Sea and flows generally eastward across the Deccan Plateau, along the Mahārāshtra–Andhra Pradesh border and across Andhra Pradesh state, turning southeastward for the last 200 mi of its course before reaching the Bay of Bengal. There it empties via its two mouths: the Gautami Godāvari to the north and the Vasishta Godāvari to the south. Its total length is approximately 910 mi, and it has a drainage basin of 121,000 sq mi (313,000 sq km).

From its source to the Eastern Ghāts, the Godāvari River flows through gentle, somewhat monotonous terrain, along the way receiving the Dārna, Kadva, Pūrna, Manār, and Prānhita rivers. Upon entering the Eastern Ghāts region, however, the river flows between steep and precipitous banks, its width contracting until it flows through a deep cleft only 600 ft (180 m) wide, known as the Gorge. On either side wooded hills rise almost vertically from the waters. Having passed through the Eastern Ghāts, the river widens again, traversing wide plains, the low islands in its stream being used for tobacco growing. At this point the Godāvari flows placidly. Just above the town of Rājahmundry a dam was constructed on the river in 1948 to provide irrigation and hydroelectric power.

The upper reaches of the Godāvari are dry in winter and spring, making it virtually useless for irrigation. At its mouths, however, the development of a navigable irrigation-canal system, linking its delta with that of the Krishna River to the southwest, has made the land one of the richest rice-growing areas of India. The Godāvari, throughout its entire length, is sacred to the Hindus.

Goddard FAMILY, celebrated New England cabinetmakers, whose furniture was among the finest made in America during the 17th and 18th centuries.

Quakers of English ancestry, the Goddards intermarried with the Townsend family, who were equally famous as cabinetmakers. In four generations, 20 Goddard and Townsend craftsmen are known, the peak of their excellent productivity coming in the early and mid-18th century. Founding the Newport (R.I.) school of American furniture, they were especially noted for designs in the Queen Anne and Chippendale styles, identified by an original type of shell carving and by an innovative surface treatment of which no exact European prototypes existed.

Secretary desk, 1760–80, Newport Chippendale style, by John Goddard; in the Rhode Island Historical Society, Providence

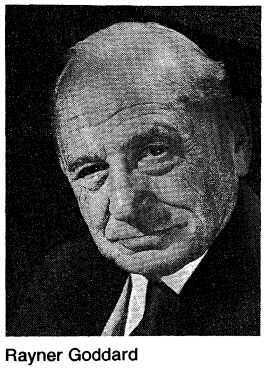
By courtesy of the Rhode Island Historical Society, Providence

The son of Daniel Goddard, a house carpenter in Massachusetts, John Goddard (1723/24–85) moved with his family in the 1740s to Newport, where he and his younger brother James worked for Job Townsend. Shortly after they married Townsend's daughters, John established his own workshop, and by the 1760s he had become Newport's leading cabinetmaker, being commissioned by such eminent early Americans as Gov. Stephen Hopkins of Rhode Island and the famous philanthropist Moses Brown. In contrast with the Philadelphia school, which tried to imitate the more flamboyant Chippendale styles, Goddard, like the Townsends, created simple adaptations, unpretentious and sensible and possessing a solid dignity. A superb cabinetmaker following basically the Queen Anne tradition, he has been credited with having originated the blockfront, or tub front (although the Townsends have an equally qualified claim to this style), a distinctive furniture front that is divided vertically through alternating convex (sides) and concave (centre) panels. His blockfront desks, secretaries, and cabinets usually had readily identifiable ogee bracket feet (also called console legs, having curved inner edges and straight corner edges) and were decorated with his rather personal shell ornaments. Instead of using carving, marquetry, or metal mounts, so prevalent in contemporary European furniture, he decorated along the patterns of the wood grains, and many of his best known pieces, as with the Townsends, were of mahogany from the West Indies or South America. Above all, he strove for harmony, conceiving each piece as a unified whole. Among the cabinetmakers who imitated him were those of the Connecticut school.

Only two of Goddard's sons, to whom he bequeathed his tools and shop, were cabinetmakers: Stephen (died 1804) and Thomas (1765–1858); Townsend Goddard (1750–90), probably his eldest son, was named executor of his will (written 1761). Both Stephen and Thomas had worked with John the elder and carried on his business for many years. Although they produced some works in their father's style, they shifted to the Hepplewhite and Sheraton styles current in England; but as their father had innovated on the idea of Queen Anne, so their treatment of these new styles was also adaptive. Their well-known pinewood card table (*c.* 1785–1804), veneered with mahogany and satinwood, reveals a restrained and selective treatment of Hepplewhite.

Stephen Goddard's son, John Goddard II (1789–1843), was also a cabinetmaker. They were all survived by Thomas, who remained virtually a relic of the bygone Colonial era and whom his obituarist in the *Newport Mercury* honoured as one of the century's most humane and benevolent men.

Goddard (of Aldbourne), Rayner Goddard, Baron (b. April 10, 1877, London—d. May 29, 1971, London), lord chief justice of England from 1946 to 1958. Seldom lenient but always respectful of legal proprieties, he set a valuable example to the lower judiciary in controlling the crime wave that followed World War II in England.



Rayner Goddard
Popperfoto

From 1917 Goddard served successively as recorder (judge) of Poole (Dorset), Bath, and Plymouth until 1932, when he was made judge of the high court of justice, King's Bench division. In 1938 he became a lord justice of appeal and in 1944 a lord of appeal in ordinary, and he was created a life peer as Baron Goddard of Aldbourne, Wiltshire. His work as lord chief justice was especially notable because he assumed the office at the age of 69.

Goddard, Robert Hutchings (b. Oct. 5, 1882, Worcester, Mass., U.S.—d. Aug. 10, 1945, Baltimore), American professor and inventor generally acknowledged to be the father of modern rocketry. He published his classic treatise, *A Method of Reaching Extreme Altitudes,* in 1919.

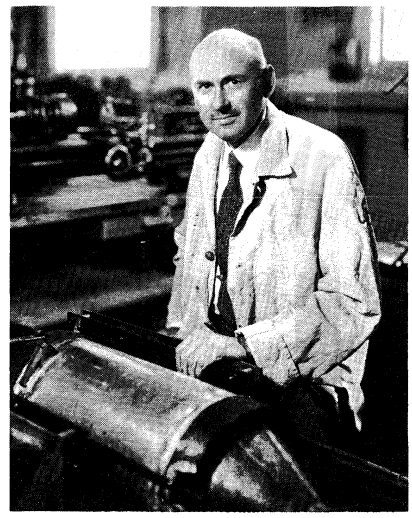
Early life and training. Goddard was the only child of a bookkeeper, salesman, and machine-shop owner of modest means. The boy had a genteel upbringing and in early youth felt the excitement of the post-Civil War Industrial Revolution when Worcester factories were producing machinery and goods for the burgeoning country. From childhood on he displayed great curiosity about physical phenomena and a bent toward inventiveness. He read in physics and mechanics and dreamed of great inventions.

In 1898 young Goddard's imagination was fired by the H.G. Wells space-fiction novel *War of the Worlds,* then serialized in the *Boston Post.* Shortly thereafter, as he recounted, he actually dreamed of constructing a workable space-flight machine. On Oct. 19, 1899, a day that became his "Anniversary Day," he climbed a cherry tree in his backyard and "... imagined how wonderful it would be to make some device which had even the *possibility* of ascending to Mars ... when I descended the tree ...," he wrote in his diary, "existence at last seemed very purposive."

Goddard's fascination with space flight and the means of attaining it continued into his college years at the Worcester Polytechnic Institute. In an assigned theme, "Travelling in 1950," he was also intrigued with the notion of "the fastest possible travel for living bodies on the earth's surface" and projected a plan for travel inside a steel vacuum tube in which cars were suspended and driven by the attraction and repulsion of electromagnets. Patents on a vacuum-tube system of transport were later granted the inventor, with thrust—acceleration and deceleration—the chief principle.

Research in Massachusetts. In 1908 Goddard began a long association with Clark University, Worcester, where he earned his doctorate, taught physics, and carried out rocket experiments. In his small laboratory there, he was the first to prove that thrust and consequent propulsion can take place in a vacuum, needing no air to push against. He was the first to explore mathematically the ratios of energy and thrust per weight of various fuels, including liquid oxygen and liquid hydrogen. He was also the first to develop a rocket motor using liquid fuels (liquid oxygen and gasoline), as used in the German V-2 rocket weapon 15 years later. In a small structure adjoining his laboratory, a liquid-propelled rocket in a static test in 1925 "operated satisfactorily and lifted its own weight," he wrote. On March 16, 1926, the world's first flight of a liquid-propelled rocket engine took place on his Aunt Effie's farm in Auburn, Mass., achieving a brief lift-off.

As is frequently the case with scientific theory and invention, developments proceeded in various parts of the world. In achieving lift-off of his small but sophisticated rocket engine,



Robert H. Goddard in his workshop, 1935
By courtesy of Esther C. Goddard

Goddard carried his experiments further than did the Russian and German space pioneers of the day. While Goddard was engaged in building models of a space-bound vehicle, he was unaware that an obscure schoolteacher in a remote village of Russia was equally fascinated by the potential for space flight. In 1903 Konstantin E. Tsiolkovsky wrote "Investigations of Space by Means of Rockets," which many years later was hailed by the Soviet Union as the forerunner of space flight. The other member of the pioneer space trio—Hermann Oberth of Germany—published his space-flight treatise, *Die Rakete zu den Planetenräumen,* in 1923, four years after the appearance of Goddard's early monograph.

Goddard's early tests and others were modestly financed over a period of several years by the Smithsonian Institution, whose secretary, Charles G. Abbot, had responded to Goddard's appeal for financial support. In 1929, following an aborted and noisy flight test that brought unwanted press notice to the publicity-shy inventor, Charles A. Lindbergh was instrumental in procuring greater financial assistance for Goddard's experiments. From 1930 to the mid-1940s, the Guggenheim Fund for the Promotion of Aeronautics financed the work on a scale that made possible a small shop and crew and experimental flights in the open spaces of the American southwest, at Roswell, N.M. There, Goddard spent most of his remaining days in the unending trial-and-error reach for high altitudes.

Experiments at Roswell. In the course of his experiments there he became the first to shoot a liquid-fuel rocket faster than the speed of sound (1935). He obtained the first patents of a steering apparatus for the rocket machine and of the use of "step rockets" to gain great altitudes. He also developed the first pumps suitable for rocket fuels, self-cooling rocket motors, and other components of an engine designed to carry man to outer space. Furthermore, his experiments and calculations took place at a time when any news of his work drew from the press and the public high amusement that "Moony" Goddard could take seriously the possibility of travel beyond Earth. His small rockets, early prototypes of the modern Moon thrusters, achieved altitudes of up to 1.6 kilometers (1 mile) above the prairie.

During World War II, Goddard offered his work to the military, but lack of interest in rocket development led to his closing down the Roswell establishment and participating in the war effort through a small Navy contract for work at Annapolis, Md., on the development of a jet-thrust booster for seaplane take-off. Lindbergh and the industrialist and phi-

lanthropist Harry F. Guggenheim remained staunch advocates of the Worcester inventor and the feasibility of space exploration.

Goddard died of throat cancer in 1945, at the threshold of the age of jet and rocket. Years later, his work was acknowledged by the United States government when a $1,000,000 settlement was made for the use of his patents. The Goddard Memorial Library at Clark University was named in his honour.

(M.K.L./M.Ln.)

BIBLIOGRAPHY. The main biographical source is Milton Lehman, *This High Man: The Life of Robert H. Goddard* (1963). See also *The Papers of Robert H. Goddard,* 3 vol. (1970); and R.H. Goddard, *Rocket Development* (1948), both ed. by Esther C. Goddard and G. Edward Pendray.

Goddess of Mercy fir: *see* Japanese cedar.

Godefroi (French personal name): *see under* Godfrey, except as below.

Godefroid DE CLAIRE, also called GODEFROID DE HUY (b. Huy-sur-le-Meuse, Belg.; fl. 1130–50), important Belgian Romanesque goldsmith and enamelist of the Mosan school. Little is known of his life, but he seems to have been most active in the service of the abbot of Stavelot Abbey. Among the best known works attributed to him are a bronze aquamanile (ewer) reliquary of St. Alexander (*c.* 1145; Musées Royaux d'Art et d'Histoire, Brussels) and two enamel plaques showing the "Baptism of Christ" and the "Crucifixion" (Metropolitan Museum of Art, New York City).

Godefroy (French personal name): *see under* Godfrey, except as below.

Godefroy FAMILY, distinguished French family of legal scholars and historians. Denis I Godefroy, called Denis the Old (1549–1621), was a Protestant who for that reason lived in exile in Switzerland and Germany. His *Corpus juris civilis* (1583) had a long life, going through 20 editions. His son Théodore (1580–1649) abjured Protestantism and lived in France, where he wrote historical works. Jacques Godefroy (1587–1652), also a son of Denis I, was a professor at the University of Geneva. His edition of the Codex Theodosianus, published posthumously, was his most important work. Denis II Godefroy, called Denis the Young (1615–81), son of Théodore, was also a historian and archivist. Denis III (1653–1719), son of Denis II, was keeper of the books at the Chambre des Comptes, the central financial administration, in Paris. Jean Godefroy, sieur d'Aumont (1656–1732), also a son of Denis II, was editor of a number of historical documents.

Gödel, Kurt, Gödel also spelled GOEDEL (b. April 28, 1906, Brünn, Austria-Hungary—d. Jan. 14, 1978, Princeton, N.J., U.S.), Austrian-born U.S. mathematician, logician, and author of Gödel's proof, which states that within any rigidly logical mathematical system there are propositions (or questions) that cannot be proved or disproved on the basis of the axioms within that system and that, therefore, it is uncertain that the basic axioms of arithmetic will not give rise to contradictions. This proof has become a hallmark of 20th-century mathematics, and its repercussions continue to be felt and debated.

A member of the faculty of the University of Vienna from 1930, Gödel was also a member of the Institute for Advanced Study, Princeton, N.J. (1933, 1935, 1938–52); he emigrated to the United States in 1940 (naturalized 1948) and from 1953 served as a professor at the institute.

Gödel's proof first appeared in an article in the *Monatshefte für Mathematik und Physik,* vol. 38 (1931), on formally indeterminable propositions of the *Principia Mathematica* of Alfred North Whitehead and Bertrand Russell. This article ended nearly a century of attempts to establish axioms that would provide a rigorous basis for all mathematics, the most nearly (but, as Gödel showed, by no means entirely) successful attempt having been the *Principia Mathematica.* Another well-known work is *Consistency of the Axiom of Choice and of the Generalized Continuum-Hypothesis with the Axioms of Set Theory* (1940; rev. ed., 1958), which has become a classic of modern mathematics.

Goderich of Nocton, Frederick John Robinson, Viscount: *see* Ripon, Frederick John Robinson, 1st earl of.

Godescalchus OF ORBAIS, also spelled GODESCALC (poet and theologian): *see* Gottschalk of Orbais.

godfather: *see* godparent.

Godfred (Danish, Norwegian, Swedish personal name): *see under* Godfrey.

Godfrey (personal name): *see under* Geoffrey, except as below.

Godfrey, Danish GODFRED, or GUDFRED (d. 810), king in Denmark who halted the northward extension of Charlemagne's empire. He may have ruled over all Denmark, but his centre of power was in the extreme south of Jutland. There Hedeby (*q.v.*) became an important station on the new Frankish trade route to the Muslim states of the East via the Baltic Sea and the Russian rivers.

In 804, during a period of intense Danish-Carolingian warfare, Godfrey destroyed the Sorbian port of Reric (later Lübeck) in retaliation for the Sorbs' alliance with Charlemagne; the activity of the port was transferred to Hedeby, greatly enhancing its importance. In addition to campaigning successfully against the forces of Charlemagne and his son Louis I the Pious, Godfrey began construction of the Danevirke, a line of earthwork fortifications along the southern base of the Jutland peninsula, south of Hedeby. He was murdered while on campaign in Frisia.

Godfrey OF BOUILLON, French GODEFROI DE BOUILLON (b. *c.* 1060—d. July 18, 1100, Jerusalem), duke of Lower Lorraine (as Godfrey IV; 1089–1100) and a leader of the First Crusade, who became the first Latin ruler in Palestine after the capture of Jerusalem from the Muslims in July 1099.

Godfrey's parents were Count Eustace II of Boulogne and Ida, daughter of Duke Godfrey II of Lower Lorraine. Although he was named heir to the duchy of Lower Lorraine by his uncle in 1076, the Holy Roman emperor Henry IV kept the duchy for his son and left Godfrey with the lordship of Bouillon, in the Ardennes region of France. Godfrey won back his duchy in 1089 as a reward for his loyal service in Henry's war against the Saxons.

Godfrey of Bouillon in the moving tower, detail from a French manuscript, 12th century; in the Bibliothèque Nationale, Paris

Giraudon—Art Resource/EB Inc.

Impelled by religious motives, a craving for adventure, and his failure as an administrator, Godfrey, with his brothers Eustace and Baldwin, joined the First Crusade in 1096. When Raymond of Toulouse, lay leader of the crusade, declined to become king of Jerusalem, Godfrey accepted the crown but refused the title of king and was called instead *Advocatus Sancti Sepulchri* (Defender of the Holy Sepulchre).

Although Godfrey arranged truces with the Muslim maritime cities of Ascalon, Caesarea, and Acre and successfully beat off an Egyptian attack, he alienated many of the crusade's leading figures. Most of these returned to Europe or took up residence in other parts of Palestine, leaving Jerusalem defenseless. Godfrey also acknowledged himself as a vassal of Daimbert, patriarch of Jerusalem, thus laying the foundation for future struggles between lay and ecclesiastical figures who sought to control the kingdom. On his death he was succeeded by his brother Baldwin I.

Despite Godfrey's weakness as a ruler, the tall, handsome, and fair-haired descendant of Charlemagne was later idolized in legend as the "perfect Christian knight, the peerless hero of the whole crusading epic."

Godfrey OF FONTAINES, French GODEFROY DE FONTAINES (b. before 1250, Fontaines-les-Hozémont, Lower Lorraine—d. after 1305, Paris), French Aristotelian philosopher and theologian prominent in the medieval controversy over faith versus reason that dominated the intellectual life of the University of Paris, then the academic centre of the West.

At the Faculty of Arts in Paris, Godfrey studied with the Augustinian-Neoplatonist Henry of Ghent; with Siger of Brabant, the leading European follower of Averroës; and with St. Thomas Aquinas. After obtaining his master's diploma in theology in 1285, Godfrey taught at the University of Paris almost continuously until 1304; during his last 13 years at Paris he was regent, or dean, of the faculty. At this time he worked with Henry of Ghent in opposing the newly formed mendicant religious orders, whose members were attempting to secure teaching positions at the university. In 1292 he received a papal commission to examine academic affairs at Paris. Proposed as bishop of Tournai, Belg., in 1300, he withdrew his candidacy in the face of conservative opposition. In his principal works, the 15 *Quodlibeta,* or tracts, on miscellaneous topics, and a collection of *Scholia* (Annotations) on the *Summa theologiae* of St. Thomas Aquinas, Godfrey showed an eclecticism in trying to integrate the contending ideological positions at Paris. Generally, however, he strove to express the literal teaching of Aristotle untainted by Christian theological demands. In the area of the theory of knowledge he maintained a strict Aristotelian approach in attributing all universal concepts to the image perception of material objects, a view in contrast with the Neoplatonic influence of the Augustinian school that opted for the theory of innate ideas and the intervention of supernatural enlightenment.

Godfrey's independence as a critical thinker embroiled him in disputes both with the Thomistic and Scotistic (exponents of the thought of the Franciscan John Duns Scotus) schools, whose adherents drew up a list of Godfrey's innovations and divergences from their "common teaching." He was active as a spokesman for the Aristotelians and the secular clergy at the university. His influence declined after the mid-14th century, perhaps because there was no religious community to espouse his cause. Godfrey's *Quodlibeta* were

edited by M. De Wulf and A. Pelzer (1904–38).

Godfrey OF SAINT-VICTOR (b. *c.* 1125—d. 1194, Paris), French monk, philosopher, theologian, and poet whose writings summarized an early medieval Christian Humanism that strove to classify areas of knowledge, to integrate distinctive methods of learning, and to recognize the intrinsic dignity of man and nature.

A student with the arts faculty at Paris, Godfrey was influenced early by dialectical thought. After a brief period of teaching, in about 1160 he entered the Augustinian abbey of Saint-Victor, Paris, where he further developed his cultural Humanism. An unsympathetic monastic superior, however, harassed Godfrey to such an extent that he was obliged to leave the abbey in about 1180 for the solitude of a rural priory. There he wrote his principal work, *Microcosmus.* After the superior's death (*c.* 1190), he returned permanently to Saint-Victor.

The central theme of *Microcosmus* recalls the insight of classical philosophy and of the early Church Fathers, viz., that man is a microcosm, containing in himself the material and spiritual elements of reality. *Microcosmus* offers one of the first attempts by a medieval Scholastic philosopher to systematize history and knowledge into a comprehensive, rational structure. Godfrey used the symbolism of a biblical framework to treat the physical, psychological, and ethical aspects of man. He affirmed man's matter–spirit unity and the basic goodness of his nature, tempering this optimism with the realization that human nature has been weakened ("fractured") by sin, but not to an intrinsically corrupted and irreparable extent.

Godfrey admits four principal capabilities in man: sensation, imagination, reason, and intelligence. Man's analytic reason and power of insight have the theoretical science of philosophy for their natural fulfillment. But a supernatural fulfillment, he maintains, consists in love. To this end divine intervention is needed to confer on man the perfective graces, or gifts, of enlightenment, affectivity, and perseverance.

In his other notable work, the *Fons philosophiae* (*c.* 1176; "The Fount of Philosophy"), Godfrey, in rhymed verse, proposed a classification of learning and considered the controversy between Realists and Nominalists (who held that ideas were only names, not real things) over the problem of universal concepts. *Fons philosophiae* is an allegorical account of the sources of Godfrey's intellectual formation (*e.g.,* Plato, Aristotle, and Boethius), symbolized as a flowing stream from which he drew water as a student.

Another treatise, "Anatomy of the Body of Christ," appended to *Fons philosophiae,* is a leading example of medieval Christian symbolism. A long poem ascribing to each member and organ of Christ's body some aspect of man's natural and supernatural purpose, it assembled texts from the early Church Fathers and helped form medieval devotion to the humanity of Christ. Godfrey's writings have won appreciation as a prime example of 12th-century Humanism only through relatively recent scholarship, although their fundamental concepts of the positive values of man and nature were recognized to a limited extent by the high Scholasticism of the 13th century. The works of Godfrey of Saint-Victor are contained in *Patrologia Latina,* J.P. Migne ed., vol. 196 (1864). A modern edition of the text with commentary by P. Delhaye appeared in 1951.

Godfrey, Arthur (Morton) (b. Aug. 31, 1903, New York City—d. March 16, 1983, New York City), U.S. radio and television entertainer widely popular in the 1940s and '50s, whose many broadcast programs launched the careers of numerous popular singers and other entertainers.

The child of a newspaperman-author-lecturer, Arthur Godfrey grew up in New Jersey not far from New York City. At the age of 14 he abandoned high school and ran away from home. After three years of working at nondescript jobs he enlisted in the U.S. Navy, where he was trained to be a radio operator. After serving for four years he enlisted in the U.S. Coast Guard in 1927, and with this turn his career as an entertainer began; he became involved with Coast Guard entertainment programs. A Coast Guard program put him in touch with the Baltimore radio station WFBR, and when he was released from the service he found employment there, first as a singer, then announcing, and eventually as station manager.

When Godfrey first eased into programs of his own, his relaxed manner and quick rapport with other performers made listeners feel part of the group. He found that an occasional good-humoured retort to advertising copy he was reading would entertain and still sell the product. In the 1940s his casual, affable banter with guests on the air had become so popular that he had two programs daily and one weekly on the Columbia Broadcasting System (CBS) for several years. His format, which he successfully transferred to television, was an easy-going and unselfconscious variety show.

In 1959 Godfrey was stricken with lung cancer. Although he recovered from it, he did not return to radio until 1972; he never made a successful comeback on television. Godfrey was proud of his association with the Navy and Coast Guard, and he was a reserve naval officer.

Godfrey, Sir Edmund (Berry) (b. Dec. 23, 1621, probably Sellinge, Kent, Eng.—d. October 1678), English magistrate whose death, allegedly at the hands of Roman Catholics, touched off a wave of anti-Catholic hysteria that shook the government of King Charles II.

Sir Edmund Godfrey, chalk drawing by an unknown artist, *c.* 1678; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Godfrey went into business in London and later became a justice of the peace for the city of Westminster. He was knighted in 1666 for his services during the Great Plague of London (1664–65).

In September 1678 a renegade Anglican priest named Titus Oates and two other men laid before Godfrey fabricated evidence of what became known as the Popish Plot (*q.v.*) to murder Charles II and put his Roman Catholic brother James, duke of York (later King James II), on the throne. Public concern over these allegations was intensified after Godfrey's body was found in a ditch in October 1678. Two months later a Catholic silversmith named Miles Prance confessed that he had witnessed hirelings murder Godfrey in the presence of Catholic priests. Although Prance's testimony led to the execution of three men in 1679, he later admitted that he had lied. The mystery of Godfrey's death remains unsolved. The intensity of anti-Catholic hostility stemming from the Popish Plot was a factor behind attempts in Parliament, commencing in 1679, to exclude the Duke of York from the succession.

Godfrey, Thomas (b. December 1704, Bristol Township, Pa.—d. December 1749, Philadelphia), American colonial artisan, inventor, and mathematician.

Godfrey became a glazier during his youth and later installed the windows in Philadelphia's state house, now Independence Hall. While he was employed at the residence of Pennsylvania's Gov. James Logan, the governor himself encouraged Godfrey's talents in mathematics and science. Godfrey soon undertook the development of an improved quadrant for determining latitude. He carried out much of his work in part of a home that he rented from Benjamin Franklin. Godfrey completed his quadrant in 1730; its accuracy was subsequently proved during voyages in Delaware Bay and in the Atlantic Ocean to Jamaica.

Godfrey's invention was challenged by James Hadley, vice president of the Royal Society in London, who had developed a similar quadrant. In December 1734 Godfrey, with the support of Governor Logan, wrote to the society, claiming recognition as the original inventor, but his claims were not acknowledged.

Godfrey's son, Thomas (1736–63), won notice as a colonial playwright and poet.

Godhra, also spelled GODRH, town, administrative headquarters of Pānch Mahāls district, northeastern Gujarāt state, west central India. Godhra is a road and rail junction and a commercial centre for timber and agricultural produce. Industries include oilseed pressing, flour milling, and glass manufacture. Pop. (1981) town, 85,784; metropolitan area, 86,288.

Godiva, Lady, Old English GODGIFU (fl. *c.* 1040–80), Anglo-Saxon gentlewoman famous for her legendary ride while nude through Coventry, Warwickshire.

Godiva was the wife of Leofric, earl of Mercia, with whom she founded and endowed a monastery at Coventry. The chronicler Florence of Worcester (d. 1118) mentions Leofric and Godiva with respect, but does not refer to the ride. There is no evidence connecting the rider with the historical Godiva.

The earliest extant source for the story is the *Chronica* (under the year 1057) of Roger of Wendover (d. 1236). He recounts that her husband, in exasperation over her ceaseless imploring that he reduce Coventry's heavy taxes, declared he would do so if she rode naked through the crowded marketplace. She did so, her hair covering all of her body except her legs. Ranulf Higden (d. 1364), in his *Polychronicon,* says that as a result Leofric freed the town from all tolls save those on horses. An inquiry made in the reign of Edward I shows that at that time no tolls were paid in Coventry except on horses. A later chronicle asserts that Godiva required the townsmen to remain indoors at the time fixed for her ride. Peeping Tom, a citizen who looked out his window, apparently became a part of the legend in the 17th century. In most accounts he was struck blind or dead.

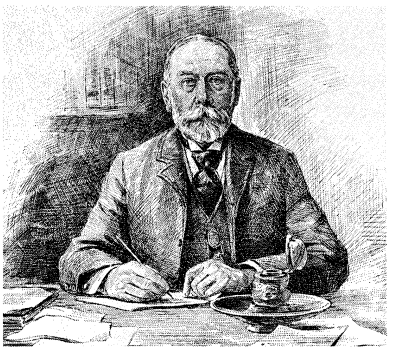
The Godiva procession, from 1678 part of Coventry Fair, is held every seven or eight years.

Godkin, E(dwin) L(awrence) (b. Oct. 2, 1831, Moyne, County Wicklow, Ire.—d. May 21, 1902, Greenway, Devonshire, Eng.), Anglo-U.S. editor and founder of *The Nation.*

After graduating in 1851 from Queen's College, Belfast, studying law, and working for newspapers in London and Belfast, Godkin went to America late in 1856. He continued a connection with the *London Daily News* while studying law in New York City; he was admitted to the bar in 1858. In the early 1860s Godkin was offered a partnership in *The New York Times* by its editor, Henry Jarvis Raymond. Although attracted by the offer, he declined and in 1865 founded *The Nation.* This quickly became the foremost review in the country.

In 1881 Godkin sold *The Nation* to Henry Villard, owner of the *New York Evening Post,* of which paper *The Nation* became the weekly edition. Godkin became associate editor of the *Post,* succeeding Carl Schurz as editor in chief in 1883. He shaped the policy of the *Post* until his retirement in 1899.

Under his leadership the *Post* broke with the Republican Party in the presidential campaign of 1884. Godkin's opposition to J.G. Blaine (Republican candidate for president in 1884) did much to create the so-called Mugwump Party, and the *Post* became independent. He consistently advocated currency reform, the gold basis, a tariff for revenue only, and civil service reform, rendering the greatest aid to the last cause. His attacks on Tammany Hall were so frequent that he was several times sued for libel because of biographical sketches of Tammany leaders, but the cases were dismissed. He also voiced strong and often effective opposition to "jingoism" and to imperialism.



Godkin, woodcut by R.W. Lane
By courtesy of the New-York Historical Society

Godmanchester (England): *see* Huntingdon and Godmanchester.

godmother: *see* godparent.

Godolphin, Sidney Godolphin, 1st earl of, VISCOUNT RIALTON, also called (1684–1706) BARON GODOLPHIN OF RIALTON (b. 1645, Godolphin Hall, Cornwall, Eng.—d. Sept. 15, 1712, St. Albans, Hertfordshire), English politician and administrator who did much to stabilize English financial administration during the 20 years after the Revolution of 1688.

A member of a cadet branch of an ancient Cornish family, he became page of honour to King Charles II in 1662, beginning a lifetime in court service and court politics. As page he became intimate with John Churchill (later duke of Marlborough), his lifelong political ally, who was then page to the Duke of York (later James II). The strength of Godolphin's and Churchill's position lay in the favour that they enjoyed at court. After holding several court and diplomatic offices, Godolphin served James II as lord treasurer until the end of his reign in 1688. After the Revolution of 1688, Godolphin immediately obtained office under William III but, nevertheless, maintained contact with agents of the Jacobites, the supporters of the exiled James II. In 1696 his differences with the Whigs came to a head and he resigned.

He was lord treasurer again from 1700 to 1701 and from Queen Anne's accession in 1702 until 1710. Godolphin, Marlborough, and Robert Harley (later the 1st earl of Oxford) formed the core of Anne's ministry. He persuaded the Queen gradually to eject the Tories from office, and with Marlborough he helped bring about union with Scotland (1706–07). He was created earl of Godolphin (1706) but fell out of favour with the Queen when his efforts to control Tory ecclesiastical patronage led to a breach with Harley (1708). Marlborough and Godolphin, however, successfully forced Harley's resignation by threatening a massive Cabinet resignation.

Godolphin, detail of a painting after Sir Godfrey Kneller; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

As lord treasurer, Godolphin gave efficient financial support for Marlborough's military campaigns during the War of the Spanish Succession (1701–13), but he had to seek Whig support to remain in office and to continue the war, which became increasingly unpopular. The prosecution of the popular Tory ecclesiastic Henry Sacheverell for his inflammatory anti-Whig sermons brought about the fall of the Whigs in 1710. Despite a long personal friendship, Anne dismissed Godolphin, too, without an audience. His death in 1712 prevented him from enjoying the resurgence of the Whigs, who revived at the accession of George I.

In private life Godolphin was among the first to improve English racehorses by importing Barb and Arab sires. The famous stallion Godolphin Barb was owned by his son, Francis, the second earl. There is a biography by Sir Tresham Lever, *Godolphin, His Life and Times* (1952).

Godowsky, Leopold (b. Feb. 13, 1870, Soshly, Lithuania, Russian Empire—d. Nov. 21, 1938, New York City), renowned Russian-born U.S. virtuoso pianist and composer, known for his exceptional piano technique.

Godowsky entered the Berlin High School for Music at age 14; soon thereafter he went to the United States, where he spent most of the remainder of his life. His first American concert was in 1884; by 1890 he was teaching at the New York College of Music. He became a U.S. citizen in 1891. Godowsky taught later in Philadelphia and Chicago and in Vienna from 1909 to 1914. He pursued an international career until 1930, when a stroke ended his playing.

Leopold Godowsky
Brown Brothers

As a performer, Godowsky had a very advanced technique and a scholarly approach to the classics. Among his more than 400 original compositions and ornate transcriptions of older vocal and instrumental works are many that exploited his formidable dexterity but at the same time remain musically conservative. Most notable is his *Triakontameron* (1920), a cycle of 30 pieces. Rarely played since his death, his compositions are said to have influenced Ravel and the Russian composer Sergey Prokofiev.

Godowsky, Leopold, Jr. (b. May 27, 1900, Chicago), American musician and photographic technician primarily known as a co-developer of Kodachrome film (1935).

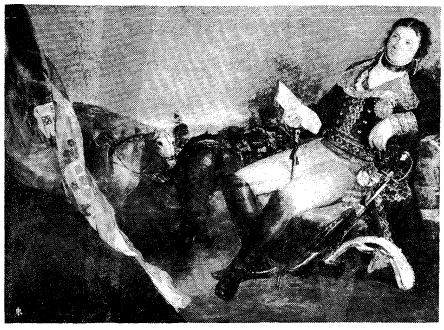
Godowsky attended New York City's Riverdale School, where he met his future photographic partner, Leopold Mannes, who shared Godowsky's interest in both music and photography. Working as a violinist, Godowsky was able to set up a small laboratory with Mannes and begin experiments in colour photography. In 1917 Godowsky entered the University of California as a physics and chemistry major, as well as accepting positions with the Los Angeles and San Francisco symphony orchestras. He continued to collaborate with Mannes, exchanging experimental findings and ideas by mail.

In 1919 Godowsky and Mannes created a mediocre colour film, at which time they realized that the additive process they had been working with would not give them the true colours that they sought. It was at this point that Godowsky and Mannes switched to a multiple-layered subtractive-colour-film approach that would eventually lead them to the development of Kodachrome. They opened their first real laboratory in New York City in 1922, and, with the backing of C. E. Kenneth Mees of the Eastman Kodak Company in 1930, the two men moved to Rochester, N.Y., to work with assistants at the well-equipped Kodak Research Laboratories. On April 15, 1935, Kodachrome was announced as the earliest of the colour-subtractive films that proved to be a boon for colour photography. Though initially used for animated motion pictures, Kodachrome was later improved, and it remains a popular film today. Godowsky went on to study mathematics at Columbia University and continued his photographic experiments in New York City and at Westport, Conn. He assisted in the development of Kodacolor and Ektachrome and received numerous awards for his contributions in the field of photography.

Godoy, Manuel de, in full MANUEL DE GODOY ALVAREZ DE FARIA RÍOS SÁNCHEZ ZARZOSA, PRÍNCIPE (prince) DE LA PAZ Y DE BASANO, DUQUE (duke) DE ALCUDIA Y DE SUCCA (b. May 12, 1767, Castuera, Spain—d. Oct. 4, 1851, Paris), Spanish royal favourite and twice prime minister, whose disastrous foreign policy contributed to a series of misfortunes and defeats that culminated in the abdication of King Charles IV and the occupation of Spain by the armies of Napoleon Bonaparte.

Born into an old but poor noble family, Godoy followed his brother to Madrid in 1784 and, like him, entered the royal bodyguard. He attracted the attention of Maria Luisa of Parma, wife of the heir to the throne, and soon became her lover. When her husband ascended the throne in 1788 as Charles IV, the domineering Maria Luisa persuaded Charles to advance Godoy in rank and power, and he became by 1792 field marshal, first secretary

of state, and duque de Alcudia. From then on Godoy's hold over the royal family, buttressed by his pliability, guile, and ingratiating nature, rarely, if ever, weakened.



Godoy, detail of an oil painting by Francisco de Goya; in the Academy of San Fernando, Madrid
Mansell—Alinari/EB Inc.

When Godoy was named prime minister in 1792, his first undertaking was to try to save the French king Louis XVI from the guillotine. When that failed, war broke out between France and Spain (1793). Initial Spanish successes were followed by reverses, and Godoy negotiated the Peace of Basel (1795) for which he was given the title Príncipe de la Paz (Prince of the Peace) by his grateful sovereign.

To strengthen ties with France, Godoy negotiated an alliance against England in the Treaty of San Ildefonso (1797). War was soon declared, and Spain suffered a major naval defeat off Cape St. Vincent. France proved an unfaithful ally and showed little scruple in betraying Spanish interests. In 1798 Godoy was removed from office, though in temporary retirement he continued to enjoy royal favour and wield great influence. When, in 1801, Godoy was reinstated, the war with England still raged and Napoleon was dictator of France. Godoy yielded to French pressure and collaborated in an invasion of Portugal, England's ally, commanding Spanish forces in the three-week War of the Oranges. After Portuguese capitulation, Napoleon sacrificed Spanish interests in the Treaty of Amiens, signed with England in 1802. An opposition party then began to form against Godoy around the heir apparent, Ferdinand, later Ferdinand VII, spurred by growing discontent over the conduct of national affairs.

When war between France and England flared anew in 1803, Godoy managed to maintain neutrality until December 1804, when he joined France once again in declaring war on England. Ten months later Spanish naval power was utterly destroyed in the Battle of Trafalgar. Relations with Napoleon gradually improved, and in the secret Treaty of Fontainebleau (1807), in which Spain and France agreed to the partition of Portugal, Godoy was offered the kingdom of Algarve, in southern Portugal. Several months later, however, Spain learned that France planned to seize certain of its northern provinces. The court, seeking to establish a government in exile, attempted to flee the country; but at Aranjuez a mob, loyal to Ferdinand, nearly killed Godoy and forced Charles to abdicate in his son's behalf. Godoy was then arrested by Ferdinand, and in May 1808 all three—Godoy, Ferdinand, and Charles—were enticed across the border into France, where they became prisoners of Napoleon. Godoy stayed with Charles in Rome until the former king's death in 1819. He then lived in obscurity in Paris on a modest French royal pension until 1847, when Isabella II of Spain restored his titles and returned some of his confiscated estates.

Godoy Cruz, suburb immediately south of the city of Mendoza in northern Mendoza province, western Argentina. Originally an agricultural oasis supplying wine grapes, fruit, potatoes, and alfalfa, Godoy Cruz has become an important manufacturing and industrial centre within Greater Mendoza. Wineries, canneries, meat-packing plants, distilleries and breweries, flour mills, and sawmills are among its varied industrial establishments. Hydroelectric stations are located nearby. Mendoza is accessible by highway and railroad. Pop. (1980 prelim.) 141,553.

godparent, formally SPONSOR (from Latin *spondere*, "to promise"), masculine GODFATHER, feminine GODMOTHER, one who stands surety for another in the rite of Christian Baptism. In the modern Baptism of an infant or child the godparent or godparents make profession of faith for the person being baptized (the godchild) and assume an obligation to serve as proxies for the parents if the parents either are unable or neglect to provide for the religious training of the child, in fulfillment of baptismal promises. In churches mandating a sponsor only one godparent is required; two (in most churches, of different sex) are permitted. Many Protestant denominations permit but do not require godparents to join the infant's natural parents as sponsors.

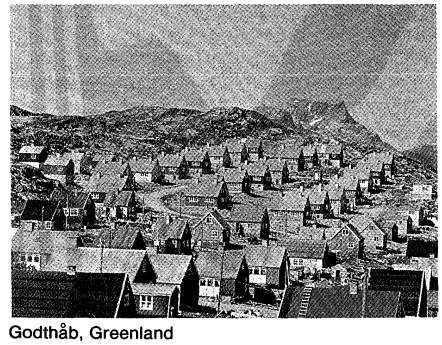
The practice of sponsorship originated not in infant Baptism but in the custom that required that an adult pagan who offered himself for the rite should be accompanied by a Christian known to the bishop—a Christian who could vouch for the applicant and undertake his supervision. The Greek word for the person undertaking this function was *anadochos*, to which the Latin *susceptor* is equivalent. The word sponsor in this ecclesiastical sense occurred for the first time in Tertullian's 2nd-century treatise *De Baptismo*. The sponsors to whom he alluded may have been in many cases the actual parents, and even in the 5th century it was not felt to be inappropriate that they should be so; Augustine in one passage appears to speak of it as a matter of course that parents should bring their children and answer for them, and the oldest Egyptian ritual bears similar testimony. Elsewhere Augustine contemplated masters bringing the children of slaves, and of course orphans and foundlings were brought by other benevolent persons.

The comparatively early appearance, however, of such names as *compatres, commatres, propatres, promatres, patrini*, and *matrinae* seems to prove not only that the sponsorial relationship had come to be regarded as a very close one but also that it was not usually assumed by the natural parents. How very close it was held to be is shown by the emperor Justinian's prohibition of marriage between godparents and godchildren. On the other hand, the anciently allowable practice of parents becoming sponsors for their own children, though gradually becoming obsolete, seems to have lingered until the 9th century, when it was at last formally prohibited by the Council of Mainz (813). For a long time there was no fixed rule as to the necessary or allowable number of sponsors, and sometimes the number actually assumed was large. By the Council of Trent (1545–63), however, it was decided that one only, or at most two, these not being of the same sex, should be permitted. In the Roman Catholic Church the spiritual relationship established between the sponsor and the baptized, and the sponsors and the parents of the baptized, continues to constitute an impediment to marriage.

Godrh (India): *see* Godhra.

Godrum (king of East Anglia): *see* Guthrum.

Godthåb, Greenlandic NÛK, also spelled NUUK, capital and main port of Greenland, on the southwestern coast, near the mouth of Godthåbs Golf (gulf), an inlet of the Davis Strait, and the Hjortetakken (meaning "deer antlers"), a mountain landmark. The modern town dates from 1721, when Hans Egede, a Norwegian missionary, founded a colony near



Godthåb, Greenland
Pictorial Parade—EB Inc.

the site of Vesterbygden, a 10th-century Norse settlement. It is the seat of the 21-member Parliament (Landsting) and Supreme Court and has foreign consulates, a teachers' college, hospital, and radio station. Government administrative work and hunting, fishing, fish canning, and reindeer and sheep raising are the main occupations. Most transportation is by boat. Helicopter services link Godthåb with other towns in Greenland and with the airport at Søndre Strømfjord, which has connecting flights to Copenhagen. An airfield was built at Godthåb in the late 1970s. Pop. (1982) 9,717.

Godunov, Boris (Fyodorovich) (b. *c.* 1551—d. April 23 [April 13, old style], 1605, Moscow), Russian statesman who was chief adviser to Tsar Fyodor I (ruled 1584–98) and was himself elected tsar of Muscovy (ruled 1598–1605) after the extinction of the Rurik dynasty; his reign inaugurated the devastating

Boris Godunov, detail of a portrait by an unknown artist, last quarter of the 16th century; in the Museum of History and Reconstruction, Moscow
Novosti Press Agency

Time of Troubles (1598–1613) in the Russian lands.

A member of the noble Tatar family Saburov-Godunov that had migrated to Muscovy in the 14th century, Boris Godunov began his career of service in the court of Ivan IV the Terrible (ruled 1533–84). After gaining Ivan's favour by marrying the daughter of a close associate of the Tsar (1571), Godunov gave his sister Irina to be the bride of the tsarevich Fyodor (1580), was promoted to the rank of boyar (1580), and in 1584 was named by Ivan to be one of the guardians for the dim-witted Fyodor, who shortly afterward ascended the throne. A group of boyars who regarded Godunov as a usurper conspired to undermine his authority, but Godunov banished his opponents and became the virtual ruler of Russia.

Having complete control over Muscovy's foreign affairs, Godunov conducted successful

military actions, promoted foreign trade, built numerous defensive towns and fortresses, recolonized Western Siberia, which had been slipping from Moscow's control, and arranged for the head of the Muscovite Church to be raised from the level of metropolitan to patriarch (1589). Domestically, Godunov promoted the interests of the service gentry.

When Fyodor died leaving no heirs (1598), a *zemsky sobor* (assembly of the land), dominated by the clergy and the service gentry, elected Boris Godunov successor to the throne (Feb. 17, 1598). Tsar Boris, proving himself to be an intelligent and capable ruler, undertook a series of benevolent policies, reforming the judicial system, sending students to be educated in western Europe, allowing Lutheran churches to be built in Russia, and, in order to gain power on the Baltic Sea, entering into negotiations for the acquisition of Livonia.

In an effort to reduce the power of the boyar families that opposed him, however, Boris banished the members of the Romanov family; he also instituted an extensive spy system and ruthlessly persecuted those whom he suspected of treason. These measures, however, only increased the boyars' animosity toward him, and, when his efforts to alleviate the suffering caused by famine (1601–03) and accompanying epidemics proved ineffective, popular dissatisfaction also mounted. Thus, when a pretender claiming to be Prince Dmitry (*i.e.*, Tsar Fyodor's younger half brother who had actually died in 1591) led an army of Cossacks and Polish adventurers into southern Russia (October 1604), he gained substantial support. The Tsar's army impeded the false Dmitry's advance toward Moscow; but with Boris' sudden death, resistance broke down, and the country lapsed into a period of chaos characterized by swift and violent changes of regime, civil wars, foreign intervention, and social disorder (the Time of Troubles) that did not end until after Michael Romanov, son of Fyodor Nikitich Romanov, was elected tsar in 1613.

Godwin (Anglo-Saxon earl): *see* Godwine.

Godwin, Edward (William) (b. May 26, 1833, Bristol, Gloucestershire, Eng.—d. Oct. 6, 1886, London), architect, designer, and writer, notable for his contributions to the English Aesthetic movement in design, which drew its inspiration mainly from the Orient and particularly from Japan.

In 1854 Godwin set up his own practice, specializing in ecclesiastical architecture. In 1861 he won a competition for a design for the Northampton town hall and its decoration and furniture; the design he submitted was in the personal French Gothic Revival style of all his early work. About that time he decorated his own house in the Japanese manner, the first of its kind in Great Britain. He moved to London in 1865 and between 1867 and 1871 designed Dromore and Glenbegh castles, in Ireland.

Godwin's later architectural work was on a smaller domestic scale and included houses for artists at Bedford Park (1875), outside London, and the White House (1877) in Chelsea for his artist friend James McNeill Whistler. From 1865 he designed furniture, textiles, and wallpapers for commercial production and private clients. Because of his association with the actress Ellen Terry, with whom he lived for six years, he was greatly interested in all aspects of the theatre. This theatrical interest was also shared by their son, the noted stage designer Edward Gordon Craig.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Godwin, Francis (b. 1562, Hannington, Northamptonshire, Eng.—d. April 1633, Whitbourne, Herefordshire), bishop and historian who wrote the first story of space travel in English literature, *The Man in the Moone: or A Discourse of a Voyage Thither by Domingo Gonsales, the Speedy Messenger.* The tale was begun in about 1603–06 and finished around 1621–30; it was published in 1638. By 1768 at least 25 editions had appeared in various languages.

Francis Godwin, detail of an engraving by G. Vertue, derived from an earlier portrait, frontispiece to *De Praesulibus Angliae*, 1743

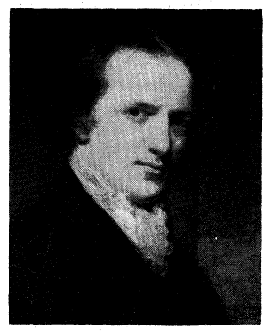
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Godwin was a student at Christ Church, Oxford, at the time when the Italian philosopher Giordano Bruno was introducing his revolutionary ideas to the university. In his story Godwin accepts the new cosmology of Copernicus and Kepler and the new ideas of Galileo.

After holding two Somerset livings he became subdean of Exeter (1587) and successively bishop of Llandaff (1601) and of Hereford (1617). His other writings include *A Catalogue of the Bishops of England* (1601; Latin translation, by Godwin, *De Praesulibus Angliae*, 1616, 1743), containing thumbnail character studies, and *Rerum Anglicarum, Henrico VIII, Edwardo VI, et Maria regnantibus* (1616; Eng. trans. 1630), chronicling the English Reformation in a detached manner for one with decidedly Puritan leanings.

Godwin, Mary Wollstonecraft (writer and feminist): *see* Wollstonecraft, Mary.

Godwin, William (b. March 3, 1756, Wisbech, Isle of Ely, Cambridgeshire, Eng.—d. April 7, 1836, London), social philosopher, political journalist, and religious dissenter who anticipated the English Romantic literary movement with his writings advancing atheism, anarchism, and personal freedom.



William Godwin, oil painting by J.W. Chandler, 1798; in the Tate Gallery, London

By courtesy of the Tate Gallery, London

Godwin's idealistic liberalism was based on the principle of the absolute sovereignty and competence of reason to determine right choice. An optimist regarding man's future perfectibility, he combined cultural determinism with a doctrine of extreme individualism. The object of his principal work, *An Enquiry Concerning Political Justice, and Its Influence on General Virtue and Happiness* (1793), was to reject conventional government by demonstrating the corrupting evil and tyranny inherent in its power of manipulation. He proposed in its place small self-subsisting communities. He argued that social institutions fail because they impose on man generalized thought categories and preconceived ideas, which make it impossible to see things as they are.

It has been claimed that Godwin's works laid the foundations for the mutually contradictory doctrines of communism and anarchy. In fact their germ, though undeveloped, is to be found in two separate elements in his thinking. He advocated neither the abolition nor the "communalization" of property; property was to be held, a sacred trust, at the disposal of him whose need was greatest. His most powerful personal belief was that "everything understood by the term co-operation is in some sense an evil," from which proceeded his most influential anarchic doctrines.

Among his other writings are *The Enquirer* (1797), a collection of essays; *Of Population* (1820), a reply to Thomas Malthus's writings on the subject; *Thoughts on Man: His Nature, Production, and Discoveries* (1831); and his widely acclaimed ideological novel, *Things as They Are; or, The Adventures of Caleb Williams* (1794).

Godwin was married in 1797 to Mary Wollstonecraft (*q.v.*), who was the mother of his daughter Mary Wollstonecraft Shelley.

Godwin Austen, Mount (Jammu and Kashmir): *see* K2.

Godwine, also spelled GODWIN (d. April 15, 1053), earl of Wessex, the most powerful man in England during the opening years of the reign of Edward the Confessor.

Godwine became a favourite of King Canute the Great, who made him earl of Wessex about 1018. In the disputes over the succession that followed the death of Canute, Godwine was held responsible for the murder (1036) of one of the claimants to the throne, Alfred the Aetheling. Godwine maintained his position, however, and went on to dominate Edward the Confessor.

In 1045 Godwine married his daughter Edith to Edward. Nevertheless, Edward wanted to throw off Godwine's influence so that he would be free to fill his court with Norman courtiers. In 1051 he outlawed Godwine for refusing to punish the men of Dover, who had defied a Norman lord.

Edward's pro-Norman policies, however, soon aroused widespread hostility. Seizing his opportunity, Godwine emerged from exile to join his son Harold and invade England in September 1052. The defenseless Edward was forced to restore all the possessions and offices of the Godwine family. Harold became earl of Wessex upon the death of Godwine, and in 1066 he succeeded to Edward's throne as Harold II (*q.v.*).

godwit, any of four species of large, long-billed shorebirds of the genus *Limosa*, family Scolopacidae, named for its whistling call. Godwits are generally reddish brown in summer and grayish in winter; all nest in the Northern Hemisphere. The black-tailed godwit (*L. limosa*), about 40 centimetres (16 inches) long including the bill, has a black-banded, white tail. The bill is long and straight. The black-tailed godwit, which breeds in Iceland and on wet plains across Eurasia, is the emblem of the Netherlands Ornithological Union. In North America a smaller form, the Hudsonian godwit (*L. haemastica*), declined in population from overshooting to an estimated 2,000 survivors, but it may be reviving. The other North American form, the marbled godwit (*L. fedoa*), with slightly upturned bill and pinkish brown underwings, is fairly common; it un-

Black-tailed godwit (*Limosa limosa*)
Eric Hosking

dergoes little seasonal colour change. Slightly smaller is the bar-tailed godwit (*L. lapponica*), of the Eurasian and Alaskan tundra.

Goebbels, (Paul) Joseph (b. Oct. 29, 1897, Rheydt, Ger.—d. May 1, 1945, Berlin), minister of propaganda for the German Third Reich under Adolf Hitler, generally accounted responsible for presenting a favourable image of the Nazi regime to the German people.

Goebbels was the third of five children of a Catholic factory clerk. His parents provided him with a high school education and also helped support him during the five years of his undergraduate studies. In World War I he was exempted from military service because of his clubfoot, which later enabled his enemies to draw a parallel with the cloven hoof and limp of the Devil. This defect, presumably not congenital but rather the result of a childhood disease, played a disastrous role in his life by engendering strong desires for compensation.

After graduating from Heidelberg University in 1922, with a doctorate in German philology, Goebbels engaged in—largely unremunerative—literary, dramatic, and journalistic efforts. Although not yet involved in politics, Goebbels, in common with most of his contemporaries, was imbued with a nationalistic fervour made more intense by the frustrating outcome of the war. During his university days, a friend also introduced him to socialistic and communistic ideas. Antibourgeois

Goebbels, *c.* 1935
Interfoto-Friedrich Rauch, Munich

from his youth, Goebbels remained so in spite of all his later upper-class affectations. On the other hand, he was initially not anti-Semitic. The high school teachers he valued most were Jews, and he was, during that time, engaged to a half-Jewish girl. At that point his options, if he chose to enter politics, were still wide open. An accident determined the party he was to join.

In the autumn of 1924 he made friends with a group of National Socialists. A gifted speaker, he was soon made the district administrator of the Nationalsozialistische Deutsche Arbeiterpartei (NSDAP; National Socialist German Workers' Party) in Elberfeld and editor of a biweekly National Socialist magazine. In November 1926 Hitler appointed him district leader in Berlin. The NSDAP, or Nazi Party, had been founded and developed in Bavaria, and, up to that time, there had been practically no party organization in Berlin, the country's capital. Goebbels owed his new appointment to the prudent choice he made in a conflict between Gregor Strasser, representing the "left-wing," anti-capitalist faction of the NSDAP, and the "right-wing" party leader, Hitler. In this conflict, Goebbels, against his own inner convictions, took Hitler's side.

Personally courageous and never shirking danger, Goebbels proceeded to build Nazi strength in Berlin until Hitler's accession to power in January 1933. In 1928 Hitler gave the successful orator, well-versed propagandist, and brilliant journalist (he was editor of *Der Angriff* ["The Assault"] and later, from 1940 to 1945, *Das Reich*) the additional post of propaganda director for the NSDAP for all of Germany. Goebbels began to create the Führer myth around the person of Hitler and to institute the ritual of party celebrations and demonstrations that played a decisive role in converting the masses to Nazism. In addition, he spread propaganda by continuing his rigorous schedule of speechmaking.

After the "seizure of power," Goebbels was also able to take control of the national propaganda machinery. A "National Ministry for Public Enlightenment and Propaganda" was created for him, and in addition he became president of the newly formed "Chamber of Culture" for the *Reich*. In this capacity he controlled, besides propaganda as such, the press, radio, theatre, films, literature, music, and the fine arts as well. To be sure, his control of foreign propaganda, the press, theatre, and literature was limited—exercised only in bitter jurisdictional struggles with other officials—and he displayed little interest in regulating music and art. He did not, however, succeed in extending his power into other areas, such as the high schools.

His cultural policies were fairly liberal, but he had to capitulate to the demands of nationalist extremists. Even his propaganda messages were limited by the rationale that ceaseless agitation only dulls the receptive powers of the listener. As far as Goebbels was concerned, efficiency took precedence over dogmatism, expediency over principles.

Goebbels' influence decreased in the years 1937 and 1938. During this time he also became involved in a love affair with a Czechoslovakian film star that nearly caused him to give up his career and family. (Since 1931 he had been married to a woman from the upper middle class who eventually bore him six children.) His position underwent little change with the outbreak of World War II (which he did not welcome): in times of victory, the propagandist's services are not much in demand. Goebbels' hour came with the turn in fortunes of the war after the defeats in Stalingrad and Africa, when he was to prove himself a master of the clever propaganda of holding out in the face of defeat.

It would be erroneous to believe that Goebbels falsified the facts of the prevailing situation. On the contrary, the main thrust of his propaganda—which he carried on personally and without respite in the press and over the radio—was to continually raise hopes by citing historical parallels and making other comparisons, by conjuring up allegedly immutable laws of history, or even, as a last resort, by referring to some secret miracle weapons. Here, too, he demonstrated personal courage by appearing constantly before the public long after the other prominent Nazis had retreated to their bunkers and fortifications. His public appearances in these years did much to improve an image that had until then been overwhelmingly negative. Goebbels' work was especially effective in intensifying the efforts of the home front: he became the protagonist of total war. After several false starts, the attempted assassination of Hitler on July 20, 1944, brought him within view of his goal. On August 25 he became "Reich Plenipotentiary for Total War"—but it was, as he shortly lamented, too late.

On May 1, 1945, the only one of the original Nazi leaders to remain with Hitler in the besieged bunker in Berlin, Goebbels and his wife took their lives and those of their six children. This was the last and, if not the bloodiest, at least the most macabre production of this talented stage manager. The day before, he had been named chancellor of the *Reich* in Hitler's will. For one day, on a few square metres, he thus became the last successor to Otto von Bismarck. (H.Hei.)

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Goebel, Karl (Immanuel Eberhard) von (b. March 8, 1855, Billigheim, Baden—d. Oct. 9, 1932, Munich), German botanist whose *Organographie der Pflanzen* (1898–1901; *Organography of Plants*, 1900–05) clarified the principles of the science of plant morphology in relation to form and structure.

After receiving his Ph.D. in 1877, Goebel held a number of teaching positions and participated in numerous scientific expeditions to the South American Andes, the U.S. Rockies, the Indian Ghāts, the Middle East, and the New Zealand Alps. In his studies Goebel emphasized function as the determinant of form; thus, according to him, all structural characters are, or have been, adapted to their function, with a change in function producing a change in form. His ideas on form and function, fully expanded in his major work on *Organographie,* were an effective transition between the strictly observational and experimental approaches to botany.

Goeben, August Karl von (b. Dec. 10, 1816, Hannover, Hanover—d. Nov. 13, 1880, Coblenz, Prussian Rhine Province), a victorious and exceptionally able Prussian general in the wars of 1864, 1866, and 1870–71.

About 1848, while a staff officer, Goeben formed a lasting friendship with Helmuth von

Goeben, engraving by H. Weger, 1871
Archiv fur Kunst und Geschichte, West Berlin

Moltke, future chief of the Prussian and imperial German general staffs. In 1860 he served with Spanish troops in Morocco and was present at the Battle of Tetuán; he wrote two books, published in 1841 and 1863, on his Spanish experiences.

By 1863 Goeben was a major general. In the war against Denmark in 1864, he distinguished himself as a brigade commander. In the Seven Weeks' War against Austria and its allies (1866), he commanded a division in the campaign against Bavarian forces around Würzburg.

In 1870 Goeben successfully commanded the VIII (Rhineland) Corps against the French in the battles of Spicheren and Gravelotte (August 6 and 18). On Jan. 8, 1871, he succeeded Edwin von Manteuffel in command of the Prussian 1st Army and soon (January 18–19) brought the war in northern France to an end by his victory at Saint-Quentin. At his death he was once more commander of the VIII Corps. Goeben wrote *Vier Jahre in Spanien* (1841; "Four Years in Spain") and *Reise- und Lager-Briefe aus Spanien und vom spanischen Heere in Marokko* (1863; "Travel and Camp Letters from Spain and from the Spanish Army in Morocco").

Goedel, Kurt (mathematician): *see* Gödel, Kurt.

Goeje, Michael Jan de (b. Aug. 13, 1836, Dronrijp, Neth.—d. May 17, 1909, Leiden), Dutch scholar who edited many Arabic works, most important of which was the medieval history, *Annals of Tabari,* 13 vol. (1879–1901).

Attracted to Oriental languages during childhood, Goeje became proficient in Arabic. During his postdoctoral studies at the University of Oxford, he collated the Bodleian Library manuscripts of the important medieval Arabic geographer Idrīsī and published a part of this work with R.P. Dozy under the title *Description de l'Afrique et de l'Espagne* (1866; "Description of Africa and Spain"). About the same time he wrote *Mémoires d'histoire et de géographie orientales* (1866; "Memoirs of Oriental History and Geography"). He became professor of Arabic at Leiden (1883–1906) and was also chief editor of the first three volumes of the *Encyclopaedia of Islam* (1908).

Goerdeler, Karl Friedrich (b. July 31, 1884, Schneidemühl, Ger.—d. Feb. 2, 1945, Berlin), conservative German municipal administrator and prominent figure in the resistance movement and in an unsuccessful coup against Adolf Hitler. A long-time mayor of Leipzig, he was to have been chancellor of the new government if the coup had succeeded.

After studying law and economics, Goerdeler served in the city administration of Solingen from 1912. He spent World War I mostly on the Eastern Front. In 1920 he became second mayor of Königsberg (now Kaliningrad, Russian S.F.S.R.), and from 1930 to 1937 he headed the city government of Leipzig. Twice he served as federal commissioner for price control, first from 1931 to 1932, then under the Nazi government from 1934 to 1935.

Never at ease with the parliamentary democracy of the Weimar Republic, Goerdeler, who advocated Germany's return to its pre-1914 frontiers, was a member of the rightist German National People's Party (DNVP). His relations with the Nazi party, never cordial, worsened until he was forced to resign as mayor of Leipzig in 1937. Almost immediately he entered the resistance against Hitler. Maintaining ties abroad and with the Western Allies even during World War II, he worked with a number of conservative generals whose recognized head was the former army chief of staff Ludwig Beck. The conspirators planned a coup after the disastrous Stalingrad campaign (late 1942–early 1943).

After the planned overthrow of Hitler, Goerdeler hoped to negotiate a peace with the Western Allies to pursue Germany's war against the Soviet Union. The group came closest to success with an attempt on Hitler's life on July 20, 1944. After the coup's failure, Goerdeler, for whom the Gestapo had been searching even before July 20, went into hiding. He was arrested in Poland on August 12, sentenced to death on Sept. 8, 1944, and hanged at Plötzensee prison five months later.

Goering, Hermann (Nazi leader): *see* Göring, Hermann.

Goes, Hugo van der (b. *c.* 1440—d. 1482, Roode Kloster, near Brussels [now in Belgium]), one of the greatest Flemish painters of the second half of the 15th century, whose strange, melancholy genius found expression in religious works of profound but often disturbing spirituality.

Early sources disagree about van der Goes's birthplace (Ghent, Antwerp, Bruges, and Leiden are mentioned), and nothing is known of his life before 1467, when he was accepted as a master in the painters' guild in Ghent. From then until 1475 he received many commissions from the town of Ghent and provided decorations (heraldic shields, processional banners, etc.) for such occasions as the marriage of Charles the Bold in Bruges (1468) and the transference of the remains of Philip the Good to Dijon (1473). In 1474 he was elected dean of the guild, but the following year—when he was at the climax of his career—he decided to enter Roode Kloster, a priory near Brussels, as a lay brother. There he continued to paint and received distinguished visitors; he also undertook journeys. In 1481 a tendency to acute depression culminated in a mental breakdown during which he tried to kill himself. An account of the artist's last years at Roode Kloster, written by a monk, Gaspar Ofhuys (who apparently resented some of van der Goes's privileges), has survived.

"The Adoration of the Shepherds," centre panel of the "Portinari Altarpiece," by Hugo van der Goes, *c.* 1474–76; in the Uffizi, Florence

SCALA—Art Resource/EB Inc.

Van der Goes's masterpiece, and his only securely documented work, is the large triptych usually known as the "Portinari Altarpiece" (*c.* 1474–76) with a scene called "The Adoration of the Shepherds" on the centre panel. It was commissioned by Tommaso Portinari, agent for the Medici in Bruges, who is portrayed with his family on the wings. One of the greatest of the early examples of northern realism, it yet subordinates this quality to spiritual content, uses still-life detail with symbolic intent, and shows unprecedented psychological insight in portraiture, especially in the faces of the awe-struck shepherds and the Portinari children. It achieves an emotional intensity unprecedented in Flemish painting. Soon after its completion it was taken to Florence, where its rich colours and careful attention to detail impressed many Italian artists.

Van der Goes's earlier and more tentative style shows that he had studied the leading Netherlandish masters of the first half of the 15th century: a diptych (begun around 1467) in the Kunsthistorisches Museum, Vienna, reflected an awareness of the "Ghent Altarpiece" of Jan van Eyck in the "Fall of Man," while the "Lamentation" is reminiscent of Rogier van der Weyden. A comparison between the large "Adoration of the Magi" and "The Nativity" reveals the direction in which van der Goes's late works were to evolve. The "Adoration" is spatially rational, compositionally tranquil, and harmonious in colour; the "Nativity," a later work painted on a curiously elongated panel, is disturbing even in its format—an emotionally charged supernatural drama on an uncomfortably low stage revealed by the drawing of curtains. This exploitation of space and colour for emotional potentiality rather than rational effect characterizes the later works. It appears in the "Holy Trinity Adored by Sir Edward Bonkil" and "The Royal Family of Scotland," panels that were probably designed as organ shutters (*c.* 1478–79), and culminates in the "Death of the Virgin," executed not long before van der Goes's death. The unearthly colours of this work are particularly disturbing, and its poignancy is intensified by the controlled grief seen in the faces of the Apostles, who are placed in irrationally conceived space. Van der Goes's art, with its affinities to Mannerism, and his tortured personality have found a particularly sympathetic response in the 20th century.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

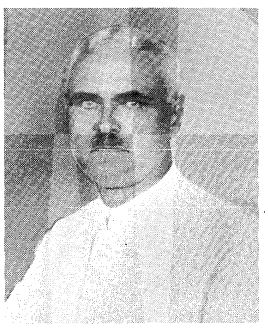
Goetel, Ferdynand (b. May 15, 1890, Sucha, Austria-Hungary [now in Poland]—d. Nov. 24, 1960, London, Eng.), Polish novelist and essayist.

Goetel became a writer after World War I, when he returned to his liberated country from Russian Turkistan, where he had spent

two years in Tashkent as an Austro-Hungarian prisoner of war and later as a member of the Council of Workers' and Soldiers' Delegates. In 1924 he published his colourfully written book *Przez płonący Wschód* ("Through the Blazing East"), in which he described his experiences in Russia during the Revolution and Civil War. His short stories, *Pątnik Karapeta* ("Karapeta the Pilgrim") and *Ludzkość* ("Mankind"), are based on his intelligent observations of the Turkic peoples. *Z dnia na dzień* (1926; *From Day to Day,* 1931) is a novel interesting for its use of the diary form within the main narrative as a means of exploring character. Goetel was chairman of the Polish PEN writers' organization (1932–33), of the Polish Writers' Union (1932–39), and a founding member of the Polish Academy of Literature (from 1935). During the German occupation of Poland (1939–45), Goetel, as a secret plenipotentiary of the Polish government-in-exile, received considerable sums of money from London that he used to help Polish writers in need. In 1938 he wrote a political essay, *Pod znakiem faszyzmu* ("Under the Sign of Fascism"), in which he did not hide his admiration for Mussolini.

Goethals, George Washington (b. June 29, 1858, Brooklyn, N.Y., U.S.—d. Jan. 21, 1928, New York City), U.S. army officer and engineer who directed the building of the Panama Canal.

Following his graduation from the U.S. Military Academy at West Point, N.Y., in 1880,



Goethals
By courtesy of the Panama Canal Co.

Goethals was commissioned in the U.S. Army Corps of Engineers, where he gained valuable experience in the construction of canals and harbours. He also served as an instructor at West Point. In 1907 he was selected by Pres. Theodore Roosevelt as chairman and chief engineer of the Isthmian Canal Commission (two predecessors had resigned). The following January he took complete charge of construction work and government in the Canal Zone.

The obstacles facing Goethals were enormous. In addition to the technical problem of constructing the massive locks, he had to house and feed some 30,000 employees, many of whom were troubled by disease, although yellow fever and malaria were by then under control. The esprit de corps he engendered has become legendary.

When the Panama Canal was opened to commercial traffic in 1914, Pres. Woodrow Wilson appointed Goethals the first governor of the Canal Zone, a post he retained until January 1917. During World War I he served as acting quartermaster general and, later, as director of purchase, storage, and traffic as well as the movement of military troops within the United States and overseas. From 1919 to 1928 he was president of the engineering firm of George W. Goethals and Company. He also served as consultant to many important engineering organizations, including the Port of New York Authority.

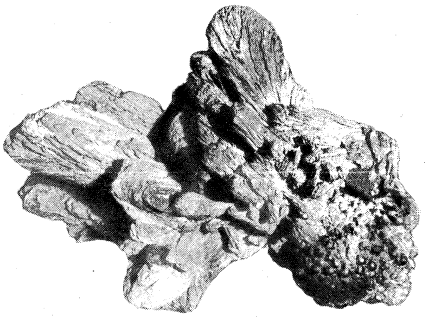
Goethe, Johann Wolfgang von (b. Aug. 28, 1749, Frankfurt am Main—d. March 22, 1832, Weimar, Saxe-Weimar), German poet, novelist, playwright, and natural philosopher, the greatest figure of the German Romantic period. The bulk of his writing was immense, running to 133 volumes in the Weimar edition.

A brief account of the life and works of Johann Wolfgang von Goethe follows; for full biography, *see* MACROPAEDIA: Goethe.

Goethe studied law in Leipzig and Strassburg. His formative years coincided with the turbulent *Sturm und Drang* movement, and he contributed to it the drama *Götz von Berlichingen* (1773) and the novel *Die Leiden des jungen Werthers* (1774; *The Sorrows of Young Werther*). From 1775 he resided in Weimar, where he fell in love with Charlotte von Stein, who inspired some of his finest lyrics and to whom he wrote some 1,500 letters. Although she was only one of the many women who inspired him, her influence was crucial in the development of Goethe's classicism. Direct contact with classical culture during his Italian sojourn of 1786 helped to shape his plays *Iphigenie auf Tauris* (1787) and *Torquato Tasso* (1790) and the poems *Römische Elegien* (published 1795; "Roman Elegies").

Goethe's aesthetic theories were sharpened by his friendship and correspondence with the poet Schiller. Although not wholly sympathetic to the Romantic movement, he approved of the Romantics' receptivity to foreign literatures and sought a rapprochement with Eastern culture in the *West-östlicher Divan* (1819). Throughout his life he retained a passion for scientific and philosophical studies, elaborating a theory of colours and writing on botany and biology. Remaining astonishingly creative, Goethe in his last years wrote *Wilhelm Meisters Wanderjahre* (1821–29; Wilhelm Meister's Travels) and completed his greatest drama, *Faust* (Part I, 1808; Part II, 1832).

goethite, also called BOG IRON ORE, widespread iron oxide mineral ($HFeO_2$) and the principal component of iron rust. It was named in 1806 for the German poet J.W. von Goethe. It is, after hematite, the most abundant ferric oxide and is the stable iron



Goethite from Douglas County, Colo.
By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard—EB Inc.

mineral under the hydrous, oxidizing conditions near the Earth's surface; it sometimes is an important iron ore (*e.g.,* in Alsace-Lorraine). Goethite occurs as a direct precipitate (as in bogs) and as a weathering product of other iron minerals. With limonite it forms the gossan of sulfide ores of iron. The name was originally given to the less common lepidocrocite, which has the same chemical composition as goethite but a different crystal structure; goethite does not contain a hydroxyl (OH) group but has cationic hydrogen (H^+) in twofold coordination with the oxygen atoms. For detailed physical properties, *see* oxide mineral (table).

Gofannon (Celtic god): *see* Goibniu.

Gog, in the Bible, a hostile power ruled by Satan that will manifest itself immediately before the end of the world (Rev. 20). In the biblical passage in Revelation and in other

Gog (left) and Magog, wooden effigies in the Guildhall, London
By courtesy of the British Tourist Authority

Christian and Jewish apocalyptic literature, Gog is joined by a second hostile force, Magog; but elsewhere (Ezek. 38; Gen. 10:2) Magog is apparently the place of Gog's origin.

An independent legend of Gog and Magog surrounds two colossal wooden effigies in the Guildhall, London. They are thought to represent survivors of a race of giants destroyed by Brutus the Trojan, the legendary founder of London (Troia Nova, or New Troy), and brought there to act as porters at the gate of the royal palace. Effigies of Gog and Magog have existed in London from the time of Henry V. The first figures were destroyed in the Great Fire (1666) and were replaced in 1708. The second pair was destroyed in an air raid in 1940 and again replaced in 1953.

In the legends told by the medieval historian Geoffrey of Monmouth, Gogmagog, or Goëmagot, was a giant chieftain of Cornwall who was slain by Brutus' companion Corineus.

Gogarty, Oliver St. John (b. Aug. 17, 1878, Dublin—d. Sept. 22, 1957, New York City), writer associated with the Irish literary renaissance whose memoirs vividly recreate the Dublin of his youth.

Gogarty attended Royal University (now University College, Dublin), where he was a fellow student of James Joyce. (He later appeared in Joyce's *Ulysses* as the character Buck Mulligan, an identification that he heartily disliked and that proved to be a lifelong irritant to him. He did not take Joyce seriously as an artist.) Gogarty practiced as a surgeon and throat specialist in Dublin, where he became acquainted with W.B. Yeats, George Moore, George Russell (Æ), and other leaders of the renaissance. He wrote the entertaining memoirs *As I Was Going Down Sackville Street* (1937), *Tumbling in the Hay* (1939), and *It Isn't This Time of Year at All* (1954).

Gogh, Vincent (Willem) van (b. March 30, 1853, Zundert, Neth.—d. July 29, 1890, Auvers-sur-Oise, near Paris), generally considered the greatest Dutch painter after Rembrandt; he powerfully influenced the current of Expressionism in modern art. His work, all of it produced during a period of only 10 years, hauntingly conveys through its striking colour, coarse brushwork, and contoured forms the anguish of a mental illness that eventually resulted in suicide. Among his masterpieces are numerous self-portraits and the well-known "The Starry Night" (1889).

Early life. Van Gogh, the eldest of six children of a Protestant pastor, was born and reared in a small village in the Brabant region of southern Netherlands. His early years in his father's parsonage were happy, and he loved wandering in the countryside. At 16 he was apprenticed to The Hague branch of the art dealers Goupil and Co., of which his uncle was a partner.

Van Gogh's working life can be roughly divided into two periods. The first, from 1873 to 1885, during which he wrestled with temperamental difficulties and sought his true means of self-expression, was a period of repeated apprenticeships, failures, and changes of direction. The second, from 1886 to 1890, was a period of dedication, rapid development, and fulfillment, until it was interrupted by a series of mental crises from 1889 onward.

He worked for the art-dealing firm Goupil in London from 1873 to May 1875 and in Paris from then until April 1876. Daily contact with works of art aroused van Gogh's artistic sensibility, and he soon formed a taste for Rembrandt, Hals, and other Dutch masters, although his preference was for two contemporary French painters, Millet and Corot, whose influence was to last throughout his life. Van Gogh disliked art dealing. Moreover, his approach to life darkened when his love was rejected by a London girl in 1874. His burning desire for human affection thwarted, he became and remained increasingly solitary. He became a language teacher and lay preacher in England and, in 1877, worked for a bookseller in Dordrecht. Impelled by a longing to give himself to his fellowmen, he envisaged entering the ministry and took up theology but abandoned this project for short-term training as an evangelist in Brussels in 1878. A conflict with authority ensued when he disputed the orthodox doctrinal approach. Failing to get an appointment after three months, he left to do missionary work among the impoverished population of the Borinage, a coal-mining region in southwestern Belgium. There, in the winter of 1879–80, he experienced the first great spiritual crisis of his life. He was sharing the life of the poor completely but in an impassioned moment gave away all his worldly goods and was thereupon dismissed for a too literal interpretation of Christian teaching.

Penniless and with his faith destroyed, he sank into despair, cut himself off from everyone, and began seriously to draw, thereby discovering in 1880 his true vocation. Van Gogh decided that his mission from then on would be to bring consolation to humanity through art, and this realization of his creative powers restored his self-confidence.

The productive decade. His artistic career was extremely short, lasting only the 10 years from 1880 to 1890. During the first four years of this period, while acquiring technical proficiency, he confined himself almost entirely to drawings and watercolours. First, he went to study drawing at the Brussels Academy; in 1881 he moved to his father's parsonage at Etten, Neth., and began to work from nature.

Van Gogh worked hard and methodically but soon perceived the difficulty of self-training and sought the guidance of more experienced artists. Late in 1881 he settled at The Hague to work with a Dutch landscape painter, Anton Mauve. He made visits to museums and had meetings with other painters. Van Gogh thus extended his technical knowledge and experimented in the summer of 1882 with oil paint. In 1883 the urge to be "alone with nature" and the peasants took him to Drenthe, a desolate part of northern Netherlands frequented by Mauve and other Dutch artists, where he spent three months before returning home, which was now at Nuenen, another village in the Brabant. He remained at Nuenen during most of 1884 and 1885, and during these years his art grew bolder and more assured. He painted three types of subjects—still life, landscape, and figure—all interrelated by their reference to the peasants' daily life, to the hardships they endured, and to the countryside they cultivated. Émile Zola's *Germinal* (1885), a novel about the coal-mining region of France, greatly impressed van Gogh, and sociological criticism is implicit in many of his pictures—*e.g.*, "Weavers" and "The Potato Eaters." Eventually he felt too isolated in Nuenen.

"Self-Portrait with Pipe and Bandaged Ear," oil painting by Vincent van Gogh, 1889; in the Leigh B. Block Collection, Chicago

By courtesy of Mr. and Mrs. Leigh B. Block, Chicago

His understanding of the possibilities of painting was evolving rapidly; from studying Hals he saw that academic finish destroys the freshness of a visual impression; Veronese and Delacroix taught him that colour expresses something by itself. This led to enthusiasm for Rubens and a sudden departure for Antwerp, where the greatest number of Rubens' works could be seen. The revelation of Rubens' simple means, of his direct notation, and of his ability to express a mood by a combination of colours proved decisive. Simultaneously, van Gogh discovered Japanese prints and Impressionist painting. His refusal to follow academic principles led to rows at the Antwerp academy, where he was enrolled, and after three months he left precipitately in 1886 to join his brother Theo in Paris. There, still concerned with improving his drawing, van Gogh met Toulouse-Lautrec, Paul Gauguin, and others who were to play historic roles in modern art. They opened his eyes to the latest developments in French painting. At the same time, Theo showed him Impressionist paintings at Goupil's and introduced him to Camille Pissarro, Georges Seurat, and other artists of the group.

By this time van Gogh was ready for such revelations, and the changes that his painting underwent in Paris between the spring of 1886 and February 1888 led to the creation of his personal idiom and style of brushwork. His palette at last became colourful, his vision less traditional, and his tonalities lighter, as may be seen in his first paintings of Montmartre. Finally, van Gogh's Postimpressionist style crystallized by the beginning of 1888 in masterpieces such as "Portrait of Père Tanguy" and "Self-Portrait in Front of an Easel," as well as in some landscapes of the Parisian suburbs.

After two years van Gogh was tired of city life, physically exhausted, and longing "to look at nature under a brighter sky." His passion was now for "the Japanese way of feeling and drawing" and for "a full effect of colour." He left Paris in February 1888 for Arles.

In his pictures of the following 12 months—his first great period—he strove to respect natural appearances and yet to convey by emphatic contours and heightened effects of colour the reality of his own feelings about the subject. Van Gogh's pictorial conception was partly Expressionist and partly Symbolist. His procedure was not calculated, however, but spontaneous and instinctive, for he worked with great speed and intensity, determined to capture an effect or a mood while it possessed him. His Arles subjects include blossoming fruit trees, views of the town and surroundings, self-portraits, portraits of Roulin the postman and his family and other friends, interiors and exteriors of the house, a series of sunflowers, and a "starry night."

Van Gogh knew that his approach to painting was individualistic, but he was also deeply aware that some tasks are beyond the power of isolated individuals to accomplish. In Paris he had hoped to form a separate Impressionist group with Gauguin, Toulouse-Lautrec, and others whom he supposed to have similar aims. He rented and decorated "a yellow house" in Arles with the intention of persuading them to join him and found a working community of "Impressionists of the South." Gauguin arrived in October 1888, and for two months they worked together; but while each influenced the other to some extent, their relations rapidly deteriorated because they had opposing ideas and were temperamentally incompatible.

On Christmas Eve 1888, van Gogh broke under the strain and cut off part of his left ear. Gauguin left, and van Gogh was taken to a hospital. He returned to the "yellow house" a fortnight later and resumed painting, producing such works as "Self-Portrait with Pipe and Bandaged Ear," several still lifes, and "La Berceuse." Several weeks later, he again showed symptoms of mental disturbance severe enough to cause him to be sent back to the hospital. At the end of April 1889, fearful of losing his renewed capacity for work, which he regarded as a guarantee of his sanity, he asked to be temporarily shut up in the asylum at Saint-Rémy-de-Provence in order to be under medical supervision.

Van Gogh stayed there for 12 months, haunted by recurrent attacks, alternating between moods of calm and despair, and working intermittently: "Garden of the Asylum," "Cypresses," "Olive Trees," "Les Alpilles," portraits of doctors, and interpretations of paintings by Rembrandt, Delacroix, and Millet all date from this period. The keynote of this phase (1889–90) is fear of losing touch with reality and a certain sadness. Confined for long periods to his cell or the asylum garden, having no choice of subjects, and realizing that his inspiration depended on direct observation, van Gogh fought against having to work from memory. At Saint-Rémy he muted the violent colours of the previous summer and tried to make his painting calmer. As he repressed his excitement, however, he involved himself more imaginatively in the drama of the elements, developing a style based on dynamic forms and a vigorous use of line (line often equated with colour). The best of his Saint-Rémy pictures are thus bolder and more visionary than those of Arles.

Van Gogh himself brought this period to an end. Oppressed by homesickness—he painted souvenirs of Holland—and loneliness, he longed to see Theo and the north once more and arrived in Paris in May 1890. Four days later he went to stay with a homeopathic doctor-artist, Paul-Ferdinand Gachet, a friend of Pissarro and Paul Cézanne, at Auvers-sur-Oise. Back in a village community such as he had not known since Nuenen, four years earlier, van Gogh worked at first enthusiastically; and his choice of subjects such as fields of corn, the river valley, peasants' cottages, the church, and the town hall reflects his spiritual relief. A modification of his style

follows: in the northern light he adopted pale, fresh tonalities; the brushwork is broader and more expressive and the vision of nature more lyrical. This phase was short, however, and ended in quarrels with Gachet and feelings of guilt at his inescapable dependence on Theo (now married and with a son) and his inability to succeed. In despair of ever overcoming his loneliness or of being cured, he shot himself and died two days later. Coincidentally, Theo died six months later (Jan. 25, 1891) of chronic nephritis.

Assessment. Largely on the basis of the works of the last three years of his life, van Gogh is generally held to have been one of the greatest Dutch painters. Everything in van Gogh's pictures seems to be pulsating with life. His work exerted a powerful influence on the development of much modern painting, in particular on the works of Soutine and the German Expressionists. Yet of the more than 800 oil paintings and 700 drawings that constitute his life's work, he sold only one in his lifetime. Always desperately poor, he was sustained by his faith in the urgency of what he had to communicate and by the generosity of Theo, who believed in him implicitly. The letters that he wrote to Theo from 1872 onward, and to other friends, give such a vivid account of his aims and beliefs, his hopes and disappointments, his fluctuating physical and mental state that they form a unique and touching biographical record that is a great human document.

The name of van Gogh was virtually unknown when he took his life. He had exhibited a few canvases at the Salon des Indépendants in Paris between 1888 and 1890 and in Brussels in 1890; both salons showed small commemorative groups of his work in 1891. One-man shows of his work did not occur until 1892; only one article about him appeared during his lifetime. His fame, made largely by other painters, dates from the early years of the 20th century, and his reputation has never ceased to grow.

MAJOR WORKS. "In the Field" (1883; Rijksmuseum Vincent van Gogh, Amsterdam); "The Loom" (1884; Rijksmuseum Kröller-Müller, Otterlo, Neth.); "Autumn Landscape with Four Trees" (1885; Rijksmuseum Kröller-Müller); "Peasant Woman in a Red Bonnet" (1885; Rijksmuseum Vincent van Gogh); "The Potato Eaters" (1885; Rijksmuseum Vincent van Gogh); "Skull with a Cigarette" (1886; Rijksmuseum Vincent van Gogh); "Boots" (1887; Museum of Art, Baltimore); "View of Arles with Irises" (1888; Rijksmuseum Vincent van Gogh); "La Mousmé" (1888; Chester Dale Collection, National Gallery of Art, Washington, D.C.); "The Postman Roulin" (1888; Museum of Fine Arts, Boston); "The Chair and the Pipe," popularly known as "Van Gogh's Chair" (1888–89; Tate Gallery, London); "Self-Portrait in Front of an Easel" (1888; Rijksmuseum Vincent van Gogh); "The Night Café" (1888; Yale University Art Gallery, New Haven, Conn.); "Self-Portrait with Pipe and Bandaged Ear" (1889; Leigh B. Block Collection, Chicago); "Green Corn" (1889; Národní Galerie, Prague); "Pietà" (1889; Rijksmuseum Vincent van Gogh); "L'Arlésienne" (1890; Museu de Arte, São Paulo, Braz.); "Hospital Corridor at Saint-Rémy" (1889; Museum of Modern Art, New York City); "The Starry Night" (1889; Museum of Modern Art); "Old Man in Sorrow," also known as "On the Threshold of Eternity" (1890; Rijksmuseum Kröller-Müller); "Mademoiselle Gachet at the Piano" (1890; Kunstmuseum, Basel, Switz.); "Stairway at Auvers" (1890; City Art Museum, St. Louis, Mo.); "The Church at Auvers" (1890; Louvre, Paris); "Self-Portrait" (1890; Louvre).

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Gogo, also called WAGOGO, a Bantu-speaking people inhabiting Dodoma administrative region in central Tanzania. They live in a portion of the East African Rift System. The land is bounded by hills to the east and south, the Bahi Swamp to the west, and the Masai Steppe to the north.

"Gogo" is a sobriquet given by outsiders—probably Nyamwezi traders following the major east–west caravan route across Gogo territory to coastal ports—to people who among themselves consider clan affiliation as the primary social identity. Gogo clans claim descent from surrounding peoples in all directions, a factor that precludes broad political cohesion. The northern Gogo (who think of themselves as Gogo) consider the southern Gogo to be members of the Hehe people, the ethnic group to the south; southern Gogo, however, also consider themselves Gogo, and consider the northern Gogo to be members of the Sandawe ethnic group to the north. Such confusion is compounded by the fact that the Gogo share much of their material culture and several methods of adapting to their harsh environment with Nilotic Baraguyu and Masai, and have been taken for the former by outsiders and denigrated by Westerners for "imitating" the latter.

The Gogo language is closely related to that of the Kaguru to the northeast, although culturally the two groups differ greatly. Distinctive to Gogo material culture are smithing and metalwork, beadwork, dance and musical styles, and facial markings.

Gogo live in an area characterized by erratic rainfall (20 inches [500 millimetres] or less annually), periodic drought, floods, and famine; yet their area is well suited for cattle herding and agriculture, with sorghum and millet as staple crops. They maintain large herds, which are the principal medium for the accumulation and exchange of wealth. Cattle are never slaughtered solely for meat but are offered to spirits, and the meat is carefully distributed through networks of kinship and mutual assistance.

Age sets, one of the cultural traits adopted from the Baraguyu, lost relevance with British colonialism. From the late 1920s colonial administrators created hierarchical chiefships—hence centralized authority—where there had been none before. The Tanzanian government abolished all chiefships in the early 1970s and gathered Gogo into cooperative villages. Despite such wide-ranging political changes, Gogo remain conservative, with social cohesion based upon kinship and locality. Missionary work among Gogo, long ineffective, has had greater impact since about 1960.

Gogol, Nikolay (Vasilyevich) (b. March 31 [March 19, old style], 1809, Sorochintsy, near Poltava, Ukraine, Russian Empire—d. March 4 [Feb. 21, O.S.], 1852, Moscow), Ukrainian-born Russian humorist, dramatist, and novelist, whose novel *Myortvye dushi* (*Dead Souls*) and whose short story "Shinel" ("The Overcoat") are considered the foundations of the great 19th-century tradition of Russian Realism.

The Ukrainian countryside, with its colourful peasantry, its Cossack traditions, and rich folklore, constituted the background of Gogol's boyhood. A member of the petty Ukrainian gentry, Gogol was sent at the age of 12 to the high school at Nezhin. There he distinguished

Gogol, oil painting by F.A. Moller, 1840; in the State Tretyakov Gallery, Moscow

By courtesy of the State Tretyakov Gallery, Moscow

himself by his biting tongue, his contributions of prose and poetry to a magazine, and his portrayal of comic old men and women in school theatricals. In 1828 he went to St. Petersburg, hoping to enter the civil service, but soon discovered that without money and connections he would have to fight hard for a living. He even tried to become an actor, but his audition was unsuccessful. In this predicament he remembered a mediocre sentimental–idyllic poem he had written in the high school. Anxious to achieve fame as a poet, he published it at his own expense, but its failure was so disastrous that he burned all the copies and thought of emigrating to the United States. He embezzled the money his mother had sent him for payment of the mortgage on her farm and took a boat to the German port of Lübeck. He did not sail but briefly toured Germany. Whatever his reasons for undertaking such an irresponsible trip, he soon ran out of money and returned to St. Petersburg to look again for a job. He got such an ill-paid government post that after three months he exchanged it for another, which he also left about a year later.

In the meantime he wrote occasionally for periodicals, finding an escape in childhood memories of the Ukraine. He committed to paper what he remembered of the sunny landscapes, peasants, and boisterous village lads and also related tales about devils, witches, and other demonic or fantastic agents that enliven Ukrainian folklore. Romantic stories of the past were thus intermingled with realistic incidents of the present, in which Gogol's sense of fun and at times his feeling of evil came into their own. Such was the origin of his eight narratives, published in two volumes in 1831–32 under the title *Vechera na khutore bliz Dikanki* (*Evenings on a Farm near Dikanka*). Written in a lively and at times colloquial prose, they contributed something fresh and new to Russian literature. In addition to the author's whimsical inflection, they

abounded in genuine folk flavour, including many Ukrainian words and phrases, all of which captivated the Russian literary world.

The young author became famous overnight. Among his first admirers were the poets Aleksandr Pushkin and Vasily Zhukovsky, both of whom he had met before. This esteem was soon shared by the writer Sergey Aksakov and the critic Vissarion Belinsky, among others. Having given up his second government post, Gogol was now teaching history in a boarding school for girls. In 1834 he was appointed assistant professor of medieval history at St. Petersburg University, but he felt inadequately equipped for the position and left it after a year. Meanwhile, he prepared energetically for the publication of his next two books, *Mirgorod* and *Arabeski* (*Arabesques*), which appeared in 1835. The four stories constituting *Mirgorod* were a continuation of the *Evenings,* but they revealed a strong gap between Gogol's romantic escapism and his otherwise pessimistic attitude toward life. Such a splendid narrative of the Cossack past as "Taras Bulba" certainly provided an escape from the present. "Povest o tom, kak possorilsya Ivan Ivanovich s Ivanom Nikiforovichem" ("Story of the Quarrel Between Ivan Ivanovich and Ivan Nikiforovich") was, for all its humour, full of bitterness about the meanness and vulgarity of existence. Even the idyllic motif of Gogol's "Starosvetskiye pomeshchiki" ("Old-World Landowners") is undermined with satire, for the mutual affection of the aged couple is marred by gluttony, their ceaseless eating for eating's sake.

Aggressive realism of a romantic who can neither adapt himself to the world nor escape from it, and is therefore all the more anxious to expose its vulgarity and evil, predominates in Gogol's Petersburg stories printed (together with some essays) in the second work, *Arabeski.* In one of these stories, "Zapiski sumasshedshego" ("Diary of a Madman"), the hero is an utterly frustrated office drudge who finds compensation in megalomania and ends in a lunatic asylum. In another, "Nevsky prospekt" ("Nevsky Prospect"), a tragic romantic dreamer is contrasted to an adventurous vulgarian, while in the revised finale of "Portret" ("The Portrait") the author stresses his conviction that evil is ineradicable in this world. In 1836 Gogol published in Pushkin's *Sovremennik* ("The Contemporary") one of his gayest satirical stories, "Kolyaska" ("The Coach"). In the same periodical also appeared his amusingly caustic surrealist tale, "Nos" ("The Nose"). Gogol's association with Pushkin was of great value because he always trusted his friend's taste and criticism; moreover, he received from Pushkin the themes for his two principal works, *Revizor* (*The Government Inspector,* sometimes titled *The Inspector General*), and *Myortvye dushi* (*Dead Souls*), which were important not only to Russian literature but also to Gogol's further destiny.

A great comedy, *Revizor* mercilessly lampoons the corrupt bureaucracy under Nicholas I. Having mistaken a well-dressed windbag for the dreaded incognito inspector, the officials of a provincial town bribe and banquet him in order to turn his attention away from the crying evils of their administration. But during the triumph, after the bogus inspector's departure, the arrival of the real inspector is announced—to the horror of those concerned. It was only by a special order of the Tsar that the first performance of this comedy of indictment and "laughter through tears" took place on April 19, 1836. Yet the hue and cry raised by the reactionary press and officialdom was such that Gogol left Russia for Rome, where he remained, with some interruptions, until 1842. The atmosphere he found in Italy appealed to his taste and to his somewhat patriarchal—not to say primitive—religious propensity. The religious painter Aleksandr Ivanov, who worked in Rome, became his close friend. He also met a number of travelling Russian aristocrats and often saw the émigrée princess Zinaida Volkonsky, a convert to Roman Catholicism, in whose circle religious themes were much discussed. It was in Rome, too, that Gogol wrote most of his masterpiece, *Myortvye dushi.*

This novel, or "epic," as the author labelled it, reflects feudal Russia, with its serfdom and bureaucratic iniquities. Chichikov, the hero of the novel, is a polished swindler who, after several reverses of fortune, wants to get rich quick. His bright but criminal idea is to buy from various landowners a number of the recently deceased serfs (or "souls," as they were called in Russia) whose deaths have not yet been registered by the official census and are therefore regarded as still being alive. The landowners are only too happy to rid themselves of the fictitious property on which they continue to pay taxes until the next census. Chichikov intends to pawn the "souls" in a bank and, with the money thus raised, settle down in a distant region as a respectable gentleman. The provincial townsmen of his first stop are charmed by his polite manners; he approaches several owners in the district who are all willing to sell the "souls" in question, knowing full well the fraudulent nature of the deal. The sad conditions of Russia, in which serfs used to be bought and sold like cattle, are evident throughout the grotesquely humorous transactions. The landowners, one more queer and repellent than the last, have become nicknames known to every Russian reader. When the secret of Chichikov's errands begins to leak out, he hurriedly leaves the town.

Myortvye dushi appeared in 1842, the same year in which the first edition of Gogol's collected works was published. The edition included, among his other writings, a sprightly comedy titled *Zhenitba* (*Marriage*) and the story "Shinel." The latter concerns a humble scribe who, with untold sacrifices, has acquired a smart overcoat; when robbed of it he dies of a broken heart. The tragedy of this insignificant man was worked out with so many significant trifles that, years later, Dostoyevsky was to exclaim that all Russian Realists had come "from under Gogol's greatcoat." The apex of Gogol's fame was, however, *Myortvye dushi.* The democratic intellectuals of Belinsky's brand saw in this novel a work permeated with the spirit of their own liberal aspirations. Its author was all the more popular because after Pushkin's tragic death Gogol was now looked upon as the head of Russian literature. Gogol, however, began to see his leading role in a perspective of his own. Having witnessed the beneficent results of the laughter caused by his indictments, he was sure that God had given him a great literary talent in order to make him not only castigate abuses through laughter but also to reveal to Russia the righteous way of living in an evil world. He therefore decided to continue *Myortvye dushi* as a kind of *Divine Comedy* in prose; the already published part would represent the *Inferno* of Russian life, and the second and third parts (with Chichikov's moral regeneration) would be its *Purgatorio* and *Paradiso.*

Unfortunately, having embarked upon such a soul-saving task, Gogol noticed that his former creative capacity was deserting him. He worked on the second part of his novel for more than 10 years but with meagre results. In drafts of four chapters and a fragment of the fifth found among his papers, the negative and grotesque characters are drawn with some intensity, whereas the virtuous types he was so anxious to exalt are stilted and devoid of life. This lack of zest was interpreted by Gogol as a sign that, for some reason, God no longer wanted him to be the voice exhorting his countrymen to a more worthy existence. In spite of this he decided to prove that at least as teacher and preacher—if not as artist—he was still able to set forth what was needed for Russia's moral and worldly improvement. This he did in his ill-starred *Vybrannye mesta iz perepiski s druzyami* (1847; *Selected Passages from Correspondence with My Friends*), a collection of 32 discourses eulogizing not only the conservative official church but also the very powers that he had so mercilessly condemned only a few years before. It is no wonder that the book was fiercely attacked by his one-time admirers, most of all by Belinsky, who in an indignant letter called him "a preacher of the knout, a defender of obscurantism and of darkest oppression." Crushed by it all, Gogol saw in it a further proof that, sinful as he was, he had lost God's favour forever. He increased his prayers and his ascetic practices; in 1848 he even made a pilgrimage to Palestine, but in vain. Despite a few bright moments he began to wander from place to place like a doomed soul. Finally he settled in Moscow where he came under the influence of a fanatical priest, Father Matvey Konstantinovsky, who seems to have practiced on Gogol a kind of spiritual sadism. Ordered by him, Gogol burned the presumably completed manuscript of the second volume of *Dead Souls* on Feb. 24 (Feb. 11, O.S.), 1852. Ten days later he died, on the verge of semi-madness.

Whatever the vagaries of Gogol's mind and life, his part in Russian literature was enormous. Above all, it was from the nature of such works as *The Government Inspector, Dead Souls,* and "The Overcoat" that Belinsky derived the tenets of the "natural school" (as distinct from the "rhetorical," or Romantic, school) that was responsible for the trend of subsequent Russian fiction. Gogol was among the first authors to have revealed Russia to itself. Yet in contrast to the simple classical–realistic prose of Pushkin, adopted by Leo Tolstoy, Ivan Goncharov, and Ivan Turgenev, Gogol's ornate and agitated prose was assumed by Fyodor Dostoyevsky and, later, by the Symbolist poet and novelist Andrey Bely whose style has, in turn, influenced several post-revolutionary writers of the Soviet Union. Gogol's realism of indictment found many followers, among them the great satirist Saltykov-Shchedrin. He was also a champion of the little man as a literary hero. His vexation of spirit, too, was continued (but on a higher level) by both Tolstoy and Dostoyevsky as was his effort to transcend "mere literature." (Ja.La.)

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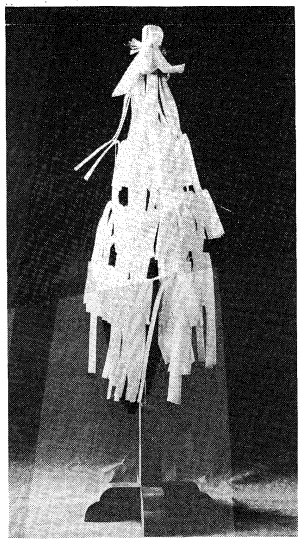
Gogra River: *see* Ghāghara River.

Gogūnda, Battle of (June 1576), also called BATTLE OF HALDĪGHĀT, battle fought in Rājasthān, northwestern India, between Pratap Singh of Mewār, the senior Rājput chief, and a Mughal army led by Raja Mān Singh of Jaipur. It represented an attempt by the Mughal emperor Akbar to subdue the last of the independent chiefs of Rājasthān. Pratap Singh made a stand at the pass of Haldīghāt, about 12 miles (19 km) from the fortress of Gogunda, and northwest of Udaipur.

The Mughals were victorious, but the battle became legendary for the heroic Rājput resistance against odds. Pratap continued his resistance from hill fastnesses, and Mewār did not finally acknowledge the Mughals until 1614.

gohei, in the Shintō religion of Japan, a kind of paper or cloth offering made to a god. The *gohei* consists of an upright stick to which is attached a strip of paper or cloth folded in such a way that zigzag folds fall on either side. The many styles of *gohei* are differentiated from one another by the number of folds, manner of folding, colour, and material of the strips. According to one point of view, the *gohei* also operates as a symbol of the *kami* (god, or sacred power) and indicates that the deity is present in the shrine.

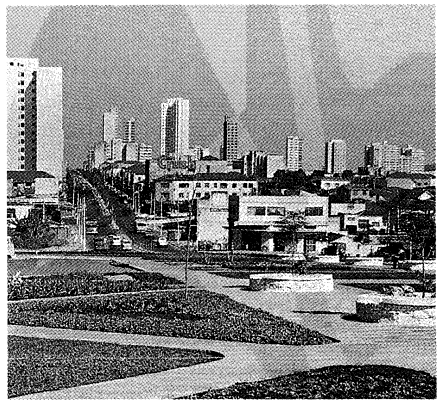


Gohei

By courtesy of the International Society for Educational Information, Tokyo

Göhrde, forest, Lower Saxony *Land* (state), northern Germany. The forest lies on the eastern edge of the Lüneburger Heath, southeast of Lüneburg. Set on a moraine near the Elbe River, it is famous for its oaks, beeches, and game preserves. About 23 square miles (60 square km) of the woodland is under protection as a state forest. The Hohenzollerns formerly had a royal hunting lodge within the forest. In an encounter there in 1813, Napoleon's forces were defeated by the Allies. The forest's central populated place is the small village of Göhrde.

Goiânia, city, capital of Goiás state, south-central Brazil. It is situated in the Brazilian Highlands in the Meia Ponte River valley, southwest of Brasília, the federal capital. The city lies at an elevation of 2,493 feet (760 m) above sea level. Goiânia was planned in 1933 to replace the old, unhealthful former state capital of Goiás, 70 miles (110 km) northwest. In 1937 the state government moved there, and in 1942 the official inauguration was held. The city has wide avenues and attractive parks. Goiânia is the seat of both the Federal University of Goiás (1960) and the Catholic University of Goiás (1959). Agriculture (particularly coffee), livestock raising, and nickel mining are the region's most important economic activities. The city is accessible by air, railroad, and highway. Pop. (1980 prelim.) 703,263.



Botafogo Square, Goiânia, Braz.

Plessner International

Goiás, formerly GOYAZ, inland *estado* ("state"), south-central Brazil. Goiás is the site of the *distrito federal* ("federal district") and national capital, Brasília. It is part of the rapidly developing frontier of the country and is bounded by the states of Tocantins on the north, Bahia and Minas Gerais on the east, Minas Gerais and Mato Grosso do Sul on the south, and Mato Grosso on the west. Its area is 137,215 square miles (355,386 square km). The state capital, since 1937, has been Goiânia.

The first European penetration of this interior part of Brazil was carried on by expeditions from São Paulo in the 17th century. Gold was discovered in the stream gravels of a tributary of the Araguaia River by the explorer Bartolomé Bueno de Silva in 1682. The settlement he founded there, called Santa Anna, became the colonial town of Goiás, the former state capital. In 1744 the large inland area, much of it still unexplored by Europeans, was made a captaincy general, and in 1822 it became a province of the empire of Brazil. It became a state in 1889. The Brazilian constitution of 1891 specified that the nation's capital should be moved to the Planalto Central (Central Plateau), and in 1956 Goiás was selected as the site for the federal district and capital city, Brasília. The seat of the federal government was officially moved to Brasília in 1960. In 1988 the northern half of Goiás became a separate state, which was called Tocantins.

Goiás lies wholly within the Brazilian Highlands. It occupies the larger part of the Planalto Central, the vast level surface of which stands between 2,500 and 3,000 feet (750 and 900 m) above sea level. A few rounded ridges stand higher than this, the highest being the Veadeiros Upland (5,505 feet [1,678 m]). The Planalto Central forms the divide between three of Brazil's largest river systems: to the south Goiás is drained by the Paranaíba River, a tributary of the Paraná River; to the east it is drained by tributaries of the São Francisco River; and the state is drained northward by the Araguaia River and the Tocantins River and their tributaries. None of these rivers is navigable except for short distances. The state is covered with a woodland savanna known in Brazil as *campo cerrado.*

The climate of the plateau is subtropical. Average monthly temperatures vary from 78° F (26° C) in the warmest month to 72° F (22° C) in the coldest month. The year is divided into a rainy season (October–March) and a dry season (April–September). Average annual rainfall is about 67 inches (1,700 mm).

The Grande Região Centro-Oeste (Great Central West Region), consisting of Goiás, Mato Grosso, Mato Grosso do Sul, and the federal district, is among the fastest-growing regions of Brazil. The population of the state tripled in size in the period from 1950 to 1980. Outside the federal district most of Goiás is very thinly populated, however. The chief concentration of settlement is in the southeast, in the area of Goiânia, across the border from Minas Gerais.

Historically, the inhabitants have been predominantly of mixed European-Indian ancestry. The new settlers have come from all parts of Brazil, including many from nearby areas, and thus represent varying degrees of European, Indian, and African origins. The ethnic composition of the population, therefore, is becoming more typical of the nation as a whole.

The standard of living is low, especially in the rural areas. Deaths from malaria have been reduced, but health services are limited, and life expectancy is still low. Higher education is available at the Catholic University of Goiás (founded 1959) and at the Federal University of Goiás (founded 1960), both situated at Goiânia, and at the University of Brasília (founded 1961).

Goiás is a modern frontier area, and agriculture and livestock raising continue to be the most important economic activities, serving the growing urban markets. The principal crops are upland rice, corn (maize), beans, cassava, and coffee. Livestock raising is expanding, with cattle predominant on the open *campos* and pigs in the settled farming regions. Mineral resources include gold, diamonds, tin, titanium, nickel, and rock crystal (quartz crystal).

Goods and services in the area have been expanding with the growth in population since 1950. Anápolis, for example, which can be reached by rail from Rio de Janeiro and São Paulo, is a rapidly growing frontier town, serving the new zone of pioneer settlement, the Mato Grosso de Goiás. The construction of Brasília and the formal transfer of the nation's capital there has reinforced Goiás' economic growth.

Until Anápolis was connected by rail with

São Paulo in 1913, transport to and from the coast was by mule train. A network of feeder roads has been constructed in Goiás and a highway extended to Brasília. Direct access to the interior is by air. Outside of Goiânia, the state formerly had few cultural institutions. The establishment of the national capital in Brasília has resulted in the development of a major new cultural centre, however. Pop. (1988 est.) 3,665,000.

Goibniu (Celtic: "Divine Smith"), Welsh GOFANNON, ancient Celtic smith god. Goibniu figured in Irish tradition as one of a trio of divine craftsmen; the other two were Luchta the wright and Credne the metalworker. Goibniu was also the provider of the sacred otherworld feast, the Fled Goibnenn; he allegedly brewed the special ale thought to confer immortality on those who drank it. In Christian times he became known as Gobbán Saer (Gobbán the Joiner), legendary builder of churches and other structures; as such he is still remembered in modern Celtic folk tradition. His Welsh equivalent, Gofannon, figured in *The Mabinogion* (a collection of medieval Welsh tales). It was believed that his help was vital in cleansing the plow at the end of the furrows.

Goidelic languages, one of two groups of the modern Celtic languages; the group includes Irish, Manx, and Scottish Gaelic. The Goidelic languages (Old Irish *goidel,* "Irishman"; modern English *gael,* whence *Gaelic*) originated in Ireland and are distinguished from the other group of Celtic tongues—the Brythonic—by the retention of the sound *q* (later developing to *k,* spelled *c*), where Brythonic has developed a *p* sound. Both sounds are assumed to be derived from an ancestral form $*k^w$ in the Indo-European parent language. (An asterisk identifies a sound as a hypothetical and reconstructed form.) Because of this *k* (or *q*) sound, the Goidelic languages are sometimes referred to as Q-Celtic.

Góis, Damião de (b. Feb. 2, 1502, Alenquer, Port.—d. Jan. 30, 1574, Alenquer?), leading Portuguese humanist, who had an encyclopaedic mind and was one of the most critical spirits of his age.

Born of a noble family, Góis spent 10 years of his childhood at the court of King Manuel I and was appointed to a secretarial post at a Portuguese trading establishment in Antwerp in 1523 by John III, Manuel's successor. He carried out a series of diplomatic and commercial missions throughout Europe between 1528 and 1531. In 1533 he resigned from government service to devote himself exclusively to humanistic pursuits. Góis became a close friend of Erasmus, who guided him in his studies as well as in his writing. He studied in Padua between 1534 and 1538 and was acquainted with the Italian humanists Pietro Bembo and Lazzaro Buonamico. Shortly thereafter he settled in Louvain for a period of six years. He was taken prisoner during the French invasion of the Low Countries but was freed through the intervention of King John, who summoned him to Portugal. In 1548 he was appointed chief keeper of the Tôrre do Tombo, the national archive, and 10 years later was chosen by Cardinal Henrique to write the official chronicle of King Manuel, which was completed in 1567. In 1571 Góis faced the charges of the Inquisition and was subjected to imprisonment and a series of hearings lasting nearly two years. Abandoned by his family, he is thought to have died in his birthplace, Alenquer.

Góis, drawing by Albrecht Dürer; in the Albertina, Vienna

By courtesy of the Albertina, Vienna

Góis's major works, in both Latin and Portuguese, are histories. They include the *Crónica do Felicíssimo Rei Dom Emanuel* (4 parts, 1566–67; "Chronicle of the Most Happy King Dom Manuel") and the *Crónica do Príncipe Dom João* (1567; "Chronicle of Prince Dom John"). Unlike his contemporary João de Barros, the cosmopolitan humanist maintained a neutral position in his chronicles dealing with King Manuel the Fortunate and his son Prince John.

goitre, enlargement of the human thyroid gland, resulting in a prominent swelling at the front of the neck. A normal human thyroid gland weighs 20–30 g (about 0.75 ounce), a goitrous gland as much as 1 kg (more than 2 pounds). A very large or extensive goitre may produce sensations of choking and can cause difficulty in breathing and swallowing.

There are several causes and types of goitre. One class of goitre arises as a result of any of a variety of defects in the thyroid gland's synthesis of thyroid hormone. The gland is unable to secrete sufficient amounts of that hormone and grows larger as if to compensate for its inadequate secretion by producing more. Other types of goitre occur when the thyroid gland has normally functioning tissue but enlarges for reasons that have not been conclusively determined. Still another type of enlarged gland produces too much hormone, resulting in the conditions known as exophthalmic goitre, or Graves' disease (*q.v.*), and toxic multinodular goitre, or Plummer's disease (*q.v.*).

The most common type of goitre is called simple, or endemic, goitre and results from an inadequate intake of iodine, which is one of the two raw materials necessary to make thyroid hormone. When the body does not receive iodine in sufficient quantities, the thyroid gland grows larger in an effort to produce an adequate amount of hormone. Endemic goitre is five times more common among women than among men. It occurs most frequently in inland or mountainous regions where the iodine content of the drinking water and the food is exceedingly low. It is prevented by the use of iodized salt in one's diet. In the early stages of endemic goitre, regression of the gland may be complete if iodine is ingested in adequate amounts. The most effective treatment in more advanced cases is the administration of thyroid hormone. Surgical removal of the thyroid gland may be necessary if the gland has grown so large that it is obstructing breathing.

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Gökalp, Ziya, pseudonym of MEHMED ZIYA (b. 1875/76, Diyarbakır, Ottoman Empire [now in Turkey]—d. Oct. 25, 1924, Constantinople [now Istanbul]), sociologist, writer, and poet, one of the most important intellectuals and spokesmen of the Turkish nationalist movement.

While Gökalp was a student at the Constantinople Veterinary School, his active membership in a secret revolutionary society led to his imprisonment. After the Young Turk revolution in 1908, he took part in the underground Committee of Union and Progress in Salonika and settled there as a philosophy and sociology teacher in a secondary school. He played a major role as an intellectual leader in this organization, which later virtually ruled the country. During that period he contributed to the avant-garde periodicals *Genç Kalemler* ("The Young Pens") and *Yeni Mecmua* ("New Magazine"), both vehicles for the dissemination of revolutionary nationalist ideas. In 1912 he was appointed to the chair of sociology at Istanbul University.

At first Gökalp espoused the ideas of Pan-Turanism, or Pan-Turkism, an ideology that aspired to unite the Turks of the world. Later, however, he limited his dream to an ideology that essentially embraced only the Turks of the Ottoman Empire and was concerned with the modernization and westernization of the Turkish nation. Although interested in developing his countrymen's awareness of Turkish history, customs, and beliefs, he thought the Turkish nation could adopt many of the ways of Western civilization without destroying its Turkish heritage.

After the 1918 armistice, Gökalp was exiled to Malta with a number of leading Turkish political leaders. Freed in 1921 after the nationalist victory, he returned to Diyarbakır briefly and then went to Ankara, where he worked in a government translation bureau. He was elected a member of the Parliament of the new Turkish Republic in 1923 but died soon after.

As a spokesman for Turkish nationalism, Gökalp greatly influenced the politicians and writers of his generation. His best-known works include the verse collection *Kızıl Elma* (1915; "The Red Apple"). The title poem deals with an ancient Turkish myth in which universal sovereignty, symbolized in the apple, devolves on the Turks.

Other writings are *Yeni Hayat* (1918; "The New Life"), an anthology of poems; the prose work *Türkeşmek, İslamlaşmak, Muasırlaşmak* (1918; "Turkification, Islāmization, and Modernization"); fables in prose and poetry, *Altın Işık* (1923; "The Golden Light"); the prose work *Türkcülüğün Esasları* (1923 and 1970; *Principles of Turkism,* 1968); his unfinished *Türk Medeniyeti Tarihi* ("A History of Turkish Civilization," vol. 1, 1925); and *Malta Mektublar* (1931; "Maltese Letters"). Some of his essays have been collected and translated into English by Niyazi Berkes in *Turkish Nationalism and Western Civilization: Selected Essays of Ziya Gökalp* (1959).

Gokanna (Sri Lanka): *see* Trincomalee.

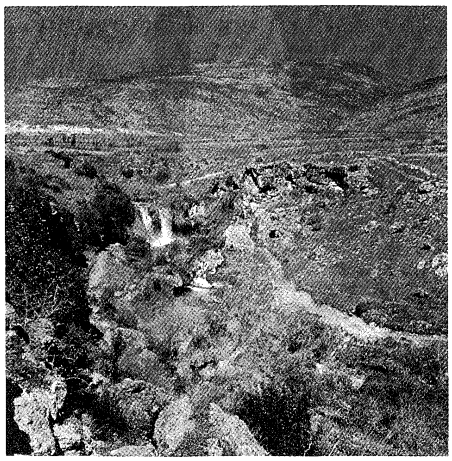
Gokhale, Gopāl Krishna (b. May 9, 1866, Ratnagiri district, India—d. Feb. 19, 1915, Poona), social reformer who founded a sectarian organization to work for relief of the underprivileged of India. He led the moderate nationalists in the early years of the Indian independence movement.

In 1902 Gokhale resigned as professor of history and political economy at Fergusson College, Poona, to enter politics. As an influential and respected member of the Indian National Congress (the leading nationalist organization), Gokhale advocated moderate and constitutional methods of agitation and gradual reform. Three years later he was elected president of the Congress.

In addition to his political activities, Gokhale's deep concern with social reform led him to found (1905) the Servants of India Society, whose members took vows of poverty and lifelong service to the underprivileged. He opposed the ill-treatment of untouchables, or low-caste Hindus, and also took up the

cause of impoverished Indians living in South Africa.

Golan Heights, also called GOLAN PLATEAU, Arabic JAWLĀN, Hebrew RAMAT HA-GOLAN, or HA-GOLAN, hilly area of extreme southwestern Syria, overlooking the upper Jordan Valley on the west. It includes most of al-Qunayṭirah (*q.v.*) *muḥāfaẓah* (governorate) and



Golan Heights, near the Syrian border, Israel
Keystone

parts of Dar'ā *muḥāfaẓah*. In 1967 it came under Israeli military occupation; and in December 1981 Israel unilaterally annexed the part of the Golan it held. The name is from the biblical city of refuge Golan in Bashan (Deuteronomy 4:43; Joshua 20:8).

Geographically, the Golan is bounded by the Jordan River and the Sea of Galilee on the west, Mt. Hermon (Arabic Jabal ash-Shaykh; Hebrew Har Ḥermon) on the north, the seasonal Wādī ar-Ruqqad (a north–south branch of the Yarmūk River) on the east, and the Yarmūk River on the south. As a political unit the boundaries differ; Israel is the suzerain of the entire coast of the Sea of Galilee, while on the east the border is irregular, following the Israeli–Syrian armistice line of June 10, 1967, which was later modified by the separation of forces agreement of May 31, 1974. The administrative Golan is about 44 mi (71 km) from north to south, and about 27 mi from east to west at its widest point; it is roughly boat-shaped and has an area of 444 sq mi (1,150 sq km). The better agricultural land lies in its southern portion; the stony foothills of Mt. Hermon to the north, with patches of woodland and scrub, are a stock-raising area. The Israeli-held Golan rises to 7,297 ft (2,224 m) at its extreme northeast point on the Mt. Hermon slopes.

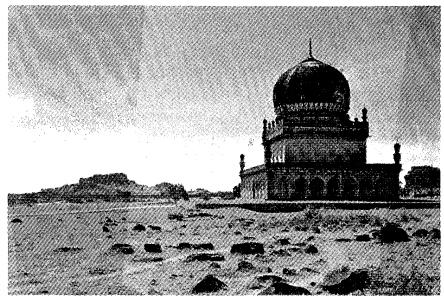
Scholars generally agree that the biblical city of Golan lay west of the modern Golan area, in the region of the Ḥawrān (Haurān). The conquests of the Hasmonean king Alexander Jannaeus (ruled 103–76 BC) included most of inhabited Palestine east of the Jordan; the Greek name Gaulanitis was applied to the area corresponding to modern Golan. Remains of numerous ancient synagogues in Hellenistic towns attest Jewish presence there after the destruction of the Temple at Jerusalem (AD 70). The region was a Ghassānid seat of power in the 6th century AD, acting as a buffer between the Byzantines to the north and nomads in the south. Its capital was Baniyās (Greek Paneas), near the source of the Jordan River, northwest of al-Qunayṭirah, the present capital.

In 1894 the French-Jewish banker and philanthropist Baron Edmond de Rothschild bought a large tract of land for Jewish settlement in the Golan; he was followed by other groups in the United States, Canada, and Europe. Colonization was attempted (Bene Yehuda, near Bi'r ash-Shuqūm, just east of the Sea of Galilee) but was frustrated by the hostility of the Arab population and by the Ottoman land laws, which virtually forbade settlement by nonnatives. After World War I the Golan became part of the French mandate of Syria and in 1941 passed to independent Syria. After the Arab–Israeli War of 1948–49, Syria fortified the western crest of the Golan Heights, which commands the 'Emeq Ḥula (Hula Valley), the Sea of Galilee, and the upper Jordan Valley, all in Israel. In these sections many Israeli civilians were killed by the fire of Syrian artillery and snipers; agriculture and fishing were rendered difficult, and at times impossible.

On the last two days (June 9–10, 1967) of the Six-Day War, the Israeli armed forces, after defeating Egypt and Jordan, turned their attention to Syria. Under cover of the Israel Air Force, engineer troops built access roads up the steep Golan Heights, which were then frontally assaulted by armoured vehicles and infantry. The Syrian defenders and most of the Arab inhabitants fled, and Syria asked for an armistice; fighting ceased on June 10. The heights were placed under Israeli military administration, and Golan was integrated into the communications and financial framework of Israel. By the late 1970s nearly 30 Jewish settlements had been established on the heights, and in 1981 Israel unilaterally annexed the area. After the Arab–Israeli War of 1973 a UN buffer zone was established between Syrians and Israelis in the heights. Pop. (1983 est.) 19,700, of which 6,800 are Israelis, the remainder, mainly Druze.

Golasecca, site of cremation cemeteries of the 7th and 6th centuries BC, located on the Somma plateau at the southern end of Lake Maggiore, northwest of modern Milan. Each tomb contained a jar-shaped burial urn covered with an inverted bowl; the urns held the ashes of the dead, together with small accessories and weapons. The burial site was, in almost every instance, surrounded by a circle of unworked stones. The pottery found in the tombs was of two different but contemporary styles. Swords of Hungarian and other northern types and bronze ornaments identical with some found in Picenum on the Adriatic coast indicate trade connections.

Golconda, also spelled GOLKONDA, or GOLKUNDĀ, fortress and ruined city in Hyderābād Urban district, north central Andhra Pradesh state, southern India. From 1512 to 1687 Golconda was the capital of the Shī'ah kingdom, one of five Muslim sultanates of the Deccan.



Tombs of the Quṭb Shāhī dynasty near Golconda, Andhra Pradesh, India
Christina Gascoigne

The territory of Golconda lay between the lower reaches of the Godāvari and Krishna rivers and extended to the Bay of Bengal coast. In 1687 the ruling dynasty of Quṭb Shāhīs was overthrown by the Mughal emperor Aurangzeb, and Golconda was annexed to the Mughal Empire (1526–1857).

The fortress, 5 mi (8 km) west of the city of Hyderābād, is 3 mi in circumference, with concentric masonry-block walls. Palaces, mosques, and the Quṭb Shāhī tombs still remain intact. Historically, Golconda was famous for its diamonds, derived from the conglomerate rocks of the nearby hills.

gold (Au), chemical element, a dense, precious, bright yellow and lustrous metal of Group Ib of the periodic table.

Properties, occurrence, and uses. Gold, a good conductor of heat and electricity, is soft and is the most malleable and ductile of metals. An ounce (28 grams) can be beaten out to 300 square feet (about 30 square metres); in thin sheets, called leaf, it transmits green light.

Leaf formation on gold from the Mother Lode, Nevada County, California
By courtesy of Demuth Collection; photograph, Mary A. Root—EB Inc.

Because this rare metal is found in relatively pure form in nature, is visually pleasing and workable, and does not tarnish or corrode, it was one of the first metals to attract man's attention. Egyptian, Minoan, Assyrian, and Etruscan artisans fabricated beautiful and elaborate works of art from gold, and it was one material accepted in exchange for goods and services.

Like many other elements, gold is widespread in small amounts in all igneous rocks. Its abundance in the Earth's crust is estimated at about 0.005 parts per million. Gold occurs mostly in the native state, remaining chemically uncombined except with tellurium and possibly selenium and bismuth. Natural gold is 100 percent isotope gold-197. Large masses of gold-bearing rock rich enough to be called ores are unusual. Two types of deposits containing significant amounts of gold are known: hydrothermal veins, where it is associated with quartz and pyrite (fool's gold); and placer deposits, both consolidated and unconsolidated, that are derived from the weathering of gold-bearing rocks.

The origin of enriched veins is not fully known, but it is believed that the gold was carried up from great depths with other minerals, at least in partial solid solution, and later precipitated. The gold in rocks usually occurs as invisible disseminated grains, more rarely as flakes large enough to be seen, and even more rarely as masses or veinlets. Crystals an inch or more across have been found in California. Masses, some on the order of 200 pounds (90 kilograms), have been reported from Australia.

For information about the mining, recovery, and refining of gold, *see* MACROPAEDIA: Industries, Extraction and Processing. Specifics on assaying can be found in the same entry.

Approximately 60 percent of all the gold mined to date is held by governments and central banks. It not only has been used to back paper currencies in individual nations but has also been by far the most significant means of international payment. As an artistic material gold continues to be valuable. Gold used for jewelry is generally alloyed with sil-

ver, palladium, or platinum. The gold content of alloys is expressed in 24ths, called karats; a 12-karat gold alloy is 50 percent gold, and 24-karat gold is pure.

Because of its high electrical conductivity (71 percent that of copper) and inertness, the largest industrial use of gold is in the electric and electronic industry for plating contacts, terminals, printed circuits, and semiconductor systems. Thin films that reflect up to 98 percent of incident infrared radiation have been employed on satellites to control temperature and on space-suit visors to afford protection. Used in a similar way on the windows of large office buildings, it reduces the air-conditioning requirement and adds to the beauty. Gold has long been used for fillings and other repairs to teeth. The brilliant red colour of ruby glass is caused by the presence of a trace of colloidally dispersed gold.

Compounds. The characteristic oxidation states of gold are +1 (aurous compounds) and +3 (auric compounds). Gold is at the bottom of the electrochemical series; even platinum will reduce Au^{3+} ions to metallic gold.

Among the relatively few gold compounds of practical importance are gold(I) chloride, AuCl; gold(III) chloride, or gold trichloride, $AuCl_3$; and chlorauric acid, $HAuCl_4$. All three are involved in the electrolytic refining of gold. Potassium cyanoaurate, $K[Au(CN)_2]$, is the basis for most gold plating baths (the solution employed when gold is plated). The soluble salt sodium aurichloride, $NaAuCl_4 \cdot 2H_2O$, is used in the treatment of rheumatoid arthritis. Several organic compounds of gold have industrial applications. For example, gold mercaptides, which are obtained from sulfurized terpenes, are dissolved in certain organic solutions and used for decorating china and glass articles.

For statistical data on mine production of ore, refining of metal, reserves (or production capacity), and trade worldwide and for major national industries, *see* mining (table).

atomic number	79
atomic weight	196.967
melting point	1,063° C (1,945° F)
boiling point	2,966° C (5,371° F)
specific gravity	19.3 (20° C)
valence	1, 3
electronic config.	2-8-18-32-18-1 or $(Xe)4f^{14}5d^{10}6s^1$

Gold, Thomas (b. May 22, 1920, Vienna, Austria), Austrian-born British astronomer who promulgated the steady-state theory of the universe, holding that although the universe is expanding, a continuous creation of matter in intergalactic space is gradually forming new galaxies, so that the average number of galaxies in any part of the universe remains approximately the same.

Gold studied at Trinity College, Cambridge (B.A., 1942; M.Sc., 1946), and during World War II served in the British Admiralty. Elected a fellow of Trinity College, Cambridge, in 1947, Gold became university demonstrator in physics in 1949 at the Cavendish Laboratory, Cambridge. During the late 1940s, in collaboration with Hermann Bondi and Fred Hoyle, he formulated the steady-state theory, of which Hoyle became the leading proponent.

In 1952 Gold joined the staff of the Royal Greenwich Observatory, London. Five years later he became professor of astronomy at Harvard University. There he worked on the maser (*m*icrowave *a*mplification by *s*timulated *e*mission of *r*adiation) amplifier for use with radio telescopes. In 1959 he joined the faculty of Cornell University in Ithaca, N.Y., as professor of astronomy. He served as director of the Center for Radiophysics and Space Research from 1959 to 1981. An early supporter of space exploration, Gold contributed significant theories and conjectures on the structure of the Moon, on the effect of solar flares and storms on the Earth's atmosphere, and on the origin of the solar system and of life.

Gold Coast, section of the coast of the Gulf of Guinea, in Africa, extending approximately from Axim, Ghana, or nearby Cape Three Points, in the west to the Volta River in the east, so called because it was an important source of gold. An area of intense colonial rivalry from the 17th century, it was acquired by the British in the 19th century. The Gold Coast colony (as Ghana) became a dominion of the British Commonwealth (March 6, 1957) and achieved independence as the Republic of Ghana in 1960.

Gold Coast, city, extending for 25 miles (40 km) along the southern coastline of Queensland, Australia, from Paradise Point along the Pacific Highway to Coolangatta at the New South Wales border. Tweed Heads, across the border in New South Wales, is also part of the Gold Coast urban complex. The city is primarily a chain of beach resorts, including Northcliffe, Broadbeach, Mermaid Beach,

Gold Coast, Queensland
J. Alex Langley—DPI

Surfers Paradise, Nobby's, Miami, Burleigh Heads, Palm Beach, Currumbin, Tallebudgera, Tugun-Bilinga, and Kirra; Southport is the administrative centre. There was an extensive building boom after restrictions were lifted in 1952; the area was created a city in 1959. Among the area's attractions are a bird sanctuary and a fauna reserve. Some light manufacturing, largely related to the tourist trade, is carried on there. Its population increases greatly during Christmas holidays. Pop. (1987 est.) 219,700.

Gold Cup, premier annual motorboat-racing prize in the United States, instituted by the American Power Boat Association in 1904. The first race for the cup was held on the Hudson River and was won by C.C. Riotte's *Standard* with the fastest heat of 23.6 miles (38 km) per hour. The winning boats since 1911 have been hydroplanes, usually of unlimited engine displacement. The Gold Cup is one of a series of unlimited hydroplane races sponsored annually by the American Power Boat Association and culminating with the award of a national championship. For Gold Cup race records, *see* Sporting Record: *Motorboating.*

gold-exchange standard, monetary system under which a nation's currency may be converted into bills of exchange drawn on a country whose currency is convertible into gold at a stable rate of exchange. A nation on the gold-exchange standard is thus able to keep its currency at parity with gold without having to maintain as large a gold reserve as is required under the gold standard.

The gold-exchange standard came into prominence after World War I because of an inadequate supply of gold for reserve purposes. British sterling and the U.S. dollar have been the most widely recognized reserve currencies. The requirement of a fixed rate of exchange for the reserve currency has the effect of limiting the freedom of the reserve-currency country's monetary policy to solve domestic economic problems. The use of gold reserves is now limited almost exclusively to the settlement of international transactions, on rare occasions.

gold reserve, a fund of gold bullion or coin held by a government or bank, as distinguished from a private hoard of gold held by an individual or nonfinancial institution.

In the past, reserves were accumulated by rulers and governments primarily to meet the costs of waging war, and in most eras governmental policy greatly emphasized the acquiring and holding of "treasure." Banks accumulated gold reserves to redeem their promises to pay their depositors in gold.

During the 19th century, banks supplanted governments as the principal holders of gold reserves. Commercial banks received deposits subject to repayment in gold on demand and issued notes (paper money) that were redeemable in gold on demand; hence each bank had to hold a reserve of gold coins to meet redemption demands. In the course of time, however, the preponderant portion of the gold reserves shifted to central banks. Because the notes of commercial banks were wholly or largely replaced by notes of the central bank, the commercial banks needed little or no gold for note redemption. The commercial banks also came to depend upon the central bank for gold needed to meet the demands of their depositors.

In the 1930s many governments required their central banks to turn over to the national treasuries all or most of their gold holdings. For example, in the United States, the Gold Reserve Act of 1934 stipulated that the U.S. Treasury should take title to all gold coin, gold bullion, and gold certificates held by the central Federal Reserve banks, giving gold certificates of a new type and gold credits on its books in exchange. The U.S. Treasury placed most of its gold reserve at Fort Knox, Ky. But not all governments "nationalized" gold, with the result that the status of gold reserves varies from country to country. In some countries, monetary gold reserves are held exclusively by the national government; in others they are held largely by the central bank; and in still others they are held partly by the government and partly by the central bank.

Regardless of the holder, however, the use of gold reserves is now limited almost exclusively to the settlement of international transactions—and, even then, only rarely.

gold standard, monetary system in which the standard unit of currency is a fixed weight of gold or is kept at the value of a fixed weight of gold. In an internal gold-standard system, which implies the use of an international gold standard, gold coins circulate as legal tender, or paper money is freely convertible into gold at a fixed price.

In an international gold-standard system, which may exist in the absence of any internal gold standard, gold or a currency that is convertible into gold at a fixed price is used as a means of making international payments. Under such a system, exchange rates between countries are fixed; if exchange rates rise above or fall below the fixed mint rate by more than the cost of shipping gold from one country to another, large gold inflows or outflows occur until the rates return to the official level.

The gold standard was first put into operation in Great Britain in 1821. In the full internal and international gold standard before 1914, gold could be exchanged for equal weights of gold coinage, coins could be melted down for their gold content, and gold coin or bullion could be exported or imported freely.

The reign of the full gold standard was short, lasting only from the 1870s to the outbreak of World War I. By 1928, however, both

the internal and international gold standards had been virtually reestablished, although gold coins were no longer in general circulation in most countries, and more extensive use was made of the gold-exchange standard than before 1914. The gold standard collapsed again during the Great Depression of the 1930s. By 1937 not a single country remained on the full gold standard.

The post-World War II system was one in which most exchange rates were pegged either to the dollar or to gold. In 1958 a type of gold standard was reestablished in which the major European countries provided for the free convertibility of their currencies into gold and dollars for international payments. There was no restoration of an internal gold standard.

The advantages of the gold standard are that (1) it limits the power of governments or banks to cause price inflation by excessive issue of paper currency, although there is evidence that even before World War I monetary authorities did not contract the supply of money when the country incurred a gold outflow; and (2) it creates certainty in international trade by providing a fixed pattern of exchange rates.

The disadvantages are that (1) it may not provide sufficient flexibility in the supply of money, because the supply of newly mined gold is not closely related to the growing needs of the world economy for a commensurate supply of money; (2) a country may not be able to isolate its economy from depression or inflation in the rest of the world; and (3) the process of adjustment for a country with a payments deficit can be long and painful whenever an increase in unemployment or a decline in the rate of economic expansion occurs.

Goldbach, Christian (b. March 18, 1690, Königsberg, Prussia [now Kaliningrad, Russian S.F.S.R.]—d. Nov. 20, 1764, Moscow, Russia), mathematician whose contributions to number theory include Goldbach's conjecture.

In 1725 Goldbach became professor of mathematics and historian of the Imperial Academy at St. Petersburg (now Leningrad). Three years later he went to Moscow as tutor to Tsar Peter II, and from 1742 he served as a staff member of the Russian Ministry of Foreign Affairs.

Goldbach first proposed the conjecture that bears his name in a letter to the Swiss mathematician Leonhard Euler in 1742. In the letter he claimed: (1) that every even natural number is equal to the sum of two prime numbers (numbers not divisible by any integer greater than one except themselves); and (2) that every natural number greater than 2, even or odd, is equal to the sum of three primes. Although the first conjecture has been verified for all even natural numbers up to 100,000 and some beyond, no definitive proof for it has been found. A partial proof of the second conjecture was presented in 1937 by the Soviet mathematician Ivan Matveyevich Vinogradov. Goldbach also made notable contributions to the theory of curves, to infinite series, and to the integration of differential equations.

Goldberg, Arthur J(oseph) (b. Aug. 8, 1908, Chicago, Ill., U.S.—d. Jan. 19, 1990, Washington, D.C.), labour lawyer, U.S. secretary of labor (1961–62), associate justice of the U.S. Supreme Court (1962–65), and U.S. representative to the United Nations (1965–68). His liberal activism on the Supreme Court contrasted with the judicial self-restraint urged by Felix Frankfurter, whom he succeeded on the court.

The son of Russian immigrants, Goldberg passed the Illinois bar examination at the age of 20, practiced in Chicago from 1929 to 1948, and first gained national attention as counsel for the Chicago Newspaper Guild during its 1938 strike. In 1948 he went to Washington, D.C., as general counsel for the Congress of Industrial Organizations (CIO) and the United Steelworkers of America. He was instrumental in merging the American Federation of Labor (AFL) and the CIO in 1955 and in expelling from the general labour movement various unions thought to be dominated by communists or racketeers.

After brief but effective service as secretary of labour, Goldberg was appointed to the Supreme Court by President John F. Kennedy on Aug. 29, 1962. In *Murphy* v. *Waterfront Commission of New York Harbor,* 378 U.S. 52 (1964), he ruled that a witness induced to testify in a state court case under a grant of immunity from state prosecution may not afterward be charged with a federal crime on the basis of his testimony. In a highly controversial case, *Escobedo* v. *Illinois,* 378 U.S. 478 (1964), he held that a criminal suspect must have the assistance of counsel when, prior to his indictment, he is interrogated by police for the purpose of eliciting a confession.

On July 20, 1965, at President Lyndon B. Johnson's request, Goldberg relinquished his seat on the Supreme Court and became U.S. representative to the UN, with the rank of ambassador. On August 16 Goldberg announced that, to avert a crisis, the United States would not press the Soviet Union and France for payment of UN peace-keeping assessments. While he was serving as president of the UN Security Council in September 1965, he helped to secure a cease-fire between India and Pakistan. After his resignation from his UN post in 1968, he practiced law in New York City until 1971.

In 1970 he was an unsuccessful candidate for governor of New York. Goldberg held distinguished professorships of law at a number of universities in the 1960s and '70s. In 1971 he returned to Washington, D.C., where he continued his legal practice. He also served in international arbitration cases and, in 1977 and 1978, during the Jimmy Carter administration, twice acted as ambassador-at-large. In his final years he was engaged in human-rights projects.

His published works include *Defenses of Freedom* (1966) and *Equal Justice: The Warren Era of the Supreme Court* (1972).

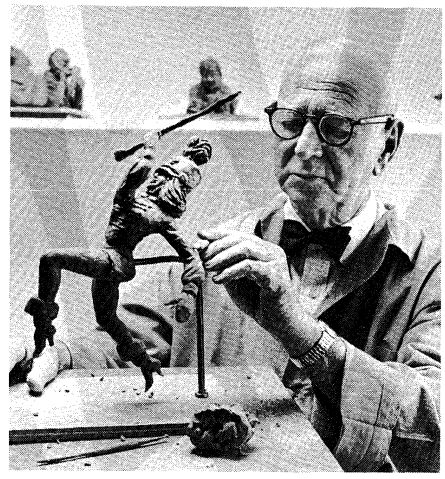
Goldberg, Dora: *see* Bayes, Nora.

Goldberg, Rube, byname of REUBEN LUCIUS GOLDBERG (b. July 4, 1883, San Francisco, Calif., U.S.—d. Dec. 7, 1970, New York, N.Y.), American cartoonist who satirized the American preoccupation with technology. His name became synonymous with any simple process made outlandishly complicated.

Rube Goldberg was born the son of a San Francisco police and fire commissioner, who guided him into engineering at the University of California. He received his B.S. in 1904 and took a job designing sewer pipes for the San Francisco Sewer Department.

After a few months, however, he left to become a sportswriter and cartoonist for the *San Francisco Chronicle* (1904–05), and later for the *San Francisco Bulletin* (1905–07). He went east and joined the *New York Evening Mail* (1907–21), where he created three long-running comic strips. He also created the cartoon character Professor Lucifer Gorgonzola Butts, an inventor of contraptions that accomplished simple ends in a roundabout manner. One of his hundreds of inventions was an automatic stamp licker activated by a dwarf robot who overturned a can of ants onto a page of postage stamps, gumside up. They were then licked up by an anteater who had been starved for three days.

In 1938 Goldberg turned to editorial cartooning, working successively for *The New York Sun, The New York Journal,* and *The Journal-American.* He won the Pulitzer Prize in 1948 for the best editorial cartoon, his "Peace Today," a warning against atomic weapons. When he retired from cartooning in 1964, he achieved critical recognition for his sculpture in bronze and his cartoons in clay.



Rube Goldberg, 1965
The New York Times

goldcrest, European species of kinglet (*q.v.*).

Golden, city, seat (1861) of Jefferson county, north-central Colorado, U.S. It lies on Clear Creek at the foot of Lookout Mountain at an altitude of 5,675 feet (1,730 m), just west of Denver. Founded as a mining town in 1859, it was named after Tom Golden, a miner. From 1862 to 1867 Golden was the capital of the Colorado Territory, rivaling Denver as the state's chief settlement. Manufactures include porcelain, cans and bottles, units for nuclear reactors, and cement blocks; the city is also the site of a large brewery. Golden is the seat of the Colorado School of Mines (founded in 1869 as Jarvis College). Inc. town, 1871; city, 1879. Pop. (1988 est.) 14,807.

Golden Age, in Latin literature, the period, from approximately 70 BC to AD 18, that was a time of literary achievement during which the Latin language was brought to perfection as a literary medium and many Latin classical masterpieces were composed. The Golden Age can be subdivided into two major sections, the Ciceronian period (*q.v.*; 70–43 BC), dominated by Marcus Tullius Cicero, and the Augustan Age (*q.v.*; 43 BC–AD 18), a period of mature literary achievements by such writers as Virgil, Horace, and Livy. *See also* Silver Age.

Golden Age, Spanish SIGLO DE ORO, the period of Spanish literature extending from the early 16th century to the late 17th century, generally considered the high point in Spain's literary history. The Golden Age began with the partial political unification of Spain around 1500, and its literature is characterized by patriotic and religious fervour, heightened realism, and a new interest in earlier epics and ballads, together with the somewhat less-pronounced influences of humanism and Neoplatonism.

During the Golden Age such late medieval and early Renaissance forms as the chivalric and pastoral novels underwent their final flowering. They were replaced by the picaresque novel, which usually described the comic adventures of low-born rogues, and which was exemplified by the anonymously written *Lazarillo de Tormes* (1554) and by the works of Mateo Alemán and Francisco Gómez de Quevedo y Villegas. Miguel de Cervantes Saavedra's monumental novel *Don Quixote* (Part I, 1605; Part II, 1615), a satirical treatment of anachronistic chivalric ideals, combined pastoral, picaresque, and romantic elements in its narrative, and remains the single most

important literary work produced during the Golden Age. Spanish poetry during the period was initially marked by the adoption of Italian metres and verse forms such as those used by Garcilaso de la Vega. Spanish poetry eventually became marked by the elaborate conceits and wordplay of the Baroque movements known as *culteranismo* and *conceptismo* (*qq.v.*), whose chief practitioners were Luis de Góngora y Argote and Quevedo, respectively. The Golden Age also witnessed the almost singlehanded creation of the Spanish national theatre by the extremely productive playwright Lope de Vega. His establishment of a dramatic tradition using characteristically Spanish themes, values, and subject matter was further developed by Tirso de Molina and by Pedro Calderón de la Barca. Among the highlights of the period's religious literature are the mystical glorifications of spirituality by St. Teresa of Ávila, Luis de León, and St. John of the Cross. The end of the Golden Age is marked by Calderón's death in 1681.

golden algae, also called GOLDEN-BROWN ALGAE, members of the division Chrysophyta (about 300 species) found in both marine and fresh waters. Diverse in form, although most are primitive single-celled flagellates, they are characterized by the pigment fucoxanthin and oil droplets as the food-reserve. Sexual reproduction is rare; asexual reproduction is by the formation of motile and nonmotile spores and by cell division.

golden bell (plant): *see* Forsythia.

Golden Bull of 1222, charter granted by King Andrew II of Hungary, which stated the basic rights and privileges of the Hungarian nobility and clergymen and the limits of the monarch's powers. The Hungarian nobles, aroused by Andrew's excesses and extravagances, forced him to promulgate the Golden Bull. It contained 31 articles, reaffirming previously granted rights and bestowing new ones.

The charter compelled the king to convoke the diet regularly, forbade him to imprison a noble without a proper trial before the palatine (an official who assumed the chief administrative duties in the king's absence), and denied the king the right to tax nobles' and the church's estates. It released the nobles from required service without pay in the king's army abroad and also prohibited foreigners from owning landed estates and Jews and Muslims from holding public office (the latter provision was added in 1231).

The charter also increased the nobles' authority in the counties; the king's county officials (*főispán*) could be dismissed for misconduct, and their positions could not become hereditary. Furthermore, if the king or his successors violated the provisions of the Golden Bull, the nobles and bishops had the right to resist (*jus resistendi*) without being subject to punishment for treason. After 1222 all Hungarian kings had to swear to uphold the Golden Bull.

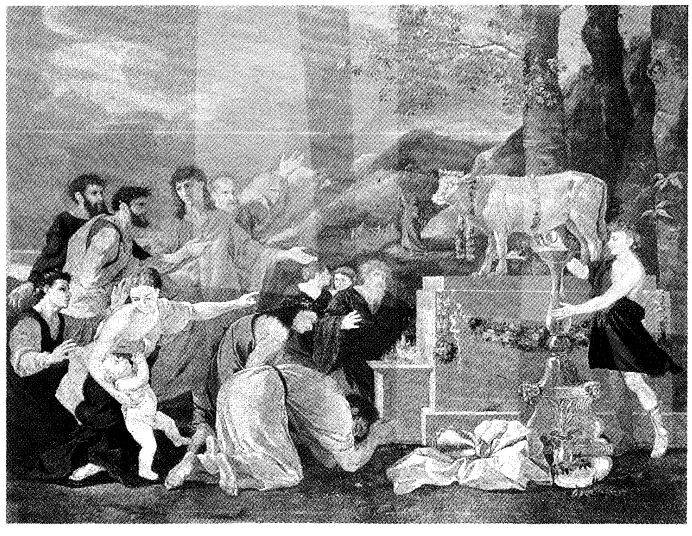
Golden Bull of Emperor Charles IV, constitution for the Holy Roman Empire promulgated in 1356 by the emperor Charles IV. It was intended to eliminate papal interference in German political affairs and to recognize the importance of the princes, especially the electors, of the empire. Its name, like that of other "golden bulls," derived from its authentication with a golden seal (Latin *bulla*).

Returning to Germany in July 1355 after his coronation as emperor in Rome, Charles IV summoned the princes to deliberations at Nürnberg, which resulted in the promulgation of the first 23 chapters of the Golden Bull on Jan. 10, 1356; the concluding 8 chapters were added after further negotiation with the princes in Metz on Dec. 25, 1356. The purpose was to place the election of the German ruler firmly in the hands of the seven electors and to ensure that the candidate elected by the majority should succeed without dispute. That the electoral college (*see* electors) consisted of three ecclesiastical and four lay princes had been established since 1273, but it was not always clear who these seven were. Therefore, the Saxon vote was now attached to the Wittenberg (not the Lauenburg) branch of the Saxon dynasty; the vote was given to the count Palatine (not to the duke of Bavaria); and the special position of Bohemia, of which Charles himself was king, was expressly recognized. In addition Charles established succession by primogeniture, attached the electoral vote to the possession of certain lands, and decreed that these territories should never be divided. The candidate elected by the majority was regarded as unanimously elected and entitled to exercise his royal rights immediately. Thus the pope's claim to examine rival candidates and to approve the election was ignored. Also, by instituting the duke of Saxony and the count Palatine as regents during the vacancy, the Golden Bull excluded the pope's claim to act as vicar.

These results were achieved only by concessions to the electoral princes, who were given sovereign rights, including tallage and coinage, in their principalities. Appeals by their subjects were severely curtailed; conspiracies against them incurred the penalties of treason. Moreover, the efforts of cities to ensure autonomous development were repressed, with serious and long-lasting consequences for the future of the German middle classes. In theory, these privileges were confined to the seven electors; in practice, all the princes quickly adopted them.

golden calf, idol worshipped by the Hebrews during the period of the Exodus from Egypt in the 13th century BC and during the age of Jeroboam I, king of Israel, in the 10th century BC. Mentioned in Exodus 32 and I Kings 12 in the Old Testament, worship of the golden calf is seen as a supreme act of apostasy, the rejection of a faith once confessed. The figure is probably a representation of the Egyptian bull god Apis in the earlier period and of the Canaanite fertility god Baal in the latter.

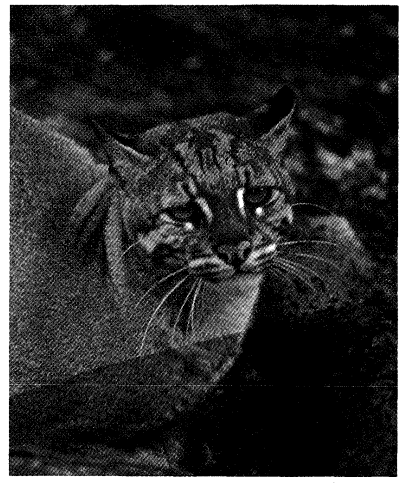
In Exodus 32 the Hebrews escaping Egypt asked Aaron, the brother of their leader Moses, to fashion a golden calf during the long absence of Moses on Mt. Sinai. Upon returning from the mountain with the tablets of the Law and seeing the people worshipping the golden calf, Moses broke the tablets (symbolic of breaking the covenant relationship with God) and had the idol melted down, pulverized, and mixed with water. The people were required to drink the mixture, an ordeal to separate the unfaithful (who later died in a plague) from the faithful (who lived). Defending the faith in the God revealed to Moses against the calf worshippers were the Levites, who became the priestly caste.



"The Adoration of the Golden Calf," oil painting by Nicolas Poussin, 1626; in the M.H. de Young Memorial Museum, San Francisco

By courtesy of the M.H. de Young Memorial Museum, San Francisco, gift of the Samuel H. Kress Foundation

golden cat, either of two cats of the family Felidae: the African golden cat (*Felis aurata*), or the Asian golden cat (*F. temmincki*), also known as Temminck's cat.



Asian golden cat (*Felis temmincki*)

Russ Kinne—Photo Researchers

The African golden cat is a solitary, nocturnal inhabitant of tropical forests. It is 90–100 centimetres (36–40 inches) long, including the 20–25-cm tail, and stands about 40 cm at the shoulder. The coat is either solid reddish brown or grayish brown above, and white with dark spots below.

The Asian golden cat, also a forest dweller, is found in India and Southeast Asia. Its coat is typically an unmarked, deep, reddish brown above and paler below, with white and black markings on the face. Its colour varies, however, and may be brown or grayish; in China the coat is reported to have dark markings. The adult cat measures from 75 to 85 cm long, excluding the 40–48-cm tail. It preys on birds and small mammals and reportedly bears its litters of two or three young in hollow trees or other secluded den sites.

golden chain, any of several small trees of the genus *Laburnum*, of the pea family (Faba-

ceae), especially *L. anagyroides*. This species, which is native to southern Europe, is also cultivated in other regions as an ornamental.

Golden chain (*Laburnum vossii*)
Grant Heilman—EB Inc.

It grows to approximately 6 m (20 feet) tall and begins to branch at a point quite near the ground. The alternate leaves are compound, bearing three leaflets. The yellow flowers, measuring about 2 cm (0.75 inch) across, are borne in drooping clusters 10–30 cm (4–12 inches) long. The fruit of the golden chain is a pod about 5 cm (2 inches) long. The branches, leaves, and pods are somewhat hairy.

golden cup, also called MEXICAN TULIP POPPY (*Hunnemannia fumariifolia*), ornamental perennial plant of the poppy family (Papaveraceae) native to southwestern North America. It has large, four-petaled, sulfur-yellow flowers about 5 to 7.5 cm (2 to 3 inches) wide, with a central puff of orange stamens (male

Golden cup (*Hunnemannia fumariifolia*)
A to Z Botanical Collection—EB Inc.

reproductive structures). Golden cup grows to about 30 to 50 cm (12 to 20 inches) in height. The bluish green leaves have many blunt, narrow segments.

golden eagle (*Aquila chrysaetos*), dark brown eagle of the family Accipitridae, characterized by golden lanceolate nape feathers (hackles), dark eyes, yellow cere, gray beak, fully feathered legs, large yellow feet, and great talons. Its wingspread reaches 2.3 m (almost 8 feet). It is the national bird of Mexico.

In North America the golden eagle ranges from central Mexico along the Pacific coast and through the Rocky Mountains as far north as Alaska and Newfoundland. Small numbers range through the Appalachian Mountains as far south as North Carolina.

Golden eagle (*Aquila chrysaetos*)
©Alan and Sandy Carey

The golden eagle is protected by federal law throughout the United States, but special permits for the shooting of eagles are issued in areas where the birds are believed to kill lambs. In Europe a few breeders persist in Norway, Scotland, Spain, the Alps, Italy, and the Balkans. The species also occurs in northwestern Africa, but it is more common at higher latitudes and eastward—across the Soviet Union and Siberia and from Asia Minor through Iran and Pakistan to southern China and Japan.

Golden eagles nest in cliff caves or in lone trees. There are one to four (usually two) eggs, which vary, within the clutch, from all white to brown blotched. Both parents incubate the eggs, for a total of 40 to 45 days. The young (only one or two usually surviving) fledge in approximately three months.

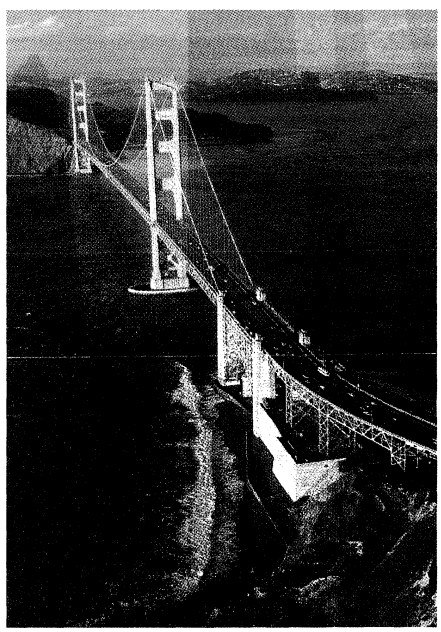
Golden Fleece, The Order of the, French L'ORDRE DE LA TOISON D'OR, German DER ORDEN VOM GOLDENEN VLIES, Spanish LA ORDEN DEL TOISÓN DE ORO, order of knighthood founded in Burgundy in 1430 and associated later especially with Habsburg Austria and with Spain.

The order was founded by Philip III the Good, Duke of Burgundy, at Bruges in Flanders in 1430, to commemorate his wedding there to Isabella of Portugal. Its first chapter was held at Lille in 1431, and in 1432 its seat was fixed at Dijon, capital of the duchy of Burgundy. Dedicated to the Blessed Virgin and to St. Andrew, it was first constituted to have a grand master (the sovereign duke) and 23 knights, but membership was subsequently increased to 31 and eventually to 51. The order, founded to defend the Roman Catholic religion and to uphold the usages of chivalry, was ideally supposed to settle all disputes between its knights, whose actions were to be appraised, commended, or censured at its chapters; and the knights had the right to trial by their fellows on charges of rebellion, treason, or heresy.

Through the marriage of Mary of Burgundy to the Austrian archduke Maximilian (1477), the grand mastership passed to the house of Habsburg. The Holy Roman emperor Charles V (Charles I of Spain), who granted the order exclusive jurisdiction over all crimes that might be committed by its members, left the grand mastership to his son Philip II of Spain, to whose successors it was confirmed by Pope Clement VIII in 1600; but, following the extinction of the Spanish Habsburgs (1700), it was disputed between the Bourbon kings of Spain and the Austrian Habsburgs. The emperor Charles VI instituted the order in Vienna in 1713, and thenceforward both the Austrian and the Spanish sovereigns and pretenders continued to award the Golden Fleece as their principal order of knighthood. It was exclusively reserved to Roman Catholics of the highest nobility.

Golden Gate, strait, in California, western coastal U.S., connecting San Francisco Bay with the Pacific Ocean and separating San Francisco from Marin County. An ancient river mouth, it is about 3 miles (5 km) long, from 1 to 3 miles wide, and 300 feet (90 m) deep and serves as the ocean gateway to the port cities of the bay and the Sacramento–San Joaquin river system. The strait, now spanned by the Golden Gate Bridge, was probably seen by Sir Francis Drake in 1579, but the actual European discovery of it was made in 1769 by a land party led by Francisco de Ortega. In 1775 the *San Carlos,* navigated by Juan Manuel de Ayala, was the first European ship to sail through the strait. The name Golden Gate was given in 1846 by Captain John C. Frémont in analogy to the Golden Horn of the Bosporus (Turkey) when he visualized rich cargoes from the Orient flowing through the strait.

Golden Gate Bridge, suspension bridge spanning the Golden Gate, in California, U.S. From its completion in 1937 to the completion of the Verrazano-Narrows Bridge in New York City in 1964, it had the longest main span in the world, and it remains incomparable in the magnificence of its setting. Its



Golden Gate Bridge, San Francisco
George Hall—Woodfin Camp

construction, under the supervision of Joseph B. Strauss (*q.v.*), involved many difficulties: rapidly running tides, frequent storms and fogs (during one of which a cargo vessel collided with the access trestle, causing serious damage), and the problem of blasting rock under deep water to plant earthquake-proof foundations. The main span, 4,200 feet (1,280 m) long, is suspended from two cables hung from towers 746 feet (227 m) high; at midpoint the roadway is 265 feet (81 m) above mean high water.

Golden Gate Highlands National Park, national park in southeastern Orange Free State, South Africa, near the Lesotho border. Established in 1963, it has an area of 18.5 square miles (48 square km) in the foothills of the Maluti Mountains. Noted for its red and golden cliffs, the park rises from a 6,000-foot (1,800-m) plateau in the north to peaks of 9,000 feet (2,700 m) in the south. Originally inhabited only by mountain reedbuck, Golden Gate Highlands was subsequently stocked with black wildebeest, eland, springbok, and red hartebeest that were transplanted from other parts of Africa. Headquarters are at Bethlehem.

Golden Gloves, amateur boxing competition, initiated by Arch Ward, sports editor of the *Chicago Tribune.* First sponsored by the *Tribune* in 1926, annual tournaments were held between Chicago and New York teams from 1927. The New York organizer was Paul Gallico of the *New York Daily News.* In later years the idea was taken up by other cities, and national tournaments were held. In some years before and after World War II, U.S. Golden Gloves champions met a picked European team. Many Golden Gloves champions went on to become professional world champions, among them Joe Louis, Sugar Ray Robinson, Barney Ross, Floyd Patterson, and Sugar Ray Leonard. Cassius Clay (later Muhammad Ali) won six Golden Gloves titles, the first at the age of 14.

golden hamster (*Mesocricetus auratus*), popular species of hamster (*q.v.*).

Golden Horde, also called KIPCHAK KHANATE, Russian designation for the Ulus Juchi, the western part of the Mongol Empire, which flourished from the mid-13th century to the end of the 14th century. The people of the Golden Horde were a mixture of Turks and Mongols, with the latter generally constituting the aristocracy.

The ill-defined western portion of the empire of Genghis Khan formed the territorial endowment of his oldest son, Juchi. Juchi predeceased his father in 1227, but his son Batu (*q.v.*) expanded their domain in a series of brilliant campaigns that included the sacking and burning of the city of Kiev in 1240. At its peak the Golden Horde's territory included most of European Russia from the Urals to the Carpathian Mountains, extending east deep into Siberia. On the south the Horde's lands bordered on the Black Sea, the Caucasus Mountains, and the Iranian territories of the Mongol dynasty known as the Il-Khans.

Batu founded his capital, Sarai Batu, on the lower stretch of the Volga River. The capital was later moved upstream to Sarai Berke, which at its peak held perhaps 600,000 inhabitants. The Horde was gradually Turkified and Islāmized, especially under their greatest khan, Öz Beg (1313–41). The Turkic tribes concentrated on animal husbandry in the steppes, while their subject peoples, Russians, Mordvinians, Greeks, Georgians, and Armenians, contributed tribute. The Russian princes, particularly those of Muscovy, soon obtained responsibility for collecting the Russian tribute. The Horde carried on an extensive trade with Mediterranean peoples, particularly their allies in Mamlūk Egypt and the Genoese.

The Black Death, which struck in 1346–47, and the murder of Öz Beg's successor marked the beginning of the Golden Horde's decline and disintegration. The Russian princes won a signal victory over the Horde general Mamay at the Battle of Kulikovo Pole (*q.v.*) in 1380. Mamay's successor and rival, Tokhtamysh, sacked and burned Moscow in retaliation in 1382 and reestablished the Horde's dominion over the Russians. Tokhtamysh had his own power broken, however, by his former ally Timur, who invaded the Horde's territory in 1395, destroyed Sarai Berke, and deported most of the region's skilled craftsmen to Central Asia, thus depriving the Horde of its technological edge over resurgent Muscovy.

In the 15th century the Horde disintegrated into several smaller khanates, the most important being those of the Crimea, Astrakhan, and Kazan. The last surviving remnant of the Golden Horde was destroyed by the Crimean Khan in 1502.

Golden House of Nero, Latin DOMUS AUREA, palace in ancient Rome that was constructed by the emperor Nero between AD 65 and 68, after the great fire (an occasion the Emperor used to expropriate an area of more than 200 acres [81 hectares] of land in the centre of the city). Nero had already planned and begun a palace, the Domus Transitoria, that was to link the existing buildings on the Palatine Hill with the Gardens of Maecenas and other imperial properties on the Esquiline and adjoining hills. To these he now added a large part of the Caelian and Oppian hills and the valley between them and the Palatine. This whole area was laid out as a park with porticoes, pavilions, baths, and fountains, and in the centre an artificial lake was made that under the emperor Vespasian was drained to provide a site for the Colosseum. On the slopes of the Velia at the east end of the Forum a grandiose colonnaded approach and vestibule were constructed, within which stood a colossal gilded bronze statue of Nero. The domestic wing of the palace stood on the slopes of the Oppian Hill facing south across the lake.

Little has survived of the palace. Because the expropriations involved in its building were deeply resented, Nero's successors hastened to put large parts of the palace to public use or to construct other buildings on the land. Of the sumptuous wall paintings and stucco decorations described by Pliny, all that was visible by the 16th century to inspire the grotesques of Raphael and his followers were the wall paintings in the *grotte*, or caverns, of the palace.

The Golden House is historically important because it expressed the aesthetic of monumental architecture that was to characterize the imperial style of Roman architecture under Domitian, Trajan, and Hadrian. A most informative study of the palace is *The Golden House of Nero; Some Aspects of Roman Architecture* (1960), by Axel Boethius.

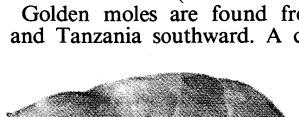
golden larch (*Pseudolarix amabilis*), coniferous tree of the family Pinaceae, native to China. A golden larch resembles a tree of the true larch genus (*Larix*) but has small cones that fall apart when mature and club-shaped, short branchlets, or shoots, that are longer than those of *Larix* species. It has reddish-brown, fissured bark and may grow to 30 to 40 metres (about 100 to 130 feet) tall and 1.5 to 2.4 m (5 to 8 ft) in diameter. The needlelike leaves are bright green in summer but turn golden in autumn before they fall. They are grouped in spirals on the long shoots and arranged in star-shaped clusters on the spurlike shoots.

Articles are alphabetized word by word, not letter by letter

Golden Lotus, title of an English translation of the classic Chinese novel *Chin p'ing mei* (*q.v.*).

golden mole, any of the 11 species of African mammals composing the family Chrysochloridae, order Insectivora. Like true moles (Talpidae), they are blind, stout-bodied, virtually tailless burrowers. They have four toes on each forefoot, two of which bear large, pointed claws, like picks. The fur is commonly iridescently golden or greenish. Size ranges from 7 to 23 centimetres (3 to 9 inches) in length.

Golden moles are found from Cameroon and Tanzania southward. A common small



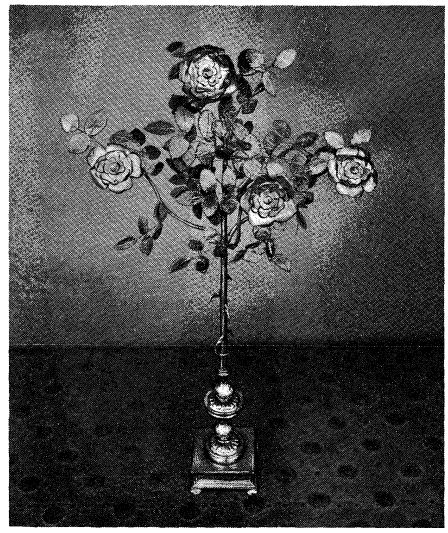
Golden mole (*Chrysochloris stuhlmanni*)
Painting by Don Meighan

form in South Africa is the Cape golden mole (*Chrysochloris asiaticus*); a large example is the giant forest mole (*Chrysospalax villosus*).

For analogues in Australia, *see* marsupial mole.

golden number, in chronology, the position of a solar, or calendar, year within the 19-year Metonic cycle (*q.v.*) after which the phases of the Moon recur on the same dates. The sequence of golden numbers, used in fixing the date of Easter, begins at one at each year in which the New Moon occurs on January 1 (*e.g.,* 1976).

golden rose, ornament of wrought gold set with gems, generally sapphires, that is blessed



Golden rose given to the city of Siena by Pope Pius II, made by Simone di Firenze, 1458; in the Palazzo Pubblico, Siena, Italy
By courtesy of the Museo Civico, Siena, Italy

by the pope on the fourth Sunday in Lent (Laetare Sunday) and sent, as one of the highest honours he can confer, to some distinguished individual, ecclesiastical body, or religious community or, failing a worthy recipient, kept in the Vatican. Many of these historical examples of the goldsmith's art, being of great value, have been melted down. The origin of the custom is obscure, the first reliable accounts dating from the 11th century. Of more symbolic than material significance, the rose was usually sent, like the papal cap and sword, for political as well as religious reasons, together with an explanatory letter.

Golden Rule, precept in the Gospel of Matthew (7:12): "In everything, do to others what you would have them do to you. . . ." This rule of conduct is a summary of the Christian's duty to his neighbour and states a fundamental ethical principle. In its negative form, "Do not do to others what you would not like done to yourselves," it occurs in the 2nd-century documents *Didachē* and the *Apology of Aristides* and may well have formed part of an early catechism. It recalls the command to "love the stranger (sojourner)" as found in Deuteronomy. It is not, however, peculiar to Christianity. Its negative form is to be found in Tob. 4:15, in the writings of the two great Jewish scholars Hillel (1st century BC) and Philo of Alexandria (1st centuries BC and AD), and in the *Analects* of Confucius (6th and 5th centuries BC). It also appears in one form or another in the writings of Plato, Aristotle, Isocrates, and Seneca.

golden silk spider: *see* silk spider.

Golden Spike National Historic Site, national historic site at Promontory in Box Elder County, northern Utah, U.S., near the Great Salt Lake, commemorating the completion in 6½ years of the first transcontinental railroad (1,800 mi [2,900 km] of hand-built track) in

the country. A pyramidal monument marks the spot where the golden (last) spike was driven on May 10, 1869, linking the Central Pacific and Union Pacific railroads. Replicas of the Central Pacific's "Jupiter" and the Union Pacific's "No. 119," the two engines used during the final stages, are on display. A reenactment of the original ceremony takes place several times daily during the summer months. In 1942 the rails were taken up for war scrap and the golden spike drawn from where it had been driven 73 years before; the old railroad bed remains. The area (2,203 ac [892 ha]) was designated a national historic site in 1957.

Golden Spurs, Battle of the, also called BATTLE OF COURTRAI, or BATTLE OF KORTRIJK (July 11, 1302), military engagement on the outskirts of Kortrijk in Flanders in which an untrained Flemish infantry militia, consisting mainly of members of the craft guilds (notably that of the weavers) defeated a professional force of French and patrician Flemish cavalry, thus checking the growth of French control over the area. It is so named for the spurs supposedly taken from the vanquished. The ill-armed militia prevailed over the mounted force by making its stand on a patch of ground surrounded by streams and moats, thus frustrating any attempt at a rapid cavalry charge; the marshy terrain also impeded other efforts of the horsemen. This victory led to a generation of political ascendancy of the weavers' guild in the urban centres and ended the threat of French annexation. It was not, however, sufficient to break French influence in Flanders or to end the economic domination of the patrician class over the towns.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

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golden tuft alyssum (plant): *see* basket-of-gold.

golden whistler, songbird, a species of thickhead (*q.v.*).

goldeneye, also called WHISTLER, either of two species of small, yellow-eyed diving ducks (family Anatidae), which produce a characteristic whistling sound with their rapidly beating wings. The common goldeneye (*Bucephala clangula*) breeds throughout the Northern Hemisphere; the major breeding area of Barrow's goldeneye (*B. islandica*) is in northwestern North America. Both winter mainly in northern coastal waters. Although prized as game birds because of their wariness, they are not highly desired for the table. Both species are about 46 centimetres (18 inches) long and have black backs marked with white and white sides and breasts. The black wing markings of the two species differ considerably. The head of the common goldeneye is dark green, that of Barrow's goldeneye purplish black. Both have conspicuous white patches in front of the eyes. They nest in tree cavities and prefer a diet of aquatic invertebrates.

Goldenfoden, Abraham: *see* Goldfaden, Abraham.

goldenrain tree, also called PRIDE-OF-INDIA, CHINA TREE, or VARNISH TREE (*Koelreuteria paniculata*), flowering tree, of the soapberry family (Sapindaceae), native to East Asia and widely cultivated in temperate regions for its handsome foliage and curious bladderlike seedpods.

The dome-shaped tree grows to about 9 metres (30 feet) tall. The yellow, four-petalled flowers grow in a showy terminal cluster. The

Goldenrain tree (*Koelreuteria paniculata*) leaves, flowers, and fruit
Miles C. Labrum

papery, greenish fruit pods, which appear soon after the flowers, contain black seeds.

goldenrod, any of about 100 species of weedy, usually perennial herbs that comprise the genus *Solidago* of the family Asteraceae, most of which are native to North America, though a few species grow in Europe and Asia. They have toothed leaves that usually alternate along the stem and yellow flower heads composed of both disk and ray flowers. The many small heads may be crowded together in one-sided clusters, or groups of heads may be borne on short branches to form a cluster at the top of the stem.

Some species are clump plants with many stems; others have only one stem and few branches. Canadian goldenrod (*S. canadensis*) has hairy, toothed, lance-shaped leaves and hairy stems; it is sometimes cultivated as a garden ornamental. *Solidago virgaurea* of Eu-

Early goldenrod (*Solidago juncea*)
Peter L. Ames—EB Inc.

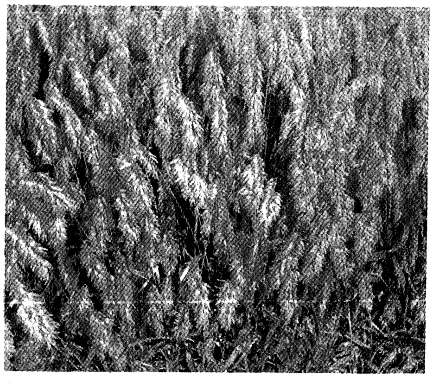
rope, also grown as a garden plant, is the source of a yellow dye and was once used in medicines.

goldenseal, also called ORANGEROOT, or YELLOW PUCCOON (*Hydrastis canadensis*), perennial herb native to eastern U.S. woods with rootstocks having medicinal properties. The plant has a single greenish flower, the sepals of which fall as they open, followed by a cluster of small red berries. It is sometimes planted in the shady wild garden but is also grown commercially for the yellow rootstocks, which yield hydrastine, an alkaloid.

Goldenseal (*Hydrastis canadensis*)
Kitty Kohout from Root Resources—EB Inc.

This and a related Japanese species constitute the family Hydrastidae; some authorities list them in the buttercup family (Ranunculaceae).

goldentop (*Lamarckia aurea*), ornamental annual grass of the family Poaceae, native to the Mediterranean region and cultivated in gardens for its golden, tufted flower clusters.



Goldentop (*Lamarckia aurea*)
Arthur O. Tucker

It grows as a weed in cultivated and disturbed areas of Europe and North America.

Goldenweiser, Alexander (Alexandrovich) (b. Jan. 29 [Jan. 17, old style], 1880, Kiev—d. July 6, 1940, Portland, Ore., U.S.), U.S. anthropologist whose analyses of cultural questions ranged widely, encompassing intellectual movements in psychology and psychoanalysis. In particular, he suggested that cultural diffusion is not a mechanical process but, rather, depends in part on the receptiveness of cultures to proffered traits.

Goldenweiser studied under anthropologist Franz Boas at Columbia University, where he took a Ph.D. in 1910 and then taught until 1919. A brilliant lecturer, he held subsequent posts at the New School for Social Research, New York City; the University of Oregon, Eugene; and Reed College, Portland. Though he did field work among the Iroquois Indians of

North America, he addressed himself mainly to theoretical considerations. Convinced that totemism is founded on a symbolic mystical relationship, he stressed psychological factors common to different tribal cultures but concluded that there is no single, distinct class of totemic practices. He regarded the conceptual worlds of nonliterate peoples as not fundamentally different from the world of modern man and was interested in theoretical and applied primitive science. One of the first U.S. textbooks in anthropology was his *Early Civilization* (1922; rev. ed. *Anthropology,* 1937). He also wrote *History, Psychology, and Culture* (1933).

goldeye, North American freshwater fish, a species of mooneye (*q.v.*).

Goldfaden, Abraham, original name ABRAHAM GOLDENFODEN (b. July 24 [July 12, old style], 1840, Starokonstantinov, Russia—d. Jan. 9, 1908, New York City), Hebrew and Yiddish poet and playwright and originator of Yiddish theatre and opera.

Goldfaden published volumes of Hebrew and Yiddish poems before his graduation from a rabbinical seminary at Zhitomir in 1866. He then taught in Russia until migrating in 1875 to Poland, where he founded two Yiddish newspapers. After several failures in journalism he moved to Romania, where he organized at Iaşi, in 1876, what is generally recognized as the first Yiddish theatre. He toured Romania and Russia, and, in 1883, when Yiddish plays were prohibited in Russia, he established his theatre in Warsaw. In 1887 he migrated to New York City, where he established the first illustrated Yiddish periodical, but his work in the established Yiddish theatre encountered strong opposition, and he returned to London two years later. He reorganized the Yiddish theatre that had been founded there the previous year but again encountered hostility from the actors. In 1903 he finally settled in New York, where he opened a dramatic school. Since many of his dramatic works are set to his own music, he is also considered to be the founder of Yiddish opera. Among his nearly 400 plays are *David at War* (the first Hebrew play produced in the U.S.; first performed, 1904), *Shulamit* (considered his masterwork, 1880), and *Bar Kochba* (1882).

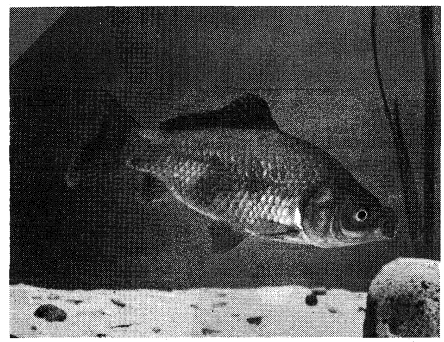
Goldfield, mining ghost town, seat (1907) of Esmeralda County, southwestern Nevada, U.S., in desert country south of Tonopah. It was the site of a gold rush that began in 1902; the mining boom lasted until 1918. In 1910 the production of ore reached an all-time high, valued at more than $11,000,000. Federal troops were stationed in the town during a bitter labour struggle (1907–08) between the miners and the operators. After 1918 Goldfield's population declined rapidly from an estimated 40,000 in 1910 to less than 200. The 200-room Goldfield Hotel was closed except for a brief period during World War II when it accommodated servicemen at an air force station located a few miles north. To the southeast is the vast Nellis Air Force Range and Nuclear Testing Site. Tourism keeps the few people still living in Goldfield in business. Pop. (1970) about 300.

goldfinch, any of several species of the genus *Carduelis* (some formerly in *Spinus*) of the songbird family Carduelidae (sometimes placed in the Ploceidae); they have short, notched tails and much yellow in the plumage. All have rather delicate sharp-pointed bills for finches. Flocks of goldfinches feed on weeds in fields and gardens. They have high, lisping calls, often given in flight. The 14-centimetre (5½-inch) European goldfinch (*C. carduelis*) of western Eurasia has been introduced into Australia, New Zealand, and Bermuda and the United States (where it has not become established). It is brownish and black, with a

Goldfinch (*Carduelis tristis*)
Karl H. Maslowski

red–white–black head pattern and gold in the wings (sexes alike). The 13-cm (5-in.) American goldfinch (*C. tristis*), also called wild canary, is found across North America; the male is bright yellow, with black cap, wings, and tail. The 10-cm (4-in.) dark-backed goldfinch (*C. psaltria*) ranges from the western U.S. (where it is called lesser goldfinch) to Peru.

goldfish (*Carassius auratus*), ornamental aquarium and pond fish of the carp family (Cyprinidae) native to East Asia but introduced into many other areas. The goldfish resembles the carp (*Cyprinus carpio*) but differs from its relative in having no mouth barbels. It was domesticated by the Chinese at least as early as the Sung dynasty (960–1279).



Goldfish (*Carassius auratus*)
W.S. Pitt—Eric Hosking

The goldfish is naturally greenish-brown or gray. The species, however, is variable, and numerous abnormalities occur. A deviant fish may be black, spotted, golden, white, or white with silver; it may have a trilobed tail fin or protruding eyes; or it may lack the normally long dorsal fin. Centuries of selecting out and breeding such abnormal specimens have produced over 125 breeds of goldfish, including the common, pet-shop comet; the veiltail, with a three-lobed, flowing tail; the lionhead, with a swollen "hood" on the head; and the celestial, with protruding, upward-directed eyes.

The goldfish is omnivorous, feeding on plants and small animals. In captivity it does well on small crustaceans, and the diet may be supplemented with chopped mosquito larvae, cereal, and other foods.

Spawning occurs in spring or summer. As the season approaches, colours become brighter, the belly of the female enlarges, and the male may develop pinhead-sized tubercles on the gill covers, back, and pectoral fins. The eggs stick to water plants until hatching about a week later. Pet goldfish have been known to live 25 years; the average life span, however, is much shorter.

Escaping from park and garden pools, the goldfish has become naturalized in many areas of the eastern United States. Upon resuming wild life, it reverts to its original colour and may grow from an aquarium size of about 5–10 centimetres (2–4 inches) to a length of up to 30 centimetres.

Goldhaber, Maurice (b. April 18, 1911, Lemberg, Austria-Hungary), U.S. physicist whose contributions to nuclear physics include the discovery that the nucleus of the deuterium atom consists of a proton and a neutron.

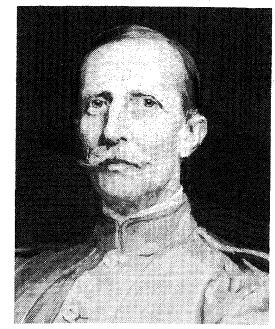
While studying at Cambridge University, Goldhaber, in collaboration with James Chadwick, discovered (1934) the nuclear photoelectric effect (the disintegration of a nucleus by high-energy X-rays or gamma rays). This discovery later provided evidence that the neutron is heavier than the proton. While studying slow neutrons, they discovered the neutron-induced disintegrations of the nuclei of lithium, boron, and nitrogen. Goldhaber also showed the usefulness of photographic emulsions in recording the tracks of particles formed in nuclear reactions. The slow-neutron scattering studies he made in 1937 were essential to the development of the first nuclear reactors.

In 1938 Goldhaber joined the staff of the University of Illinois, Urbana, where, with his wife, Gertrude Scharff Goldhaber (also a physicist), he demonstrated that electrons and beta rays are the same. In 1940 he discovered that beryllium is a good moderator (a material that slows down fast neutrons so they more readily split uranium atoms), and it has since been widely used in nuclear reactors.

In 1950 Goldhaber went to Brookhaven National Laboratory, Upton, N.Y., where, seven years later, with the U.S. physicist L. Grodzins, he discovered that the neutrino has a left-handed spin. He became director of Brookhaven in 1961, retiring in 1973.

Goldie, Sir George (Dashwood Taubman), original name GEORGE DASHWOOD GOLDIE-TAUBMAN (b. May 20, 1846, near Douglas, Isle of Man—d. Aug. 20, 1925, London), British colonial administrator, organizer of a chartered company (1886) that established British rule on the Niger River, who was chiefly responsible for the development of northern Nigeria into an orderly and prosperous British protectorate and later a major region of independent Nigeria. Although his importance in West Africa may have equalled that of Cecil John Rhodes in South Africa, he differed from Rhodes in his preference for obscurity; he destroyed his papers and pronounced a curse on any of his children should they write about him after his death.

Educated at the Royal Military Academy, Woolwich, Goldie served briefly (1865–67) in



Goldie, detail of an oil painting by H. Von Herkomer, 1899; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

the Royal Engineers. After travelling for several years in Egypt and the Sudan, he formed the Central African Trading Company in 1876

and first visited West Africa the following year. He soon conceived the idea of combining the competitive British trading firms on the Niger River to form a single chartered company, which then would govern the area for the crown. In 1879 he succeeded in amalgamating all British commercial interests on the Niger into the United African Company, but his application for a royal charter was refused in 1881 on the ground that British influence was not paramount in the Niger region. After the company had bought out its French competitors, however, Great Britain successfully claimed at the Berlin West Africa Conference (1884–85) that its commercial predominance on the lower Niger justified British rather than international political control. In 1886 Goldie's firm was chartered as the Royal Niger Company. He became governor of the company in 1895. (He was knighted in 1887.)

By force and persuasion Goldie established control over the peoples of the hinterland of the Niger and Benue rivers, and, in negotiations with the French and German governments, he settled the boundaries of the British sphere of influence. When it appeared, however, that a private company was necessarily at a disadvantage in dealing with international questions, the Royal Niger Company's charter was revoked, the British government taking direct control of the company's possessions on Jan. 1, 1900. This territory and the adjacent Niger Coast Protectorate were reorganized as the two protectorates of Northern and Southern Nigeria.

About this time Goldie lost interest in West Africa and became fascinated with China as a theatre of British imperialism. His visit to that country in 1900 was disrupted by the Boxer Rebellion, however, and he returned to England. In 1902–03 and 1905–06 he served on royal commissions established consequent to the South African War (1899–1902). From 1908 to 1919 he was an alderman of the London County Council and chairman of its finance committee.

BIBLIOGRAPHY. Biographies include Dorothy Wellesley, *Sir George Goldie, Founder of Nigeria* (1934, reprinted 1977); and John E. Flint, *Sir George Goldie and the Making of Nigeria* (1960), which pays special attention to the concept of the chartered company in imperialism.

Golding, Louis (b. Nov. 19, 1895, Manchester, Eng.—d. Aug. 9, 1958, London), English novelist and essayist, an interpreter of British Jewish life.

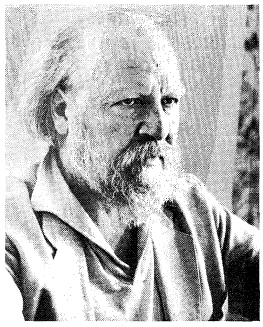
The son of poor Jewish parents who had emigrated to Britain from Russia, Golding attended Manchester Grammar School and Queen's College, Oxford. He began to write while at the university, publishing his first novel, *Forward from Babylon,* in 1920. In World War I he fought in the Salonika campaign and after leaving Oxford traveled widely in the Mediterranean and the Middle East.

Golding produced at least a book a year. The best known was *Magnolia Street* (1932), a story of working-class life among Jews and Gentiles in a Manchester back street. In 1934 it was produced as a play. His book *The Jewish Problem* (1938) was a study of anti-Semitism. A broadcaster and lecturer, he also wrote film scripts, verse, short stories, and books on boxing.

Louis Golding
Elizabeth Ivimey—Camera Press

Golding, Sir William (Gerald) (b. Sept. 19, 1911, St. Columb Minor, near Newquay, Cornwall, Eng.), English novelist who in 1983 won the Nobel Prize for Literature for his parables of the human condition. He attracted a cult of followers, especially among the youth of the post-World War II generation.

Educated at Marlborough Grammar School and at Brasenose College, Oxford, Golding graduated in 1935 and became a master at Bishop Wordsworth's School, Salisbury. He joined the Royal Navy in 1940, took part in the action that saw the sinking of the German battleship *Bismarck,* and commanded a rocket-launching craft during the invasion of France in 1944. After the war he returned to teaching and remained a teacher until 1960.



William Golding
Mark Gerson

Golding's first published novel was *Lord of the Flies* (1954; film 1963 and 1990), the story of a group of schoolboys isolated on a coral island who revert to savagery. Its imaginative and brutal depiction of the rapid and inevitable dissolution of social mores aroused widespread interest. *The Inheritors* (1955), set in the last days of Neanderthal man, is another story of the essential violence and depravity of human nature. The guilt-filled reflections of a naval officer, his ship torpedoed, who faces an agonizing death are the subject of *Pincher Martin* (1956). Two other novels, *Free Fall* (1959) and *The Spire* (1964), also demonstrate Golding's belief that "man produces evil as a bee produces honey." *Darkness Visible* (1979) tells the story of a boy horribly burned in the London blitz during World War II. His later works include *Rites of Passage* (1980), which won the Booker McConnell Prize; *A Moving Target* (1982; essays); and *The Paper Men* (1983). Golding was knighted in 1988.

Goldman, Emma (b. June 27, 1869, Kaunas, Lithuania, Russian Empire [now in Lithuanian S.S.R.]—d. May 14, 1940, Toronto, Ont., Can.), international anarchist who conducted leftist activities in the United States from about 1890 to 1917.

The daughter of a government theatre manager, she spent her early life in Königsberg, the capital of Prussia, and St. Petersburg, the capital of Russia. She emigrated to the United States in 1885 and worked in a clothing factory in Rochester, N.Y., where she attended meetings of German socialists. Later she worked in New Haven, Conn., where she met a group of Russian anarchists.

By 1889 Goldman had espoused anarchism and had moved to New York City, where she became associated with the Russian anarchist Alexander Berkman. In 1892 he was sentenced to a 22-year prison term for his attempted assassination of the industrialist Henry Clay Frick during the Homestead steel strike in Pittsburgh, Pa. Goldman continued her activities as an anarchist lecturer despite one year in prison for inciting a riot in New York City in 1893. After Berkman's early release in 1906 she resumed her association with him. They carried on anarchist activities, publishing the anarchist magazine *Mother Earth,* until 1917, when they were arrested for obstructing the military draft and served two years in prison. They were deported to Russia in 1919. Although Goldman had previously favoured the Soviet government, her stay in Russia disillusioned her. She left Russia in 1921 and went to England and later to Canada and Spain (during the Spanish Civil War). She wrote *My Disillusionment in Russia* (1923) and her autobiography, *Living My Life* (1931), as well as many other publications on anarchism, feminism, and birth control.

Emma Goldman
By courtesy of the State Historical Society of Wisconsin

Goldmann, Max (theatre director): *see* Reinhardt, Max.

Goldmark, Josephine Clara (b. Oct. 13, 1877, Brooklyn, N.Y., U.S.—d. Dec. 15, 1950, White Plains, N.Y.), American reformer whose research contributed to the enactment of labour legislation.

Goldmark graduated from Bryn Mawr College in 1898. In 1903 she began working with the National Consumer's League. As research director there, she compiled the social, economic, and medical data used in many of the legal briefs supporting protective legislation for women. She is especially known for her work on the noted Brandeis briefs of her brother-in-law, the Supreme Court justice Louis Brandeis, which were used in landmark rulings upholding laws restricting the hours of work and night work for women.

Goldmark's research was published in several influential studies, including *Child Labor Legislation Handbook* (1907), *Fatigue and Efficiency* (1912), and an exhaustive study published in *Nursing and Nursing Education in the United States* (1923), which spurred the growth of nursing schools in the United States.

Goldmark, Karl (b. May 18, 1830, Keszthely, Hung.—d. Jan. 2, 1915, Vienna, Austria), Austro-Hungarian composer whose opera *Die Königin von Saba* ("The Queen of Sheba") was highly popular in the late 19th century.

The son of a poor Jewish cantor, Goldmark studied violin in Vienna under G. Böhm and theory under G. Preyer; in composition he was self-taught. He produced his most successful works, the overture *Sakuntala* in 1860 and the opera *Die Königin von Saba,* in 1875, and he became known as a piano teacher and critic. Among his other works are five operas, notably *Das Heimchen am Herd* (1896; "The Cricket on the Hearth," after Charles Dickens); two violin concerti; two symphonies; and chamber works.

Goldmark, Peter Carl (b. Dec. 2, 1906, Budapest, Hung.—d. Dec. 7, 1977, Westchester county, N.Y., U.S.), American engineer (naturalized 1937) who developed the first commercial colour-television system and

the 33⅓ revolutions-per-minute (rpm) long-playing (LP) phonograph record, which revolutionized the recording industry.

Goldmark joined the Columbia Broadcasting System (CBS) Laboratories in 1936. There he began work on a colour-television system that was first demonstrated in 1940. Based on the use of a rotating, three-colour disk, his field-sequential system was improved after World War II and approved for commercial use by the Federal Communications Commission in 1950. Although soon replaced by all-electronic colour systems that were compatible with black-and-white transmission, his system has found wide application in closed-circuit television for industry, medical institutions, and schools because his colour camera is much smaller, lighter, and easier to maintain and operate than cameras used in commercial television.

In 1948 Goldmark and his team at CBS Laboratories introduced the LP record. Utilizing a groove width of only 0.003 inch (0.076 millimetre), as compared with 0.01 inch for the old 78-rpm records, the equivalent of six 78-rpm records could be compressed into one 33⅓ LP.

After Goldmark became a vice president of CBS in 1950, he developed the scanning system that allowed the U.S. Lunar Orbiter spacecraft (launched in 1966) to relay photographs 238,000 miles (380,000 kilometres) from the Moon to the Earth.

Goldmark also developed an electronic video recording system, utilizing unperforated plastic film to record the picture in monochrome and to carry the colour information in coded form. In cartridges, the film could be played through any standard television receiver in either colour or black and white.

Goldoni, Carlo (b. Feb. 25, 1707, Venice—d. Feb. 6, 1793, Paris), prolific dramatist who renovated the well-established Italian commedia dell'arte dramatic form by replacing its masked stock figures with more realistic characters, its loosely structured and often repetitive action with tightly constructed plots, and its predictable farce with a new spirit of gaiety and spontaneity. For these innovations Goldoni is considered the founder of Italian realistic comedy.

Goldoni, oil painting by Alessandro Longhi; in the Casa di Goldoni (Museo Teatrale e Istituto di Studi Teatrali), Venice

By courtesy of the Civico Museo Correr, Venice

The precocious son of a physician, Goldoni read comedies from his father's library when young and ran away from school at Rimini in 1721 with a company of strolling players. Back in school at the papal college in Pavia, Goldoni read comedies by Plautus, Terence, and Aristophanes. Later he studied French in order to read Molière.

For writing a satire on the ladies of the town, Goldoni was expelled from the Ghislieri College in Pavia, and he reluctantly began law studies at the University of Pavia. Although he practiced law in Venice (1731–33) and Pisa (1744–48) and held diplomatic appointments, his real interest was the dramatic works he wrote for the Teatro San Samuele in Venice.

In 1748 Goldoni agreed to write for the Teatro Sant'Angelo company of the Venetian actor-manager Girolamo Medebac. Although Goldoni's early plays veer between the old style and the new, he dispensed with masked characters altogether in such plays as *La Pamela* (performed 1750; Eng. trans., *Pamela, a Comedy,* 1756), a serious drama based on Samuel Richardson's novel.

During the 1750–51 season Goldoni promised defecting patrons 16 new comedies and produced some of his best, notably *I pettegolezzi delle donne* ("Women's Gossip"), a play in Venetian dialect; *Il bugiardo* (*The Liar,* 1922), written in commedia dell'arte style; and *Il vero amico* ("The True Friend"), an Italian comedy of manners.

From 1753 to 1762 Goldoni wrote for the Teatro San Luca (now Teatro Goldoni). There he increasingly left commedia dell'arte behind him. Important plays from this period are the Italian comedy of manners *La locandiera* (performed 1753; Eng. trans., *Mine Hostess,* 1928) and two fine plays in Venetian dialect, *I rusteghi* (performed 1760; "The Tyrants") and *Le baruffe chiozzote* (performed 1762; "Quarrels at Chioggia").

Already engaged in rivalry with the playwright Pietro Chiari, whom he satirized in *Il malcontenti* (performed 1755; "The Malcontent"), Goldoni was assailed by Carlo Gozzi, an adherent of the commedia dell'arte, who denounced Goldoni in a satirical poem (1757), then ridiculed both Goldoni and Chiari in a commedia dell'arte classic, *L'amore delle tre melarance* (performed 1761; "The Love of the Three Oranges").

In 1762 Goldoni left Venice for Paris to direct the Comédie-Italienne. Subsequently, he rewrote all of his French plays for Venetian audiences; his French *L'Éventail* (performed 1763) became in Italian one of his finest plays, *Il ventaglio* (performed 1764; *The Fan,* 1907).

Goldoni retired in 1764 to teach Italian to the princesses at Versailles. In 1783 he began his celebrated *Mémoires* in French (1787; Eng. trans., 1814, 1926). After the French Revolution his pension was cancelled, and he died in dire poverty.

Goldsboro, city, seat of Wayne County, east central North Carolina, U.S., near the Neuse River. Settled in 1838, it was named for Matthew T. Goldsborough of the Wilmington and Weldon Railroad and developed as a trade-shipping centre for farm produce. After the Battle at Bentonville (18 mi [29 km] west), one of the last major engagements of the Civil War, Federal armies under generals William Sherman and John Schofield united at Goldsboro before the final advance to Durham. The city is now a tobacco market, with some light manufactures, notably textiles and furniture. Mental health facilities, including Cherry Hospital and O'Berry School for retarded children, serve the eastern third of the state. Odd Fellows Orphans' Home, Wayne Community College (1957), and Seymour-Johnson Air Force Base are also in Goldsboro. Inc. 1847. Pop. (1980) 31,871.

Goldschmidt, Hans, byname of JOHANN WILHELM GOLDSCHMIDT (b. Jan 18, 1861, Berlin—d. May 25, 1923, Baden-Baden, Ger.), German chemist who invented the alumino-thermic process (1905). Sometimes called the Goldschmidt reduction process, this operation involves reactions of oxides of certain metals with aluminum to yield aluminum oxide and the free metal. The process has been employed to produce such metals as chromium, manganese, and cobalt from oxide ores. It is also used for welding; in this case, iron oxides react with aluminum to produce intense heat and molten iron. Besides this invention, Goldschmidt developed, in collaboration with Alfred Stock, a commercial process for beryllium production about 1918.

Goldschmidt, Meïr Aron (b. Oct. 26, 1819, Vordingborg, Den.—d. Aug. 15, 1887, Copenhagen), Danish writer of Jewish descent whose work foreshadowed later Realism. He went to school in Copenhagen and planned to study medicine but became a journalist instead. In 1840 he founded *Corsaren,* a satirical weekly expressing his radical ideas. His own witty, and often politically ambiguous, contributions made the publication influential. A feud with the philosopher Søren Kierkegaard caused him to give up the paper and go abroad in 1846. His first novel, *En Jøde* (1845; *The Jew of Denmark,* 1852), described the gulf between the Jew and Danish society. Returning in 1847, Goldschmidt abandoned radicalism and founded a new periodical, *Nord og Syd,* in which his novel *Hjemløs* (which he himself translated as *Homeless,* 3 vol., 1861) was serialized (1853–57). He visited England several times and thought of settling there but decided to remain a Danish writer. In the 1860s he was regarded as Denmark's most important novelist, but his influence later declined in the face of the new radical movement led by Georg Brandes.

Meïr Aron Goldschmidt

By courtesy of the Royal Danish Ministry for Foreign Affairs, Copenhagen

Goldschmidt's finest descriptions of Jewish life are to be found in his short stories, notably in *Fortællinger* (1846; "Tales"). In *Ravnen* (1867), one of the outstanding Danish novels of the 19th century, he depicts Jews with an unusual blend of sympathy and irony. Goldschmidt is an exquisite stylist, especially in his short stories. His philosophy of retributive justice, or nemesis, underlies most of his novels, and also his memoirs, *Livserindringer og Resultater* (1877).

Goldschmidt, Richard B(enedict) (b. April 12, 1878, Frankfurt am Main—d. April 24, 1958, Berkeley, Calif., U.S.), German-born U.S. zoologist and geneticist, formulator of the theory that chromosome molecules are the more decisive factors in inheritance (rather than the qualities of the individual genes). His experimental work in genetics led to the discovery of genetics as the cause of geographical variation among animals.

Goldschmidt interbred various geographical races of the gypsy moth *Lymantria dispar.* The moths that resulted from this cross showed that characters distinguishing local varieties were transmitted to the offspring and, therefore, could be explained in terms of Mendelian laws as being determined by genes. This was the first genetic explanation of geographic variety.

In crosses between certain strains of *Lymantria,* Goldschmidt discovered the occurrence of what he called intersexuality, in which

some individuals experienced intermingling of male and female characteristics. From this, he developed his so-called time law of intersexuality, which stated that an intersex is an individual that begins development under the influence of one of the two sex factors but ends its development, after a turning point, with the opposite sex.

Later, Goldschmidt studied phenocopies of fruit flies. Phenocopy was a term he used to designate changes in the outward appearance of an organism caused by temperature shocks and other drastic changes in environmental factors. Goldschmidt was able to produce nonhereditary copies of almost all known mutations. This proved that genes were not the sole determiners of phenotypic character.

Goldschmidt suggested other genetic theories, including one stating that genes control enzymatic activity. Many of his theories were rejected by other scientists, but these theories were still instrumental in causing a major reevaluation of the concepts governing the science of genetics.

Goldschmidt, Victor Mordechai (b. Feb. 10, 1853, Mainz, Hesse—d. May 8, 1933, Salzburg, Austria), German mineralogist who made important studies of crystallography. His first major publication, *Index der Kristallformen* (3 vol., 1886–91; "Index of Crystal Forms"), was a catalog of the known forms of crystals of all minerals. New tables of crystal angles to meet his new needs were devised and published as *Krystallographische Winkeltabellen* (1897; "Crystallographic Table of Angles"). The compilation of all published figures of mineral crystals appeared in *Atlas der Kristallformen* (9 vol., 1912–23; "Atlas of Crystal Forms"). From his interest in the number series appearing in crystal symbols, he developed a philosophic theory of number and harmony, which led to an analysis of musical harmony, colour, and the development of the colour sense in man and, finally, of the spacing of the planets about the Sun.

Goldschmidt, Victor Moritz (b. Jan. 27, 1888, Zürich—d. March 20, 1947, Oslo), Swiss-born Norwegian mineralogist and petrologist who laid the foundation of inorganic crystal chemistry and founded modern geochemistry.

Having moved with his family to Kristiania (now Oslo) in 1900, Goldschmidt became a pupil of the noted Norwegian geologist Waldemar C. Brøgger at the University of Kristiania, where he was appointed professor and director of the Mineralogical Institute in 1914.

Victor Moritz Goldschmidt
By courtesy of the Archiv der Georg-August-Universitat, Gottingen, Ger.

Die Kontaktmetamorphose im Kristianiagebiet (1911; "Contact Metamorphism in the Kristiania Region"), now a classic, embodies Goldschmidt's extensive studies of thermal metamorphism (alteration in rocks because of heat) and made fundamental advances in correlating the mineralogical and chemical composition of metamorphic rocks. A further work, *Die Injektionsmetamorphose im Stavangergebiet* (1921; "Injection Metamorphism in the Stavanger Region"), related his masterly study of structures created by the penetration of magma or other rock into pre-existing deposits.

The dearth of raw materials during World War I led Goldschmidt to research in geochemistry. His work in that area, which broadened into more general studies after the war, marks the beginnings of modern geochemistry. Out of these studies grew the *Geochemische Verteilungsgesetze der Elemente* (8 vol., 1923–38; "The Geochemical Laws of the Distribution of the Elements"), a work that formed the foundation of inorganic crystal chemistry.

In 1929 Goldschmidt joined the faculty of the University of Göttingen in Germany, but six years later anti-Semitism, coupled with the Nazi rise to power in Germany, led him to resign his post and return to Norway. Using data from geochemistry, astrophysics, and nuclear physics, he worked on an estimate of the relative cosmic abundances of the elements and attempted to find a relationship between the stability of the different isotopes and their occurrence in the universe. In other studies he showed that the size of the constituent atoms was of prime importance in explaining mineral composition and that crystal hardness is determined by the distance between and the charge of adjacent ions (charged atoms).

After the German occupation of Norway, Goldschmidt was arrested twice and was finally interned in a concentration camp. In late 1942 he escaped to Sweden, and the following spring he arrived in Great Britain. There he worked first for the Macaulay Institute for Soil Research, Aberdeen, and then for the Rothamsted Experimental Station, Harpenden. After the war he returned to Oslo.

Goldsmid, Sir Frederick John (b. May 19, 1818, Milan—d. Jan. 12, 1908, Brook Green, Hammersmith, Eng.), major general in the British Army who, through negotiations with several Asian countries and supervision of a cross-continental construction project, made possible the Indo-European telegraph, the first rapid communication system linking Europe and Asia.

After military service in China (1840), India, and Turkey (1855), where he mastered several Asian languages, Goldsmid became connected with the British plan for linking East and West by telegraph in 1861. After negotiating telegraph treaties with leaders of India, Baluchistan (now in Iran and Pakistan), and the Ottoman Empire, in 1864 he supervised the carrying of telegraph wire from Europe to India and became director general of the Indo-European telegraph in 1865, a post he held until 1870. His knowledge of Asian languages enabled him to arbitrate boundary disputes between Iran and Baluchistan in 1871 and between Iran and Afghanistan in 1872. He was knighted in 1871.

Goldsmid, Sir Isaac Lyon, 1ST BARONET (b. Jan. 13, 1778, London—d. April 27, 1859, London), financier, Britain's first Jewish baronet, whose work for Jewish emancipation in that nation made possible the passage of the Jewish Disabilities Bill of 1859, granting basic civil and political rights to Jews.

Highly successful as a dealer in precious metals with Portugal, Brazil, and Turkey, Goldsmid became active in the cause of Jewish emancipation and social reform. After passage of the Act of 1829, providing civil rights for Roman Catholics in England, he sought and made possible the passage of a similar measure for Jews.

Goldsmid also worked for reform of the penal system and was one of the founders of University College, London, in 1826. In 1841 he was made the first Jewish baronet. His son, Sir Francis Henry Goldsmid (1808–78), worked with him for Jewish emancipation and was the first Jewish barrister in England.

Isaac Goldsmid, detail of an etching by Richard Dighton, 1824
BBC Hulton Picture Library

Goldsmith, Oliver (b. Nov. 10, 1730, Kilkenny West, County Westmeath, Ire.—d. April 4, 1774, London), English essayist, poet, novelist, dramatist, and eccentric, made famous by such works as the series of essays *The Citizen of the World, or, Letters from a Chinese Philosopher* (1762), the poem *The Deserted Village* (1770), the novel *The Vicar of Wakefield* (1766), and the play *She Stoops to Conquer* (1773).

Life. Goldsmith was the son of an Anglo-Irish clergyman, the Rev. Charles Goldsmith, curate in charge of Kilkenny West, County Westmeath. At about the time of his birth, the family moved into a substantial house at nearby Lissoy, where Oliver spent his childhood. Much has been recorded concerning his youth, his unhappy years as an undergraduate at Trinity College, Dublin, where he received the B.A. degree in February 1749, and his many misadventures before he left Ireland in the autumn of 1752 to study in the medical school at Edinburgh. His father was now dead, but several of his relations had undertaken to support him in his pursuit of a medical degree. Later on, in London, he came to be known as Dr. Goldsmith—Doctor being the courtesy title for one who held the Bachelor of Medicine—but he took no degree while at Edinburgh nor, so far as anyone knows, during the two-year period when, despite his meagre funds, which were eventually exhausted, he somehow managed to make his way through Europe. The first period of his life ended with his arrival in London, bedraggled and penniless, early in 1756.

Oliver Goldsmith, oil painting from the studio of Sir Joshua Reynolds, 1770; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Goldsmith's rise from total obscurity was a

matter of only a few years. He worked as an apothecary's assistant, school usher, physician, and as a hack writer—reviewing, translating, and compiling. It remains amazing that this young Irish vagabond, unknown, uncouth, unlearned, and unreliable, was yet able within a few years to climb from obscurity to mix with aristocrats and the intellectual elite of London. Such a rise was possible because Goldsmith had one quality, soon noticed by booksellers and the public, that his fellow literary hacks did not possess—the gift of a graceful, lively, and readable style. His rise began with the *Enquiry into the Present State of Polite Learning in Europe* (1759), a minor work. Soon he emerged as an essayist, in *The Bee* and other periodicals, and above all in his *Chinese Letters,* the essays of which were collected as *The Citizen of the World* in 1762. The same year brought his *Life of Richard Nash, of Bath, Esq.* Already Goldsmith was acquiring those distinguished and often helpful friends whom he alternately annoyed and amused, shocked and charmed—Samuel Johnson, Sir Joshua Reynolds, Thomas Percy, David Garrick, Edmund Burke, and James Boswell. The obscure drudge of 1759 became in 1764 one of the nine founder-members of the famous Club, a select body, including Reynolds, Johnson, and Burke, which met weekly for supper and talk. Goldsmith could now afford to live more comfortably, but his extravagance continually ran him into debt, and he was forced to undertake more hack work. He thus produced histories of England and of ancient Rome and Greece, biographies, verse anthologies, translations, and works of popular science. These were mainly compilations of works by other authors, which Goldsmith then distilled and enlivened by his own gift for fine writing. Some of these makeshift compilations went on being reprinted well into the 19th century, however.

By 1762 Goldsmith had established himself as an essayist with his *Citizen of the World,* in which he used the device of satirizing Western society through the eyes of an Oriental visitor to London. By 1764 he had won a reputation as a poet with *The Traveller,* whose verses embodied both his memories of tramping through Europe and his political ideas. In 1770 he confirmed that reputation with the more famous *Deserted Village,* which contains charming vignettes of rural life while denouncing the evictions of the country poor at the hands of wealthy landowners. In 1766 Goldsmith revealed himself as a novelist with *The Vicar of Wakefield* (completed 1762), a portrait of village life whose idealization of rural life, sentimental moralizing, and melodramatic incidents are nevertheless underlain by a sharp but good-natured irony. In 1768 Goldsmith turned to the theatre with *The Good Natur'd Man,* which was followed in 1773 by the much more effective *She Stoops to Conquer.* This play has outlived almost all other English comedies from the early 18th to the late 19th century by virtue of its broadly farcical horseplay and vivid, humorous characterizations.

During his last decade Goldsmith's conversational encounters with Johnson and others, his foolishness, and his wit were preserved in Boswell's *Life of Samuel Johnson.* Goldsmith eventually became deeply embroiled in mounting debts despite his considerable earnings as an author, though, and after a short illness in the spring of 1774 he died.

Assessment. When Oliver Goldsmith died he had achieved eminence among the writers of his time as an essayist, a poet, and a dramatist. He was one "who left scarcely any kind of writing untouched and who touched nothing that he did not adorn"—such was the judgment expressed by his friend Dr. Johnson. His contemporaries were as one in their high regard for Goldsmith the writer, but they were of different minds concerning the man himself. He was, they all agreed, one of the oddest personalities of his time. Of established Anglo-Irish stock, he kept his brogue and his provincial manners in the midst of the sophisticated Londoners among whom he moved. His bearing was undistinguished, and he was unattractive physically—ugly, some called him—with ill-proportioned features and a pock-marked face. He was a poor manager of his own affairs and an inveterate gambler, wildly extravagant when in funds, generous sometimes beyond his means to people in distress. The graceful fluency with words that he commanded as a writer deserted him totally when he was in society—his conversational mishaps were memorable things. Instances were also cited of his incredible vanity, of his constant desire to be conspicuous in company, and of his envy of others' achievements. In the end what most impressed Goldsmith's contemporaries was the paradox he presented to the world: on the one hand the assured and polished literary artist, on the other the person notorious for his ineptitudes in and out of society. Again it was Johnson who summed up the common sentiment. "No man," he declared, "was more foolish when he had not a pen in his hand, or more wise when he had."

Goldsmith's success as a writer lay partly in the charm of personality emanated by his style—his affection for his characters, his mischievous irony, and his spontaneous interchange of gaiety and sadness. He was, as a writer, "natural, simple, affecting." It is by their human personalities that his novel and his plays succeed, not by any brilliance of plot, ideas, or language. In the poems again it is the characters that are remembered rather than the landscapes—the village parson, the village schoolmaster, the sharp, yet not unkindly portraits of Garrick and Burke. Goldsmith's poetry lives by its own special softening and mellowing of the traditional heroic couplet into simple melodies that are quite different in character from the solemn and sweeping lines of 18th-century blank verse. In his novel and plays Goldsmith helped to humanize his era's literary imagination, without growing sickly or mawkish. Goldsmith saw people, human situations, and indeed the human predicament from the comic point of view; he was a realist, something of a satirist, but in his final judgments unfailingly charitable.

MAJOR WORKS. *An Enquiry into the Present State of Polite Learning in Europe* (1759); *The Bee* (1759), a collection of essays originally published in the periodical of the same name; *The Citizen of the World; or, Letters from a Chinese Philosopher, Residing in London, to his Friends in the East,* 2 vol. (1762); *The Life of Richard Nash, of Bath, Esq.* (1762); *An History of England in a Series of Letters from a Nobleman to His Son,* 2 vol. (1764); *The Traveller, or a Prospect of Society* (1764), verse; *The Vicar of Wakefield: A Tale,* 2 vol. (1766); *The Good Natur'd Man: A Comedy* (1768); *The Deserted Village* (1770), verse; *She Stoops to Conquer: or, The Mistakes of a Night. A Comedy* (1773); *Retaliation. A Poem* (1774); *An History of the Earth, and Animated Nature,* 8 vol. (1774).

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Works. *The Collected Works of Oliver Goldsmith,* ed. by Arthur Friedman, 5 vol. (1966), supersedes all other collected editions. *The Collected Letters of Oliver Goldsmith,* ed. by K.C. Balderston (1928), is standard. All of the poetry, together with full notes and extensive commentary, is given in *The Poems of Thomas Gray, William Collins, and Oliver Goldsmith,* ed. by R.H. Lonsdale (1969). *The Complete Poetical Works of Oliver Goldsmith,* ed. by A. Dobson (1906), is still valuable for its commentary and notes, as is the edition of the plays by A. Dobson and G.P. Baker, *The Good Natur'd Man and She Stoops to Conquer* (1905). Of the many editions of *The Vicar of Wakefield* those by Oswald Doughty (1928) and F.W. Hilles (1951) are outstanding by reason of their critical introductions.

Biography and criticism. The authoritative biography is R.M. Wardle, *Oliver Goldsmith* (1957). Significant older biographical works are Sir James Prior, *The Life,* 2 vol. (1837), and John Forster, *The Life and Times of Oliver Goldsmith,* 2nd ed., 2 vol. (1854). Of the many treatments of Goldsmith by contemporaries of his, the most important is that by Boswell in his *Life of Samuel Johnson,* 2 vol. (1791). Recent critical studies include C.M. Kirk, *Oliver Goldsmith* (1967); Ricardo Quintana, *Oliver Goldsmith: A Georgian Study* (1967); and R.H. Hopkins, *The True Genius of Oliver Goldsmith* (1969).

Goldstein, Eugen (b. Sept. 5, 1850, Gleiwitz, Prussia—d. Dec. 25, 1930, Berlin), German physicist known for his work on electrical phenomena in gases and on cathode rays; he is also credited with discovering canal rays.

Goldstein studied at the University of Breslau (now in Wrocław, Pol.), where he received his doctorate in 1881. His career was spent at the Potsdam Observatory. He was primarily interested in electrical discharges in moderate to high vacuums. In 1886 he discovered what he termed *Kanalstrahlen,* or canal rays, also called positive rays; these are positively charged ions that are accelerated toward and through a perforated cathode in an evacuated tube. He also contributed greatly to the study of cathode rays; in 1876 he showed that these rays could cast sharp shadows, and that they were emitted perpendicular to the cathode surface. This discovery led to the design of concave cathodes to produce concentrated or focused rays, which became fundamental to numerous experiments.

Goldstein, Joseph L(eonard) (b. April 18, 1940, Sumter, S.C., U.S.), American molecular geneticist who, along with Michael S. Brown (*q.v.*), was awarded the 1985 Nobel Prize for Medicine or Physiology for their elucidation of the process of cholesterol metabolism in the human body.

Goldstein received his B.S. degree from Washington and Lee University, Lexington, Va., in 1962 and obtained his medical degree from the Southwestern Medical School of the University of Texas at Dallas in 1966. Goldstein became friends with Brown when they were both working as interns at Massachusetts General Hospital from 1966 to 1968. Goldstein then conducted research under the auspices of the National Institutes of Health from 1968 to 1972, studying genetically predisposing factors that caused the accumulation of blood cholesterol in people prone to heart attacks. He returned to teach at the Southwestern Medical School in Dallas in 1972 and was there reunited with his colleague Brown.

The two men then began a concerted study of the processes affecting the accumulation of cholesterol in the bloodstream. In the course of their research they discovered that low-density lipoproteins (LDL), which are primary cholesterol-carrying particles, are withdrawn from the bloodstream into the body's cells by receptors on the cells' surface. The genetic absence of these LDL receptors was found to be the cause of familial hypercholesterolemia, a disorder in which the body's tissues are incapable of removing cholesterol from the bloodstream. The new understanding of cells receptors' role in the regulation of cholesterol levels in the bloodstream spurred the successful use of drugs and the manipulation of diet in lowering blood cholesterol levels.

From 1976 Goldstein was professor of medicine and from 1977 chairman of the department of molecular genetics at the University of Texas Health Science Center in Dallas.

Goldwater, Barry M(orris) (b. Jan. 1, 1909, Phoenix, Ariz., U.S.), U.S. senator from Arizona (1953–64, 1969–87) and Republican presidential candidate in 1964.

Goldwater dropped out of college and began working in his family's Phoenix department store, Goldwater's, of which he was president from 1937 to 1953. He was elected to the Phoenix city council in 1949, and in 1952 he won election to the U.S. Senate by a narrow margin. He was reelected in 1958 by a large majority. A conservative Republican, he called for a harsher diplomatic stance toward the Soviet Union, opposed arms-control negotiations with that country, and charged the Democrats with creating a quasi-socialist state at home.

After winning several key victories in the 1964 primary elections, Goldwater won the Republican presidential nomination on the first ballot. He fought a determined campaign against the incumbent president, Lyndon B. Johnson, but national prosperity worked in Johnson's favour, and Goldwater was handicapped by the charge that he was an extreme anticommunist who might carry the country into war with the Soviet Union. Goldwater and his vice-presidential running mate, William E. Miller, were decisively defeated in the election (November 3); they carried only Arizona and five states in the Deep South.

In 1968 Goldwater was reelected to the Senate and was successively reelected thereafter until he retired in 1987. He led the delegation of senior Republican politicians who on August 7, 1974, persuaded President Richard M. Nixon to resign from office. Goldwater moderated many of his views in his later years and became a symbol of high-minded conservative Republicanism. His published works include *The Conscience of a Conservative* (1960), *The Coming Breakpoint* (1976), and *With No Apologies* (1979).

goldwork, sculpture, vessels, jewelry, ornamentation, and coinage made from gold. Gold is at once the most malleable and the most ductile of metals. One ounce can be hammered into a 100-foot (30-metre) square of gold leaf or drawn into a mile (1.6 kilometre) of fine wire. Because of its chemical inertness, gold retains its brilliant colour even after centuries of exposure to corrosive elements. The most workable of metals, gold has been forged, chased, embossed, engraved, inlayed, cast, and—in the form of gold leaf—used to gild metals, woods, leather, and parchment. Gold wire has found wide uses in brocades and ornamentation of other materials.

From the earliest of times, gold was often held in awe as the symbol of divinity and was therefore the material of choice for religious objects. During the Middle Ages, gold was used widely for crosses, altars, doors, chalices, and reliquaries. This association with divinity naturally developed into an association with royalty. In ancient Egypt, for example, all gold was the property of the pharaoh, and even in modern times the accoutrements of royalty are predominantly gold. Objects of solid gold have always been the province of the wealthy, but, with the development of gilding, golden artwork and jewelry became accessible to the middle classes. *See* metalwork.

Goldwyn, Samuel, original name SCHMUEL GELBFISZ, also called SAMUEL GOLDFISH (b. July 1879, Warsaw—d. Jan. 31, 1974, Los Angeles), pioneer American filmmaker and one of Hollywood's most prominent producers for more than 30 years.

Orphaned as a child, Goldwyn emigrated first to London and eventually to a small town in New York state, where he worked in a glove factory. By the age of 18 he was one of the top glove salesmen in the world and a partner in his company. With his brother-in-law Jesse Lasky, then a vaudeville producer, he cofounded the Jesse Lasky Feature Play Company. Their initial release was Cecil B. deMille's *Squaw Man* (1913), one of the first full-length feature films made in Hollywood. In 1917 the company merged with Adolph Zukor's Famous Players Film Company, and Goldwyn became the chairman of the board of the Famous Players-Lasky Company. That same year he established the Goldwyn Pictures Corporation, which was incorporated into Metro-Goldwyn-Mayer in 1924. He thereafter worked as an independent producer, distributing his films through the United Artists Corporation until 1940, then through RKO.

As a producer Goldwyn made it a practice to hire the finest writers, directors, actors, and cinematographers available, and consequently his pictures maintained a high level of excellence. Many of his films have a literary flavour, among them *Dodsworth* (1936), *Wuthering Heights* (1939), and *The Little Foxes* (1941); but he is also remembered for more purely cinematic features, such as *The Best Years of Our Lives* (1946), and a series of Technicolor musicals, such as *Guys and Dolls* (1955) and *Porgy and Bess* (1959). He was instrumental in introducing to films such stars as Bebe Daniels, Pola Negri, Will Rogers, Vilma Banky, and Ronald Colman. Malapropos but expressive "Goldwynisms"—such as "Include me out"—were widely quoted and attributed to him, often apocryphally.

golem, in Jewish folklore, an image endowed with life. The term is used in the Bible (Psalms 139:16) and in Talmudic literature to refer to an embryonic or incomplete substance. It assumed its present connotation in the Middle Ages, when many legends arose of wise men who could bring effigies to life by means of a charm or of a combination of letters forming a sacred word or one of the names of God. The letters, written on paper, were placed in the golem's mouth or affixed to its head. The letters' removal deanimated the golem. In early golem tales the golem was usually a perfect servant, his only fault being a too literal or mechanical fulfillment of his master's orders. In the 16th century the golem acquired the character of protector of the Jews in time of

Golem (right) in the German film *Der Golem* (1920)

By courtesy of Friedrich-Wilhelm Murnau-Stiftung, Wiesbaden; photograph, Museum of Modern Art Film Stills Archive, New York

persecution but also had a frightening aspect. The most famous tale involves the golem created by the 16th-century rabbi Judah Löw ben Bezulel of Prague. It was the basis for Gustav Meyrink's novel *Der Golem* (1915) and for a classic of German silent films (1920), which provided many details on the movement and behaviour of man-made monsters that were later adopted in the popular American horror films on the *Frankenstein* theme.

Golenishchev-Kutuzov, Mikhail Illarionovich, Prince: *see* Kutuzov, Mikhail Illarionovich, Knyaz.

golf, game played by individual competitors, whose object is to drive a small, hard ball with one of a set of clubs toward and into a series of holes. The player who is able to hole the ball in the fewest strokes is the winner. The game of golf is played outdoors on a course that consists of 9 or 18 teeing areas and corresponding holes.

A brief treatment of golf follows. For full treatment, *see* MACROPAEDIA: Sports, Major Team and Individual.

Golf developed in Scotland, where it was played as early as the 15th century. James I of England (who was also James VI of Scotland) is believed to have introduced golf to Blackheath in London around 1608, but the oldest club with proof of origin is the Company of Gentlemen Golfers, now called the Honourable Company of Edinburgh Golfers. The game took a foothold in England with the birth of the Royal North Devon Club in 1864, and the first amateur championship in Great Britain was held in 1885 at Hoylake. The game was played in the United States and Canada by the 17th century, but it did not develop as an organized sport until 1888, when St. Andrews Golf Club in Yonkers, N.Y., was established by John Reid and Robert Lockhart, both Scots.

Golf balls were originally made of wood, but in the early 17th century the feather ball was introduced. It was a slow and expensive process to manufacture these balls, which consisted of boiled feathers compressed into a hole left in a stitched leather cover. The invention of the cheaper gutta-percha ball about 1848 helped to make the game more popular. Golf clubs were made of wood, but by the late 18th century iron heads, called cleeks, were introduced for driving, putting, and getting the ball out of rough terrain. With the emergence of harder rubber balls at the turn of the 20th century came advances in club-making, including laminated club heads and seamless steel shafts. In 1938 the United States Golf Association (USGA) ruled that 14 was the maximum number of clubs a player was permitted to carry in a round. The Royal and Ancient Golf Club of St. Andrews, Scot., and the USGA are now the governing organizations of the sport.

The major golf tournaments for individual men consist of the Open and the Amateur of the British Isles and the U.S. Open, Amateur, Professional Golfers' Association (PGA), and Masters. Major individual women's golf tournaments include the Ladies' British Open and British Ladies Amateur, the U.S. Women's Open and Amateur, and the Ladies' Professional Golf Association. The best-known team golf competitions are the Walker Cup (for amateurs); the Ryder Cup (professionals); the Curtis Cup (amateurs), contested between U.S. and British women's teams; and the World Cup (amateurs) and the World Cup (professionals), which is played by teams from all over the world.

There are two forms of play in golf: match and stroke (or medal) play. In match play two players generally compete against each other, and each hole is won by the player who holes the ball in the fewest strokes. In stroke play each player competes against every other player in the tournament, and the competitor who holes the round (or rounds) in the fewest strokes is the winner. For winners of the major amateur and professional championships, *see* Sporting Record: *Golf.*

golf, pocket-billiards game named for its similarity to the outdoor game played with special clubs and a small hard ball. In the billiards version, each player tries to play an assigned object ball into the six holes, or pockets, of the table, beginning with the left side pocket and moving in clockwise rotation around the table. The object balls are respotted after each hole is completed, and the player who com-

pletes the "course" in the lowest number of strokes is the winner.

Each player begins with the cue ball on the centre spot and the object ball on the foot spot. The player's first shot of the game must rebound off the foot cushion before contacting the object ball. If the shot is missed, the player continues from wherever the cue ball comes to rest. On subsequent holes the object ball is replaced on the foot spot, but the cue ball is played from where the previous player left it. These shots need not be banked. Other rules are similar to those of pocket billiards (*q.v.*).

Golfito, city, southern Puntarenas province, southern Costa Rica, on sheltered El Golfito Inlet, off the Gulf of Dulce and surrounded by steep hills. The heavy rainfall supports a tropical rain forest vegetation similar to that of the Caribbean coast. Built in the 1930s, when disease forced the shifting of banana cultivation from the Atlantic to the Pacific coast of Costa Rica, Golfito is still primarily a banana port, belonging to the Banana Company of Costa Rica. It handles about one-fifth of Costa Rica's seaborne trade, following the nation's other important ports, Limón and Puntarenas, in total traffic. The Southern Railway runs from the plantations to Golfito, and a highway leads from the city to the Pan-American Highway. Pop. (1983 est.) 30,148.

Golgi, Camillo (b. July 7, 1843/44, Corteno, Italy—d. Jan. 21, 1926, Pavia), Italian physician, cytologist whose investigations into the fine structure of the nervous system earned him (with the Spanish histologist Santiago Ramón y Cajal) the 1906 Nobel Prize for Physiology or Medicine.

Golgi, 1906

By courtesy of the Wellcome Trustees

As a physician at the home for incurables, Abbiategrasso, Italy (1872–75), with only rudimentary facilities at his disposal, Golgi devised (1873) the silver nitrate method of staining nerve tissue, an invaluable tool in subsequent nerve studies. This stain enabled him to demonstrate the existence of a kind of nerve cell (which came to be known as the Golgi cell) possessing many short, branching extensions (dendrites) and serving to connect several other nerve cells. Discovery of Golgi cells led the German anatomist Wilhelm von Waldeyer-Hartz to postulate, and Ramón y Cajal to establish, that the nerve cell is the basic structural unit of the nervous system, a critical point in the development of modern neurology.

After his arrival at the University of Pavia (1876), Golgi found and described (1880) the point (now known as the Golgi tendon spindle or Golgi tendon organ) at which sensory nerve fibres end in rich branchings encapsulated within a tendon. He also discovered (1883) the presence in nerve cells of an irregular network of fibrils (small fibres), vesicles (cavities), and granules, now known as the Golgi complex or Golgi apparatus. The Golgi complex (found in all cells except bacteria) may play an important role in membrane construction, protein and lipid storage, and particle transport across the cell membrane.

Turning to the study of malaria (1885–93), Golgi found that the two types of intermittent malarial fevers (tertian, occurring every other day, and quartan, occurring every third day) are caused by different species of the protozoan parasite *Plasmodium* and that the paroxysms of fever coincide with release of the parasite's spores from red blood cells.

Golgotha (Aramaic: Skull), also called CALVARY (from Latin *calva:* "bald head," or "skull"), skull-shaped hill in Jerusalem, the site of Jesus' Crucifixion. It is referred to in all four Gospels. The hill of execution was outside the city walls of Jerusalem, apparently near a road and not far from the sepulchre where Jesus was buried. Its exact location is uncertain, but most scholars prefer either the spot now covered by the Church of the Holy Sepulchre or a hillock called Gordon's Calvary just north of the Damascus Gate.

Goliad, historic city, seat (1837) of Goliad County, southern Texas, U.S., near the San Antonio River, 85 mi (137 km) southeast of San Antonio. A Spanish mission, Nuestra Señora del Espíritu Santo Zuñiga (Our Lady of the Holy Spirit of Zuniga), and its protective fort, Presidio La Bahía, were established there in 1749 on the site of an Aranama Indian village. The presidio was occupied briefly in 1812 by a fillibustering American expedition, led by Augustus Magee, fighting for Mexico against Spain and again in 1821 by James Long's invading Mississippians. At the beginning of the Texas Revolution (December 1835), the presidio's Mexican garrison was overwhelmed by Texans led by George Collinsworth and Ben Milam, and on December 20 a preliminary "declaration of independence" was published there. A few weeks after the fall of the Alamo, a detachment of 330 American and Texan troops at Goliad under Col. James Fannin surrendered (March 20, 1836, after the Battle of Coleto Creek) to superior Mexican forces under Gen. José Urrea. Although Mexican law stipulated that foreign belligerents taken on Mexican soil be executed for piracy, Fannin surrendered with the understanding that his men would be treated as prisoners of war. Gen. Antonio López de Santa Anna overruled the agreement, and the entire force was shot on March 27. "Remember Goliad" (along with "Remember the Alamo") became one of the two famed Texan revolutionary battle cries. A monument marks the burial site outside the walls of the well-preserved presidio, the officers quarters of which now serve as a museum. The nearby Mission Espíritu Santo has been restored within Goliad State Historic Park.

The name Goliad, in use since 1829, is supposedly an anagram of (H)idalgo, the Mexican patriot, but may also be derived from the biblical Goliath. Goliad is now a farming centre (cotton, grains, turkeys, and ranching) with oil and gas interests, but it is known chiefly as a monument to the Texas Revolution. Pop. (1980) 1,990.

goliard, any of the wandering students and clerics in medieval England, France, and Germany, remembered for their satirical verses and poems in praise of drinking and debauchery. The goliards described themselves as followers of the legendary Bishop Golias: renegade clerics of no fixed abode who had more interest in rioting and gambling than in the life of a responsible citizen. It is difficult to be sure how many of them were in fact social rebels or whether this was merely a guise adopted for literary purposes. Of the identifiable poets, Huoh Primas of Orleans, Pierre de Blois, Gautier de Châtillon, and Phillipe the Chancellor all became important establishment figures and to some extent outgrew their student high spirits. Only the one known as the Archpoet seems to have lived what he preached to the end of his life.

The goliards were noted more as rioters, gamblers, and tipplers than as poets and scholars. Their satires were almost uniformly directed against the church, attacking even the pope. In 1227 the Council of Trier forbade priests to permit goliards to take part in chanting the service. In 1229 they played a conspicuous part in disturbances at the University of Paris in connection with the intrigues of the papal legate; in 1289 it was ordered that no cleric should be a goliard, and in 1300 (at Cologne) they were forbidden to preach or to grant indulgences. Finally the privileges of clergy were withdrawn from the goliards.

The word goliard lost its clerical association, passing into French and English literature of the 14th century in the general meaning of jongleur, or minstrel (its meaning in *Piers Plowman* and in Chaucer).

A remarkable collection of their Latin poems and songs in praise of wine and riotous living was published in the late 19th century under the title *Carmina Burana,* taken from the manuscript of that title at Munich which was written in Bavaria in the 13th century. Many of these were translated by John Addington Symonds as *Wine, Women, and Song* (1884). The collection also includes the only known two surviving complete texts of medieval passion dramas—one with and one without music. In 1937 the German composer Carl Orff based his scenic oratorio *Carmina Burana* on these poems and songs. Many of them are also to be found in the important Cambridge Songbook written in England some 200 years earlier.

The subject matter of the Goliard poems and songs varies: political and religious satire; love songs of an unusual directness; and songs of drinking and riotous life. The last category involves the most characteristically goliardic elements: the plaints of unfrocked clergy, a homeless scholar's learned cries of self-pity, the unashamed panegyrics of hedonism, and the dauntless denials of Christian ethics.

It is this last category for which the least trace of written music survives. Present knowledge of medieval poetry and music suggests that all the poems were intended for singing, even though only a few are provided with music in the manuscripts. The music is normally notated in diastematic neumes—a kind of musical shorthand that can be read only by comparison with another version of the tune, fully written out. In musical style the amorous songs are similar to those of the trouvères; in several cases the same melody appears in both repertories. The more goliardic songs have a simpler metrical form, more syllabic melodies, and an unsophisticated repetitive style.

Goliath (*c.* 11th century BC), in the Bible (I Sam. xvii), the Philistine giant slain by David, who thereby achieved renown. The Philistines had come up to make war against Saul, and this warrior came forth day by day to challenge to single combat. Only David ventured to respond, and armed with a sling and pebbles he overcame Goliath. The Philistines, seeing their champion killed, lost heart and were easily put to flight. The giant's arms were placed in the sanctuary, and it was his famous sword that David took with him in his flight from Saul (I Sam. 21: 1–9).

In another passage it is said that Goliath of Gath was slain by a certain Elhanan of Bethlehem in one of David's conflicts with the Philistines (II Sam. 21: 18–22). This may be a transcriptural error as the parallel I Chron.

20:5 avoids the contradiction by reading "Elhanan . . . slew Lahmi the brother of Goliath."

Golitsyn, Boris Alekseyevich (b. July 30 [July 20, old style], 1654—d. Nov. 8 [Oct. 28, O.S.], 1714), Russian statesman who played a major role during the early years of the reign of Peter I the Great (ruled 1682–1725).

Boris Alekseyevich Golitsyn, detail of a lithograph
Novosti Press Agency

A nobleman whose clan descended from the 14th-century Lithuanian grand duke Gediminas, Golitsyn became a court chamberlain (1676) and Peter's tutor. Although Peter's half-sister, the regent Sophia Alekseyevna (ruled 1682–89), favoured him with an appointment as head of the government department that administered the lower Volga region, his political sympathies lay with Peter and his family, the Naryshkins.

In 1689 he participated in the coup d'etat that removed Sophia and placed Peter on the throne; with several other advisers to the Naryshkins, he unofficially assumed control of the government. In 1690 he was made a boyar (next in rank to the ruling princes) and subsequently was closely associated with the major achievements of the early period of Peter's reign—the exploratory expeditions in the White Sea (1694–95), the military campaigns against the Turks at Azov (1695–96), and the shipbuilding projects on the Don River (1697). While Peter was travelling in western Europe (1697–98), Golitsyn remained in Moscow, acting (with two others) as head of state; in 1698 he participated in the suppression of the revolt led by Sophia and urged the severe punishment of her supporters. After the Russian army was badly defeated by the Swedes at Narva (November 1700), Golitsyn helped rebuild it by recruiting and training 80,000 new dragoons. But he ruled his province on the lower Volga despotically, and in 1705 his misrule resulted in a major revolt in Astrakhan. Despite his long years of faithful service, Peter relieved him of his duties.

Golitsyn, Boris Borisovich, Knyaz (Prince), Golitsyn also spelled GALITZIN (b. March 2 [Feb. 18, old style], 1862, St. Petersburg, Russia—d. May 17 [May 4, O.S.], 1916, near Petrograd), Russian physicist known for his work on methods of earthquake observations and on the construction of seismographs.

Boris Borisovich Golitsyn
Novosti—Sovfoto

Golitsyn was educated in the naval school and naval academy. In 1887 he left active service for scientific studies and went to Strasbourg. In 1891 he was appointed *Privatdozent* at the University of Moscow and in 1893 professor of physics at Dorpat. The same year he was elected fellow, and in 1908 a member, of the Academy of Sciences in St. Petersburg. His early research was in spectroscopy.

He invented the first effective electromagnetic seismograph in 1906. Five years later he modified his earlier seismograph to produce an instrument essentially identical to that used today. His valuable seismic interpretations earned Russian seismology international recognition. One of the first to suggest using explosives for studying subsurface structure, he established across Russia a chain of seismic stations that continue in operation.

He received the degree of doctor of science from the University of Manchester in 1910, and in 1911 he was elected president of the International Seismological Association. In 1913 he was appointed director of the Central Physical (later Geophysical) Observatory at St. Petersburg and achieved good results in the organization of meteorological service throughout Russia. His book, *Lectures on Seismometry,* was published in 1912 and translated into German in 1914.

Golitsyn, Dmitry Mikhaylovich, Knyaz (Prince) (b. June 13 [June 3, old style], 1665, Russia—d. April 25 [April 14, O.S.], 1737, St. Petersburg), Russian statesman who unsuccessfully tried to transform the Russian autocracy into a constitutional monarchy.

Having been sent to Italy in 1697 by Tsar Peter I the Great to study "military affairs," Golitsyn was appointed commander of an auxiliary corps (1704) to fight the Swedes during the Great Northern War. He later entered civil government service and occupied the posts of governor general of Kiev (1715–19), senator (after 1719), and president of the Kamer-Kollegiya (Finance Ministry; 1719–22).

But Golitsyn was basically opposed to Peter's reforms, which tended to undermine aristocratic privileges and place members of lower classes in powerful state offices; in 1724 he fell into disgrace and was deprived of all his public duties. Although Empress Catherine I (ruled 1725–27) restored him to his former status, he did not achieve a position of influence until after she died and her close adviser, Prince Aleksandr D. Menshikov, fell from power (1727). Golitsyn then became a member of the Supreme Privy Council (created in 1726), which in fact governed for Peter II (ruled 1727–30).

When Peter II died (1730), Golitsyn urged the Supreme Privy Council to offer the throne to Duchess Anna Ivanovna of Courland, a niece of Peter I, provided that she accept a set of "conditions" that he had composed, transferring many crucial prerogatives of the autocrat to the council. Anna signed the conditions at Mitau (Jelgava), but, when she arrived in Moscow and learned that the Imperial Guard opposed them, she tore them up and dissolved the Supreme Privy Council. Golitsyn then lived in retirement until 1736, when he was arrested and condemned to death, largely for his anti-autocratic political beliefs. Anna commuted his sentence to life imprisonment in the Schlüsselburg (modern Petrokrepost) fortress.

Golitsyn, Vasily Vasilyevich, Knyaz (Prince) (b. 1643, Russia—d. May 2 [April 21, old style], 1714, Kholmogory, Russia), Russian statesman who was the chief adviser to Sophia Alekseyevna and dominated Russian foreign policy during her regency (1682–89).

Extremely well educated and greatly influenced by western European culture, Golitsyn was awarded the rank of boyar (next in rank to the ruling princes) in 1676 by Tsar Alexis (ruled 1645–76) and was also given a military command in the Ukraine with broad political powers. Continuing his state service under Tsar Fyodor III (ruled 1676–82), Golitsyn worked on a commission established to reorganize the military service and on its behalf recommended that the system of *mestnichestvo* (hereditary precedence) be abolished.

When Sophia Alekseyevna became regent for her brother Ivan V and her half brother, Peter I, in 1682, she made Golitsyn, who was also her lover, the head of the *posolsky prikaz* (foreign office); in 1684 she named him keeper of the great seal. Golitsyn formulated many far-reaching reform measures, including the development of close diplomatic and cultural relations with western European nations, the abolition of serfdom, the establishment of religious toleration in Russia, and the construction of industrial enterprises. But he was prevented from enacting these measures by the opposition of traditionalists, who favoured Sophia's political rivals, the Naryshkins—the family of Peter's mother.

Golitsyn's activities, therefore, became confined to foreign affairs. In addition to improving commercial relations with Sweden, Poland, England, and other western states, he negotiated a treaty of perpetual peace and alliance with Poland (1686), in which the Poles recognized Kiev and all the territory east of the Dnieper River as Russian possessions, and Russia agreed to join Poland and its allies, Austria and Venice, in a Holy League against the Ottoman Turks. In accordance with this agreement, Golitsyn led two campaigns against the Crimean Tatars (vassals of the Turks; 1687, 1689); both were dismal defeats for Russia. Golitsyn also directed the negotiations with China and concluded the Treaty of Nerchinsk (ratified 1689), which set the Russo-Chinese border along the Amur River, thereby preparing the way for Russia's subsequent expansion to the Pacific Ocean. But the diplomatic success of the Treaty of Nerchinsk did not engender enough support for Sophia's regime to save it from the Naryshkin coup d'etat that displaced Sophia in August 1689 and placed Peter on the throne. The new Naryshkin government exiled Golitsyn to the far north, where he remained until his death.

Golkonda, also spelled GOLKUNDĀ (India): *see* Golconda.

Gollancz, Sir Victor (b. April 9, 1893, London—d. Feb. 8, 1967, London), British publisher, writer, and humanitarian who championed such causes as socialism and pacifism while managing a highly successful publishing business.

Born to a family of orthodox Jews of Polish origin, Gollancz attended St. Paul's School and New College, Oxford. During his student years he evolved a personal religious outlook that was strongly influenced by Christian ethics. He left Oxford without a degree after the outbreak of World War I and was commissioned an officer, in which capacity he oversaw officer training courses at Repton, a well-known public school (1916–18). From 1920 to 1928 he worked in the publishing house of Benn Brothers, and in the latter year he founded his own firm, Victor Gollancz, Ltd. He quickly set the pattern that was to mark his entire career as a publisher, issuing both best sellers and works supporting his favoured causes. Among his better known authors were Harold Laski, John Strachey, A.J. Cronin, Dorothy Sayers, and John Le Carré.

Gollancz supported or headed numerous committees and organizations dedicated to social welfare, pacifism, abolition of capital punishment, and related goals. Through the Left Book Club, which he founded in 1936, he mobilized intellectuals and the public in the

fight against Fascism, and after World War II he was a leader in organizing relief efforts in Europe, especially in Germany, through the Save Europe Now campaign. At home his private and public work was credited with helping to lay the groundwork for the postwar Labour government and the creation of the modern British welfare state.

Among his own books were *Shall Our Children Live or Die?* (1942), *In Darkest Germany* (1947), *Our Threatened Values* (1947), and three volumes of autobiography, including *My Dear Timothy* (1952). Gollancz also compiled several inspirational anthologies, including *A Year of Grace* (1950; U.S. title *Man and God*, 1951) and *From Darkness to Light* (1956). He was knighted in 1965.

Golmud, Wade–Giles romanization KO-ERH-MU, Pinyin GE'ERMU, town in Tsinghai Province (*sheng*), western China. It is a county (*hsien*) seat in Hai-hsi-meng-ku-tsu-tsang-tsu-ha-sa-k'o-tsu (Hai-hsi Mongol-Tibetan-Kazakh) Autonomous Prefecture (*tzu-chih-chou*). Golmud is an important highway centre, standing at the intersection of two ancient routes, which have in recent times become modern highways. One links Hsi-ning in Tsinghai and Lan-chou in Kansu Province in the east with the western Tsaidam area; the other runs north to south from western Kansu via the Tang-chin Shan-k'ou (pass) to Na-ch'ü and Lhasa in Tibet. An insignificant place until the development of the rich mineral resources of the Tsaidam region (which include coal, oil, and vast natural deposits of salt and other minerals), Golmud has developed a chemical industry. The fertilizer produced there is of importance in plans to bring parts of the barren region into cultivation. Pop. (1970 est.) 10,000–50,000.

Golovin, Fyodor Alekseyevich, Graf (Count) (b. 1650, Russia—d. Aug. 10 [July 30, old style], 1706), Russian statesman and diplomat who served prominently during the reign of Peter I the Great of Russia (ruled 1682–1725).

Despite Golovin's loyalty to Peter, the regent Sophia Alekseyevna (ruled 1682–89)—Peter's half sister and political rival—promoted Golovin to the rank of *okolnichi* (court official) in 1685. Sent on a diplomatic mission to the Amur region, he entered into negotiations with China which resulted in the Treaty of Nerchinsk (ratified 1689). When Golovin returned to Moscow, he was rewarded with the rank of boyar (next in rank below the ruling princes) by Peter, who had displaced Sophia in 1689.

Golovin later participated as a general in Peter's two Azov campaigns against the Ottoman Turks (1695 and 1696), and in 1697–98 he accompanied Peter on his grand tour of western Europe, seeking and hiring trained naval officers for service in the new Russian Navy. In 1699 he was made an admiral general and placed in charge of the new navy department. In addition he was head of the foreign department and in charge of Russian diplomacy; before the outbreak of the Great Northern War against Sweden, he engaged in extensive diplomatic activity to prepare Russia for the war. Among other accomplishments he secured Russia's southern frontier by concluding the peace treaty of Constantinople with the Turks (1700) and directed, until his death, the negotiations with Peter's ally, the Polish king Augustus II.

Golovkin, Gavriil Ivanovich, Graf (Count) (b. 1660, Russia—d. 1734), Russian statesman and diplomat who was a close associate of Peter I the Great (ruled 1682–1725) and became Russia's first state chancellor.

A relative of Peter's mother, Natalya Naryshkina, Golovkin became a member of the royal court in 1677, and during Peter's childhood he actively supported the Naryshkins in their efforts to overthrow the regent, Peter's half sister Sophia Alekseyevna. When they succeeded (1689), Golovkin was appointed director of the state treasury.

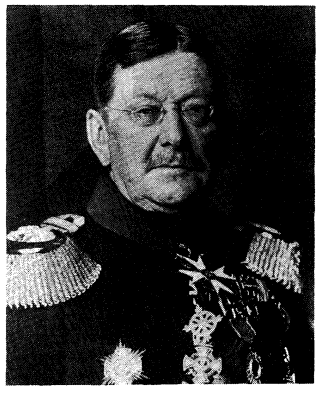
In 1697–98 he accompanied Peter on his grand tour of western Europe and worked with him in the Dutch shipbuilding yards. But when they returned home and Russia entered the Great Northern War against Sweden (1700), Golovkin became primarily engaged in diplomatic activities; in 1706 he was placed in charge of Russia's foreign affairs. He was promoted to the new position of state chancellor in 1709, and in 1710 he was honoured with the title "count."

When Catherine I (ruled 1725–27) succeeded Peter I, Golovkin became a member of the Supreme Privy Council, which assumed most state administrative functions. Catherine also named him the executor of her will, which left the Russian throne to Peter's descendants. Golovkin faithfully supported the succession of Peter I's grandson Peter II (ruled 1727–30) and served as his guardian. But he then destroyed the will, and when Peter II died he promoted the succession of the duchess of Courland, Anna Ivanovna, the daughter of Peter I's half brother Ivan V (died 1696). Golovkin helped Anna oppose other members of the Supreme Privy Council who tried to limit her autocratic powers. As a result, he was made a member of her cabinet as well as a senator (1731). Old age and illness, however, prevented him from actively participating in government affairs during Anna's reign.

Golovnin, Vasily Mikhaylovich (b. April 19 [April 8, old style], 1776, Ryazan province, Russia—d. July 11 [June 29, O.S.], 1831, St. Petersburg), Russian naval officer and seafarer who in 1807 was commissioned by the government of Tsar Alexander I to chart the coasts of Russian-held Alaska, the Kurile Islands, and Kamchatka. He was taken prisoner by the Japanese in 1811 and spent two years in captivity. His *Narrative of My Captivity in Japan 1811–1813* (1816) stimulated an interest in Japan throughout the United States and Europe. In 1817, again by government order, Golovnin set out to circumnavigate the globe. Enroute he continued to map the Kurile Islands and Kamchatka coasts.

Golovnin served as a volunteer in the British navy during Great Britain's wars against Napoleon. His books include *Journey to Kamchatka* (1819) and *Voyage Around the World* (1822).

Goltz, (Wilhelm Leopold) Colmar, Freiherr von der (baron of), Turkish title GOLTZ PASHA (b. Aug. 12, 1843, near Labiau, East Prussia—d. April 19, 1916, Baghdad), Prussian soldier, military teacher, and writer, an imperial German field marshal who reorganized the Turkish Army (1883–96) and who served as commander in chief of Turkish forces against the British in Mesopotamia (Iraq) during World War I. Despite his advanced age, he successfully conducted the 143-day siege of Gen. Sir Charles Townshend's British contingent at Kut (1915–16).



Colmar, Freiherr von der Goltz

By courtesy of the Staatsbibliothek Berlin

A soldier from 1861, Goltz taught military history at the military academy in Berlin (1878–83). Sent to Turkey in June 1883, he modernized its army so effectively that, after his return to Germany, Turkey was winning the Greco-Turkish War of 1897 decisively until the major European powers intervened to stop the conflict.

In August 1914, the first month of World War I, Goltz was appointed governor general of German-occupied Belgium. In November of that year he became aide de camp to the sultan Mehmed V of Turkey. Placed in command of the Turkish First Army in Mesopotamia, he halted Townshend's Anglo-Indian army at Ctesiphon on Nov. 22, 1915, and then, on December 8, trapped Townshend inside Kut. After Goltz's troops had repulsed a large British relief force, Townshend surrendered on April 29, 1916. According to the official report, Goltz had died of typhus, but it has been said that he was poisoned by the revolutionary Young Turks.

Among Goltz's military writings is his classic *Das Volk in Waffen* (1883; *The Nation in Arms*).

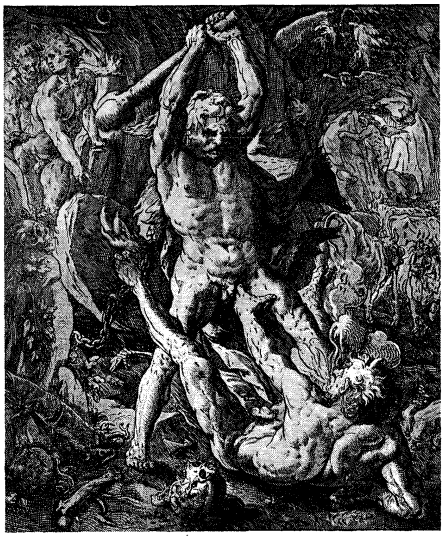
Goltz, (Gustav Adolf Joachim) Rüdiger, Graf von der (count of) (b. Dec. 8, 1865, Züllichau, Brandenburg, Prussia—d. Nov. 4, 1946, Kinsegg, Allgäu, W.Ger.), German army officer who, at the end of World War I, tried unsuccessfully to build a German-controlled *Baltikum* in Latvia, in order to prevent domination of that country by Soviet Russia.

A general commanding an infantry division in France, Goltz was transferred to Finland in March 1918 to help the Finnish national army against the Finnish–Russian Red Army. Entering Helsinki on April 13, his division held the city until after the armistice of Nov. 11, 1918. In January 1919 the German high command appointed him "governor" of Liepāja (Libau), Latvia, where Prime Minister Kārlis Ulmanis' Latvian government had taken refuge from the Red Army occupying Riga. Arriving at Liepāja on February 3, he took command of the German–Latvian VI Reserve Corps, which, on May 22, captured Riga, where he attempted to set up a pro-German civil government. In a battle near Cesis (Wenden) on June 19–22, however, he was defeated by an Estonian–Latvian force under Estonian general Johan Laidoner and forced to abandon Riga, to which the Ulmanis government returned.

On July 19, British general Sir Hubert de la Poer Gough, head of the Allied military mission to the Baltic countries, ordered Goltz and his troops to return to Germany. For five months Goltz declined to obey, using such stratagems as the pretense that his army comprised anti-Communist White Russians rather than Germans. Finally, on Dec. 18, 1919, he retreated into East Prussia.

Goltzius, Hendrik (b. 1558, Mulebrecht, Neth.—d. Jan. 1, 1617, Haarlem), Dutch engraver noted for his exquisite miniatures.

Under his father, Goltzius studied painting on glass; he then learned engraving and produced a set of prints of the story of Lucretia, the ravished Roman matron. Marriage to a rich widow enabled him to set up an independent business in Haarlem, where he spent the rest of his life except for a tour of Germany and Italy in 1590. His miniature portraits are distinguished both by their finish and as studies of character. Of his larger heads, a life-size portrait of himself is probably the most striking. In his technique as an engraver Goltzius is considered unsurpassed, even by Dürer; his



"Hercules Killing Cacus," woodcut by Hendrik Goltzius, 1588

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

paintings, on the other hand, show no special excellence.

Gołuchowski, Agenor (Romuald), Graf (Count) (b. Feb. 8, 1812, Skała, Austrian Galicia—d. Aug. 3, 1875, Lemberg, Austrian Poland), conservative Polish aristocrat and statesman who as Austria's minister of the interior (or minister of state; August 1859–December 1860) was one of the principal authors of the "October diploma" of 1860, which granted diets to the Habsburg lands and made the empire into a federal state.

Having served in the Galician provisional administration, Gołuchowski was governor of Galicia from 1849 to 1859. Then, as minister of the interior, he secured unprecedented autonomy for Galicia (Austrian Poland) and introduced Polish as an official language in the empire. His support of the "October diploma" reflected his federalist views. As governor of Galicia again (1866–68 and 1871–75), he successfully turned the Poles' revolutionary spirit into one of cooperation with the Habsburg dynasty in return for concessions to Polish nationalism.

Gołuchowski, Agenor (Maria Adam), Graf (Count) (b. March 25, 1849, Skała, Austrian Galicia—d. March 28, 1921, Lwów, Pol.), Austrian foreign minister (1895–1906) who negotiated the Austro-Russian agreement of 1897 that became the basis for a decade-long détente between the two powers.

Gołuchowski, the son of the governor of Galicia, Count Agenor Gołuchowski, was a longtime member of the Austrian diplomatic service. He significantly eased European tensions with his Austro-Russian agreement of 1897 and with the Austro-Russian Mürzsteg Pact of 1903 concerning a joint policy toward Turkey. Gołuchowski nevertheless remained loyal to Austria's principal ally, Germany. During the first Moroccan crisis (1905) between France and Germany, his role as mediator earned him the praise of the German emperor William II. Gołuchowski, a Pole, fell when the Hungarians suspected him of opposing the use of Hungarian as a command language in the Austro-Hungarian Army. At the same time the heir presumptive Archduke Francis Ferdinand blamed him for being too subservient to Hungarian demands.

Gomal Pass (Pakistan): *see* Gumal Pass.

Gomarist, also called CONTRA-REMONSTRANT, or COUNTER-REMONSTRANT, follower of the Dutch Calvinist theologian Franciscus Gomarus (1563–1641), who upheld the theological position known as supralapsarianism, which claimed that God is not the author of sin yet accepted the Fall of man as an active decree of God. They also opposed toleration for Catholics, for Jews, and for other Protestants. In opposing the Gomarists, Johan van Oldenbarnevelt, one of the Netherland's great statesmen, became embroiled in a religious controversy that had political implications, and he eventually was found guilty of treason and executed. At about the same time the Gomarists took control of the Dutch Reformed Church. Their intransigence helped lead to renewal of war with Spain in 1621.

Gomarus, Franciscus, English FRANCIS GOMAR, French FRANÇOIS GOMAR (b. Jan. 30, 1563, Bruges, Flanders—d. Jan. 11, 1641, Groningen, Groningen), Calvinist theologian and professor whose disputes with his more liberal colleague Jacobus Arminius over the doctrine of predestination led the entire Dutch Reformed Church into controversy.

Gomarus served as pastor of a Dutch Reformed church in Frankfurt am Main from 1587 until 1593, when the congregation was dispersed by anti-Protestant persecution. In 1594 he was appointed professor of theology at Leiden, where he became a leader of the opponents of Arminius. When Arminius joined the same faculty in 1603, their disputes increased in intensity.

Gomarus debated Arminius before the assembly of the estates (regional governmental bodies) of Holland in 1608, and was one of five Gomarists who debated five Arminians in

Gomarus, engraving after a portrait by W.I. Swanenburgh

By courtesy of the Iconographisch Bureau, The Hague

the same assembly in 1609. In their disputes Gomarus upheld the strict Calvinist view that those elected to salvation had already been chosen before Adam's Fall, but Arminius allowed for the possibility that every man was potentially a member of the elect. Later a professor at Saumur and at Groningen, Gomarus took a leading part in the Synod of Dort (Dordrecht) in 1618–19 as an opponent of Arminianism, which was condemned by the synodical delegates.

Gomati River, also called GUMTI, tributary of the Ganges River, central Uttar Pradesh, northern India. It rises in northern Uttar Pradesh about 32 mi (51 km) east of Pilibhit and is intermittent for the first 35 mi of its course, becoming perennial after its junction with the Joknai. Below this point it flows generally southeastward for some 500 mi, receiving its only major tributary, the right-bank Sai River, near Jaunpur and emptying into the Ganges near Saidpur. It drains a basin of approximately 7,240 sq mi (18,750 sq km).

Gombe, town and traditional emirate, southeastern Bauchi State, northeastern Nigeria. Gombe emirate was founded in 1804 by Buba Yero (Abubakar), a follower of the Muslim Fulani leader Usman dan Fodio. The emirate headquarters of Gambe was established in 1824 and renamed Gombe Aba (Old Gombe) upon the death of Buba Yero in 1841. The emirate prospered until the 1880s, when religious warfare and the encroachment of British colonial rule brought severe disruption to the area. The emirate capital was moved from Gombe Aba in 1913 to Nafada and in 1919 to Doma, which was then renamed Gombe.

Lying in the wooded savanna lands of the Gongola Basin, the area is mainly inhabited by Fulani, Bolewa, Tera (Terawa), Tangale, Hausa, Kanuri, Waja (Wajawa), and Tula peoples. In addition to Gombe town, Kumo, Deba Habe, Pindiga, Dukku, and Nafada are important market centres. The multipurpose Dadin Kowa dam has been constructed on the nearby Gongola River.

Gombe town is a major collecting point, especially since the opening of the railroad in 1963, for peanuts (groundnuts) and cotton, and a local trade centre in sorghum, millet, cowpeas, cassava, beans, onions, and tobacco. Its people keep cattle, goats, sheep, horses, and donkeys and practice the traditional crafts of weaving and dyeing cotton. The presence of limestone deposits led to the building of a cement factory at nearby Ashaka Village in the early 1970s. Modern textile manufacture in Gombe town also began in the early 1970s, and a seed-oil mill has been built. The town is served by a national technical teacher-training college and an Arabic teacher-training college, and it has a hospital. Gombe is located just south of the railway from Bauchi to Maiduguri and on the secondary highway between Bauchi and Kumo. Pop. town (1983 est.) 77,730.

Gomberg, Moses (b. Feb. 8, 1866, Elisavetgrad, Russia—d. Feb. 12, 1947, Ann Arbor, Mich., U.S.), Russian-born U.S. chemist who initiated the study of free radicals in chemistry when in 1900 he prepared the first authentic one, triphenylmethyl.

At age 18 Gomberg migrated with his family to the U.S. because his father's anti-tsarist activities made them unwelcome in Russia. He overcame poverty and language difficulties to earn his undergraduate degree (1890) and Ph.D. (1894) at the University of Michigan, Ann Arbor. Except for a year of study abroad, he was active in teaching and research at the university and was head of the chemistry department from 1927 to his retirement in 1936.

Gombert, Nicolas (b. *c.* 1490, southern Flanders—d. *c.* 1556, Tournai, Flanders), one of the leading Flemish composers of the Renaissance whose work forms a link between that of the two masters Josquin des Prez and Palestrina.

He travelled widely as a singer and master of the choirboys in the Chapel Royal of Charles V and later held positions at the cathedrals of Courtrai and Tournai. Gombert, like Josquin, developed techniques of melodic imitation, but Gombert used a freer, less symmetrical style. His compositions are smooth and even in texture, with less dramatic feeling than those of Josquin. His musical textures and his unobtrusive handling of dissonance point to the later style of Palestrina. His chansons are admired for their fresh, straightforward quality.

Gombert was viewed by his colleagues as an innovator. In his travels he was influential in spreading the Franco-Netherlandish style that became the international musical style of the Renaissance. His works include about 160 motets, about 60 chansons, 10 masses, and 8 Magnificats.

Gömbös, Gyula (b. Dec. 26, 1886, Murga, Hung., Austria-Hungary—d. Oct. 6, 1936, Munich), Hungarian premier (1932–36) who was known for his reactionary and anti-Semitic views and who was largely responsible for the trend to Fascism in Hungary in the interwar period.

Gömbös began his career as a professional officer and soon became conspicuous for his nationalist and anti-Habsburg views. In 1919, when a Communist government ruled Hungary, Gömbös organized a network of counterrevolutionary societies, some secret, others public; served as minister of defense in the émigré Szeged government; and formed a close connection with Adm. Miklós Horthy, regent of Hungary (1920–44). He also organized the military opposition to an attempt by King Charles IV (the Austrian emperor Charles I) to recover his throne in 1921.

Although Gömbös joined the opposition during the premiership of the conservative István Bethlen (1921–31), he became minister of defense on Oct. 10, 1929. On Oct. 1, 1932, Gömbös became premier, swept in on the wave of "right radical" unrest then prevalent in Hungary. He hoped to ally Hungary with Germany and Italy and to remodel the country internally on dictatorial lines. The opposition proved too strong, however, and he died in office with scarcely a single point of his program achieved.

Gombroon ware, in Islāmic ceramics, pierced white pottery and porcelain dating from the 18th century and noted for its colourless glaze and delicate texture, seeming more like glass than porcelain. Simple patterns were inscribed in paste or punctured through the sides, while the glaze flooded the incisions. The name is taken from an English trading post in Persia (now Bandar 'Abbās), from where the ware was shipped.

Gombrowicz, Witold (b. Aug. 4, 1904, Małoszyce, near Opatów, Kingdom of Poland—d. July 25, 1969, Vence, Fr.), Polish novelist and story writer, best known for his novel *Ferdydurke* (1937; Eng. trans., 1961), which he described as the "grotesque story of a gentleman who becomes a child because other people treat him like one."

Exiled in Argentina for 25 years (1937–63), his somewhat surrealistic work was banned in turn by the Nazis, the Stalinists, and the Polish government; and, although he returned to Europe, he lived in France for the remainder of his life. He published his postwar work abroad: the novels *Trans-Atlantyk* (1953), *Pornografia* (1960; *Pornography,* 1966), and *Kosmos* (1965; *Cosmos,* 1967), for which he won the 1967 International Prize for Literature. His ideas are similar to those expressed by Existentialist writers, but the style and language is unique and highly idiosyncratic, as can be seen in the play *Ślub* (1953; *The Marriage,* 1970) and his diaries, *Dziennik,* 3 vol. (1957–66). His short stories include *Pamiętnik z okresu dojrzewania* (1933; "Memoirs of an Adolescent") and *Bakakaj* (1957).

Gomel, *oblast* (administrative region), Belorussian Soviet Socialist Republic, with an area of 15,600 sq mi (40,400 sq km) on the level plain of the middle Dnepr River and its tributaries, in the southeastern corner of the republic. There are considerable areas of reed and grass marsh and of peat bog, most of the drier areas lying in dense forest of oak, pine, and hornbeam on soils that are commonly sandy. Much of the *oblast* is swampland, but some of this has been reclaimed in a number of localities. The east has slightly higher ground, largely cleared of forest and cultivated for flax, hemp, and potatoes. Dairying is widespread, the broad floodplain meadows along the rivers being used for hay and pasture. The timber industry is highly developed, the town of Gomel (the *oblast* headquarters) and Dobrush being the main lumbering centres. Other industries include machine building, metalworking, and food and timber processing. In the 1960s, exploitation of petroleum deposits began near Rechitsa and Ostashkovichi, but by 1977 production had declined. Pop. (1983 est.) 1,646,000.

Gomel, city and administrative centre, Gomel *oblast* (administrative region), Belorussian Soviet Socialist Republic, on the Sozh River. First mentioned in 1142 as Gomy, it passed to Lithuania in the 14th century and later to Poland; it was acquired by Russia in 1772. In the late 19th century Gomel developed as a major railway junction, and industries began to flourish. The town now is an important port and industrial centre, producing superphosphate fertilizers, agricultural machinery, machine tools, cables, bearings, timber products, glass, and footwear, foodstuffs, and other consumer goods. There are rolling-stock and rivercraft repair yards. Gomel has teacher-training and railway engineering institutes and a forestry research institute. Pop. (1983 est.) 432,000.

Gomera, island, Santa Cruz de Tenerife province, Spain, one of the Canary Islands in the North Atlantic. Circular in shape, it has an area of 146 sq mi (378 sq km), and its coasts, especially on the west, are rugged and precipitous; its interior is mountainous. The flattish dome of Alto de Garajonay (4,879 ft [1,487 m]) in the centre of the island is the highest point. The lower areas are semi-arid, but, because of the plentiful supply of fresh water from springs, the valley floors are irrigated, and bananas and date palms are grown. In the south, grapes, figs, cereals, and tomatoes are cultivated. The economy depends mainly on agriculture and the salting of tuna, and there is some boatbuilding. The only roads are short and follow the lines of the larger valleys.

San Sebastián de la Gomera, on the east coast, the chief port and capital, has a sheltered roadstead and is backed by the steep cliffs of a wide ravine. It was the last stopping place of Christopher Columbus on his first transatlantic voyage in 1492, and the house where he stayed and the church he attended are tourist attractions.

Gomera is famous for the whistling language (an art acquired from the extinct Guanches people) used by natives of the island to communicate from hilltop to hilltop. Pop. (1981) 18,237.

Gomes, Diogo (fl. 1440–84), Portuguese explorer sent by Prince Henry the Navigator to investigate the West African coast in about 1456. He sailed south beyond the Gêba River, now in Guinea-Bissau, and on the return trip ascended the Gambia River to the town of Cantor (now Kuntaur, The Gambia), where he met men from Tombouctou (Timbuktu). Illness among his crew precluded exploration any farther inland. On a second voyage, about 1460, he landed at São Tiago in the Cape Verde Islands. Though he later claimed to have discovered this island group, it had allegedly been visited in 1456 by Alvise Ca'da Mosto (Cadamosto), a Venetian in service to Prince Henry.

The reliability of the routes and dates in Gomes' account of his voyages, dictated in 1484 to the German geographer Martin Behaim, is considered questionable.

Gómez, José (bullfighter): *see* Joselito.

Gómez, Juan Vicente (b. 1864, San Antonio de Táchira, Venezuela—d. Dec. 17, 1935, Maracay), the dictator of Venezuela from 1908 until 1935, reputed to have been the wealthiest man in South America.

Although a nearly full-blooded Indian with almost no formal education, Gómez became a figure of local prominence in the Andean region. Joining the private army of Cipriano Castro in 1899, he was appointed vice president when Castro captured Caracas and the government. In 1908, when Castro was recuperating from illness in Europe, Gómez seized power and ruled either as president or through puppet figures until his death.

Under Gómez, Venezuela achieved a measure of independence and economic progress. In 1918, when oil was discovered near Lake Maracaibo, Gómez bargained shrewdly with the United States, British, and Dutch petroleum interests for the benefit of Venezuela. He continued to maintain good relations with foreign nations and managed to eliminate all foreign indebtedness. He exercised control over the local *caudillos* ("bosses") and the Roman Catholic Church, embarked on a program of public works, and organized an efficient administration.

All the while, however, he added to his legendary fortune, acquiring farms, businesses, and various industries. While he was growing richer, he controlled the nation through force and terror. His army was the best equipped in South America, and his spies and agents were everywhere. When he died, the nation was left without a single political figure untainted by association with Gómez.

Gómez (Castro), Laureano Eleuterio (b. Feb. 20, 1889, Bogotá—d. July 13, 1965, Bogotá), extremely conservative politician who was president of Colombia (1950–53) until forced into exile by a coalition of Liberals and Conservatives.

Laureano Gómez
By courtesy of the Organization of American States

Gómez received an engineering degree in 1909 but immediately entered politics and journalism, serving in various ministries at home and abroad in the 1920s. In 1932 he became the head of the Conservative Party.

Gómez' strong support for both Hitler and Franco caused him frequent trouble in Colombia, and he was forced into exile several times. When the Conservatives gained the presidency in 1946, he was appointed foreign minister but was exiled once again for his suspected involvement in the assassination of the Liberal politician, Jorge Eliécer Gaitán. Returning to Colombia, he became president in 1950 after an election marked by the imposition of martial law and press censorship and by the failure of the Liberals to participate. His rule earned him the enmity of most Colombians of all political shades. He censored the press, shackled the courts, terrorized Protestants, and caused violent rebellion in the countryside. Deposed in 1953, he fled once again to Spain. But his successor as president, Gustavo Rojas Pinilla, was so savage and incompetent that in 1957 Gómez joined with the Liberals in establishing the national front that placed Alberto Lleras Camargo in the presidency.

Gómez de Avellaneda, Gertrudis (b. March 23, 1814, Puerto Príncipe, Cuba—d. Feb. 1, 1873, Madrid), Cuban playwright and poet who is considered one of the foremost Romantic writers of the 19th century and one of the greatest women poets.

Gómez came to Spain in 1836, where, except for a short period from 1859 to 1863, she lived for the rest of her life. During her Cuban stay she had a strong influence on Cuban literature. Her first poems, originally published under the pseudonym of La Pere-

grina (The Pilgrim), were collected in 1841 into a volume entitled *Poesías líricas* ("Lyrical Poems"). Combining the classical style of Manuel José Quintana with her own romantic vision, tinged with a pessimism born of much personal suffering, these poems rank among the most poignant in all Spanish literature. Her plays, distinctive for their poetic diction and lyrical passages, are based chiefly on historic models; her play *Alfonso Munio* (1844; rev. ed., *Munio Alfonso,* 1869), based on the life of Alfonso X, and *Saúl* (1849), a biblical drama, achieved popular success. Her novels, such as *Sab* (1841), an anti-slavery work, are

Gertrudis Gómez de Avellaneda, detail of a portrait by Federico de Madrazo, 1857

Archivo Mas, Barcelona

now almost completely forgotten. Twice widowed and with many lovers, she has been the subject of several biographies.

Gómez de la Serna, Ramón (b. July 5, 1891, Madrid—d. Jan. 12, 1963, Buenos Aires), Spanish writer whose *greguerías,* brief poetic statements characterized by a free association of words, ideas, and objects, had a significant influence on avant-garde literature in Europe and Latin America.

Gómez de la Serna studied law but never practiced. He devoted his life to literature, publishing his first book in 1904. About 1910 he invented the *greguería* (the word was accepted in the dictionary of the Academy), which he defined as "humour plus metaphor"; *e.g.,* "it is only in botanical gardens that trees carry visiting cards." He also wrote biographies, novels, and plays. Although totally apolitical, he went into exile in Argentina in 1936 and suffered after Perón's fall in 1955. He founded the important literary magazine *Prometeo* and wrote more than 100 books and countless articles in leading European and South American newspapers and journals. His *Dali* (1977; Eng. trans., 1979) reflects the surrealism of both the artist and the author.

Gómez Farías, Valentín (b. Feb. 14, 1781, Guadalajara, Mex.—d. July 5, 1858, Mexico City), the leader of Mexican liberalism in the mid-19th century, notable for his social reforms of 1833–34, which earned him the enmity of the clergy, the army, and the gentry. After training as a physician, he was influenced by French liberal political ideas and participated in the Mexican struggle for independence during the 1820s. In 1833 he was elected vice president in the administration of Antonio López de Santa Anna.

When Santa Anna left the capital, Gómez Farías, in effective control of the government, immediately obtained legislation that reduced the number of generals, ended the special privileges of the military, and created a civilian militia. Personally devout, he nonetheless favoured a complete separation of church and

Gómez Farías, detail of a portrait by L. Garcés, 19th century

By courtesy of the Instituto Nacional de Antropologia e Historia, Mexico City

state but succeeded only in severing church control of education, rescinding the compulsory payment of tithes, and permitting members of religious orders to retract their vows. He also reformed the customhouses and eliminated the tobacco monopoly.

The uproar from the offended interests brought Santa Anna back to the capital, and Gómez Farías was forced to flee to New Orleans (1835). Although his liberalism was out of favour, Gómez Farías persisted in Mexican politics, becoming president for a brief period in 1846, only to be unseated once again by Santa Anna. It was not until 1857 that his daring social reforms became established in the new constitution drafted by Benito Juárez.

Gómez Palacio, former city, now a suburb of Torreón (to the southeast across the Río Nazas), northeastern Durango state, north central Mexico. It is an important agricultural and industrial centre in the Laguna irrigation district. In the environs, cotton and wheat are the principal crops, but corn (maize), barley, wine grapes, fruits, vegetables, sugarcane, and tobacco are also cultivated. Among the city's industries are flour and textile mills, distilleries, tanneries, iron and steel foundries, and soap factories. The city, founded in 1886 by Spanish philanthropist Santiago Lavín, who donated the land from his hacienda, bears the name of Francisco Gómez Palacio, then governor of the state. Through Torreón, it is easily accessible by highway, railroad, and air. Pop. (1970) 79,650.

Gómez y Báez, Máximo (b. Nov. 18, 1836, Bani, Dominican Republic—d. June 17, 1905, Havana), distinguished commander in chief of the Cuban revolutionary forces in the unsuccessful Ten Years' War (1868–78) and again in the successful revolution against Spain some 20 years later.

Rejecting the clerical career that his mother desired for him, Gómez at the age of 16 fought against Haitian forces and later unsuccessfully led his nation's army against Spanish troops, after which he migrated to Cuba to work as a farmer, enlisting as a sergeant when the Cuban revolution broke out in 1868. He rose quickly to become second in command and later, in 1870, commander in chief. A master strategist, he organized and directed the guerrilla forces against the well-equipped Spanish Army. The Ten Years' War ended inconclusively, however, with a general amnesty and limited concessions to the Cubans; Gómez and the other revolutionary leaders refused to accept the accord and went into exile.

When rebellion erupted again in 1895, Gómez returned to Cuba to reassume command of the revolutionary forces. He hoped that his guerrilla activity would induce the United States to intervene to end the destruction of American property, and, ironically, it was the eventual U.S. military intervention that completely overshadowed the heroic exploits of Gómez and other Cuban patriots. When the Cubans were finally granted limited freedom in 1902, Gómez could have been elected president but did not wish to accept public office.

Gommateśvara: *see* Bāhubali.

Gomorrah: *see* Sodom and Gomorrah.

Gompers, Samuel (b. Jan. 27, 1850, London—d. Dec. 13, 1924, San Antonio, Texas, U.S.) U.S. labour leader and first president of the American Federation of Labor.

Gompers emigrated in 1863 to New York, where he followed his father's trade of cigar making and became a naturalized citizen in 1872. As a labour leader, Gompers gained a worldwide reputation for conservatism. In a period when the U.S. was bitterly hostile to labour organizations, he evolved the principles of "voluntarism," which stressed that unions should exert coercion by economic actions, *i.e.,* strikes and boycotts. In 1886 Gompers led the national organization of cigar makers from the Knights of Labor to form the American Federation of Labor (AFL), of which he was president from 1886 to 1924 (except for one year, 1895). He distrusted the influence

Gompers, 1911

By courtesy of the Library of Congress, Washington, D.C.

of intellectual reformers, fearing any activity which would divert labour's energy from economic goals. To make unionism respectable as a bulwark against radicalism and irresponsible strikes, he encouraged binding, written trade agreements and advocated the primacy of national organizations over both local unions and international affiliations.

Gompers kept the AFL politically neutral until pressed by employer tactics, including an open-shop drive, and by federal court injunctions which greatly weakened labour's economic weapons, the strike, picket line, and boycott. The Democratic presidential platform of 1908 included an anti-injunction plank; hence, Gompers supported William Jennings Bryan's unsuccessful presidential candidacy. With the victory of Woodrow Wilson in 1912, the Clayton amendments to the Sherman Antitrust Act (1914) and the Adamson Act (1916) were passed and a Cabinet post for labour was created (1913). Gompers hailed the Clayton amendments as labour's "Magna Carta," but the U.S. Supreme Court interpretation of the act vitiated this hope.

Gomułka, Władysław (b. Feb. 6, 1905, Białobrzegi, near Krosno, Pol., Austria-Hungary—d. Sept. 1, 1982, Warsaw), first secretary of the Central Committee of the Polish Communist Party from 1956 to 1970.

Before Gomułka's birth his parents had emigrated to the United States but had returned disillusioned. His father, Jan, was a Socialist and worked in the oil fields. Gomułka completed primary school in 1917 and afterward was trained as a locksmith. At the age of 16 he joined the youth Socialist movement. In 1926 he entered the clandestine Communist Party of Poland and in the same year was first arrested for revolutionary activity.

At this time Gomułka became a professional trade union organizer, and in 1930 he was

elected a national secretary of the Chemical Workers' Union. Thereafter he organized workers' strikes throughout the country. During the textile strike at Łódź in 1932, he was seriously wounded in the leg by the police and was left with a permanent limp. He was arrested and sentenced to four years' imprisonment but was released for reasons of health in 1934. In 1934–35 Gomułka studied at the International Lenin School in Moscow. After his return to Poland he continued revolutionary activity in Silesia, and in 1936 he was again arrested and sentenced to seven years' imprisonment. When the Communist Party of Poland was dissolved on Stalin's orders in 1938 and most of its leaders exterminated in the Soviet Union, Gomułka stayed in prison in Poland. He was released when Germany and the Soviet Union invaded Poland in 1939. After participating in the defense of Warsaw, he moved to the Soviet-occupied eastern part of the country, where he worked as a minor official in a paper mill in Lwów.

With the outbreak of war between Germany and the Soviet Union in 1941, Gomułka resumed his political activities. At first he returned to his native region of Krosno and organized the Communist underground there. In July 1942 he moved to Warsaw, where he became district secretary and a member of the Central Committee of the newly founded Polish Workers' Party (Polska Partia Robotnicza; PPR). There he organized daring attacks by the underground on the Nazi occupiers. In November 1943, after the arrest of his predecessor, Gomułka became secretary general of the PPR. He is credited with writing the Party's ideological manifesto and helping to establish the National Home Council (Krajowa Rada Narodowa; KRN) in cooperation with other leftist groups. When Soviet troops entered Poland in July 1944, Gomułka moved to Lublin, where the Communist-dominated provisional government had been set up. In January 1945 he was appointed deputy premier, and in June he also assumed the portfolio of the Recovered Territories, with responsibility for the administration of all Polish lands that had been held by Germany. In December 1945, at the First Congress of the PPR in Warsaw, Gomułka was elected a member of the Politburo and secretary general of the Central Committee.

Gomułka was ruthless in eliminating all opposition to the Communist rule. He personally led the struggle to crush the Polish Peasant Party (PSL), and he was a strong advocate of the merger, on Communist terms, of the Polish Socialist Party (PPS) and the PPR. At the same time, however, he came out against forcible collectivization of agriculture and spoke favourably of the socialist tradition. In opposing the formation of the Cominform in September 1947, he was even critical of the Soviet line. This led to his political eclipse. On Stalin's orders, Gomułka was accused of "nationalist deviation," and in September 1948 he was replaced as secretary general of the PPR by Bolesław Bierut. After the Communist and Socialist parties merged into the Polish United Workers' Party (Polska Zjednoczona Partia Robotnicza; PZPR) in December 1948, Gomułka was also dropped from the Politburo. In January 1949 he was relieved of his government posts, and in November of the same year he was stripped of his membership in the Communist Party. Finally, he was arrested in July 1951. Throughout his persecution—even when imprisoned, his life clearly in peril—Gomułka acted in a dignified and courageous manner and refused to admit guilt.

Toward the end of 1954, more than a year after Stalin's death, Gomułka was released, and he was politically rehabilitated in 1956, after Premier Nikita Khrushchev had launched the de-Stalinization campaign in February and Bierut had died in March. In April the new party secretary, Edward Ochab, reiterated the charges of "nationalist deviation" against Gomułka but admitted he should not have been arrested. After the Poznań workers rioted against the Communist government in June, Gomułka's political fortunes started to rise once again. His persecution by Stalin had turned Gomułka into a popular figure among the Poles, and they now demanded that he be restored to power. In the tense atmosphere prevailing in the country, the Communist leaders acceded to the popular wishes. In August 1956 Gomułka was readmitted to the party and in October was reelected to the Politburo and to the position of first secretary of the Central Committee. Soon he was also elected a member of Poland's collective presidency, the Council of State. His return to power was a moment of great personal triumph for Gomułka. Hoping that he would undertake substantial reforms, the people gave him their almost universal support.

The reforms adopted by Gomułka were half-hearted. The most oppressive Stalinist features were eliminated: the rule of terror was curbed, the persecution of the Roman Catholic Church was ended, and the collectivization of agriculture was abandoned. Several objectionable features of the older system were, however, preserved: intellectual freedom remained restricted, and no major economic reform was carried out. His retrogressive course led to disillusionment among the Poles, but in the late 1950s many people still believed his policies resulted from pressure from Moscow.

In 1961, after Khrushchev launched his second de-Stalinization campaign, Gomułka failed to exploit this opportunity to undertake further reforms and the situation in Poland remained stagnant. From then on, Gomułka's popular support declined rapidly. The ferment among the people steadily gathered strength until it culminated in March 1968 in the open defiance of the Gomułka regime by intellectuals and in students' riots in Warsaw and several other Polish cities.

Gomułka survived the crisis and at the Fifth Party Congress in November 1968 was reelected first secretary, but his political influence was clearly on the wane. He was discredited among a large segment of the people and was challenged by powerful rivals within the party leadership. Gomułka tried to stave off defeat by belatedly adopting some new policies. In 1969 he changed Poland's policy vis-à-vis West Germany, leading to the signing early in December 1970 of a Polish-West German treaty normalizing relations between the two countries and sanctioning the Polish western boundary. At the same time, he launched substantial economic reforms, but by then the Polish economy was severely run down. The announcement of increased food prices on the eve of the Christmas holidays led to workers' riots in the cities of Gdańsk, Gdynia, and Szczecin. This ferment in the country resulted in a change in the top party leadership, and on Dec. 20, 1970, Gomułka was ousted as first secretary.

Although he officially continued to be a member of the Council of State until 1971 and of the Sejm (national legislature) until 1972, Gomułka had entered a retirement from public life. It was not until 1980 that the party again officially recognized Gomułka, publishing a tribute to him on his 75th birthday.

(A.Br.)

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gonad, in zoology, primary reproductive gland that produces reproductive cells (gametes). In males the gonads are called testes; the gonads in females are called ovaries. (*see* ovary; testis).

The gonads in some lower invertebrate groups (*e.g.*, hydrozoans) are temporary organs; in higher forms they are permanent. In some invertebrates, such as oligochaete worms and leeches, both male and female gonads exist in a single organism. Sponges do not have discrete gonads; instead, reproductive cells are formed by aggregations of amoebocytes in the body wall. In echinoderms (*e.g.*, starfish), the gonads are usually suspended from the radiating arms directly into the sea.

The usually paired gonads of vertebrates produce both gametes and hormones necessary for reproduction. Some, such as both male and female adult cyclostomes, have only one gonad. Most female birds, a few female teleost and elasmobranch fishes, some male lizards and female crocodiles, and the female platypus and a few female bats also have only one gonad.

Gonaïves, capital of L'Artibonite *département,* western Haiti, on the northeastern shore of the Golfe de la Gonâve (Gulf of Gonaïves). Originally an Indian village called Gonaibo, it is now the commercial centre and port of the fertile Artibonite Plain, with a natural harbour; coffee, cotton, sugar, bananas, mangoes, and cabinet woods are exported. In 1802 the French captured the revolutionary hero François Toussaint-Louverture at his farm outside the town. Jean-Jacques Dessalines proclaimed Haiti's independence from France at the town's Place d'Armes on Jan. 1, 1804. A notable landmark is the Musée du Centenaire, inaugurated in 1904 to commemorate the nation's first century of independence. Pop. (1982 prelim.) 34,209.

Gonardīya (Hindu author): *see* Patañjali.

gonbad: *see* türbe.

Gonçalves, Antônio Aurélio (b. *c.* 1920, São Vicente, Cape Verde Islands), Portuguese African story writer, novelist, critic, and teacher whose works challenge the traditional social role of women in the Cape Verde Islands.

Gonçalves attended the University of Lisbon and later taught history and philosophy at the Liceu Gil Eanes in São Vicente. All of Gonçalves' *noveletas* (his coinage for novella) and other fiction have Cape Verdean women as central characters, and in this regard he is unique among Lusophone African writers. His short story "História de Tempo Antigo" (1960; "Story of Former Times") involves the death of the narrator's mother and emphasizes familial bonds between mother and child. *Pródiga* (1956; "The Prodigal Daughter") examines the life of a wayward daughter who leaves home, has an affair, and returns to the fold. *O Enterro de Nhâ Candinha Sena* (1957; "The Burial of Mrs. Candinha Sena") delves into the narrator's childhood relationship with a childless woman of great kindness and character. *Noite de Vento* (1970; "Night of Wind") and *Virgens Loucas* (1971; "Crazy Virgins") also have female protagonists. In the former, he creates an extremely beautiful dark-skinned woman who follows her own desires, and in the latter, he parallels the book of Matthew with a story about three prostitutes. Gonçalves' world and his women revolve around the Cape Verdean social dilemma, a society in flux, and emigration.

Gonçalves, Nuno (fl. 1450–72), Portuguese painter recognized as one of the genuine masters of the 15th century. After the discovery

in 1882 of his only extant work, the altarpiece for the convent of São Vicente, he was, despite 400 years of anonymity, finally acknowledged as the founder of the Portuguese school of painting and as an artist of universal importance.

Apparently Gonçalves was appointed court painter to the Portuguese king Afonso V in 1450. Francisco de Hallanda, in his *Dialogues on Ancient Painting* (1548), refers to him as one of the "Eagles"—one of the 15th-century masters—but his name and work were lost to history. His altarpiece for the cathedral of Lisbon was destroyed in the earthquake of 1755, and his other altarpiece on the subject of São Vicente, the patron saint of Lisbon and of the royal house of Portugal, disappeared until 1882, when it was discovered in the convent of São Vicente. It was not until 1931, when

"Panel of the Infante," part of the polyptych for São Vicente by Nuno Gonçalves, second half of the 15th century; in the Museu Nacional de Arte Antiga, Lisbon

Estudio Mario Novais

this masterpiece was displayed in Paris, that Gonçalves received the international recognition that he deserved.

The polyptych for São Vicente (now in the Museu Nacional de Arte Antiga, Lisbon) consists of six panels, two large and four narrow ones, dominated by the figure of St. Vincent. In the large "Panel of the Infante" the saint is shown being venerated by a group of notables, among them Afonso V. In the other large "Panel of the Archbishop" he is surrounded by clergy and knights. This remarkable portrait gallery of figures grouped in a medieval composition is a meditation on the pilgrimage of souls, of Christians on a voyage of discovery around their patron saint. It is the work of a master who shows some debts to Italian and Flemish art but who also reveals his own remarkable gifts—an economy of line, brilliant handling, superb characterization, and a mastery of composition, all united and all subordinated to the religious vision of the work.

Gonçalves Dias, Antônio (b. Aug. 10, 1823, Boa Vista, near Caxias, Maranhão, Braz.—d. Nov. 3, 1864, off the coast of Maranhão), Romantic poet generally regarded as the national poet of Brazil. His "Song of Exile" (1843), beginning "Minha terra tem palmeiras" ("My land has palm trees"), is known to every Brazilian schoolchild.

Though he lived much of the time abroad following his education at the University of

Gonçalves Dias

By courtesy of the Library of Congress, Washington, D.C.

Coimbra in Portugal, his songs, published as *Primeiros Cantos* (1846; "First Poems"), *Segundos Cantos* (1848; "More Poems"), and *Últimos Cantos* (1851; "Last Poems"), continually celebrated the New World as a tropical paradise with exuberance and longing. He was himself of the common Brazilian racial mixture—Portuguese, Indian, and Negro—that Brazilians consider to be the source of their distinctive temperament.

Despite the romantic bohemianism of his personal life and his many fleeting love affairs, he was a respected ethnologist and scholar. He published a dictionary of the Tupí Indian language and an unfinished Indian epic, *Os Tambiras* (1857; "The Tambiras"). He held governmental posts in which he surveyed the school system of northern Brazil, and he did research on Brazilian historical sources in European archives.

In 1859 he took part in a scientific exploration of his country's natural resources in the Upper Amazon Valley, from which he returned suffering from tuberculosis. In 1862 he sought a cure in Europe, but his health continued to deteriorate, and he sailed for Brazil in 1864. He died in a shipwreck within sight of Maranhão.

Goncharov, Ivan Aleksandrovich (b. June 18 [June 6, old style], 1812, Simbirsk, Russia—d. Sept. 27 [Sept. 15, O.S.], 1891, St. Petersburg), Russian novelist and travel writer, whose highly esteemed novels dramatize social change in Russia and contain some of Russian literature's most vivid and memorable characters.

Goncharov was born into a wealthy merchant family and, after graduating from Moscow University in 1834, served for nearly 30 years as an official, first in the Ministry of Finance and afterward in the Ministry of Censorship. The only unusual event in his uneventful life was his voyage to Japan made in 1852–55 as secretary to a Russian admiral; this was described in *Fregat Pallada* (1858; "The Frigate Pallas").

Goncharov's most notable achievement lies in his three novels, of which the first was *Obyknovennaya istoriya* (1847; *A Common*

Goncharov

Novosti Press Agency

Story, 1917), a novel that immediately made his reputation when it was acclaimed by the influential critic Vissarion Belinsky. *Oblomov* (1859; Eng. trans., 1954), a more mature work, generally accepted as one of the most important Russian novels, draws a powerful contrast between the aristocratic and capitalistic classes in Russia and attacks the way of life based on serfdom. Its hero, Oblomov, a generous but indecisive young nobleman who loses the woman he loves to a vigorous, pragmatic friend, is a triumph of characterization. From this character derives the Russian term *oblomovshchina,* epitomizing the backwardness, inertia, and futility of 19th-century Russian society. Goncharov's third novel, *Obryv* (1869; *The Precipice,* 1915), though a remarkable book, is inferior to *Oblomov.*

In all three novels Goncharov contrasts an easygoing dreamer with an opposing character who typifies businesslike efficiency; the contrast illumines social conditions in Russia at a time when rising capitalism and industrialization uneasily coexisted with the aristocratic traditions of old Russia.

Of Goncharov's minor writings, the most influential was an essay on Aleksandr Griboyedov's play *Gore ot uma* (*Wit Works Woe*).

Goncharova, Natalya, Russian NATALIYA SERGEYEVNA GONCHAROVA, Goncharova also spelled GONTCHAROVA (b. June 4, 1881, Ladyzhino, Russia—d. Oct. 17, 1962, Paris), innovative Russian painter, sculptor, and stage designer who was important as a founder, with Mikhail Larionov, of Rayonism (*c.* 1910) and as a designer for the Ballets Russes.

The daughter of an aristocratic family, Goncharova studied painting and sculpture at the Academy of Fine Arts in Moscow. After an early preoccupation with sculpture, in 1904 she began seriously to paint, experimenting with the Cubist and Futurist styles during the next few years. It was as a synthesis of these movements that Goncharova and Larionov, whom she later married, conceived of Rayonism, which sought to portray in two dimensions the spatial qualities of reflected light. In 1912 Goncharova took part in Roger Fry's Postimpressionist exhibition in London and in the second exhibition of Der Blaue Reiter (The Blue Rider) in Munich.

Goncharova earned a high reputation in Moscow for her scenery and costume designs for the Kamerny Theatre. When she and Larionov moved to Paris in 1914 she became a designer for Sergei Diaghilev's Ballets Russes, her vibrant, Byzantine-inspired designs for the ballet "Coq d'Or" being especially notable.

Goncourt, Edmond and Jules, in full EDMOND-LOUIS-ANTOINE HUOT DE GONCOURT and JULES-ALFRED HUOT DE GONCOURT (respectively b. May 26, 1822, Nancy, Fr.—d. July 16, 1896, Champrosay; b. Dec. 17, 1830, Paris—d. June 20, 1870, Auteuil), French brothers, writers and constant collaborators who, despite and partly because of neurotic sensibility, contributed solidly to the Naturalistic novel, social history, and art criticism. Above all, they are remembered for their perceptive, revealing *Journal* and for Edmond's legacy, the Académie Goncourt, which annually awards a prize to the author of an outstanding work of French literature.

The Goncourts' widowed mother left them an income that enabled the brothers to live in modest comfort without working and rescued Edmond from a treasury clerkship that had driven him to suicidal despair. The brothers immediately began to lead a life doubly dominated by aesthetics and self-indulgence. Amateur artists, they first made a sketching tour of France, Algeria, and Switzerland. Back home in their Paris flat, they made a fetish of orderly housekeeping, but their lives were continually disordered by noises, upset stomachs, insomnia, and neurasthenia. Neither of them married. All the mistresses appearing in the *Journal* no doubt belonged to Jules, whose fatal stroke presumably was preceded by syphilis.

Edmond and Jules Goncourt (in a box at the theatre), lithograph by Paul Gavarni, 1853

Reproduced by courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

From attempts at art the brothers turned to plays and in 1851 published a novel, *En 18,* all without success. As journalists, they were arrested in 1852, though later acquitted, for an "outrage against public morality," which consisted of quoting mildly erotic Renaissance verses in one of their articles. The brothers achieved more success with a series of social histories, which they began publishing in 1854. These drew on private correspondence, newspaper accounts, brochures, even dinner menus and dress patterns to recreate the life of specific periods in French history. As art critics, the Goncourts' most notable achievement was *L'Art du dix-huitième siècle* (1859–75; *French Eighteenth Century Painters,* 1948), which helped redeem the reputations of such masters of that time as Antoine Watteau.

They began writing their novels in the 1860s, and in them they covered a variety of social and occupational milieus. Their frank presentation of upper and lower social classes and their clinical dissection of social relations helped establish Naturalism and paved the way for such novelists as Émile Zola and George Moore. The most lasting of their novels, *Germinie Lacerteux* (1864; *Germinie,* 1955), was based on the double life of their ugly, seemingly impeccable servant, Rose, who stole their money to pay for nocturnal orgies and men's attentions. It is one of the first realistic French novels of working-class life.

The Goncourts began keeping their monumental *Journal* in 1851, and Edmond continued it for 26 more years from Jules's death in 1870 until his own. The diary weaves among every social stratum, from the hovels where the brothers sought atmosphere for *Germinie Lacerteux* to dinners with great men of the day. Full of critical judgments, scabrous anecdotes, descriptive sketches, literary gossip, and thumbnail portraits, the complete *Journal* is at once a revealing autobiography and a monumental history of social and literary life in 19th-century Paris. Selections from the *Journal* were published in English translation in 1937.

The Académie Goncourt, first conceived by the brothers in 1867, was officially constituted in 1903.

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Gond, group of aboriginal peoples of central India, about 3,000,000 in number. They live in the states of Madhya Pradesh, Mahārāshtra, Andhra Pradesh, and Orissa. The majority speak various and, in part, mutually unintelligible dialects of Gondi, an unwritten language of the Dravidian family. Some Gond have lost their own language and speak Hindi, Marathi, or Telugu, depending on which is dominant in their area.

There is no cultural uniformity among the Gond. The most developed are the Rāj Gond, who once had an elaborate feudal order. Local rajas, linked by ties of blood or marriage to a royal house, exercised authority over groups of villages. Aside from the fortified seats of the rajas, settlements were formerly of little permanence; cultivation, even though practiced with plows and oxen, involved frequent shifting of fields and clearing of new tracts of forest land. The Rāj Gond continue to stand outside the Hindu caste system, neither acknowledging the superiority of Brahmans nor feeling bound by Hindu rules such as the ban on killing cows.

The highlands of Bastar in Madhya Pradesh are the home of three important Gond tribes: the Muria, the Bisonhorn Mariā, and the Hill Mariā. The last, who inhabit the rugged Abujhmar Hills, are the most primitive. Their traditional type of agriculture is slash-and-burn (*jhum*) cultivation on hill slopes; hoes and digging sticks are still used more than plows. The villages are periodically moved, and the commonly owned land of each clan contains several village sites occupied in rotation over the years.

Bisonhorn Mariā, so called after their dance headdresses, live in less hilly country and have more permanent fields that they cultivate with plows and bullocks.

The Muria are known for their youth dormitories, or *ghotul,* in the framework of which the unmarried of both sexes lead a highly organized social life; they receive training in civic duties and in sexual practices.

The religion of all Gond tribes centres in the cult of clan and village deities, together with ancestor worship.

Gonda, town, administrative headquarters of Gonda district, Uttar Pradesh state, northern India, northeast of Lucknow, on a tributary of the Ghāghara River. At the junction of several roads and rail lines, it is a trade centre for agricultural products. Its main industries are rice and sugar milling.

Gonda district, 2,831 sq mi (7,331 sq km) in area, stretches from the Ghāghara River (south) to the Nepal border (north). Largely an alluvial plain, it is drained by the Rāpti and other Ghāghara tributaries and has sal forests (*Shorea robusta,* a nonconiferous evergreen tree) in the north. Parts of the district suffer from frequent flooding. Crops include grains, oilseeds, and sugarcane; oilseed crushing is important, and sugar and alcohol are produced. Northeast of Gonda town is Balrāmpur, which houses a college of Gorakhpur University. Saheth-Maheth, northwest, was the site of the Śrāvastī, an ancient Buddhist monastic estate. Pop. (1981) town, 70,847; district, 2,834,562.

Gonder, formerly BEGEMDER, or BEGEMDIR AND SIMEN, province (*kifle hager*) of northwestern Ethiopia, bordering The Sudan. Occupying about 23,300 sq mi (73,400 sq km), it is bounded on the north by the Tekeze River and on the south by the Blue Nile (Abbay) River. Lake Tana, source of the Blue Nile, lies partly within Gonder. The spectacular Simen (Semien) Mountains include Ras Dashan (14,928 ft [4,550 m]), the highest peak in Ethiopia. An area of 88 sq mi has been designated Simen National Park. Flowering lobelias, 8 ft tall, grow above the tree line. The rare walia ibex, the gelada baboon, and the Semien fox (a kind of jackal) are among the many wild animals.

The historic town of Gonder (*q.v.*) is the provincial capital. In the countryside fertile soil supports coffee, oilseeds, legumes, and grains. Pop. (1982 est.) 2,166,400.

Gonder, also spelled GONDAR, capital of Gonder province, northwestern Ethiopia. It stands at an elevation of 7,500 ft (2,300 m) on a basaltic ridge from which streams flanking the town flow to Lake Tana, 21 mi (34 km) south. Capital of Ethiopia from 1632 to 1855, it has notable remains of buildings constructed by a series of emperors from Fasilides (reigned 1632–67) to Iyasu II (1730–55). The architectural style, employing both stone and wood, is related to that of the Aksumite empire and to the religious buildings and stele of South Arabia. Gonder suffered greatly during the civil wars (1750–1890), but after British conquest of The Sudan (1899), the town resumed its trade with the Blue Nile region. Gonder

Fasilides' castle in Gonder, Eth.

J. Allan Cash—EB Inc.

remains an important centre of the Ethiopian Church, and the beautifully decorated 17th-century Debre Berhan Selassie Church is still in use. The inhabitants are mainly Christians, but Muslims and Falashas (Ethiopian Jews) live in the surrounding area. Although Gonder is a trade centre for grains, oilseeds, and cattle, its economy is basically subsistence farming, supplemented by the production of textiles, jewelry, copperware, and leatherwork. It is a significant highway junction and is served by an airport. The modern hospital has an attached medical college, training staff for rural clinics. Pop. (1982 est.) 85,941.

Gondi FAMILY, French family of Florentine origin, whose diplomats and bankers were prominent in France from the 16th century. The family established itself in France after gaining the confidence and patronage of Catherine de Médicis. Antoine II (1486–1560) was the first Gondi to settle in France and started the most illustrious branch of the family. At first a banker in Lyons, he was brought to Paris by Catherine de Médicis, who made him steward to the duc d'Anjou, later Henry III. Jean-Baptiste (1501–1580), nephew of Antoine, was steward to Catherine herself. A great-nephew, Jérôme II (1550–1600), baron de Codun, helped arrange the marriage of Charles IX and Elizabeth of Austria (1570). Under Henry III, he served as ambassador to Venice and Rome, and Henry IV reappointed him as ambassador to Rome.

Antoine II's oldest son, Albert (b. Nov. 4, 1522, Florence—d. April 21, 1602), went to the court of Henry II in 1547. Serving valiantly in several military campaigns, he took the part of the monarch during the Wars of Religion. Albert himself served as proxy in the marriage of Charles IX to Elizabeth of Austria, which his nephew Jerome II had helped to arrange. On his return, the King rewarded him with the governorship of Metz. Albert was made ambassador to London, then marshal of France and governor of Provence (1573). In 1581 he was made duc de Retz and marquis de Belle-Isle. His brother Pierre, bishop of Paris, made cardinal in 1587, was sent by Henry IV as ambassador to Rome in 1595. He became a principal adviser to Louis XIII.

Albert's oldest son was killed in a duel. His second son, Henry I (1572–1622), succeeded his uncle Pierre as bishop of Paris. His third son, Philippe-Emmanuel (b. 1581, Limoges—d. June 29, 1662, Joigny), marquis de Belle-Isle, comte de Joigny, and baron de Montmirail, was an outstanding military commander. After his great success in the naval battle of La Rochelle (Oct. 26, 1622), he entered a religious order (Oratorians) in 1625, perhaps influenced by Saint Vincent de Paul. He probably would have obtained a cardinal's rank but for the animosity of Richelieu, who exiled him to Lyons in 1641. It is claimed that the queen, Anne of Austria, offered Richelieu's post to Philippe-Emmanuel before offering it to Mazarin. The youngest of Albert's four sons, Jean-François (1584–1654), succeeded his brother Henry I as bishop of Paris, later becoming archbishop.

Philippe-Emmanuel's son Jean-François-Paul (b. Sept. 20, 1613, Montmirail–d. Aug. 24, 1679, Paris), tutored by Saint Vincent de Paul, was the famous cardinal of Retz and author of the *Mémoires* (*see* Retz, Jean-François-Paul de Gondi, cardinal de).

gondola, tapered, 32-foot-long, flat-bottomed boat peculiar to the canals and lagoon of Venice, carrying from two to six passengers.

Gondolas on the Grand Canal, Venice
B. Benjamin—ZEFA

It is propelled from the starboard quarter by a single sweep manipulated by a gondolier standing on the stern cover. A prominent steel beak rises from the prow, a lesser one from the stern. In some gondolas a removable cabin cover gives passengers shelter and some privacy. The first organized boat racing was done by gondolas in the 16th century. Both men and women competed. Ever since a sumptuary law was passed in 1562, gondolas have been painted black. Most craft ply for hire, though a few, attended by liveried servants, are still owned privately. Gondolas are very costly, and their very specialized construction is a dying industry.

Gondomar, Diego Sarmiento de Acuña, conde de (count of) (b. Nov. 1, 1567—d. Oct. 2, 1626), Spanish diplomat and ambassador to England who became one of the most influential men at the court of James I of England.

Gondomar's diplomatic fame rests largely on two missions to England (1613–18 and 1620–22). The chief objective of his first mission was to persuade James I to abandon his alliance with France and the Protestant countries on the Continent and to form an alliance with Catholic Spain. His courtly manners and keen intellect, as well as his tantalizing offers of the Spanish Infanta as James's daughter-in-law, gained him great influence with the English king; on occasion he could even dictate royal policy. His power over James, coupled with his pro-Catholic attitudes, gained him the hostility of the English public. The dramatist Thomas Middleton made him the hero-villain (the Black Knight) of his play *A Game at Chaess* (1625), which was suppressed. At the height of his unpopularity in 1622, Gondomar was recalled to Spain and there made a member of the Council of State.

Gondophernes, also spelled GONDOPHARES (fl. 1st century AD), an Indo-Parthian king in the areas of Arachosia, Kābul, and Gandhāra (present Afghanistan and Pakistan). Some scholars recognize the name of Gondophernes, through its Armenian form, Gathaspar, in Gaspar, the traditional name of one of the Three Wise Men who came from the East to worship Jesus Christ at his nativity.

Gondophernes was first known from the apocryphal *Acts of Judas Thomas the Apostle,* which told that St. Thomas visited the court of Gondophernes, where he was put in charge of building a royal palace but was imprisoned for spending the construction money on charitable purposes. Meanwhile, according to the story, Gad, the king's brother, died and the angels took him to heaven and showed him the palace that St. Thomas had built there by his good deeds; Gad was restored to life, and both he and Gondophernes were converted to Christianity.

Coins of Gondophernes, some bearing his Indian name Guduphara, indicate that he may have reigned supreme over both eastern Iran and northwestern India. According to an inscription at Takht-i-Bhāi (Peshāwar district), Gondophernes ruled for at least 26 years, probably from about AD 19 to 45.

Gondwana, historic region in central India, comprising portions of Madhya Pradesh, Andhra Pradesh, and Mahārāshtra states. It is inhabited by the Gond, a group of Dravidian tribes exceeding 3,000,000 in population, first mentioned in 14th-century Muslim chronicles.

From the 14th to the 18th century the area was held by powerful Gond dynasties, which during Mughal times remained independent or served as tributary chiefs. When in the 18th century the Gond were conquered by the Marāṭhās, the greater part of Gondwana was incorporated into the dominions of the Bhonsle rajas of Nāgpur or the Niẓāms of Hyderābād. Many Gond took refuge in inaccessible highlands and became tribal raiders. Between 1818 and 1853 the greater part of the region passed to the British, although in some minor states the Gond rajas continued to rule until Indian independence in 1947.

Gondwanaland, hypothetical former super-continent in the Southern Hemisphere, which included South America, Africa, peninsular India, Australia, and Antarctica. The name was coined by the Austrian geologist Eduard Suess in reference to the Upper Paleozoic and Mesozoic formations of the Gondwana region of central India, which display typical developments of some of the shared geologic features.

The geological evidence for a former land connection between the currently separated continents and other areas includes the occurrence of tillites (glacial deposits) of Permo-Carboniferous age (the time boundary between the Carboniferous and Permian periods is 280,000,000 years ago) and similar floras and faunas that are not found in the Northern Hemisphere. The widely distributed seed fern *Glossopteris* is particularly cited in this regard. The rock strata that contain this evidence are called the Karroo System in South Africa, the Gondwana System in India, and the Santa Catharina System in South America.

The concept that the continents were at one time joined in the geological past was first set forth in detail by Alfred Wegener, a German meteorologist, in 1912. He envisioned a single great landmass, Pangaea, which supposedly began to separate during the Mesozoic Era (interval of geological time from 65,000,000 to 225,000,000 years ago). Subsequent workers distinguished between a southern landmass, Gondwanaland, and Laurasia to the north. It should be noted that much of Wegener's hypothesis of continental drift was based on the apparent geographic "fit" of the bulge of eastern South America and the western coast of Africa. The geological evidence cited earlier was provided by subsequent investigators.

The idea of Gondwanaland languished for many years, except among scientists in countries of the Southern Hemisphere, until the 1960s, when evidence of sea-floor spreading from the loci of oceanic ridges proved that the ocean basins are not permanent global features and vindicated Wegener's hypothesis of continental drift. Although the term Gondwanaland does not appear in the modern literature with great frequency, the concept of continental drift and former continental connections is widely accepted.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

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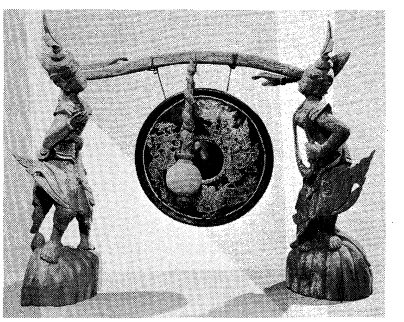
gonfalonier, Italian GONFALONIERE ("standard bearer"), a title of high civic magistrates in the medieval Italian city-states.

In Florence the gonfaloniers of the companies (*gonfalonieri di compagnia*) originated during the 1250s as commanders of the people's militia. In the 1280s a new office called the gonfalonier of justice (*gonfaloniere di giustizia*) was instituted to protect the interests of the people against the dominant magnate class. The holder of this office subsequently became the most prominent member of the Signoria (supreme executive council of Florence) and formal head of the civil administration. In other Italian cities, the role of the gonfaloniers was similar to that in Florence. Gonfaloniers headed the militia from the various city quarters, while the gonfalonier of justice often was the chief of the council of guild representatives.

The kings of France traditionally bore the title gonfalonier of St. Denis. The honorary title of gonfalonier of the church (*vexillifer ecclesiae*) was conferred by the popes, from the 13th until the 17th century, on sovereigns and other distinguished persons.

gong, percussion instrument, a circular metal plate with a turned-down rim. It is struck in the centre with a felt- or leather-covered beater, producing a sound of either definite or indefinite pitch. Its vibrations issue from the centre, in contrast to bells, which vibrate principally at the rim. Gongs may have shallow or deep rims (kettle gongs) and may be bossed (knobbed in the centre) or unbossed. Rimless gongs occur occasionally.



Burmese ceremonial gong suspended between two carved wooden figures; in the Metropolitan Museum of Art, New York City
By courtesy of the Metropolitan Museum of Art, New York City, the Crosby Brown Collection of Musical Instruments, 1889

Gongs are pictured in China in the 6th century AD as instruments of barbarian origin and were used in Java by the 9th century. Both Near Eastern and Southeast Asian origins have been proposed, and a deep-rimmed Roman gong from the 1st or 2nd century AD was excavated in Wiltshire, Eng. Flat gongs are found from India to Japan; bossed gongs occur between Burma and Indonesia, inclusively. The word gong is Javanese.

Gongs function as accompaniment to dance, theatre, and song and are used to transmit messages. Frequently, they are considered to have magical or protective qualities. In China they symbolize prosperity and mark social status. They are the leading instruments of the gamelan orchestras of Indonesia, where they are used both singly and as gong chimes (Javanese *bonang*)—sets of tuned, deep-rimmed, bossed gongs suspended on ropes in a wooden frame and producing bell-like tones.

The Western orchestra uses the flat Chinese gong of indefinite pitch (called tam-tam in the West) and, occasionally, deep-rimmed gong chimes. Acoustically, the steel drums of Trinidad are multiple-toned gongs. "Slit gong" is a name sometimes used for the slit drum.

Gong Qinwang (Chinese official): *see* Kung Ch'in-wang.

Gong Xian: *see* Kung Hsien.

gongbi (Chinese painting): *see* kung-pi.

Gongola, state, northeastern Nigeria, created in 1976 from former Adamawa and Sardauna provinces (part of the former North-Eastern State) and former Wukari Province (from former Benue-Plateau State). It is bordered on the north and northwest by Borno and Bauchi states, on the west and southwest by Plateau and Benue states, and on the south and east by the Republic of Cameroon. The state has an area of 35,286 sq mi (91,390 sq km). The region, formerly a part of the greater Fulani Empire in the early 19th century, was incorporated into British Northern Nigeria in 1903, and in the amalgamated Colony and Protectorate of Nigeria in 1914.

Most of the northern part of the state is a savanna region drained by the Benue River and its tributaries. The population here is engaged in large-scale farming and produces a wide variety of crops including peanuts (groundnuts), cotton, sorghum, millet, rice, yams, sugarcane, and corn (maize). The herding of cattle, goats, and sheep and river fishing are also economically important. Cotton, cattle, and peanuts are exported. Farther to the south, rubber trees and oil palms have also been introduced. In the extreme south, the Mambilla Mountain region of the Adamawa Plateau provides a tsetse-free grassy highland area that is highly suitable to cattle raising and is the site of experimental coffee and tea plantations. The Gashaka Game Reserve, about twice the size of Nigeria's existing Yankari Game Reserve, was being developed in the early 1980s. The state is inhabited by a wide variety of ethnic groups including the Margi (Marghi), Bata, Kanuri, Fulani, Jukum, Vere, Mambilla, and Hausa. Hausa and Fulani are lingua francas in the state and are widely spoken. There is a considerable Christian population as a result of the work of the Sudan Interior Mission.

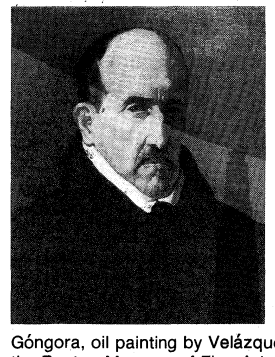
Iron ore, lead, and zinc are the major mineral resources. Cottage industries comprise leather work, calabash decoration, mat weaving, pottery making, metal work, canoe carving, and cloth dying. Industries are all agro-based and include a sugar processing plant near Numan, a timber industry at Yola, and a cotton ginnery at Lamurde. The annual fishing festivals at Njuwa and Ibi are tourist attractions. Although the state is served by trunk roads running north to Maiduguri, west to Bauchi town, and south to Makurdi, the road system as a whole is limited. Yola, the state capital, is also served by an airport, and the Benue River allows for river transport. Pop. (1983 est.) 4,259,700.

Gongola River, principal tributary of the Benue River, northeastern Nigeria. It rises in several branches (including the Lere and Maijuju rivers) on the eastern slopes of the Jos Plateau and cascades (with several scenic waterfalls) onto the plains of the Gongola Basin, where it follows a northeasterly course. It then flows past Nafada and takes an abrupt turn toward the south. Its lower course veers to the southeast, and, after receiving the Hawal (its chief tributary, which rises on the Biu Plateau), it continues in a southerly direction before joining the Benue, opposite the town of Numan, after a journey of 330 mi (531 km). During the dry season, however, the upper Gongola and many of the river's tributaries practically disappear, and even the lower course becomes unnavigable.

Almost all of the Gongola Basin lies in a dry savanna area. The basin has been enlarged by the Gongola's capture of several rivers that formerly flowed to Lake Chad—the sharp southerly bend east of Nafada is the result of the capture of the upper Gongola, and the Gungeru, another tributary from the Biu Plateau, is also a captured stream. The Gongola's floodplains are covered with a fertile black alluvial soil. Cotton, peanuts (groundnuts), and sorghum are grown for export to other parts of the nation; but millet, beans, cassava, onions, corn (maize), and rice are also cultivated. The government built the Dadin Kowa Dam (completed 1984) on the river near Numan to provide irrigation and electricity for its Gongola sugar plantation project. The basin is also used as grazing ground for cattle, goats, sheep, horses, and donkeys.

Góngora y Argote, Luis de (b. July 11, 1561, Córdoba—d. May 23, 1627, Córdoba), one of the most influential Spanish poets of his era. His Baroque, convoluted style, known as Gongorism (*gongorismo*), was so exaggerated by less gifted imitators that his reputation suffered after his death until it underwent a revaluation in the 20th century.

The son of a judge, Góngora profited from his father's fine library and from relatives in positions to further his education. He attended the University of Salamanca and achieved fame quickly. He took religious orders so that he might receive an ecclesiastical benefice but was not ordained priest until he was 55 years old, when he was named chaplain to the royal court in Madrid. His letters, as well as some of his satirical verse, show an unhappy and financially distressed life vexed by the animosity that some of his writings had evoked. He had strong partisans—Lope de Vega was an admirer—and equally powerful enemies, none more so than his rival Francisco de Quevedo, who outdid even Góngora in mordant and unrelenting satire.



Góngora, oil painting by Velázquez; in the Boston Museum of Fine Arts

Archivo Mas, Barcelona

Góngora was always successful with his lighter poetry—the *romances, letrillas,* and sonnets—but his longer works, the *Fábula de Polifemo y Galatea* and the *Soledades* (both circulated in manuscript in 1613), written in an intensely difficult and purposely complex style, provoked the scorn and enmity of many. There has been a temptation to divide his work into the light–dark and easy–difficult, but 20th-century criticism has shown his compositions to have a unity that is perhaps clouded by the compactness and intensity of style in the longer ones. *Gongorismo* derives from a more general base, *culteranismo* (*q.v.*), a Latinizing movement that had been an element in Spanish poetry since the 15th century. In the *Polifemo* and the *Soledades* Góngora elaborated his style by the introduction of numerous Latinisms of vocabulary and syntax and by exceedingly complex imagery and mythological allusions. In these long poems Góngora applied his full energies to enhancing and augmenting each device and decoration until the basically uncomplicated story was obscured. The same devices are found in his more popular lyrics.

The 19th century found little to like in the obscure and difficult Góngora, but his tercentenary in 1927 reestablished his importance. The cold beauty of his lines at last found an appreciative and receptive audience willing to see the value of verse that shunned intimate emotion but that created the purest poetry for its own sake. An English translation by R.O. Jones of selected poems was published in 1966.

Gongsun Hong (Confucianist philosopher): *see* Kung-sun Hung.

Gongsun Long (Chinese philosopher): *see* Kung-sun Lung.

Gonikāputra (Hindu author): *see* Patañjali.

Gonionemus, genus of small marine jellyfish of the hydrozoan order Limnomedusae (phylum Cnidaria). *Gonionemus* species are bell-shaped and measure about 15 millimetres (0.6 inch) or more in diameter. From the centre of the bell hangs the manubrium, a tubular structure that contains the mouth, and around the bell's rim are up to 70 hollow tentacles armed with stinging structures called nematocysts. Each member of the genus begins life as a solitary polyp (*q.v.*) that measures only about one millimetre in height. After a short time the polyp buds off medusae from its lower end.

Stings from the species *Gonionemus vertens* are unusually venomous, and dense shoals of such jellyfish in warm seas pose a danger to swimmers. A sting from *G. vertens* causes a burning sensation in the skin, which is accompanied by rapid blistering and local edema, followed in turn by general weakness after 10 to 30 minutes. Numbness sets in, along with pain in the joints of the arms and legs; breathing becomes laboured and can temporarily cease. Liver malfunction sometimes occurs, and the acute symptoms last four to five days.

Most *Gonionemus* species are widely distributed in the warmer regions of the Atlantic and Indo-Pacific oceans. Several have been introduced in the waters off northwestern Europe with Portuguese oysters to which their polyps attach. It is not certain, however, whether all populations are venomous.

Gonja (people): *see* Guang.

Gonne, Maud, married name MAUD MACBRIDE (b. 1865, Aldershot, Surrey, Eng.—d. April 27, 1953, Dublin), Irish patriot, actress, and feminist, one of the founders of Sinn Féin (We Ourselves), and an early member of the theatre movement started by her longtime suitor, W.B. Yeats.

The daughter of an Irish army officer and his English wife, Gonne made her debut in St. Petersburg and later acted as hostess for her

father when he was assistant adjutant general in Dublin. Converted to republicanism by an eviction she saw during the 1880s, she became a speaker for the Land League, founded the Daughters of Ireland (a nationalist organization), and helped to organize the Irish brigades that fought against the British in the South African War.

In the meantime she had become a noted actress on the Irish stage. In 1889 Yeats fell in love with her, and the heroine of his first play, *Cathleen ni Houlihan* (1892), was modeled after her; she played the title role when it was first produced at the Abbey Theatre in Dublin. In 1903, however, she married a fellow revolutionary, Maj. John MacBride.

She remained active in movements to release Irish political prisoners and took part in the 1916 Easter Rising, after which her husband was shot and she herself was imprisoned. Their son, Sean MacBride (*q.v.*), later became foreign minister of Ireland and winner of the Nobel Peace Prize. A book of her reminiscences, *A Servant of the Queen* (*i.e.,* Ireland), was published in 1938. *Lucky Eyes and a High Heart,* a biography by Nancy Cardoza, appeared in 1978.

gonorrhea, acute venereal disease that frequently progresses into a chronic state. It is initiated by the gonococcus, *Neisseria gonorrhoeae*—a microorganism with a predilection for the type of mucous membranes found in the genito-urinary tract and adjacent areas. All gonococcal infections except eye infections in newborn infants (ophthalmia neonatorum;), some instances of vulvovaginitis of young girls living in institutions, and occasional accidental eye infections in adults are transmitted by direct sexual contact.

Gonorrhea is worldwide in distribution and very common, though the incidence is not precisely known because of self-treatment, undiagnosed cases, and defective reporting. The World Health Organization reports that a general decline has been followed by a worldwide increase since the mid-1950s. The increase was attributed in part to the growing resistance of *N. gonorrhoeae* to penicillin. In the United States it was estimated in the late 1970s that some 2,500,000 to 3,000,000 cases occurred each year, only about 30 to 40 percent being reported. The mortality from gonorrhea is negligible, but its indirect effects on the population by its not infrequent sterilization of both sexes are incalculable.

The incubation period of gonorrhea is usually three to five days (range two to ten days). The first symptoms in the male are burning on urination and a purulent urethral discharge that may be severe or may be so mild as to go unnoticed. In the absence of treatment, the infection usually extends deeper, to involve the upper urethra, the neck of the bladder, and the prostate gland. Urgency and frequency of urination and, occasionally, blood in the urine may follow. Spontaneous recovery may occur within a few months to a year.

The initial symptoms in the female in most instances are so mild as to go unnoticed. Slight vaginal discharge with burning may occur. The disease is not usually suspected by either patient or physician until complications arise or a sexual partner is infected. Abscess of a vulvovaginal (Bartholin) gland occurs rarely as an early complication. Many women recover spontaneously from gonorrheal infections that extend no farther than the cervix (mouth of the uterus). In many, however, there is extension through the uterus to the fallopian tubes and ovaries. Fever usually accompanies these extensions to the pelvic organs, and lower abdominal pain is a prominent symptom. Pelvic abscess or peritonitis may result. The symptoms can be confused with those of appendicitis. Healing occurs without resort to surgery in most cases, often with some physical disability and sterility. In immature girls the infection is usually confined to the vagina.

In both male and female, arthritis is the commonest extragenital manifestation of gonorrhea. The process usually settles in one or two joints and may result in permanent disability in the absence of treatment. Involvement of the tendon sheaths in the region of the affected joint or joints is not uncommon. Other, very rare, complications of gonorrhea are iritis (inflammation of the iris of the eye), endocarditis (involvement of the heart valves), meningitis, and skin lesions.

Penicillin is the antibiotic usually used in treatment, one injection usually being sufficient to cure uncomplicated gonorrhea. Relatively penicillin-resistant strains of gonococci are on the increase, however, and it is difficult to reach the blood levels needed with the use of other forms of penicillin. The tetracyclines, erythromycin, chloramphenicol, and streptomycin may be useful.

The administration of the smaller amounts of penicillin and most other antibiotics sufficient to cure gonorrhea may mask the early manifestations of coexisting syphilis and delay its diagnosis. An integral part of the treatment of gonorrhea, therefore, is the so-called serologic follow-up—a blood test for syphilis at least once a month for four months.

Gontran (Merovingian king): *see* Guntram.

Gonzaga DYNASTY, Italian dynasty whose heads ruled Mantua from 1328 to 1707 and also Montferrat, with the stronghold of Casale, from 1536 to 1707. Their origins are uncertain, but by the 12th century the Corradi family of Gonzaga were established as members of the feudal gentry owning estates near Mantua, to which during the 13th century they managed to add other extensive properties. They took their name from the village and castle of Gonzaga, situated midway between Mantua and Reggio.

The dynasty's known history begins with the 13th century, when Luigi I (1267–1360), after fierce struggles, supplanted his brother-in-law Rinaldo (nicknamed Passerino) Bonacolsi as lord of Mantua in August 1328, with the title of captain general and afterward of vicar general of the empire, adding the designation of count of Mirandola and Concordia. In July 1335 his son Guido wrested Reggio from the Scaligeri, and the Gonzaga held it until 1371. Luigi was succeeded by Guido (died 1369); the latter's son Luigi II came next in succession (died 1382), and then Giovan Francesco I (sometimes referred to as Francesco I; died 1407), who, although at one time allied with the treacherous Gian Galeazzo Visconti, incurred the latter's enmity and all but lost his estates and his life in consequence; eventually he joined the Florentines and Bolognese, enemies of Visconti. He promoted commerce and wisely developed the prosperity of his dominions.

His son Giovan Francesco II (Gianfrancesco; died 1444), who succeeded him, became a famous general and was rewarded for his services to the emperor Sigismund with the title of marquess of Mantua for himself and his descendants (1432), an investiture that legitimatized the usurpations of the House of Gonzaga. Under Giovan Francesco II the first school inspired by humanistic principles was founded in 1423 in one of the family's villas near Mantua by Vittorino de Feltre. Artists also found their way to Mantua, notably Andrea Mantegna and Leon Battista Alberti, and during the 15th century the capital city and its dependencies were embellished and transformed. Giovan Francesco's son Luigi III "il Turco" (died 1478) likewise became a celebrated soldier and a learned and liberal prince, a patron of literature and the arts.

His son Federigo I and grandson Giovan Francesco III (Francesco II; died 1519) continued the military traditions of the family and raised the Mantuan lordship to the height of its prestige and power. In the dangerous and difficult politics that engaged northern Italy after the French invasion of 1494, the Gonzaga sided with the emperor Charles V. They commanded the allied Italian forces against Charles VIII of France at the Battle of Fornovo, and Giovan Francesco III afterward fought in the kingdom of Naples and in Tuscany, until captured by the Venetians in 1509. On his liberation he adopted a more peaceful and conciliatory policy, and with the help of his wife, the famous Isabella d'Este, he promoted the fine arts and letters. He was succeeded by his son Federigo II (died 1540), captain general of the papal forces. After the Peace of Cambrai (1529) Federigo II's ally and protector, the emperor Charles V, raised his title to that of duke of Mantua in 1530. It was during Federigo II's reign that the court of Mantua achieved its greatest brilliance. Palaces and villas were lavishly commissioned and splendidly adorned, among them the famous Palazzo del Te designed by Giulio Romano, and many artists as well as writers of distinction found employment or encouragement in Mantua: Baldessare Castiglione and Matteo Bandello, Boiardo and Ariosto, Berni and Bembo, Raphael, Leonardo, Titian, and Monteverdi.

Federigo II's son Francesco I (Francesco III) succeeded his father but died young, leaving his possessions to his brother Guglielmo. The latter was an extravagant spendthrift, as was his son Vincenzo I (died 1612). Then followed in succession Vincenzo's sons Francesco II (Francesco; died 1612), Ferdinando (died 1626), and Vincenzo II (died 1627), all three incapable princes. Mantua thereafter was laid waste by foreign invasions and ruled by dissolute dukes until 1708, when Austria annexed the duchy. On July 5 of the same year the last duke, Ferdinand Charles, died in Venice, and with him the Gonzagas of Mantua came to an end.

Gonzaga, Tomás António (b. Aug. 11, 1744, Porto, Port.—d. 1810, Mozambique), poet whose popularity in Portugal up to the 20th century was second only to that of Luís de Camões.

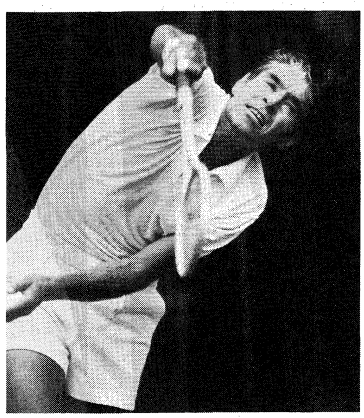
Gonzaga completed his law studies at Coimbra (1768) and in 1782 was appointed a judge in Vila Rica, Braz. There he fell in love with Marilia, who was mentioned in his lyrics, but on the eve of their marriage (1789) he was arrested on a charge, undoubtedly false, of conspiracy. After three years in prison he was exiled to Mozambique. His fame rests on a single book of pastoral love lyrics, *Marilia de Dirceu.* It was published in two parts: the first (1792), written before his arrest, expresses the joy of love and his expectation of marital happiness with Marilia; the second (1799), written in prison, describes his yearning for his beloved and laments his lost happiness. Shortly after arriving in Mozambique, Gonzaga married an heiress and remained there the rest of his life, holding important posts in the colony.

Gonzaga Myszkowski, Aleksander Wielopolski, Margrabia (Margrave): *see* Wielopolski, Aleksander, Hrabia.

Gonzales, Pancho, byname of RICHARD ALONZO GONZALES, Gonzales also spelled GONZALEZ (b. May 9, 1928, Los Angeles), American tennis player who won the U.S. professional championship in men's singles eight times, seven consecutively (1953–59, 1961).

Born into an unprosperous Mexican-American family, Gonzales as a youth had no access to tennis clubs and was largely a self-taught player. In 1943 he achieved top ranking in boys' tennis in southern California. Before turning professional in 1949, he won six

major amateur championships: United States Lawn Tennis Association singles (1948–49), U.S. clay-court singles (1948–49), U.S. indoor singles (1949), and U.S. indoor mixed doubles (1949, with Gussie Moran). In the final round



Pancho Gonzales, 1972
E.D. Lacey

of the 1949 Davis Cup international competition he won both his singles matches to help the U.S. team defeat Australia. His colourful and outspoken behaviour won him a large following.

In addition to his eight singles titles, Gonzales as a professional won the U.S. men's doubles championship five times (1953–54, 1957–58, and 1969, with various partners).

González, Julio (b. 1876, Barcelona, Spain—d. 1942, Arcueil, Fr.), Spanish sculptor and painter who developed the expressive use of iron as a medium for modern sculpture.

González received his artistic training in his native Barcelona from his father and grandfather, as well as at the School of Fine Arts. The family moved to Paris in 1900, where González, through his old Barcelona friend Pablo Picasso, became acquainted with the leaders of the Parisian avant-garde. Until his brother Jean's death in 1908, an event that deeply affected him, González was a painter. He then gave up painting and for the next 15 years experimented with metal sculpture while living

"Montserrat I," iron sculpture by Julio González, 1936–37; in the Stedelijk Museum, Amsterdam
By courtesy of the Stedelijk Museum, Amsterdam

in solitude and poverty. In 1927 he made his first sculptures in welded iron, the medium characteristically associated with his works. In the early 1930s his style was influenced by Constructivism, and he produced such abstract works as "The Kiss" (1930). Later in the '30s his style became more naturalistic, and he produced what is often considered his finest sculpture, "Montserrat I" (1936–37), a work inspired by the horrors and injustices of the Spanish Civil War.

González, Manuel (b. 1833, near Matamoros, Mex.—d. May 8, 1893, Hacienda de Chapingo, near Guanajuato), Mexican soldier and president of Mexico (1880–84).

Born on a ranch in the state of Tamaulipas, González began his military career in 1847 and became a general during the civil war of 1858–60. He became president in 1880 at the virtual dictation of his political friend Porfirio Díaz, who had preceded him as president. As head of state, González successfully defended Mexican rights in a boundary controversy with Guatemala and granted widespread railroad and mining concessions, but his administration was marked by wholesale corruption and waste. A land-survey law favoured large landowners and speculators, and an effort to rehabilitate the currency with new nickel coins brought disastrous inflation. Díaz soon dissociated himself openly from the González government and in 1884 had himself reelected president. Leaving the presidency of a country that was nearly bankrupt, González spent his last years as governor of Guanajuato.

González de Clavijo, Ruy (b. Madrid, Spain—d. April 2, 1412, Madrid), Spanish diplomat who traveled to the court of Timur (Tamerlane) at Samarkand, in Turkistan, and wrote a valuable account of his visit.

A chamberlain to King Henry III of Castile, González was a member of Henry's second embassy to Timur. Departing from El Puerto de Santa María, near Cádiz, on May 22, 1403, he sailed via Constantinople to the eastern Black Sea city of Trebizond, and then proceeded overland through Persia and on to southern Turkistan. At Samarkand the embassy was favourably received. González returned to Spain in 1406. His *Embajada a Tamor Lán* (*Embassy to Tamerlane*), containing a vivid description of Samarkand, exists in two manuscripts at the Biblioteca Nacional, Madrid.

González de Mendoza, Pedro, CARDENAL (Cardinal) (b. May 3, 1428, Guadalajara, Castile [Spain]—d. Jan. 11, 1495, Guadalajara), Spanish prelate and diplomat who influenced Isabella of Castile and Ferdinand of Aragon and was called, even in his own time, "the third king of Spain."

Mendoza, the fifth son of the illustrious poet Iñigo López de Mendoza, Marqués de Santillana, studied at the University of Salamanca and became successively bishop of Calahorra (1454) and Sigüenza (1467), archbishop of Seville (1474), and, finally, archbishop of Toledo and primate of Spain (1482). In 1473, through the influence of Rodrigo Borgia, the future Pope Alexander VI, he was created a cardinal.

Brought to the attention of the court of Castile by Alonso de Fonseca, archbishop of Seville, Mendoza by 1465 had thrown his support and that of his powerful family to Henry IV in his struggles with the nobles. The succession to Henry IV was unsettled, because the paternity of his daughter and natural heir Joan was in doubt. Mendoza gave his support to the claims of Henry's half sister, Isabella, who in 1469 married Ferdinand of Aragon. On Henry's death (1474), Isabella declared herself queen and confirmed Mendoza as chancellor of Castile, a post he had received from Henry the year before. After a war over the succession, which ended successfully for Ferdinand and Isabella, Mendoza helped Isabella to strengthen the monarchy and give peace to the kingdom by pacifying the dissident nobles and by successfully negotiating with some of the most turbulent magnates in Andalusia.

Mendoza was a supporter of Christopher Columbus and was also a patron of the arts. He himself was a humanist and translated Homer and Sallust for the benefit of his poet-father. In 1483 he founded the College of Santa Cruz, Valladolid, as part of the new educational system for the clergy. Mendoza helped Isabella in the reform of the Spanish episcopate, advising her to appoint bishops from the middle class.

González Márquez, Felipe (b. March 5, 1942, Seville), lawyer and Socialist politician who was prime minister of Spain from 1982.

The son of a livestock handler, González was the only one of five children to attend the university. He studied first to be a civil engineer at the University of Seville before transferring to its law faculty. While still a student, he became involved in the Socialist movement, then in 1964 joined the outlawed Spanish Socialist Workers' Party (Partido Socialista Obrero Español; PSOE). He started a law practice in Seville, specializing in the defense of workers' rights, and in 1965 moved to Madrid. By 1974 he had risen to become secretary-general of the party.

González' ensuing efforts to broaden his party's popular appeal and electoral base were so successful that in the 1977 general elections the now-legalized PSOE emerged as the largest single political party in Spain. Gonzalez' moderate stance and his youthful, attractive public image helped his party to a sweeping victory in the 1982 general elections. He became at age 40 Europe's youngest head of government. He and his party were reelected to power in 1986 and 1989, but with diminishing majorities.

As prime minister González froze Spain's participation in NATO but supported his country's entry into the European Community in 1986. His pragmatic domestic policies were aimed at reducing inflation and transferring significant powers to Spain's regional governments. His grand economic strategy was to channel resources toward renewing Spain's highways, railroads, and other infrastructures and stimulating new economic growth.

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González Martínez, Enrique (b. April 13, 1871, Guadalajara, Mex.—d. Feb. 19, 1952, Mexico City), poet, physician, and diplomat, who was a major influence in 20th-century Mexican literature.

González Martínez began writing while practicing medicine in the provinces. With the coming of the Mexican Revolution (1911) he entered public life, serving in the Ministry of Education and occupying diplomatic posts in Europe and various Latin-American countries. He became famous for his sonnet "Tuércele el cuello al cisne de engañoso plumaje" ("Wring the neck of the swan with the false plumage"), an attack on the excesses of poetic modernism published in his collection *Los senderos ocultos* (1911; "The Hidden Ways"). Other poetic works include *La palabra del viento* (1921; "Word of the Wind"), *Poemas truncos* (1935; "Short Poems"), and *Bajo el signo mortal* (1942; "Under the Mortal Sign").

Gonzalo Fernández de Córdoba: *see* Fernández de Córdoba, Gonzalo.

goober: *see* peanut.

Gooch, Sir Daniel, 1ST BARONET (b. Aug. 24, 1816, Bedlington, Northumberland,

Eng.—d. Oct. 15, 1889, near Windsor, Berkshire), English railway pioneer and mechanical engineer who laid the first successful transatlantic cables.

After working under the pioneer railroad builders George and Robert Stephenson, Gooch was appointed, in 1837, locomotive superintendent of the Great Western Railway. In this capacity he developed such new and efficient locomotives as the "North Briton" (1846), which set a pattern for engines of broad-gauged express trains. One of a new class of eight-wheeled locomotives ("Lord of the Isles") was awarded a gold medal at the Great Exhibition of 1851. In 1864 he left the Great Western, and during 1865–66, as director of a telegraph construction company, he superintended the laying of the first two transatlantic cables from England to the United States. For this achievement he was created a baronet in 1866. From 1865 to 1885 he served in Parliament.

Gooch, George Peabody (b. Oct. 21, 1873, London—d. Aug. 31, 1968, London), English historian of modern diplomacy, one of the first writers in English on German history from the 18th century.

During a brief political career Gooch specialized in foreign affairs and criticized the policy that led to the South African War; he was a Liberal member of Parliament, 1906–10. Although a dedicated academician, he devoted much of his time to popular lecturing, and from 1911 until 1960 he edited the *Contemporary Review*, a monthly publication dealing with world affairs. He also contributed several chapters to the *Cambridge Modern History*. In the classic *History and Historians in the Nineteenth Century* (1913)— his favorite among his own books—he dissociated himself from the widely held view that history is a mere science.

Gooch also wrote *Germany and the French Revolution* (1920), *Franco-German Relations, 1871–1914* (1923), *English Democratic Ideas in the Seventeenth Century* (1927), *Courts and Cabinets* (1944), *Maria Theresa and Other Studies* (1951), and *The Second Empire* (1960), among other books. He was joint editor of the *Cambridge History of British Foreign Policy* (1922–23) and *British Documents on the Origins of the War, 1898–1914* (1926–38).

Good Feeling(s), Era of, the national mood of the United States (1815–25), as first described by the Boston *Columbian Centinel* on July 12, 1817. Although the "era" generally is considered coextensive with Pres. James Monroe's two terms (1817–25), it really began in 1815, when for the first time U.S. citizens could afford to pay less attention to European political and military affairs. The predominant attitude was what in the 20th century is called isolationism. The good feelings, perhaps better termed complacency, were stimulated by two events of 1816, during the presidency of James Madison: the enactment of the first U.S. protective tariff and the establishment of the second National Bank. With the decline of the Federalists the U.S. was, in practice if not in theory, a one-party state on the national level; heading the Democratic-Republicans, Monroe secured all but one electoral vote in 1820. Sectionalism was in comparative abeyance, replaced by a rather unassertive nationalism. On the state and local levels, however, political disharmony prevailed, and there was much opposition to nationalism. Indeed, the era might better be termed one of mixed feelings. By 1820 a longer era of conflict might have been foretold; varying sectional interests, particularly regarding slavery and political personality conflicts, developed during Monroe's second term.

Good Friday, the Friday before Easter, the day in Holy Week on which the yearly commemoration of the Crucifixion of Jesus Christ is observed. As early as the 2nd century, there are references to fasting and penance on this day by Christians, who, since the time of the early church, had observed every Friday as a fast day in memory of the Crucifixion.

In the Roman rite of the Roman Catholic Church, the liturgical service for Good Friday has been in approximately the same form for centuries, the notable difference since 1955 being the communion of the people. The liturgy, now celebrated after 3:00 PM, consists of three distinct parts: readings and prayers (including the Passion according to St. John), the veneration of the cross, and the communion (in place of the Mass of the Presanctified, which developed in the Middle Ages). Nonliturgical devotions, the Way of the Cross (*see* Stations of the Cross) and the Tre Ore (Three Hours), were introduced in the centuries that the Good Friday liturgy was celebrated in the morning hours, and they are still observed in some places.

In the Eastern Orthodox churches, where Good Friday is known as Great Friday, the Matins service (usually celebrated on Thursday night) includes the reading of the Twelve Passion Gospel Readings, taken from the various Passion accounts in the New Testament. No Eucharist or Holy Communion service is celebrated. At Vespers there is a solemn re-enactment of the burial procession of Christ, who is represented by the *epitaphion*, a piece of material bearing an image of the dead Saviour.

In the Anglican churches *The Book of Common Prayer* provides for a celebration of the Eucharist on Good Friday, though this is largely ignored and the chief service of the day is often the Three Hours Devotion (12 noon to 3:00 PM), a series of sermons, hymns, and prayers centred on the cross.

In Lutheran and other Protestant churches various services are held, including the Three Hours Devotion and services with Holy Communion. In many areas union services take place among various denominations as an expression of Christian unity.

Good Hope, Cape of (province, South Africa): *see* Cape of Good Hope.

Good Hope, Cape of, rocky promontory at the southern end of Cape Peninsula, southwestern Cape Province, South Africa. It was first sighted by the Portuguese navigator Bartolomeu Dias in 1488 on his return voyage to Portugal after ascertaining the southern limits of the African continent. One historical account says that Dias named it Cape of Storms and that John II of Portugal renamed it Cape of Good Hope (because its discovery was a good omen that India could be reached by sea from Europe); other sources attribute its present name to Dias himself.

Known for the stormy weather and rough seas encountered there, the cape is situated at the convergence of the warm Mozambique–Agulhas current from the Indian Ocean and the cool Benguela current from Antarctic waters. Grass and low shrub vegetation is characteristic of the promontory, which is part of the Cape of Good Hope Nature Reserve (established 1939) that encompasses the southern tip of the peninsula. There is a lighthouse on Cape Point about 1.2 mi (2 km) east of the Cape of Good Hope.

Good Neighbor Policy, popular name for the Latin American policy pursued by the administration of U.S. Pres. Franklin D. Roosevelt. Suggested by the President's commitment "to the policy of the good neighbor" (first inaugural address, March 4, 1933), the approach marked a departure from traditional interventionism. Through the diplomacy of Secretary of State Cordell Hull, the U.S. repudiated privileges abhorrent to Latin Americans.

The right to intervene in the internal affairs of other nations was renounced at the Montevideo Conference (December 1933); the Platt Amendment, which sanctioned U.S. intervention in Cuba, was abrogated (1934); and the Marines were withdrawn from Haiti (August 1934).

The success of the policy was measured in part by the rapidity with which Latin American states rallied to the Allies during World War II. U.S. postwar concerns in Europe and Asia, however, led to renewed distrust in the Americas.

good-night, sensational type of broadside ballad (*q.v.*), popular in England from the 16th through the 19th century, purporting to be the farewell statement of a criminal made shortly before his execution. Good-nights are usually repentant in tone, containing a sketchy account of how the criminal first went astray, a detailed account of his grisly crime, his sentence by the judge, the grief of his aged parents, and a warning to others not to follow his example. An exception is "Sam Hall," in which the remorseless criminal boasts, "I hate you one and all," to the bitter end. Enterprising hack writers and broadside publishers often had the good-night printed in advance of the execution, ready for sale on the street (or at the scaffold if the execution were public), at the moment that it was accomplished. Many good-nights, originating in broadsides, have been incorporated into the folk tradition.

good-reasons theory, in U.S. and British meta-ethics, an approach that tries to establish the validity or objectivity of moral judgments by examining the modes of reasoning used to support them. The approach first appeared in *An Examination of the Place of Reason in Ethics* (1950) by Stephen Toulmin, a British philosopher of science and ethicist. In general, the approach represents a reaction against the Positivism of the 1930s and 1940s, which, in its theory that moral terms have only emotive meaning, tended to support ethical relativism, subjectivism, and skepticism. It also represents the constructive influence of one of the founding fathers of linguistic analysis, Ludwig Wittgenstein, who in his later philosophy rejected all interpretations of meaning and language that reduce all significant discourse to categorical statements, proposing instead that the philosophical task is to recognize and describe different "language games," or usages of language, as they actually manifest different forms of life. The good-reasons philosophers thus began to examine normative discourse, in general, and moral discourse, in particular, as a whole rather than exploring only the uniquely moral terms embedded in that discourse. This examination led to an appreciation of the complexity of the relationships between the evaluative and the descriptive aspects of moral discourse and, in particular, to a consideration of the logical connections between them.

Although these good-reasons moralists, such as Henry David Aiken, Kurt Baier, Kai Nielsen, John Rawls, Marcus G. Singer, Paul W. Taylor, Georg Henrik von Wright, and Geoffrey James Warnock, manifest a wide range of theories on normative issues, they generally agree that the primary function of moral utterances is practical—*i.e.,* directive of action—rather than emotive and expressive. Men give reasons, however, for what they say ought to be done, and the giving of these reasons follows a pattern; *i.e.,* it is a rule-governed activity, involving elements both of formal logical consistency and of reference to facts. The good-reasons approach thus diverges from earlier efforts, which sought to establish the objectivity of morals by determining the cognitive content of unique moral terms such as good and right. The good-reasons approach

shows some kinship with naturalist views in its agreement that moral reasoning does in some way ground values in facts, the "ought" in the "is," and that there are limits to what will count as good reasons and thus as justified, valid, objective moral claims—limits which reflect standards of consistency that are logical and can be made universal and which also reflect criteria of the relevancy of facts, of impartiality of attitude, and of appropriate sensitivity.

Good Shepherd Sister, member of THE RELIGIOUS OF OUR LADY OF CHARITY OF THE GOOD SHEPHERD (R.G.S.), also called SISTERS OF OUR LADY OF CHARITY OF THE GOOD SHEPHERD, a Roman Catholic order of religious devoted particularly to the care, rehabilitation, and education of girls and young women who have demonstrated delinquent behaviour. The congregation traces its history to an order founded by St. John Eudes in 1641 at Caen, Fr. This order, known as the Religious of Our Lady of Charity of the Refuge, was virtually destroyed during the French Revolution. The Refuge at Tours was trying to reestablish itself when Rose-Virginie Pelletier entered the community in 1814 and took the name Sister Mary Euphrasia. By 1829 she had become superior of the community and founded a convent at Angers, followed in the next five years by four more convents. In 1835 Pope Gregory XVI approved a unified administration for the convents under the title of Sisters of Our Lady of the Good Shepherd. The congregation spread rapidly; today, members live in convents throughout the world. They work with delinquent girls, problem children, persons who are serving sentences imposed by civil courts, and alcoholics; they also conduct hospitals and schools.

Goodall, Jane, in full BARONESS JANE VAN LAWICK-GOODALL (b. April 3, 1934, London), British ethologist, known for her exceptionally detailed and long-term research on the chimpanzees of Gombe Stream National Park in Tanzania.

Goodall, who was interested in animal behaviour from an early age, left school at age 18. She worked as a secretary and as a film production assistant until she gained passage to Africa. Once there, Goodall began assisting paleontologist and anthropologist Louis Leakey. Her association with Leakey led eventually to her establishment in June 1960 of a camp in the Gombe Stream Game Reserve (now a national park) so that she could observe the behaviour of chimpanzees in the region. In 1964 she married a Dutch photographer who had been sent in 1962 to Tanzania to film her work (later they divorced). The University of Cambridge in 1965 awarded Goodall a Ph.D. in ethology; she was one of very few candidates to receive a Ph.D. without having first possessed an A.B. degree. Except for short periods of absence, Goodall and her family remained in Gombe until 1975, often directing the fieldwork of other doctoral candidates.

Over the years Goodall was able to correct a number of misunderstandings about chimpanzees. She found, for example, that the animals are omnivorous, not vegetarian; that they are capable of making and using tools; and, in short, that they have a set of hitherto unrecognized complex and highly developed social behaviours. Goodall wrote a number of books and articles about various aspects of her work, notably *In the Shadow of Man* (1971). She summarized her years of observation in *The Chimpanzees of Gombe: Patterns of Behavior* (1986).

Goode, G(eorge) Brown (b. Feb. 13, 1851, New Albany, Ind., U.S.—d. Sept. 6, 1896, Washington, D.C.), American zoologist who directed the scientific reorganization and recataloging of the collection at the National Museum of Natural History, Washington, D.C.

After graduating from Wesleyan University at Middletown, Conn., he spent a year at Harvard University studying natural history under Louis Agassiz. Goode took charge of the Orange Judd Museum of Natural History from 1871 to 1877. In 1874 he became chief of the division of fisheries at the National Museum and in 1887 assistant secretary of the Smithsonian Institution in charge of the National Museum, a position he held until his death. He prepared government exhibits for the Centennial Exposition of 1876 at Philadelphia, the World's Columbian Exposition of 1893 at Chicago, exhibitions at Berlin (1880) and London (1883), and many others. Goode wrote several works on the history of the Smithsonian Institution and *American Fishes* (1888). In 1895 he published his most important scientific work, *Oceanic Ichthyology,* which added 156 new species to the known fishes of the Atlantic Ocean.

Articles are alphabetized word by word, not letter by letter

Goodeniaceae, the goodenia family of the bellflower order (Campanulales), containing 14 genera and about 300 species, chiefly native to Australia. Some species are widespread tropical beach shrubs such as *Scaevola plumieri* and *S. frutescens.* Both have oval, leathery leaves and small, starry, white flowers and are about 1½ m (5 feet) tall.

Heathlike shrubs in the Australian genus *Leschenaultia* sometimes are grown as mild-climate garden shrubs. They have violet, blue, red, or yellow flowers.

Goodenough Island, formerly MORATA, one of the D'Entrecasteaux Islands (*q.v.*), 20 miles (32 km) across Ward Hunt Strait from the eastern tip of New Guinea, in the Solomon Sea, southwestern Pacific. A part of Papua New Guinea, it lies northwest of Fergusson Island across Moresby Strait. The forested volcanic island, measuring 20 by 15 miles, rises to more than 8,000 feet (2,400 m) in its central mountain range. This range is bordered by a cultivated plain producing copra, yams, and kapok. The island was visited in 1873 by Captain John Moresby, who named it after Commodore James Graham Goodenough. Occupied by Japanese troops for several months in 1942, the island was captured by Allied forces, who built Vivigani airstrip (open to commercial service since 1963). Goodenough was once the site of important alluvial gold mining. Pop. (1980 prelim.) 12,676.

Goodman, Benny, byname of BENJAMIN DAVID GOODMAN (b. May 30, 1909, Chicago—d. June 13, 1986, New York City), American clarinetist and orchestra leader, called the "King of Swing," a variety of American jazz of the 1930s and early 1940s with fast insistent rhythm, improvisation riding over melody, and collective use of syncopated rhythm. Goodman's opening theme song was "Let's Dance," his closing signature "Goodbye."

After early training with musicians in Chicago, he joined the Ben Pollack jazz band and made his first recording in 1926. He lived in New York City from 1929 and, in 1933–34, organized an orchestra that became one of the most popular of the swing bands. The band served as career springboards for trumpeter Harry James, drummer Gene Krupa, vibraphonist Lionel Hampton, and pianist Teddy Wilson. Orchestrations by Fletcher Henderson and later (from 1940) by Eddie Sauter made a notable contribution. His band generated great enthusiasm for jazz among white listeners, and his small groups, particularly the trio (1935–36) and quartet (1936–39), returned jazz to its original emphasis on small performing groups and indirectly encouraged the development of modern jazz, which Goodman decried. For these small groups he hired the black musicians Wilson, Hampton, and Charlie Christian, guitarist, presenting for the first time a racially mixed popular jazz group. During the 1950s he intermittently led bands, and in 1955 he recorded the sound track for a film biography, *The Benny Goodman Story.* In 1962 he took a jazz band to the Soviet Union on a U.S. State Department tour. Thereafter he appeared sporadically with former players in special concerts and played clarinet with symphonic orchestras and smaller groups.

Goodman's jazz solo playing, noted for its technical purity, was a highly refined version of the Chicago clarinet style. As a classical clarinetist he recorded with the Budapest String Quartet and commissioned works by the contemporary composers Béla Bartók, Paul Hindemith, and Aaron Copland. *The Kingdom of Swing* (1939), with Irving Kolodin, is his autobiography. A discography, *B.G. on Record,* by D. Russell Connor and Warren W. Hicks, was published in 1969.

Goodpasture, E(rnest) W(illiam) (b. Oct. 17, 1886, Montgomery County Tenn., U.S.—d. Sept. 20, 1960, Nashville, Tenn.), American pathologist whose method (1931) for cultivating viruses and rickettsia in fertile chicken eggs made possible the production of vaccines for such diseases as smallpox, influenza, yellow fever, typhus, Rocky Mountain spotted fever, and other illnesses caused by agents that can be propagated only in living tissue.

Goodpasture spent most of his career (1924–55) at the medical school of Vanderbilt University, Nashville, Tenn.

Benny Goodman (left) and members of his band, *c.* 1938
UPI

Goodrich, Samuel Griswold (b. Aug. 19, 1793, Ridgefield, Conn., U.S.—d. May 9, 1860, New York City), American publisher and author of children's books under the pseudonym of Peter Parley.

Samuel Goodrich

By courtesy of the Library of Congress, Washington, D.C.

Largely self-educated, Goodrich became a bookseller and publisher at Hartford and later in Boston. There, beginning in 1828, he published for 15 years an illustrated annual, the *Token,* to which he was a frequent contributor both in prose and verse. The *Token* contained some of the earliest work of Nathaniel Hawthorne and Henry W. Longfellow. Goodrich published *Peter Parley's Magazine* (1832–44) and then merged it into his *Merry's Museum,* founded in 1841 and for a time edited by Louisa May Alcott.

In 1827 he began, under the name of Peter Parley, his series of books for the young, which embraced geography, biography, history, science, and miscellaneous tales. He was the sole composer of comparatively few of these, but in his *Recollections of a Lifetime,* 2 vol. (1856), he wrote that he was "the author and editor of about 170 volumes," of which about 7,000,000 copies had been sold, and gave a list both of the works of which he was the author or editor and of the spurious works published under his name. He was widely imitated, especially in England, where seven Peter Parleys held the field. Goodrich was a member of the Massachusetts House of Representatives in 1836 and of the state Senate in 1837. In 1851–53 he was consul at Paris, where he remained until 1855.

Goodrich Company, in full B.F. GOODRICH COMPANY, major American manufacturer of specialty chemicals, plastic materials, and other related products. Headquarters are in Akron, Ohio.

The company was incorporated in 1912 as the successor to a corporation of the same name formed in 1880, which grew out of a partnership—Goodrich, Tew and Company—formed in 1870 by Benjamin Franklin Goodrich. The earlier company in 1896 produced the first automobile tires made in the United States. Other technological innovations from the company included the first rubber-wound golf ball, the first cotton-covered rubber fire hose, the first commercial tubeless tire, the first U.S. space suits, and the development of man-made rubber. As the company diversified, it became one of the largest producers of polyvinyl chloride in the United States. This material has a wide range of applications, particularly in the construction industry.

In 1986 the Goodrich Company merged its tire operations with those of a rival tire manufacturer, Uniroyal Inc., to form the Uniroyal-Goodrich Tire Company. In the following year Goodrich sold its 50-percent interest in Uniroyal-Goodrich and thenceforth concentrated on the production of vinyl resins and other materials.

Goodricke, John (b. Sept. 17, 1764, Groningen, Neth.—d. April 20, 1786, York, Yorkshire, Eng.), English astronomer who was the first to notice that some variable stars (stars whose observed light varies noticeably in intensity) were periodic. He also gave the first accurate explanation of such periodic variables.

Goodricke was deaf and mute throughout his life, probably because of a serious illness he had contracted in childhood. He nevertheless proved to be a bright student and in 1778 he entered Warrington Academy, where he excelled in mathematics and his interest in astronomy was awakened. After leaving the academy in 1781 he started making his own astronomical observations, and in November 1782 he noticed that the brightness of the star known as Algol varied over a period of a few days. By further observations he confirmed these periodic variations and was also able to estimate the period's duration with remarkable accuracy. (Algol's variations in brightness had been noted by an Italian astronomer in the 17th century, but Goodricke was the first to establish the periodic nature of these variations.) Goodricke reported his findings to the Royal Society, and the society awarded him a Copley Medal in 1783.

In the remainder of his short life Goodricke discovered the variability of two other stars that are visible with the naked eye. More importantly, he suggested that the variability of Algol was due to its being periodically eclipsed by a darker companion body; this theory was eventually confirmed and forms the basis for astronomers' knowledge of the class of stars known as eclipsing variables. Goodricke died at age 21 as a consequence of his exposure to cold night air while making his observations.

goods waggon: *see* freight car.

Goodsir, John (b. March 20, 1814, Anstruther, Fife, Scot.—d. March 6, 1867, Wardie, near Edinburgh), Scottish anatomist and investigator in cellular physiology and pathology who insisted on the importance of the cell as the centre of nutrition and declared that the cell is divided into a number of departments. He was described as "one of the earliest and most acute observers of cell life" by the noted physiologist Rudolf Virchow, who dedicated his *Cellularpathologie* (Eng. trans., 1858) to him.

In 1841 Goodsir was appointed conservator of the museum of the Royal College of Surgeons in Edinburgh; in 1843 he moved to the University of Edinburgh, becoming curator of the university museum in 1845.

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Goodspeed, Edgar J(ohnson) (b. 1871, Quincy, Ill., U.S.—d. Jan. 13, 1962, Los Angeles), American biblical scholar and linguist, contributor to the Revised Standard Version of the Bible.

Goodspeed received his graduate education at Yale and the University of Chicago, the latter of which his father helped to found, then joined the faculty at Chicago, becoming professor of classical languages and the Bible and serving as chairman of the department of New Testament studies from 1929 to 1937. In 1923 he published his idiomatic version of the New Testament and in 1939, with J.M.P. Smith, produced a translation of the entire Bible. Along with eight other scholars, he laboured for 15 years on the Revised Standard Version of the Bible, published in 1946; the same year, he wrote *How to Read the Bible,* which became a standard guide for beginning Bible readers. Following his retirement from the University of Chicago, he continued to lecture at the University of California at Los Angeles. A prolific writer, Goodspeed produced a new book of biblical scholarship almost annually. His *Introduction to the New Testament* (1937), *History of Early Christian Literature* (1942), and *A Life of Jesus* (1950) were significant interpretations of the formative period of the church and its literature.

Goodwin, Thomas (b. Oct. 5, 1600, Rollesby, Norfolk, Eng.—d. Feb. 23, 1680, London?), English Puritan clergyman and a chaplain to Oliver Cromwell who helped draft a confession of faith for Congregationalism.

He graduated in 1616 from Christ's College, Cambridge, where from 1632 to 1634 he was vicar of Trinity Church. Because of Archbishop William Laud's persecution of Puritans, Goodwin left England in 1639 and lived for a time at Arnhem, Holland. After his return in 1640, he embraced the Independent, or Congregational, form of church government as the middle way between the Puritan extremes, Presbyterianism on the right, Sectarianism on the left.

Goodwin helped draft the Savoy Declaration of 1658, a confession of faith for Congregationalism. From 1649, the first year of Oliver Cromwell's Commonwealth, until the end of the Protectorate nine years later, Goodwin headed Magdalen College, Oxford, also serving as an official at the trials of heretical ministers. As chaplain to Cromwell, Goodwin reportedly told him at his deathbed that he was assured of salvation. Goodwin devoted his last years to study and writing; he was the author of five volumes of *Works,* collected and published posthumously (1681–1704).

Goodwin Sands, line of shoals trending northeast to southwest for 10 miles (16 km) at the entrance to the Strait of Dover from the North Sea and lying about 6 miles (10 km) off the Kent coast of England. The shifting sands form shelter for the anchorage of The Downs and are partly exposed at low water. They present a major hazard to navigation, however, and are frequently the scene of wrecks, in spite of lights and bell buoys.

Goodyear, Charles (b. Dec. 29, 1800, New Haven, Conn., U.S.—d. July 1, 1860, New York City), American inventor of the vulcanization process that made possible the commercial use of rubber.

Goodyear began his career as a partner in his father's hardware business, which went bankrupt in 1830. He then became interested in discovering a method of treating india rubber so that it would lose its adhesiveness and susceptibility to extremes of heat and cold. He developed a nitric acid treatment and in 1837 contracted for the manufacture by this process of mailbags for the U.S. government, but the rubber fabric proved useless at high temperatures.

For the next few years he worked with Nathaniel M. Hayward (1808–65), a former employee of a rubber factory in Roxbury, Mass., who had discovered that rubber treated with sulfur was not sticky. Goodyear bought Hayward's process. In 1839 he accidentally dropped some India rubber mixed with sulfur on a hot stove and so discovered vulcanization. He was granted his first patent in 1844 but had to fight numerous infringements in court; the decisive victory did not come until 1852. That year he went to England, where articles made under his patents had been displayed at the International Exhibition of 1851; while there he unsuccessfully attempted to establish factories. He also lost his patent rights there and in France because of technical and legal problems. In France a company that manufactured vulcanized rubber by his process failed, and in December 1855 Goodyear was imprisoned for debt in Paris. Meanwhile, in the United States, his patents continued to be infringed upon. Although his invention made millions for others, at his death he left debts of some $200,000. He wrote an account of his discov-

ery entitled *Gum-Elastic and Its Varieties* (2 vol.; 1853–55).

Goodyear Tire & Rubber Company, a major U.S. manufacturer of tires and related products for passenger cars, trucks, buses, and other vehicles. Headquarters are in Akron, Ohio.

Founded as a rubber company by Charles and Frank Seiberling in 1898, Goodyear based its products on the tire designs of Paul Litchfield. The company encountered financial problems after World War I and the subsequent reorganization forced the Seiberling brothers to relinquish control.

By far the greatest part of the company's business is devoted to passenger tires, but it also manufactures tires for trucks and buses, farm vehicles, industrial equipment, and aircraft, as well as producing industrial rubber, chemical, and plastic products. Goodyear pioneered in the use of polyester cord fabric for tires. The company also manufactures enriched uranium for both military and commercial use, and holds agricultural and resort properties in the southwestern United States.

Known more for its marketing skill than its technological innovation, Goodyear has marketed its products overseas, with foreign sales contributing more than one-fourth of corporate revenues. The company's most visible corporate symbol is the Goodyear blimp, used as a national promotional tool for more than 60 years. There are three blimps in the United States and one in Europe.

Goole, locality, Boothferry district, county of Humberside, England. Situated at the confluence of the Rivers Don and Ouse, it is the most westerly port of the Humber Estuary and the eastern terminus of the Aire and Calder navigation system. The port, located about 47 mi (75 km) from the open sea, can only accommodate small vessels; but its trade is varied because it serves a rich agricultural hinterland, the West Yorkshire and East Midlands coalfield and the industrial area of the West Yorkshire conurbation. Coal is the chief export, and industries associated with its function as a port include ship repairing, flour milling, and the manufacture of fertilizers and clothing. Pop. (1981 prelim.) 17,127.

Goolwa, town, southeastern South Australia, near the mouth of the Murray River, 40 mi (65 km) southeast of Adelaide. It is located on the Goolwa Channel, there crossed by a barrage (1939) to prevent tidal inflow and to control water draining from the estuarine Lake Alexandrina to the sea. Once (1836) considered as a possible site for the state capital, it had by the 1850s become an important river port, with large shipbuilding and brewing facilities, and had earned the name New Orleans of Australia. Goolwa declined, however, when the railways reached towns on the Murray and river transport died out. Goolwa is Aboriginal for "elbow," referring to a nearby bend in the Murray. The town is now a centre for beef and dairy cattle, sheep, and wheat growing. Pop. (1981) 1,624.

Goona (India): *see* Guna.

Goondiwindi, town, southern Queensland, Australia, on the Macintyre River and the Queensland–New South Wales border. It was proclaimed a town in 1888, its name coming from an Aboriginal word meaning "resting place for birds." Goondiwindi is today the service centre for a rich cattle- and sheep-grazing area. Located at the junction of the Cunningham, Bruxner, and Barwon highways, it is a focal point for road transport, particularly the transport of stock from central Queensland to New South Wales across the bridge over the Macintyre at Goondiwindi. Pop. (1981) 3,576.

gooney, also called GOONEY BIRD, any of certain albatrosses. *See* albatross.

goose, plural GEESE, any large, heavy-bodied waterfowl of the genera *Anser* (so-called gray geese) and *Branta* (so-called black geese)—birds of the Northern Hemisphere. These genera, comprising the true geese, belong to the subfamily Anserinae, family Anatidae (*q.v.*; order Anseriformes). Intermediate in size and build between large ducks and the swans, geese are less fully aquatic than either of these relatives. The sexes are alike in coloration, though males (called ganders) usually are larger than females. The neck is always shorter than the body. The bill is humped at the base and tapered toward the tip; the plates of the bill are adapted for grasping the sedges and grasses upon which geese feed. The legs are farther forward than in swans and ducks, allowing the bird to walk readily. Both sexes utter loud honking or gabbling cries while on the wing or when danger appears. When angry, geese vibrate their neck feathers; after routing an enemy, the gander utters a triumph note that is echoed by his mate and young goslings.

Geese pair for life. They build a simple nest on the ground. The 3–12 rough-surfaced, whitish eggs are incubated for 24–33 days by the hen while the gander stands guard. The downy young fend for themselves almost at once but receive care during their first summer. Geese may survive for 10–15 years in the wild and more than 30 years in captivity.

These migratory birds winter in limited localities far south of their breeding grounds. In migration they are greeted everywhere as harbingers of the changing seasons. Powerful and high fliers, they travel in V-formation.

Also called geese are a number of waterfowl of gooselike build that belong to other groups, among them the magpie goose, sheldgoose, perching duck (*qq.v.*), and the solan goose (*see* gannet). *See also* poultry.

goose, French L'OIE, ancient French board game, said to have been derived from the Greeks, which was popular in Europe at the end of the Middle Ages.

Goose was played on a board upon which was drawn a fantastic scroll, called the *jardin de l'oie* ("goose garden"), divided into 63 spaces marked with certain emblems, such as an inn, a death's head, a bridge, and a labyrinth. The emblem inscribed on spaces 1 and 63, as well as on every ninth space between, was a goose.

The object of the game was to land one's counter on number 63, after a series of moves to unoccupied spaces determined by the throw of two dice. A counter was moved forward, backward, or temporarily stalled, according to the space on which it was placed. Landing on an inn required a wait until two other players had played; landing on a death's head required a player to start over; and landing on a goose doubled the move. The game was usually played for a stake, and special fines were exacted for landing on certain spaces. At the end of the 18th century, a variation of the game was called *jeu de la revolution française* ("game of the French Revolution").

Goose Bay (Newfoundland): *see* Happy Valley-Goose Bay.

gooseberry, fruit bush of the Northern Hemisphere, frequently placed in the genus *Ribes,* along with the currant, in the family Saxifragaceae; some taxonomic systems assign exclusively to the gooseberry the generic name *Grossularia.* Gooseberry bushes are spiny and produce greenish to greenish-pink flowers in clusters of two or three. The oval berries are white, red, yellow, or green with a prickly, hairy, or smooth surface.

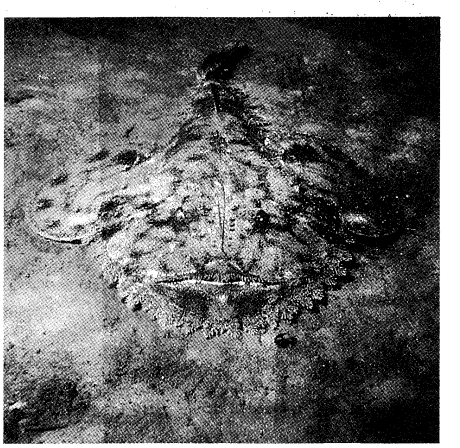
Gooseberries are extremely hardy and are grown almost as far north as the Arctic Circle. They thrive in moist, heavy clay soil in cool, humid climate. Good foliage is needed to protect the berries from the Sun. The gooseberry can withstand neglect but responds readily to good care, including potash or manure fertilizer, heavy pruning, and dormant spray to control scale and mildew. New plants are grown from cuttings.

The bushes bear well for 10 to 20 years. Two- to three-year-old spurs produce the best berries.

Gooseberry (*Ribes*)
Derek Fell

The tart fruit is eaten ripe and often made into jellies, preserves, pies, and other desserts or wine. Hundreds of varieties are grown in northern Europe, many interplanted in fruit orchards. English gooseberries (*R. uva-crispa*), popularly called grossularia, are native to the Old World and have long been cultivated for fruit. In Europe the large-fruited cultivated gooseberries became naturalized. Grossularia do not prosper in the United States, because they are susceptible to mildews and rusts. Because they provide an alternate host for the white-pine blister rust, it is illegal to grow grossularia in some states where white pine is an important resource. The most useful native North American species is the smooth gooseberry *Ribes hirtellum,* found wild across the United States; improved varieties are widely cultivated.

goosefish, any of about 12 species of anglerfishes of the family Lophiidae (order Lophiiformes), found in warm and temperate seas around the world. Goosefishes are soft and flabby with wide, flattened heads and slender, tapering bodies. They may grow to a maximum length and weight of about 1.8 metres (6 feet) and 34 kilograms (75 pounds). They have very large mouths and large, sharp teeth. Their heads are topped by a row of three isolated dorsal fin spines, the first of which is formed into a "fishing pole" tipped by a fleshy



American goosefish (*Lophius americanus*)
Douglas Faulkner

"bait," structures characteristic of all anglerfishes.

Goosefishes generally live on the bottom, lying quietly or moving slowly about. They are carnivorous, and commonly "fish" for their prey, luring it near enough with the "bait" to

be taken with a sudden snap. Fishes form the main part of the diet; various invertebrates and seabirds are also eaten. Goosefishes are sold as food in some regions. Species include the American Atlantic *Lophius americanus;* the European *L. piscatorius,* known as angler, or monkfish; and the Oriental *Lophiomus setigerus,* the *ankō* of Japan.

goosefoot, any of several salt-tolerant plant species belonging to the genus *Chenopodium,* in the goosefoot family, Chenopodiaceae. They are weedy, rank-smelling plants of wide distribution. Some of the species in the genus have leaves that resemble the foot of a goose. Good-King-Henry (*C. bonus-henricus*), sometimes called mercury, is a deep-rooted perennial with several stems and edible, spinach-like leaves. Feather geranium, or Jerusalem oak (*C. botrys*), has many clusters of small flowers and is occasionally cultivated in gardens. Pigweed, or lamb's quarters (*q.v.; C. album*), is one of the most common weedy species. Other genera in the family Chenopodiaceae include *Atriplex* (*q.v.*) and *Sarcobatus,* the members of the latter of which are commonly known as greasewood (*q.v.*). The genus *Salicornia* includes the glassworts, salt-marsh plants that may have colourful stems.

Pigweed (*Chenopodium album*)
Walter Chandoha

Goossens, Sir Eugene (b. May 26, 1893, London—d. June 13, 1962, Hillingdon, Middlesex, Eng.), prominent English conductor of the 20th century and a skilled composer.

His father, Eugène Goossens (1867–1958), and his grandfather, Eugène Goossens (1845–1906), were both noted conductors. He studied at the Bruges Conservatory in Belgium, at the Liverpool College of Music, and at the Royal College of Music in London.

In 1921, after several years of association with Sir Thomas Beecham, he formed an orchestra that gave a series of concerts and performed one of his compositions. He was director of the Rochester (N.Y.) Philharmonic Orchestra (1923–31), director of the Cincinnati Symphony Orchestra (1931–46), and resident conductor of the Sydney (New South Wales, Australia) Symphony Orchestra and director of the New South Wales Conservatorium of Music (1947–56). He was knighted in 1955.

His early compositions were influenced by impressionism. Later he developed a polyphonic style at times utilizing impressionistic harmonies but at times becoming highly chromatic, almost atonal. His chamber music includes the *Suite for Flute, Violin, and Harp* (1914) and the *Pastoral and Harlequinade for Flute, Oboe, and Piano* (1924). He composed two operas, *Judith* (produced 1929) and *Don Juan de Mañara* (1937); a ballet, *L'École en crinoline* (1921); two symphonies; songs; and pieces for piano, cello, and violin. He also wrote a book, *Overture and Beginners* (1951).

GOP (United States): *see* Republican Party.

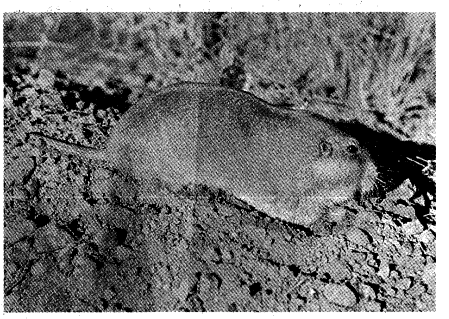
gopak (Ukrainian folk dance): *see* hopak.

gopher, also called POCKET GOPHER, any of numerous stocky rodents of the family Geomyidae (order Rodentia), found in North and Central America. There are 8 genera and about 40 species of gophers, the chief genera in North America being *Geomys* (eastern pocket gophers) and *Thomomys* (western pocket gophers).

Gophers are thickset animals that range from 13 to 45 cm (5 to 18 inches) in length, including a short, sparsely haired tail. They have small eyes and ears, short necks, chisel-like front teeth, and long, strong claws on their forefeet. Large, fur-lined cheek pouches (the "pockets") open externally on each side of the mouth. Coat colour varies among the species from almost white through brown to black.

Gophers live alone in extensive, rather shallow, underground burrows marked by a series of rounded earth mounds on the surface. They feed on the underground parts of plants and obtain their food as they tunnel along, digging with their foreclaws and teeth. Occasionally, gophers venture a short distance from the burrow entrance to collect succulent herbs, cutting the plant stems into short pieces and carrying them in their cheek pouches back to underground storage chambers. Since gophers do not hibernate, they must hoard stems, roots, and tubers in the storage chambers to survive the winter. They are solitary and pugnacious animals and tolerate company only during the breeding season, in spring or early summer. About four weeks after the parents mate, a litter of two to six young are born. The females care for the helpless, blind, naked young for about six weeks, at which time they begin to develop rapidly; in several more weeks they leave the mother's burrow to dig their own nests.

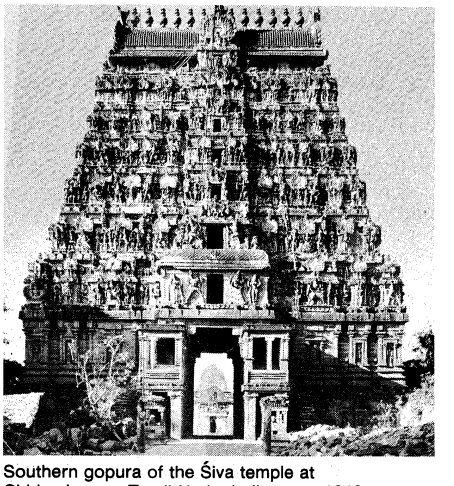
Because of their burrowing and their feeding habits, gophers are pests in some areas. They may seriously damage crops. Their burrows, however, aid in aerating and adding organic material to the soil and also collect runoff water from melting snow. Trapping, poisoning, and fumigation of the burrows are effective methods of control. The name gopher is often used for another rodent, the 13-lined ground squirrel (*see* ground squirrel).



Eastern pocket gopher (*Geomys*)
Woodrow Goodpaster—The National Audubon Society Collection/Photo Researchers

Göppingen, city, Baden-Württemberg *Land* (state), southwestern Germany. It lies at the foot of the Swabian Jura, on the Fils River, southeast of Stuttgart. Founded *c.* 1150 by the Hohenstaufen imperial family (whose fortress was nearby), Göppingen passed to the counts of Württemberg in 1273. It was devastated in the Thirty Years' War (1618–48) and largely destroyed by fire in 1425 and 1782. The city's population was greatly increased after World War II by the influx of refugees from eastern Europe. Notable buildings are the late Gothic Oberhofen Church (1436–80) and the former ducal palace (1552–68). Its manufactures include textiles, plastics, and toys. Pop. (1989 est.) 52,873.

gopura, also spelled GOPURAM, in South Indian architecture, the entrance gateway to the Hindu temple enclosure. Relatively small in the earlier period, the gopuras grew in size from the mid-12th century until the colossal gateways came to dominate the temple complex, quite surpassing the main sanctum for architectural elaboration. Often a series of gopuras are to be found at a shrine, each providing entry through a new enclosure wall.



Southern gopura of the Śiva temple at Chidambaram, Tamil Nadu, India, *c.* AD 1248
P. Chandra

The gopura is generally constructed with a stone base and a superstructure of brick and pilaster. It is rectangular in plan and topped by a barrel-vault roof. The exterior walls are covered with sculpture, which in the later periods is not of high quality. Among outstanding examples of gopuras are the Sundara Pāndya gopura of the Jambukeśvara temple at Tiruchchirāppalli, Tamil Nadu state, and the successive gopuras of the Śiva temple at Chidambaram, Tamil Nadu state (12th–13th century).

Gorakhnāth, also called GORAKṢANĀTHA (fl. late 10th–early 11th century?, India), Hindu master yogi, commonly regarded as the founder of the Kānphaṭa yogis, an order of ascetics that stresses the physical and spiritual disciplines of Haṭha Yoga.

The details of his life are obscured by the numerous legends that have grown up around his supposedly miraculous powers. Apparently of a low-caste family, Gorakhnāth either was born in, or spent a good part of his lifetime in, the Punjab, traveling widely. He was said to have met with such other religious teachers as Kabīr and Nānak and popularized the practice of Yoga throughout India.

Gorakhnāth was the disciple of Matsyendranātha (commonly regarded as the first human guru, or spiritual teacher, of the yogis) and, according to a Bengali legend, rescued his guru from Kadalī.

Gorakhnāth's work *Gorakṣaśataka* is a fundamental text among Kānphaṭa yogis. The most orthodox of his followers regarded him as an incarnation of the god Śiva, and thus eternal, and he was said to reside in a cave in the Himalayas.

Gorakhpur, town, southeastern Uttar Pradesh state, northern India. It lies along the Rāpti River, at the junction of several roads and rail lines. Embankments built along the river protect the town from flooding. Gorakhpur was founded about 1400 and named for a

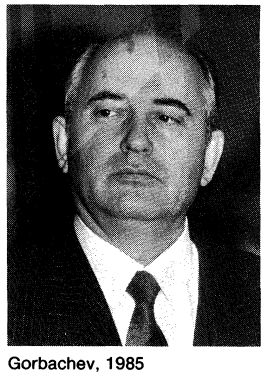
Hindu saint. Under the ruler Akbar it was an important Muslim garrison town and division headquarters. The British East India Company acquired the city and surrounding territory in 1801; it served as the recruitment centre of Gurkhas for the army. It was damaged by an earthquake in 1934. Gorakhpur is now a centre of industry and trade in agricultural products. Industries include textiles, printing, sugar milling, railroad maintenance, and manufacturing. Gorakhpur University (1956) has affiliated colleges throughout the state. The town has several museums. Pop. (1981) town, 290,814; metropolitan area, 307,501.

Gorbachev, Mikhail Sergeyevich (b. March 2, 1931, Privolye, Stavropol *kray,* Russian S.F.S.R.), Soviet official, the general secretary of the Communist Party and chief political leader of the Soviet Union from March 1985. He assumed the additional office of president in 1990. He was awarded the Nobel Prize for Peace in the latter year.

Gorbachev was the son of Russian peasants in Stavropol territory (*kray*) in the southwestern Russian S.F.S.R. He joined the Komsomol (Young Communist League) in 1946 and drove a combine harvester at a state farm in Stavropol for the next four years. He proved a promising Komsomol member, and in 1952 he entered the law school of Moscow State University. That same year he became a member of the Communist Party. He graduated with a degree in law in 1955 and went on to hold a number of posts in the Komsomol and regular party organizations in Stavropol, rising to become first secretary of the regional party committee in 1970.

Gorbachev was named a member of the Central Committee of the Communist Party of the Soviet Union (CPSU) in 1971, and he was appointed a party secretary of agriculture in 1978. He became a candidate member of the Politburo in 1979 and a full member in 1980. He owed much of his steady rise in the party to the patronage of Mikhail Suslov, the leading party ideologue. During Yury Andropov's 15-month tenure (1982–84) as general secretary of the Communist Party, Gorbachev became one of the Politburo's most highly active and visible members; and, after Andropov died and Konstantin Chernenko became general secretary in February 1984, Gorbachev became a likely successor to the latter. Chernenko died on March 10, 1985, and on the next day the Politburo elected Gorbachev general secretary of the CPSU. Upon his accession, he was still the youngest member of the Politburo.

Gorbachev quickly set about consolidating his personal power in the Soviet leadership, retiring scores of aging or incompetent high party officials and bureaucrats and replacing them with younger and more vigorous men. His primary domestic goal was to resuscitate the stagnant Soviet economy after its years of drift and low growth during Leonid Brezhnev's tenure in power (1964–82). To this end, he called for rapid technological modernization and increased worker productivity and tried to make the cumbersome Soviet bureaucracy more efficient and responsive. He also allowed freer discussion of the Soviet system's problems and deficiencies.



Gorbachev, 1985
Colton/Picture Search—Black Star

When these superficial changes failed to yield tangible results, Gorbachev in 1987–88 proceeded to initiate deeper reforms of the Soviet economic and political system. Under his new policy of *glasnost* ("openness"), a major cultural thaw took place: freedoms of expression and of information were significantly expanded; the press and broadcasting were allowed unprecedented candour in their reportage and criticism; and the country's legacy of Stalinist totalitarian rule was eventually completely repudiated by the government. Under Gorbachev's policy of *perestroika* ("restructuring"), the first modest attempts to democratize the Soviet political system were undertaken; multicandidate contests and the secret ballot were introduced in some elections to party and government posts. Under *perestroika,* some limited free-market mechanisms began to be introduced into the Soviet economy; most importantly, a large proportion of the country's industrial enterprises were made responsible for their own production, finances, and profits as an alternative to relying on state subsidies and directives from Moscow. Small-scale individual and family enterprises were also legalized, and greater economic decision-making power was granted to the nation's farms. But these economic reforms encountered serious resistance from party and government bureaucrats who were unwilling to relinquish their control over the nation's economic life.

In foreign affairs, Gorbachev from the beginning cultivated warmer relations and trade with the developed nations of both West and East. In December 1987 he signed an agreement with U.S. President Ronald Reagan for their two countries to destroy all existing stocks of intermediate-range nuclear-tipped missiles. In 1988–89 he oversaw the withdrawal of Soviet troops from Afghanistan after their nine-year occupation of that country.

In October 1988 Gorbachev was able to consolidate his power by his election to the chairmanship of the presidium of the Supreme Soviet (the national legislature). But, in part because his economic reforms were being obstructed by the Communist Party, Gorbachev thereupon embarked on a fundamental restructuring of the government's legislative and executive branches in order to release them from the grip of the CPSU and make them directly accountable to the populace through conventional electoral means. Accordingly, under changes made to the constitution in December 1988, a new bicameral parliament called the U.S.S.R. Congress of People's Deputies was created, with some of its members directly elected by the people in contested (*i.e.,* multicandidate) elections. In 1989 the newly elected Congress of People's Deputies elected from its ranks a new U.S.S.R. Supreme Soviet that, in contrast to its predecessor of that name, was a real standing parliament with substantial legislative powers. In May 1989 Gorbachev was elected chairman of this Supreme Soviet and thereby retained the national presidency, one moreover that was now endowed with broad executive powers over foreign and domestic policy and budgetary matters.

Gorbachev was the single most important initiator of a series of events in late 1989 and 1990 that transformed the political fabric of Europe and marked the beginning of the end of the Cold War. Throughout 1989 he had seized every opportunity to voice his support for reformist communists in the Soviet-bloc countries of eastern Europe, and when communist regimes in those countries collapsed like dominoes late that year, Gorbachev tacitly acquiesced in their fall. As democratically elected, noncommunist governments came to power in East Germany, Poland, Hungary, and Czechoslovakia in late 1989–90, Gorbachev agreed to the phased withdrawal of Soviet troops from those countries. By the summer of 1990 he had agreed to the reunification of East with West Germany and even assented to the prospect of that reunified nation's becoming a member of the Soviet Union's longtime enemy, the North Atlantic Treaty Organization. In 1990 Gorbachev received the Nobel Prize for Peace for his striking achievements in international relations.

The new freedoms arising from Gorbachev's democratization and decentralization of his nation's political system led to civil unrest in several of the constituent republics (*e.g.,* Azerbaijan, Georgia, and Uzbekistan) and to outright attempts to achieve independence in others (*e.g.,* Lithuania). In response, Gorbachev used military force to suppress bloody interethnic strife in several of the Central Asian republics in 1989–90, and, when Lithuania unilaterally declared its independence from the Soviet Union in March 1990, Gorbachev mounted an economic blockade which forced that republic back into the Soviet fold temporarily while constitutional mechanisms were devised that could provide for the lawful secession of a republic from the U.S.S.R.

With the CPSU waning in power and steadily losing prestige in the face of the mounting impetus for democratic political procedures, Gorbachev in 1990 further accelerated the transfer of power from the party to elected governmental institutions. In March of that year the Congress of People's Deputies elected him to the newly created post of president of the U.S.S.R., with extensive executive powers. At the same time, the Congress, under his leadership, abolished the Communist Party's constitutionally guaranteed monopoly of political power in the Soviet Union, thus paving the way for the legalization of other political parties.

Gorbachev was conspicuously successful in dismantling the totalitarian aspects of the Soviet state and in moving his country along the path toward true representative democracy. He appeared to be less able or willing to release the Soviet economy from the grip of centralized state direction and allow private entrepreneurs and free-market mechanisms to make prominent contributions.

Gorchakov, Aleksandr Mikhaylovich, Knyaz (Prince) (b. June 15 [June 4, Old Style], 1798, Khaapsalu, Estonia, Russian Empire—d. March 11 [Feb. 27], 1883, Baden-Baden, Ger.), statesman who served as Russia's foreign minister during the quarter century following the Crimean War (1853–56), when Russia was trying to regain its stature as a powerful European nation.

Gorchakov was a cousin of the Crimean War general Mikhail Dmitriyevich Gorchakov. Entering the diplomatic service in 1817, he became a member of the Russian delegations to the international congresses of Troppau, Laibach, and Verona (1820–22), and, despite the efforts of the foreign minister Count Karl Robert Nesselrode to retard his advancement, he was appointed (after 1822) to posts in various Russian embassies throughout western Europe.

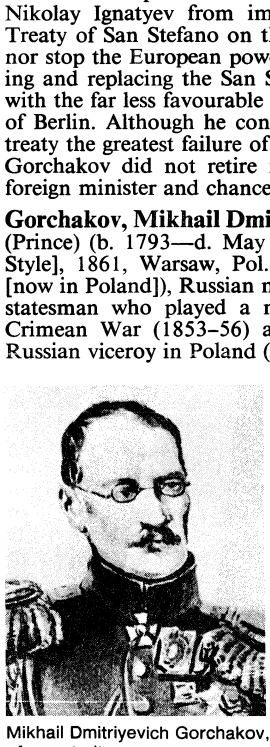
When Nesselrode resigned as foreign minister after the Crimean War, Gorchakov was chosen as his successor (April 1856). He immediately embarked on a policy of reaffirming Russia as a great European power and strove to establish cordial relations with France and Prussia. Although he could not maintain the Franco-Russian rapprochement when Russia, over French protests, suppressed the Polish insurrection of 1863, he effectively conducted diplomacy with the other European powers

and obtained Prussia's open support for Russia's actions. In 1866 Tsar Alexander II rewarded him by naming him to the post of imperial chancellor.

Gorchakov took advantage of Europe's preoccupation with the Franco-German War in 1870 to renounce the prohibitions, placed on Russia after the Crimean War, against maintaining a war fleet in the Black Sea and fortifying the coastline. He also brought Russia into a loose defensive alliance with Germany and Austria-Hungary (Dreikaiserbund, or Three Emperors' League; 1873).

Despite his achievements, Gorchakov's role in determining Russia's foreign policy began to diminish in the mid-1870s—his personal rivalry with the German chancellor Otto von Bismarck interfered with the effectiveness of the Dreikaiserbund; his disapproval of Pan-Slavism was insufficient to prevent it from becoming a major influence on Russian foreign policy; and his attempts to preserve the Dreikaiserbund and the peace following a Bosnian revolt in 1875 failed. Furthermore, after the Russo-Turkish War of 1877–78, he could neither prevent his subordinate Count Nikolay Ignatyev from imposing the harsh Treaty of San Stefano on the defeated Turks nor stop the European powers from intervening and replacing the San Stefano settlement with the far less favourable (to Russia) Treaty of Berlin. Although he considered the Berlin treaty the greatest failure of his official career, Gorchakov did not retire from his posts of foreign minister and chancellor until 1882.

Gorchakov, Mikhail Dmitriyevich, Knyaz (Prince) (b. 1793—d. May 30 [May 18, Old Style], 1861, Warsaw, Pol., Russian Empire [now in Poland]), Russian military officer and statesman who played a major role in the Crimean War (1853–56) and served as the Russian viceroy in Poland (1856–61).



Mikhail Dmitriyevich Gorchakov, detail of a portrait

Novosti Press Agency

Gorchakov gained his early military experience during the Russian campaign in Persia (1810), the invasion of Russia by Napoleon (1812–14), and in the Russo-Turkish War of 1828–29. Soon after his appointment as a general officer in 1830, he was assigned to the Russian forces suppressing an insurrection in Poland (1830); he distinguished himself when the Russian army seized Warsaw (Sept. 8, 1831) and crushed the rebellion.

Gorchakov was appointed military governor of Warsaw (1846), served as chief of staff of the Russian army that helped Austria suppress the Hungarian revolution of 1848, and afterward became chief of staff of the Russian army and adjutant general to Tsar Nicholas I. In 1853, after diplomatic relations between Russia and the Ottoman Empire were broken, he led the Russian occupation force that entered the Turkish-controlled principality of Moldavia (July 1853). When the Crimean War was formally declared several months later, he was appointed commander in chief of the Russian troops in Moldavia and Walachia. In April 1854 he laid siege to Silistra, but in June, before he could take that strategic Turkish fortress on the Danube River, Nicholas ordered him to withdraw. The following year he was transferred to the post of commander in chief of the Russian forces in the Crimea (February 1855). Although he did not believe he could salvage the hopeless Russian situation, he did try to save Sevastopol, which had been placed under siege in October 1854. He suffered defeat on August 16 at the Battle of the Chernaya River, however, and was forced to burn Sevastopol and retreat after the enemy launched a new assault (September 8).

After the conclusion of the Crimean War (March 30, 1856), Gorchakov succeeded the dictatorial Ivan Paskevich as governor-general of Poland, where he inaugurated a policy of leniency and reform. Nevertheless, he was unable to curb the mounting animosity among the Poles toward Russian rule, seen in demonstrations (February 1861) commemorating the Polish victory at Grochów.

Gordian, Latin GORDIANUS, name of Roman emperors, grouped below chronologically and indicated by the symbol •.

• **Gordian I,** Latin in full MARCUS ANTONIUS GORDIANUS SEMPRONIANUS ROMANUS AFRICANUS (b. *c.* 157—d. April 238), Roman emperor for three weeks in March–April 238.

Gordian was an elderly senator with a taste for literature. The Greek writer Flavius Philostratus dedicated his *Lives of the Sophists* to him. Early in 238, when Gordian was proconsul in Africa, a group of wealthy young landowners resisted and killed the tax collectors who had been sent to Africa by the emperor Maximinus (reigned 235–238). The insurgents proclaimed Gordian emperor, and the Senate recognized him. Gordian killed himself upon learning of the battlefield death of his son and coruler, Gordian II.

• **Gordian II,** Latin in full MARCUS ANTONIUS GORDIANUS SEMPRONIANUS ROMANUS AFRICANUS (d. April 238), Roman emperor who ruled jointly for three weeks in March–April 238 with his father, Gordian I. He was killed in a battle with Capellianus, governor of Numidia.

• **Gordian III,** Latin in full MARCUS ANTONIUS GORDIANUS (b. 225—d. 244, Zaitha, Mesopotamia), Roman emperor from 238 to 244.

After the deaths of Gordian I and Gordian II, the Roman Senate proclaimed two elderly senators, Maximus and Balbinus, joint emperors. However, the people and imperial guards in Rome distrusted the Senate's nominees and insisted on making the 13-year-old Gordian (grandson of Gordian I and nephew of Gordian II) caesar and heir to the throne. After the defeat of the deposed emperor Maximinus, the guards rioted and killed Balbinus and Maximus; in August 238 Gordian became sole emperor.

The government was directed first by his mother and later by his father-in-law, the praetorian prefect Timesitheus. In 242 Gordian accompanied Timesitheus on a campaign against the Persians. After successes in battle, the prefect died (243) of an illness and was replaced by Philip the Arabian. In the spring of 244 Gordian was murdered by the troops and succeeded by Philip.

Gordian knot, knot that gave its name to a proverbial term for a problem solvable only by bold action. In 333 BC, Alexander the Great, on his march through Anatolia, reached Gordium, the capital of Phrygia. There he was shown the chariot of the ancient founder of the city, Gordius, with its yoke lashed to the pole by means of an intricate knot with its end hidden. According to tradition, this knot was to be untied only by the future conqueror of Asia. In the popular account, probably invented as appropriate to an impetuous warrior, Alexander sliced through the knot with his sword, but, in earlier versions, he found the ends either by cutting into the knot or by drawing out the pole. The phrase "cutting the Gordian knot" has thus come to denote a bold solution to a complicated problem.

gordian worm: *see* horsehair worm.

Gordimer, Nadine (b. Nov. 20, 1923, Springs, Transvaal, S.Af.), South African novelist and short-story writer whose major theme is exile and alienation.

Gordimer was born into a privileged white, middle-class family. She published her first story in a magazine when she was 15. Her wide reading informed her about the world on the other side of apartheid (the official South African policy of racial segregation) and that discovery in time developed into strong political opposition to apartheid. In addition to writing, she lectured and taught at various schools in the United States during the 1960s and '70s.

Gordimer's first book was *The Soft Voice of the Serpent* (1952), a collection of short stories. In 1953 a novel, *The Lying Days,* was published. Her stories concern the devastating effects of apartheid on the lives of South Africans. She details the constant tension between personal isolation and the commitment to social justice that eventually produces a numbness caused by the unwillingness to accept apartheid, the inability to change it, and the refusal of exile.

Her novel *The Conservationist* (1974) won the Booker McConnell Prize in 1974. Later works include *Burger's Daughter* (1979), the short-story collection *A Soldier's Embrace* (1980), *July's People* (1981), and *A Sport of Nature* (1987).

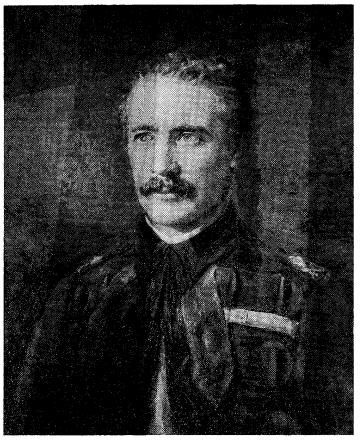
Gordium, ancient Anatolian city, the ruins of which, along the banks of the Sakarya (ancient Sangarius) River, northwestern Turkey, have yielded important information about ancient Phrygian culture. American excavations after 1950 revealed Early Bronze Age and Hittite settlements, but the city achieved its greatest prominence as the flourishing capital of Phrygia in the 9th and 8th centuries BC. According to legend, the ancient capital was founded by the peasant Gordius, who contrived the knot later cut by Alexander the Great. Gordium remained the political centre of Phrygia until the Cimmerians burned the city and shattered Phrygian power in Anatolia in the early 7th century BC. Though rebuilt under the Persians, Gordium never regained its former splendour.

Gordon, district, Grampian region, northeastern Scotland; until the reorganization of 1975 it was part of the former county of Aberdeen. The district has an area of 855 square miles (2,214 square km) and is largely a coastal plain facing the North Sea on the east, but it reaches the hills of The Grampians in the west. The district's economy was primarily based on agriculture and whisky distilling until the extraction of North Sea oil revitalized the economy. Inverurie is the seat of the district authority. Pop. (1987 est.) 71,986.

Gordon, Charles George, byname CHINESE GORDON (b. Jan. 28, 1833, Woolwich, near London, Eng.—d. Jan. 26, 1885, Khartoum, Sudan), British general who became a national hero for his exploits in China and his ill-fated defense of Khartoum against Sudanese rebels.

The son of an artillery officer, Gordon was commissioned a second lieutenant in the Royal Engineers in 1852. During the Crimean War (1853–56) he distinguished himself by his reckless bravery in the siege trenches outside Sevastopol. Promoted to captain in 1859, he volunteered the following year to join the

British forces that were fighting the Chinese in the "Arrow" War. He was present at the occupation of Peking (October 1860) and personally directed the burning of the Emperor's



Charles George Gordon, portrait by Lady Julia Abercromby; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

summer palace. In May 1862, Gordon's corps of engineers was assigned to strengthen the bulwarks of the European trading centre of Shanghai, which was threatened by the insurgents of the Taiping Rebellion. A year later he became commander of the 3,500-man peasant force, known as the "Ever-Victorious Army," raised to defend the city. During the next 18 months Gordon's troops played an important, though not a crucial, role in suppressing the uprising. He returned in January 1865 to England, where an enthusiastic public had already dubbed him "Chinese Gordon." For the next five years he was commander of the Royal Engineers at Gravesend, Kent; he spent his spare time developing his own unorthodox, mystical brand of Christianity and engaging in philanthropic activity among poor youths.

In 1873 the khedive Ismāʿīl Pasha of Egypt, who regularly employed Europeans, appointed Gordon governor of the province of Equatoria in the Sudan. In Equatoria from April 1874 to December 1876, he mapped the Upper Nile and established a line of stations along the river as far south as present Uganda. After a brief stay in England, he resumed service under the Khedive as governor general of the Sudan. Gordon established his ascendancy over this vast area, crushing rebellions and suppressing the slave trade. Ill health forced him to resign and return to England in 1880; over the next two years he served in India, China, Mauritius, and Cape Colony, South Africa.

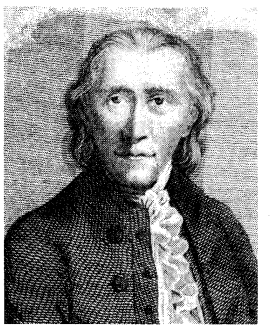
In 1884, Gordon was again sent to the Sudan by the British government to evacuate Egyptian forces from Khartoum, which was threatened by Sudanese rebels led by a Muslim mystic, Muḥammad Aḥmad al-Mahdī. Reappointed governor general, Gordon arrived in Khartoum in February. Khartoum came under siege a month later, and on Jan. 26, 1885, the rebels broke into the city and killed Gordon and the other defenders. The British public reacted to his death by acclaiming "Gordon of Khartoum" a martyred warrior-saint and by blaming government officials for failure to relieve the siege. Some biographers, as early as Lytton Strachey in *Eminent Victorians* (1918), have suggested that Gordon, in defiance of his government's orders, had deliberately refused to evacuate Khartoum, even though evacuation was still possible until late in the siege. Anthony Nutting develops this view in his *Gordon of Khartoum: Martyr and Misfit* (1966).

Gordon, Charles William: *see* Connor, Ralph.

Gordon, George: *see* Aberdeen, George Hamilton-Gordon, 4th earl of; Huntly, George Gordon, 1st marquess and 6th earl of.

Gordon, Lord George (b. Dec. 26, 1751, London—d. Nov. 1, 1793, London), English lord and instigator of the anti-Catholic Gordon riots in London (1780).

The third and youngest son of the 3rd Duke of Gordon, he was educated at Eton and entered the British Navy, rising to the rank of lieutenant in 1772. When the 4th Earl of Sandwich, then at the head of the Admiralty,



Lord George Gordon, detail of an engraving from a drawing by R. Bran, 1780

By courtesy of the trustees of the British Museum

would not promise him a command, Gordon resigned his commission shortly before the beginning of the American Revolutionary War. In 1774 he entered Parliament for a pocket borough that was given him as a bribe to withdraw from an election elsewhere.

In 1779 Gordon, previously considered insignificant, organized and made himself head of the Protestant associations formed to secure the repeal of the Catholic Relief Act of 1778. He led a mob that marched on the houses of Parliament on June 2, 1780, to present a petition against the act. The ensuing riot lasted a week, causing great property damage and nearly 500 casualties. For his part in instigating this violence, Gordon was arrested on a charge of high treason but was acquitted on the ground that he had no treasonable intentions. His life thereafter was a succession of unlikely political and financial schemes. He was excommunicated from the Church of England in 1786 for refusing to bear witness in an ecclesiastical suit; in the same year he became a convert to Judaism.

In 1787 Gordon was convicted of libelling the Queen of France, the French ambassador in London, and the administration of justice in England. After a period of exile he returned to England, and in January 1788 he was sentenced to five years' imprisonment in Newgate. In prison he lived comfortably, giving dinners and dances. Because he could not obtain the securities for his good behaviour at the end of his sentence, he was not allowed to leave Newgate and died there.

Gordon, John Brown (b. Feb. 6, 1832, Upson County, Ga., U.S.—d. Jan. 9, 1904, Miami, Fla.), Confederate military leader and post-U.S. Civil War politician who symbolized the shift from agrarian to commercial ideals in the Reconstruction South.

Gordon accomplished little of note during his first 29 years. He attended but did not graduate from the University of Georgia. He became a lawyer but abandoned his practice to develop coal mines in Georgia's northwestern tip. Then came the Civil War. Although lacking any military education or experience, Gordon was elected captain of a company of mountaineers and displayed remarkable capabilities. He quickly climbed from captain to brigadier general (1862) to major general (1864) to lieutenant general (1865). He was at many major Civil War battles—Seven Pines, Malvern Hills, Chancellorsville, Gettysburg, Spotsylvania, and Petersburg—and he commanded one wing of Gen. Robert E. Lee's army just prior to Appomattox.

A hero to Georgians at the age of just 33, Gordon returned to his home state and began to practice law once again. He vigorously opposed federal Reconstruction policies, but when he ran for governorship as a Democrat in 1868, he was defeated by his Republican opponent. Unquestionably a symbol of the age of white supremacy to his Georgian constituents, Gordon was rumoured to be a Grand Dragon in the Ku Klux Klan.

Gordon was elected to the U.S. Senate (1873–79). Though he was reelected, he resigned in 1880 to take an important position with a railroad company, thereby leading the shift of the New South to commercialism and industrialism. He returned to politics in 1886 for one term as governor and, at the conclusion of that term in 1890, was sent back to the U.S. Senate, where he served until 1897.

When the United Confederate Veterans organization was formed in 1890, Gordon was made commander in chief, a position he occupied until his death. He published memoirs of his military exploits in *Reminiscences of the Civil War* (1903).

Gordon, Judah Leib, also called LEON GORDON, byname YALAG (b. Dec. 7, 1830, Vilnius, Lithuania—d. Sept. 16, 1892, St. Petersburg, Russia), Hebrew poet, essayist, and novelist, the leading poet of the Hebrew Enlightenment (Haskala), whose use of biblical and post-biblical Hebrew resulted in a new and influential style of Hebrew poetry.

After he left Lithuania, Gordon was imprisoned as a political conspirator by the Russian government. After his release he became editor of *ha-Melitz.* His early poems dealing with biblical subjects were followed by powerful satires in verse aimed against the harsher aspects of rabbinic Judaism. His last poems reflect bitter disillusionment with the ideals of Haskala. Although of limited poetic talent, Gordon's advocacy of social and religious reforms proved widely influential, and his skillful use of post-biblical idiom increased the flexibility of modern Hebrew. His poems were collected in *Kol Shire Yehuda* (1883–84) and his stories in *Kol Kithbe Yehuda* (1889).

Gordon, Patrick (b. March 31, 1635, Auchleuchries, Aberdeen, Scot.—d. Dec. 9 [Nov. 29, old style], 1699, Moscow), Scottish soldier of fortune who became a general in the Russian Army and a close friend of Peter I the Great of Russia (ruled 1682–1725).

Having left Scotland, which was torn by religious and political strife, Gordon went to Danzig (now Gdańsk) in Poland and studied at the Jesuit College at Braniewo (Braunsberg) for two years (1651–53). When a Polish–Swedish war broke out in 1655, he became a mercenary and fought on different occasions for both sides.

In 1661 Gordon entered the Russian Army as a major and, after suppressing the Moscow riots of 1663, he was promoted to the rank of colonel. In 1666 Tsar Alexis sent him as an envoy to England, but he failed to complete his mission satisfactorily and lost the Tsar's favour. Despite his efforts to leave the Russian service, his position improved with succeeding régimes, particularly after he heroically defended Chigirin (located in the Ukraine), which was besieged by the Turks in 1678.

After Sophia Alekseyevna became regent for Peter I and Ivan V (1682), Gordon again went on a diplomatic mission to England (1686–87). Upon his return he warned Sophia and her chief adviser, Prince Vasily Golitsyn, against joining an anti-Turk European alliance and waging war against the Turks' vassals, the

Crimean Tatars. He was overruled, however, and in 1687 he joined Golitsyn in his first unsuccessful Crimean expedition. Promoted to the rank of general, Gordon served as quartermaster general in the second Crimean campaign (1689) and supplied Golitsyn with strategic advice. But when that campaign also failed and a political crisis developed, Gordon, commanding troops trained in the western European style, helped Peter I overthrow Sophia (1689).

Subsequently, Gordon became a close collaborator of the young tsar, entertaining him, teaching him ballistic science, and also supervising the war-game maneuvers of Peter's specially trained troops. As a reward, Peter made Gordon a rear admiral (1694) and his chief military counselor. In 1698 when the *streltsy* (household troops) rebelled, hoping to restore Sophia to the throne while Peter was traveling in western Europe, Gordon crushed them (June 28 [June 18], 1698).

Gordon, Richard F(rancis), Jr. (b. Oct. 5, 1929, Seattle, Wash., U.S.), American astronaut who accompanied Charles Conrad on the September 1966 flight of *Gemini 11*. They docked with an Agena target on the first orbit and were propelled together to a record altitude of 850 miles (about 1,370 km). During a 45-minute space walk, Gordon joined the two crafts with a tether.

Gordon entered naval aviation training after he graduated from the University of Washington, Seattle, in 1951. Six years later he became a test pilot, and in 1961 he won the Bendix Trophy Race, piloting an F4H Phantom jet from Los Angeles to New York City in the record time of 2 hours 47 minutes (an average speed of 879 miles, or 1,414 km, per hour).

In 1963 Gordon was chosen to be an astronaut. With Alan L. Bean and Charles Conrad, Gordon made the *Apollo 12* flight, launched on Nov. 14, 1969. During this mission, the second manned landing on the Moon, Gordon was pilot of the Command Module and remained in lunar orbit during the lunar exploration. Gordon retired from the Navy and the space program in 1972 and until 1977 served as executive vice president of the New Orleans Saints, a professional football team.

Gordon, Walter Lockhart (b. Jan. 27, 1906, Toronto—d. March 21, 1987, Toronto), Canadian businessman, political leader, and finance minister who contributed greatly to the government planning of Canada's economic development.

Gordon studied chartered accountancy, became a partner in a Toronto firm, and then became president of a company of industrial consultants. At the outbreak of World War II he was called upon by the government to advise on financial matters. He helped organize the Foreign Exchange Control Board and in 1940–42 acted as special assistant to the deputy minister of finance.

After the war, in 1946, he became chairman of the royal commissions on the Dominion civil service. In 1951 he was made chairman of the executive committee of the Canadian Institute of International Affairs and a member of the board of governors of the University of Toronto. In 1955 he was appointed to a committee investigating Canada's economic prospects and development. He entered party politics as a Liberal in the same year, and in 1962 and subsequently he held the riding of Toronto-Davenport in the House of Commons.

He served Lester Pearson's government as finance minister, but in 1963 his first budget brought the new government to the brink of a defeat in Commons. Much of the budget had to be withdrawn or amended, and he was widely accused of economic and administrative miscalculations. He made something of a comeback with two subsequent budgets, but in the 1965 elections he was a campaign issue because of his 11 percent sales tax on construction materials and manufacturing machinery and equipment. He helped persuade Pearson to call the 1965 elections and served as Liberal Party campaign chairman during them; when Pearson failed to achieve a clear parliamentary majority, Gordon resigned, accepting responsibility for bad political and financial advice. In 1967 he reentered the Cabinet as president of the Privy Council, but he resigned the following year.

Following his resignation he was chancellor (1973–77) of York University, Downsview, Ont. He wrote several books on Canadian politics and government.

Gordon, William: *see* Kenmure, William Gordon, 6th Viscount.

Gordon River, river in southwestern Tasmania, Australia, rising from Lake Richmond in the King William Range of the central highlands and flowing southeast around a great bend to the southwest and finally northwest to enter the Indian Ocean at Macquarie Harbour after a course of 115 miles (185 km). Its principal tributaries are the Franklin, Serpentine, Wedge, Denison, and Sprent rivers. The largely inaccessible mountains in which the Gordon rises give way to rain forests in the lower valley, where valuable Huon pines with a high oil content are cut for milling. Explored in 1816 by James Kelly, who named it after James Gordon, an associate, the river is navigable by small steamers only in its lowest 20 miles (32 km). Launches ply the stream during the summer, leaving from Strahan on the north shore of Macquarie Harbour.

The first stage of the Gordon River hydroelectric project was completed in 1978; Gordon Dam and dams on the Serpentine and Huon rivers have created Lakes Gordon and Pedder, the former of which is one of the largest freshwater storage reservoirs in Australia. Lake Gordon has a surface area of 105 square miles (272 square km) and a storage capacity of 399,621,000,000 cubic feet (11,316,000,000 cubic m). Lake Pedder has a surface area of 93 square miles (242 square km). With the lower Gordon River as their immediate concern, environmentalists protested against the effect of future dams on wilderness areas. A major conservation controversy ensued, and in 1983 the Australian Commonwealth government intervened to prevent the building of another dam on the Gordon River at a site below its junction with the Franklin.

Gordonia, genus of trees in the tea family (Theaceae). The members of the genus are native to North America and East Asia and include the loblolly bay and other trees with yellow-centred, white, camellia-like blooms. The loblolly bay, or tan bay (*G. lasianthus*), native to southeastern North America, reaches about 19 m (60 feet). It has ascending branches, an oval form, evergreen leaves, and long-stalked, fragrant flowers in late summer. An evergreen species from South China, *G. axillaris,* has stalkless blossoms 10 cm (4 inches) wide that flower in winter on evergreen trees about 7 m (22½ feet) tall, usually less. The franklinia (*q.v.*) tree, once included in *Gordonia,* is now called *Franklinia alatamaha.*

Gordonia
Leonard Lee Rue III

Gore, Charles (b. Jan. 22, 1853, Wimbledon, Surrey, Eng.—d. Jan. 17, 1932, London), English theologian, Anglican bishop, and exponent of the liberal tendency within the Anglo-Catholic movement. He demonstrated a willingness to accept historical criticism of the Bible, and he was interested in social reform.

Gore, drawing by John Mansbridge; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Ordained in 1878, Gore served in a variety of college positions before 1894, when he began a seven-year ministry as canon of Westminster. He was also senior (superior) of the Community of the Resurrection from its foundation in 1892 until 1901. Consecrated bishop of Worcester in 1902, he moved to the new see of Birmingham in 1905 and to Oxford in 1911. He resigned in 1919 and settled in London, where he preached and wrote extensively, lectured at King's College, and served the University of London as dean of the theological faculty (1924–28).

Gore expounded the Anglo-Catholic view of the church as the legitimate successor of the apostles in *The Ministry of the Christian Church* (1888) and *Roman Catholic Claims* (1888). Unlike some Anglo-Catholics, however, he did not think it sufficient to confront the aggressive secularism of the time with a blunt affirmation of the church's supernatural life and apostolic authority. It was also necessary, he believed, to correlate Christian theology with scientific and historical knowledge and translate it into social action. This conviction found expression in *Lux Mundi: A Series of Studies in the Religion of the Incarnation* (1889), which Gore edited and which became a major text of liberal Catholicism. He also wrote *The Incarnation of the Son of God* (1891), *Reconstruction of Belief,* 3 vol. (1921–24), *Christ and Society* (1928), and *The Philosophy of the Good Life* (1930).

Gorée Island, French ÎLE DE GORÉE, island just south of Presqu'île du Cap Vert (Cape Verde Peninsula), Senegal, and one of the earliest European settlements in western Africa. It is a rather barren volcanic rock of only 88 acres (36 hectares), commanding the roadstead of Dakar harbour. The small, picturesque town of Gorée is dominated by Forts Nassau and Saint-Michel. It was first occupied by the Portuguese in the mid-15th century; after they displaced the indigenous Lebu people, the town became a major entrepôt for the Atlantic slave trade until the end of the 18th century. During the course of three centuries, some 20 million Africans are said to have been shipped through the island to the Americas; millions more died there. Gorée changed hands several times, but from 1816 until Senegal's

independence in 1960, it was under French control. As early as 1848, Gorée participated in French elections and was represented in the French Parliament during the first half of the 20th century. There is a shortage of water, and for the last 150 years the island's importance has steadily declined with the rise of Saint-Louis and Dakar on the mainland. Several museums and remains of two forts attract tourists. It is the site of Senegal's major prison. Pop. (1970 est.) 900.

Goremykin, Ivan Logginovich (b. Nov. 8 [Oct. 27, old style], 1839, Novgorod province, Russian Empire—d. Dec. 24 [Dec. 11, O.S.], 1917, Caucasus), Russian official and government minister whom many view as a symbol of the unresponsiveness of the tsarist regime to the social unrest preceding the Russian Revolution.

Goremykin spent most of his life as a government bureaucrat, attaining successively more responsible positions until his appointment in 1895 as minister of the interior. Chiefly concerned with his own advancement, he showed little initiative in any of his posts, preferring inaction or delay on most policy matters. Forced out of office in 1899, he returned to power briefly in April 1906, when Nicholas II appointed him chairman of the Council of Ministers. The tsar viewed Goremykin as a loyal functionary who would support the throne in dealings with the newly created state Duma, or parliament. Having served his purpose, Goremykin was dismissed in July 1906.

In 1914, when Goremykin was 74 and generally thought to be senile, Nicholas reappointed him chairman of the Council of Ministers, in which he obediently followed the orders of the tsar, then under the influence of Rasputin. Dismissed as chairman in 1916, he fled to the Caucasus during the Revolution, where he died.

Goren, Charles H(enry) (b. March 4, 1901, Philadelphia), U.S. Contract Bridge authority whose innovative system of point-count bidding and repeated successes in tournaments made him one of the world's most famous players.

Goren studied law at McGill University in Montreal (LL.M., 1923) and practiced in Philadelphia. In the 1920s he worked at Bridge, at which he was already adept, as much as on law. He developed his point-count system, later elaborated in *Winning Bridge Made Easy* (1936), and his numerous tournament victories publicized it so much that he gave up law. In the 1940s he became a popular syndicated Bridge columnist, later in conjunction with Omar Sharif. Other of his books include *Contract Bridge in a Nut Shell* (1946, 1959), *Point Count Bidding in Contract Bridge* (1949), and *Goren's Bridge Complete* (1963), which was widely translated. Goren was U.S. Bridge champion more than 30 times and also lectured and gave Bridge commentaries on television.

Gorgān, also spelled GURGĀN, formerly ASTERĀBAD, town, Māzandarān *ostān* (province), Iran, on a small tributary of the Qareh Sū (stream), 23 mi (37 km) from the Caspian Sea. The town, in existence since Achaemenidian times, was subjected to incessant Qājār–Turkmen tribal conflicts in the 19th century. It was renamed Gorgān in the 1930s after being devastated by an earthquake. Articles of trade include cereals, soap, and carpets. The former province of Gorgān-Asterābad long suffered from inroads of the Turkmen tribes who occupied the plain north of the Qareh Sū, but in modern times the plain has become a flourishing granary. Pop. (1976) 88,348.

Gorgas, Josiah (b. July, 1, 1818, Dauphin County, Pa., U.S.—d. May 15, 1883, Tuscaloosa, Ala.), army officer who directed the production of armaments for the Confederacy during the U.S. Civil War.

Born and raised in poverty, Gorgas had to put work before education as a youth. He won an appointment to West Point, however, and was graduated sixth in his class in 1841. For the next 20 years Gorgas belonged to the ordnance service of the U.S. Army and was stationed at a number of posts. From 1841 to 1846 he was at the Watervliet Arsenal in New York; then he spent two years in Mexico, participating in Gen. Winfield Scott's siege of Veracruz and later commanding the ordnance depot there. From 1848 to 1860 he served in several posts, rose to the rank of captain, and married an Alabama woman.

Motivated by his wife's sympathies and his own intense dislike of the Abolitionists, Gorgas chose the Confederacy when the South seceded. In early April 1861, he resigned his commission, moved to Montgomery, and was appointed chief of ordnance in the Confederate Army. Within a week the North and South were at war.

Gorgas' fame rests on his outstanding performance in providing arms and ammunition for the Confederate forces. At the outbreak of the Civil War, the South had few modern weapons and virtually no manufacturing facilities for making them. Gorgas simultaneously sought arms from abroad while laying the groundwork for internal production of rifles, small arms, bullets, powder, and cannons.

An extraordinary administrator, Gorgas by 1863 had several factories producing weapons, mills making powder, and mines supplying needed raw materials. And despite the Confederacy's constant financial and political problems, Gorgas kept the ordnance service running at high efficiency. In recognition of his ability to keep Southern soldiers supplied, Gorgas rose from major to lieutenant colonel to colonel to brigadier general by the end of the war.

Without money or position following the collapse of the Confederacy, Gorgas took a job as manager of an Alabama ironworks and remained there until 1869. He then joined the teaching staff of the University of the South, where he became vice chancellor in 1872. In 1878 he was elected president of the University of Alabama, but resigned a year later because of ill health. He later served as librarian.

Gorgas, William Crawford (b. Oct. 3, 1854, Mobile, Ala., U.S.—d. July 3, 1920, London), U.S. Army surgeon who contributed greatly to the building of the Panama Canal by introducing mosquito control to prevent yellow fever and malaria.

After receiving his medical degree (1879) from the Bellevue Hospital Medical College, New York City, Gorgas joined the U.S. Army medical corps in 1880. From 1898 to 1902 he was in charge of sanitation measures in Havana, and conducted many experiments on the transmission of yellow fever by the mosquito. Having effectively eliminated yellow fever from the area, he was sent in 1904 as chief sanitary officer to Panama. In two years he eradicated yellow fever from the Canal Zone and brought malaria under control, thus removing the two main obstacles to building the canal.

Gorgas was appointed surgeon general of the U.S. Army in 1914, and upon his retirement in 1918 became permanent director of the International Health Board of the Rockefeller Foundation.

Gorges, Sir Ferdinando (b. *c.* 1566, probably at Wraxall, Somerset, Eng.—d. 1647, Long Ashton, Gloucestershire), British proprietary founder of Maine, who promoted, though unsuccessfully, the colonization of New England along aristocratic lines.

After a colourful military career in his early manhood, during which he was knighted (1591), Gorges' life after 1605 was dominated by attempts to gain royal sanction for various settlement schemes in North America, although he himself never travelled there. He felt that colonizing should be a royal endeavour and that colonies should be kept under rigid control from above. In 1620 Gorges succeeded in obtaining a charter to develop the Council for New England—a proprietary grant covering the entire area in North America between the 40th and 48th parallels. He intended to distribute the land as manors and fiefs to fellow gentry who were members of the Council but was thwarted by the success of two vigorous, middle-class, self-governing English colonies founded by joint-stock companies at Plymouth and Massachusetts Bay. Since these New England settlements had received their charters directly from the crown, the Council was thus bypassed as an intermediary.

Gorges was the recipient of several land grants during his lifetime, most importantly the charter for Maine in 1639. Although his agents set up a provincial government there, the English Civil War and Gorges' advancing age prevented him from fulfilling his American dream.

Görgey, Artúr (b. Jan. 30, 1818, Toporcz, Austrian Empire—d. May 20, 1916, Budapest), Hungarian army officer famous for his role in the Revolution of 1848–49.

Serving as a youth in the Austrian Army,

Görgey, lithograph

By courtesy of the Magyar Nemzeti Muzeum, Budapest

Görgey left it to study chemistry. Later, when Hungarian patriots raised a national army in 1848, he joined it and soon won a reputation for valour and leadership. After commanding a corps in the attempt to relieve Vienna on Oct. 30, 1848, he was placed in command of the Hungarian forces on the Upper Danube. Austrian armies invaded Hungary in December, but Görgey, recognizing the rawness of his troops, withdrew and refused to defend Budapest. The tension that decision created between him and the nationalist leader Lajos Kossuth was increased when on Jan. 5, 1849, Görgey issued an order to his troops that read like a defiance of the authority of the committee of national defense. Later, however, his brilliant spring offensive nearly drove the Austrians from Hungary.

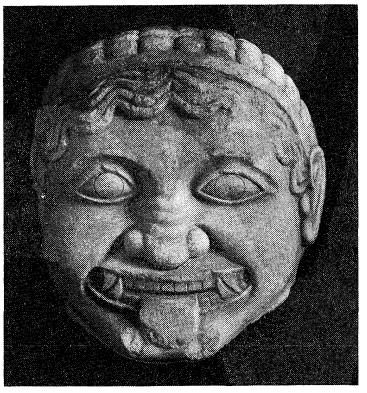
After the declaration of independence (April 14), Görgey agreed to merge his command with the post of minister of defense, although his disapproval of the dethronement of the Habsburgs was no secret. He refused requests to move his armies to the western frontier, proclaim himself military dictator, and to make peace with the Austrians before the expected Russian invasion occurred.

Against increasing odds, however, Görgey fought on with great skill and courage. On August 11, with Hungary's situation hopeless, Kossuth abdicated as governor in favour of Görgey, who capitulated to the Russians at Világos two days later.

Only the personal intervention of the Russian emperor Nicholas I spared Görgey from execution. Interned in Klagenfurt, Austria, he

was allowed to return to Hungary in 1867. Accusations of treason against him brought by Kossuth and his followers were proved false by documents published in 1918. Although Görgey viewed many actions of Hungarian extremists as foolish and wrong, he sacrified his own feelings to what he regarded as the higher interest. Görgey defended his own actions in *Mein Leben und Wirken in Ungarn, 1848–1849* (1852; "My Life and Work in Hungary, 1848–1849") and *Was verdanken wir der Revolution?* ("What Do We Owe to the Revolution?"), an anonymous paper published in 1875.

Gorgon, monster figure in Greek mythology. Homer spoke of a single Gorgon—a monster of the underworld. The later Greek poet Hesiod increased the number of Gorgons to three—Stheno (the Mighty), Euryale (the Far Springer), and Medusa (the Queen)—and made them the daughters of the sea god



Gorgon, carved marble mask of the early 6th century BC; in the Acropolis Museum, Athens

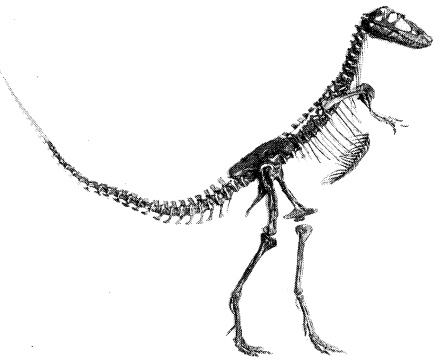
Alinari—Art Resource/EB Inc.

Phorcys and of his sister-wife Ceto. The Attic tradition regarded the Gorgon as a monster produced by Gaea, the personification of Earth, to aid her sons against the gods.

In early classical art the Gorgons were portrayed as winged female creatures; their hair consisted of snakes; they were round faced, flat nosed, with tongues lolling out and with large projecting teeth. Medusa was the only one of the three who was mortal; hence, Perseus was able to kill her by cutting off her head. From the blood that ran from her neck sprang Chrysaor and Pegasus, her two offspring by Poseidon. The head had the power of turning all who looked upon it into stone. The hideously grotesque original type of the Gorgoneion, as the Gorgon's head was called, was used generally as a protection against the evil eye.

Gorgonzola, town, Milano province, Lombardia (Lombardy) region, northern Italy, east of Milan city. The town is famous for the making of Gorgonzola cheese, which is soft when freshly made; after being drained twice, it is then oven dried for 20 days and pierced with copper needles to promote the internal formation of the characteristic greenish-blue mold (*Penicillium roqueforti*). This cheese is also made in other parts of Lombardia and in Piemonte and Emilia-Romagna. Pop. (1981 prelim.) mun., 14,571.

Gorgosaurus, genus of large carnivorous dinosaurs found as fossils in Late Cretaceous deposits of North America and eastern Asia (the Cretaceous Period began 136,000,000 years ago and lasted 71,000;000 years). In *Gorgosaurus* the skull was large and the jaws bore numerous large, sharp teeth. *Gorgosaurus* was a biped with well-developed hind limbs and



Gorgosaurus

By courtesy of the American Museum of Natural History, New York

supporting triangular pelvis. The tail was long and well developed and served as a counterbalance to the body. *Gorgosaurus* was about 9 metres (30 feet) long; the head stood 3.5 metres (11 feet) off the ground. In life *Gorgosaurus* probably moved slowly with a stooped pose. It is possible that *Gorgosaurus* was at least in part a scavenger, feeding upon dead or dying carcasses of other reptiles. In structure and presumed life habits, *Gorgosaurus* was probably similar to *Tyrannosaurus,* although smaller. *Gorgosaurus* fossils occur in rocks that are slightly older than those containing *Tyrannosaurus* fossils.

Gori, city, administrative centre of Gori *rayon* (district), Georgian Soviet Socialist Republic, on the Kura River. Gori is one of the oldest cities in Georgia, founded in the 7th century AD as Tontio. Before the 1917 Revolution it was a small administrative and market centre. Joseph Stalin, the Soviet leader, was born there in 1879. He spent his childhood years in the city and later (1888–94) studied at the theological seminary. After the 1917 Revolution the industrial base of Gori developed considerably, and today it has an important food-preserving industry, based on locally grown fruit and vegetables. Gori also has an important textile industry based largely on cotton from Azerbaijan. There are also other light industries. Gori has a teacher-training school and an agricultural college. Pop. (1983 est.) 59,000.

Göriceli Koçu Mustafa Bey (Turkish reformer): *see* Koçu Bey.

gorilla, largest of the anthropoid, or manlike, apes (family Pongidae). The gorilla is a forest dweller native to equatorial Africa. Most authorities separate the single species, *Gorilla gorilla,* into three races: the western lowland gorilla (*G. g. gorilla*), found in the lowland tropical rain forests from Cameroon to the Congo River; the eastern lowland gorilla (*G. g. graveri*), found in the lowland tropical rain forests of the eastern Congo; and the mountain gorilla (*G. g. beringei*), found in the Lake Kivu region, including montaine rain forests and bamboo forests of the mountainous terrain to the north and east.

The gorilla is a stocky, powerful ape with black skin and hair, large nostrils, and a bare face and chest. It is larger than its relative, the chimpanzee, and has flaring nostrils, smaller ears, and a less boisterous disposition. The adult male gorilla has a prominent bony crest on top of the skull and a "saddle" of gray or silver hairs on the lower part of the back (hence the name silverback for these males). It is about twice the weight of the female and may attain a height of about 1.7 metres (5½ feet) and a weight (in the wild) of 135–275 kilograms (298–606 pounds); captive gorillas of both sexes may be much heavier.

Much has been written about the ferocity of the gorilla, but studies indicate that it is an unaggressive, even shy, animal unless unduly disturbed. Gorillas live in small groups that are led by a silverbacked male. The groups are composed of females, infants, juveniles, and young adult males (blackbacks).

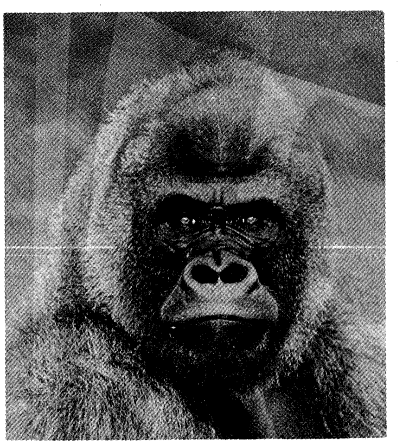
The gorilla is diurnal and primarily terrestrial, usually walking about on all four limbs, with part of its weight supported on the knuckles of its hands. Very occasionally it stands erect. Females and young climb more than males. The diet is vegetarian and includes such foods as leaves, stalks, and bamboo shoots. Much of the day is spent foraging and resting; at dusk, each gorilla builds a crude sleeping nest of branches and foliage. A new nest is built each night and is constructed either on the ground or in the trees.

Although the gorilla is a relatively quiet animal, it has a variety of calls including grunts, hoots, and the roar given by an aggressive male. The well known chest-beating of the gorilla is performed by both males and females. When performed by males, it is part of a ritual that may also include such acts as running about, tearing at vegetation, and slapping the ground. The exact purpose of this display is unknown, but at times it appears to be used to intimidate outsiders (gorilla or human). At other times, it seems to be used to maintain the dominance hierarchy within the group.

Although they lack the curiosity and adaptability of chimpanzees, gorillas are calmer and more persistent. Captive gorillas have shown a capacity for problem solving and have demonstrated that they possessed a degree of insight as well as memory and anticipation of experience.

There is no fixed breeding season for the gorilla. The gestation period is about 250–290 days; births are usually single. The life expectancy of a wild gorilla is about 30 years.

The gorilla has become increasingly rare throughout its range, having suffered from human destruction of its forest homelands, and, in the past, from big-game hunting and from over-collection by zoos and research institutes. The entire species is listed as vulnerable in the *Red Data Book,* and the mountain gorilla is classified as endangered, having an estimated population of only 500 to 1,000 individuals. Reasons for the near extinction of this race include continued loss of habitat as



Gorilla (*Gorilla gorilla*)

Kenneth W. Fink—Root Resources

a result of human activities (farming, grazing, and lumbering) and illegal hunting to satisfy a flourishing black market for gorilla "trophies" (especially heads and skins).

Göring, Hermann, Göring also spelled GOERING (b. Jan. 12, 1893, Rosenheim, Ger.—d. Oct. 15, 1946, Nürnberg), a leader of the Nazi Party and one of the primary architects of the Nazi police state in Germany. He was condemned to hang as a war criminal by the International Military Tribunal at Nürnberg but took poison and died the night his execution was ordered.

Göring was born in Bavaria, the second son by the second wife of Heinrich Ernst Göring, at the time German consul general in Haiti. The family was reunited in Germany on the

Göring, as commander of the Sturmabteilung, 1933
Heinrich Hoffmann, Munich

father's retirement in 1896. Göring, as a child, was brought up near Nürnberg, in the small castle of Veldenstein, whose owner was Hermann, Ritter von Epenstein, a Jew, who was, until 1913, the lover of Göring's mother and the godfather of her children. Trained for an army career, Göring received his commission in 1912 and served with distinction during World War I, joining the embryonic air force. In 1918 he became commander of the celebrated squadron in which the great German aviator Manfred, Freiherr von Richthofen, served. Göring so deeply resented the treatment given army officers by the civilian population during the troubled period after Germany's capitulation that he left the country. After a period as a commercial pilot in Denmark and Sweden, he met the Swedish baroness Carin von Rosen, who divorced her husband and married Göring in Munich on Feb. 3, 1922.

Göring had met Hitler the previous year and had joined the small National Socialist German Workers' (Nazi) Party late in 1922. As a former officer, he had been given command of Hitler's Storm Troopers (the SA, Sturmabteilung). Göring took part in the abortive Munich Putsch of November 1923 in which Hitler tried to seize power prematurely. During the Putsch, Göring was badly wounded in the groin. His arrest was ordered, but he escaped with his wife into Austria. Given morphine to deaden the pain from his wounds, he became so severely addicted that he twice underwent treatment in 1925–26 at Långbro mental hospital in Sweden.

He returned to Germany in 1927, where his contacts in German industry proved useful, and he was taken back into the party leadership. He occupied one of the 12 Reichstag seats that the Nazi Party won in the 1928 election. Thereafter, Göring became the acknowledged party leader in the lower house, and, when the Nazis won 230 seats in the election of July 1932, he was elected president of the Reichstag.

Göring's sole concern in the Reichstag was to stultify the democratic system, which the Reichstag ostensibly represented up to March 1933. He had the ear of the 84-year-old president, Paul von Hindenburg, and used his position to outmanoeuvre the successive chancellors, particularly Kurt von Schleicher and Franz von Papen, until Hindenburg was finally forced to invite Hitler to become chancellor on Jan. 30, 1933. The battle for dictatorial power, however, was still not won; between January 30 and March 23, when an enabling bill giving Hitler his dictatorial powers was passed, Göring was tirelessly active. He used his new position as minister of the interior in Prussia, Germany's largest and most influential state, to Nazify the Prussian police and establish the Gestapo, or secret political police. He also established concentration camps for the "corrective treatment" of difficult opponents. The Reichstag fire of Feb. 27, 1933, which the Nazis most probably instigated, made it possible for Göring to accuse the Communists of intending a coup d'etat. The wholesale arrest of Communist and even some Social Democrat deputies succeeded in removing any effective opposition to the passage of the enabling bill the following month.

Göring's position as Hitler's most loyal supporter remained unassailable for the rest of the decade. He collected offices of state almost at will. He was Reich commissioner for aviation and head of the newly developed Luftwaffe, which was disguised as a civilian enterprise until March 1935. In 1933 he became master of the German hunt and of the German forests. In June 1934 he took a leading part in the party's purge of the SA leader Ernst Röhm but in the same year ceded his position as security chief to Heinrich Himmler, thus ridding himself of responsibility for the Gestapo and the concentration camps. In 1937 he displaced Hjalmar Schacht, after 1934 Hitler's minister for economic affairs; in 1936, without consulting Schacht, Hitler had made Göring commissioner for his Four-Year Plan for the war economy. He was also constantly employed as Hitler's roving ambassador.

Göring was the most popular of the Nazi leaders, not only with the German people but also with the ambassadors and diplomats of foreign powers. He used his impregnable position to enrich himself. The more ruthless aspect of his nature showed in the recorded telephone conversation by means of which he blackmailed the surrender of Austria before the *Anschluss* (political union) with Germany in 1938. It was Göring who led the economic despoliation of the Jews in Germany and in the various territories that fell under Hitler's power.

Göring's first wife had died in 1931, and on April 10, 1935, he married the actress Emmy Sonnemann. Göring was devoted in turn to each of his wives. His hunting interests enabled him to obtain a vast forest estate in the Schorfheide, north of Berlin, where from 1933 he developed a great baronial establishment on a scale commensurate with his ambitions. This he called Carinhall in honour of his first wife. It was at Carinhall that he kept the greater part of his enormous art collection. On June 2, 1938, Emmy bore him a daughter, his only child, Edda.

Although Göring was probably sincere in his desire to avert or postpone war—as his abortive negotiations in 1939 with the Swedish industrialist Birger Dahlerus indicate—it was his Luftwaffe that conducted the blitzkrieg that smashed Polish resistance and weakened country after country as Hitler's campaigns progressed. But Göring's self-indulgent nature was too weak to sustain the rigours of war or oppose Hitler's blind prejudice in favour of the production of bombers rather than fighter planes. The Luftwaffe's capacity for defense declined as Hitler's battlefronts extended from northern Europe to the Mediterranean and North Africa, and Göring lost face when the Luftwaffe failed to win the Battle of Britain or prevent the Allied bombing of Germany. On the plea of ill health, Göring retired as much as Hitler would let him into private life, enjoying the luxuries of Carinhall, where he continued to amass his art collection (further enriched with spoils from the Jewish collections in the occupied countries) and receive many gifts from those who sought his favour. His colossal girth was more the result of glandular defect than of gluttony, but his excessive resort to paracodeine tablets (a mild derivative from morphine) poisoned his system and made recurrent treatment for drug addiction necessary. His addiction helped to make him alternately elated or depressed; he was egocentric and bombastic, delighting in flamboyant clothes and uniforms, decorations, and exhibitionist jewelry.

In spite of Göring's faults, Hitler felt he could not afford to discard a man so closely identified with the regime. In 1939 he had declared him his successor and in 1940 had given him the special rank of *Reichsmarschall des Grossdeutschen Reiches.* The other Nazi leaders both resented his favoured position and despised his self-indulgence, but Hitler did not displace him until the last days of the war, when, in accordance with the decrees of 1939, Göring attempted to assume the Führer's powers, believing him to be encircled and helpless in Berlin. Nevertheless, Göring expected to be treated as a plenipotentiary when, after Hitler's suicide, he surrendered himself to the Americans.

Cured finally of his drug addiction during his period of captivity awaiting trial as a war criminal, he defended himself ably before the International Military Tribunal at Nürnberg. He saw himself as the star defendant, a historical figure; he denied any complicity in the more hideous activities of the regime, which he claimed to be the secret work of Himmler. When after his condemnation his plea to be shot and not hanged was refused, he took poison and died in his cell at Nürnberg the night his execution was ordered. Only in 1967 was it revealed that he had left a note explaining that the poison capsule had been secreted all the while in a container of pomade.

(R.M./H.Fra.)

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Gorizia, German GÖRZ, Slovene GORICA, capital of Gorizia province, Friuli-Venezia Giulia region, northeastern Italy, on the Isonzo River north of Trieste. From the 11th century Gorizia was the seat of the independent county of Gorizia until it passed to Austria in 1500. A noted cultural centre under Austrian rule, it was the capital of the Habsburg crownland of Görz-Gradisca after 1815. The area, especially around Monte San Michele (899 ft [274 m]) to the southwest, was the scene of heavy fighting between the Austrians and the Italians during World War I, and the town, much damaged, was annexed by Italy in 1919. By treaty in 1947 Yugoslavia received the northern outskirts of the town, and the adjoining Yugoslav town of Nova Gorica was developed.

The partly 14th-century cathedral contains treasures of the patriarchate of Aquileia, which was dissolved in 1751 and replaced by the archbishoprics of Gorizia and Udine. Also notable are the old castle of the counts with the church of S. Spirito, the Baroque church of S. Ignazio, the historical museum in the Palazzo Attemis (1745), and the war museum. The town lost its commercial importance after the border settlement, but it has foundries and

chemical and textile industries. Pop. (1981 prelim.) mun., 42,955.

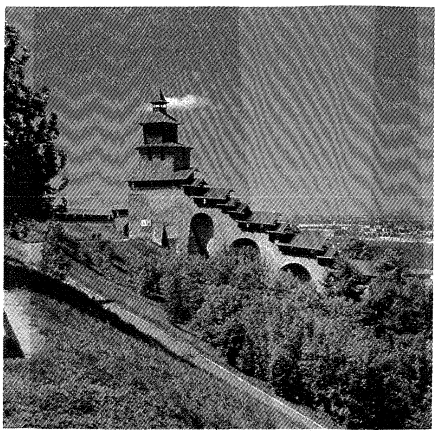
Gorj, *judeţ* (district), southwestern Romania, occupying an area of 2,177 sq mi (5,641 sq km). The Transylvanian Alps (Southern Carpathians) and the sub-Carpathians rise above settlement areas in the valleys and lowlands. The district is drained southward by the Jiu River and its tributaries. Lake Ceauru lies southwest of Tîrgu Jiu (*q.v.*), the district capital. Industries there manufacture wood products, textiles, and foodstuffs, and building materials are produced in Birseşti. Anthracite coal mines operate in Schela, and the towns of Ţicleni and Bilteni have oil wells. Lignite mines are worked in Tismana and Rovinari, and graphite is mined at Baia de Fier. Agricultural activities consist of viticulture in hilly areas and cereal cultivation and livestock raising in the lowlands. Tîrgu Jiu city was built on a Roman settlement and has a museum commemorating the sculptor Constantin Brancusi, who was born in Hobiţa village. A monument created by Brancusi depicts the heroes of Romania. The Tismana Monastery, located west of Tîrgu Jiu, was founded in the 14th century. Tîrgu Jiu and Tîrgu Cărbuneşti are centres for highway and railway connections. Pop. (1982 est.) 363,707.

Gorkha: *see* Gurkha.

Gorki, Maxim (writer): *see* Gorky, Maksim.

Gorky, also spelled GOR'KIJ, *oblast* (administrative region) in western Russian Soviet Federated Socialist Republic, in the middle of the Volga River Basin. From 1954 to 1957 the southern part was separated as Arzamas *oblast.* Gorky *oblast* has an area of 28,900 sq mi (74,800 sq km) and is bisected by the Volga; the northern half is a low plain, mostly in dense coniferous forest of spruce, pine, and fir, with some birch, while lower parts are often swampy. Its soils are infertile. The southern half comprises rolling morainic hills, with deciduous trees, especially oaks, and open areas of forest-steppe. It has gray forest soils. The highly industrialized area along the Volga and lower Oka includes the metropolis of Gorky, the administrative headquarters, and its satellite towns, producing a great range of goods. Elsewhere there are only pockets of industry; *e.g.,* steel mills in Kulebaki and Vyksa. In the forested areas timber industries are highly developed; Pravdinsk makes the newsprint for the official Soviet newspaper *Pravda.* At Zavolzhye, above Gorky, is a hydroelectric station on the Volga. The main agricultural area lies south of the Volga; grains—rye, oats, spring wheat, and buckwheat—are dominant, though potatoes and flax are important as well. Pop. (1983 est.) 3,680,000.

Gorky, also spelled GOR'KIJ, formerly (until 1932) NIZHNY NOVGOROD, city and administrative centre of Gorky *oblast* (region), western Russian Soviet Federated Socialist Republic, at the confluence of the Volga and Oka rivers. Although some authorities give an earlier date, the city was founded, according to a major chronicle, in 1221 by Yury Vsevolodovich, prince of Vladimir, as Russian colonization was advancing to the Volga into lands formerly occupied by the Mordvinians. Its strategic site on the great Volga route from the Baltic to Central Asia—with links via the navigable Oka to the Vladimir–Moscow region and via the Kama to the Urals and Siberia—ensured its importance. In 1392 the town was incorporated into the principality of Moscow and soon became a Russian stronghold against the Volga Tatars. From there, Ivan III the Great in 1469 and Ivan IV the Terrible in 1552 launched their expeditions against the Tatar capital of Kazan. The Russian conquest



The kremlin and watch tower, Gorky city, Russian S.F.S.R.
Novosti Press Agency

of the Volga in the mid-16th century brought increased trade to Nizhny Novgorod. The annual fair established there in 1817 became the largest and most important in Russia, attracting traders and goods from across Europe and Asia. The fair continued until the October Revolution in 1917. The writer Maksim Gorky was born there in 1868, and in 1932 the town was renamed in his honour.

The great volume of trade passing through the city led to the early utilization of serf labour in manufacturing, causing an earlier onset of factory industrialization than in much of Russia, especially in heavy industry and engineering. Gorky's industrial importance grew steadily, stimulated in World Wars I and II by the destruction of plants to the west. Modern Gorky is one of the largest cities of the U.S.S.R. and the centre of a vast metropolitan area strung out along the Volga and lower Oka. The city itself produces motor vehicles, many types of ships and river craft, diesel engines, machinery and machine tools, and a wide range of chemical and consumer goods. Of its satellite towns, Bor, across the Volga, makes glass, notably safety glass for cars; Dzerzhinsk makes chemicals and fertilizers; Balakhna and Pravdinsk make paper; Bogorodsk produces leather goods and footwear; and Kstovo has a major oil refinery. Power for the metropolis comes from two thermal-electric plants in Gorky—the Balakhna peat-burning station and the hydroelectric station at Zavolzhye. Gorky is the focus of excellent communications by river, road, rail, and air. Railways connect it with Moscow, Kirov, and Arzamas on the Trans-Siberian line, and electrified suburban lines serve the metropolitan area.

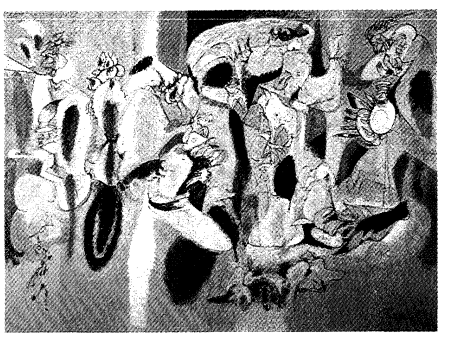
Gorky is the site of the N.I. Lobachevsky State University (founded 1918) and eight other institutions of higher education, including ones in agriculture, medicine, and engineering. There is also a state art museum and one of the oldest drama theatres in the Soviet Union (established 1798). Historic buildings include the 16th-century kremlin and the 17th-century Archangel Cathedral. Pop. (1983 est.) 1,382,000.

Gorky, Arshile, original name VOSDANIG MANOOG ADOIAN (b. 1904, Khorkom Vari, Turkish Armenia—d. July 21, 1948, Sherman, Conn., U.S.), U.S. painter, important as the direct link between the European Surrealist painters and the painters of the U.S. Abstract Expressionist movement.

Gorky's early life was disrupted when his father abandoned Turkey, his wife, and his family to avoid service in the Turkish army. The rest of the family soon fled to Armenia to escape Turkish persecution and were subsequently dispersed. In 1920 Gorky emigrated to the United States, where he rejoined his sister in Watertown, Mass., and assumed the pseudonym by which he became known. The name Arshile is derived from Achilles, the brooding Achaean hero of the *Iliad.* The name Gorky (Russian for "the bitter one") is derived from the writer, Maksim Gorky.

After studying painting at the Rhode Island School of Design, Gorky enthusiastically entered into the Bohemian life of Greenwich Village in New York City, occasionally passing himself off as a successful Russian portraitist who had studied in Paris and experimented with Automatism. From 1926 to 1931 he taught at the Grand Central School of Art. Early in his career, he hit on the idea of becoming a great painter by subjecting himself to long apprenticeships, painting in the style of such artists as Cézanne, Miró, and Picasso. His aim was never merely to imitate the work of others, however, but to assimilate fully their aesthetic vision and then move beyond it.

Gorky remained stylistically unable to move beyond the work of his mentors until about 1939, when he met the Chilean Surrealist painter Roberto Matta. The Surrealists' idea that art is the expression of the artist's unconscious enabled Gorky to discover his personal idiom, which he pursued the last eight years of his life. In such works as "The Liver Is the Cock's Comb" (1944; Albright-Knox Art Gallery, Buffalo, N.Y.) and "How My Mother's Embroidered Apron Unfolds in My Life" (1944; Mr. and Mrs. Bagley Wright Collection, Seattle, Wash.), biomorphic forms that suggest plants or human viscera float over an indeterminate background of melting colours. The erotic significance of the loosely painted forms and elegant, fine black lines is often made explicit in such titles as "The Diary of a Seducer" (1945; Mr. and Mrs. William A.M. Burden Collection, New York City) and "The Betrothal II" (1947; Whitney Museum of American Art, New York City). The years that saw Gorky finally emerge as one of the most important painters in the United States were marked by personal tragedy. It was dis-

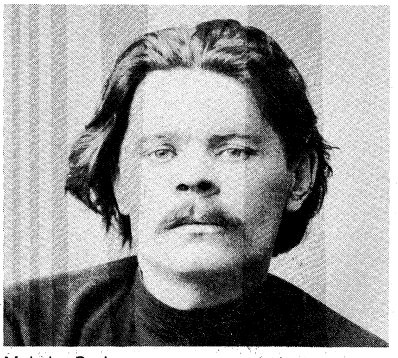


"The Liver Is the Cock's Comb," oil on canvas by Arshile Gorky, 1944; in the Albright-Knox Art Gallery, Buffalo
By courtesy of the Albright-Knox Art Gallery, Buffalo, gift of Seymour H. Knox

covered that he had cancer, and in June 1948 his neck was broken in an automobile accident. A month later, when his wife left him, Gorky committed suicide.

Gorky, Maksim, also spelled MAXIM GORKI, pseudonym of ALEKSEY MAKSIMOVICH PESHKOV (b. March 28 [March 16, old style], 1868, Nizhny Novgorod, Russia—d. June 14, 1936), Russian Naturalistic short-story writer and novelist who first attracted attention with stories of tramps and social outcasts and later wrote other stories, novels, and plays, including his famous *The Lower Depths* (1903).

Early life. Gorky's earliest years were spent in Astrakhan, where his father, a former upholsterer, became a shipping agent. When the boy was five his father died; Gorky returned to Nizhny Novgorod to live with his maternal grandparents, who brought him up after his mother remarried. The grandfather was a dyer whose business deteriorated and who treated Gorky harshly. From his grandmother



Maksim Gorky
H. Roger-Viollet

he received most of what little kindness he experienced as a child.

Gorky knew the Russian working-class background intimately, for his grandfather afforded him only a few months of formal schooling, sending him out into the world to earn his living at the age of eight. His jobs included, among many others, work as assistant in a shoemaker's shop, as errand boy for an icon painter, and as dishwasher on a Volga steamer, where the cook introduced him to reading—soon to become his main passion in life. Frequently beaten by his employers, nearly always hungry and ill clothed, he came to know the seamy side of Russian life as few other Russian authors before or since. The bitterness of these early experiences later led him to choose the word *gorky* ("bitter") as his pseudonym. His late adolescence and early manhood were spent in Kazan, where he worked as a baker, docker, and night watchman. There he first learned about Russian revolutionary ideas from representatives of the Populist movement, whose tendency to idealize the Russian peasant he later rejected. Oppressed by the misery of his surroundings, he attempted suicide by shooting himself. Leaving Kazan at the age of 21, he became a tramp, doing odd jobs of all kinds during extensive wanderings through southern Russia.

First stories. In Tbilisi (Tiflis) Gorky began to publish stories in the provincial press, of which the first was "Makar Chudra" (1892), followed by a series of similar wild Romantic legends and allegories of only documentary interest. But with the publication of "Chelkash" (1895; first Eng. trans. 1902) in a leading St. Petersburg journal, he began a success story as spectacular as any in the history of Russian literature. "Chelkash," one of his outstanding works, is the story of a colourful harbour thief in which elements of Romanticism and realism are mingled. It began Gorky's celebrated "tramp period," during which he described the social dregs of Russia. He expressed sympathy and self-identification with the strength and determination of the individual hobo or criminal, characters previously described more objectively. "Dvadtsat shest i odna" (1899; "Twenty-Six Men and a Girl," 1902), describing the sweated labour conditions in a bakery, is often regarded as his best short story. So great was the success of these works that Gorky's reputation quickly soared, and he began to be spoken of almost as an equal of Tolstoy and Chekhov.

Plays and novels. Next Gorky wrote a series of plays and novels, all less excellent than his best earlier stories. The first novel, *Foma Gordeyev* (1899), illustrates his admiration for strength of body and will in the masterful barge owner and rising capitalist Ignat Gordeyev, who is contrasted with his relatively feeble and intellectual son Foma, a "seeker after the meaning of life," as are many of Gorky's other characters. From this point, the rise of Russian capitalism became one of Gorky's main fictional interests. Other novels of the period are all to some extent failures because of Gorky's inability to sustain a powerful narrative, and also because of a tendency to digress in discussions about the meaning of life. *Mat* (1906; *Mother,* 1911) is probably the least successful of the novels, yet it has considerable interest as Gorky's only long work devoted to the Russian revolutionary movement. It was made into a notable silent film by Vsevolod Pudovkin (1926) and dramatized by Bertolt Brecht in *Die Mutter* (1930–31). Gorky also wrote a series of plays, the most famous of which is *Na dne* (1902; *The Lower Depths,* 1906). A dramatic rendering of the kind of flophouse character that Gorky had already used so extensively in his stories, it still enjoys great success abroad and in the U.S.S.R.

Marxist activity. Between 1899 and 1906 Gorky lived mainly in St. Petersburg (Leningrad), where he became a Marxist, supporting the Social Democratic Party. After the split in that party in 1903, Gorky went with its Bolshevik wing. But he was often at odds with the Bolshevik leader Lenin. Nor did Gorky ever, formally, become a member of Lenin's party, though his enormous earnings, which he largely gave to party funds, were one of that organization's main sources of income. In 1901 the Marxist review *Zhizn* ("Life") was suppressed for publishing a short revolutionary poem by Gorky, "Pesnya o burevestnike" ("Song of the Stormy Petrel"). Gorky was arrested but released shortly afterward and went to the Crimea, having developed tuberculosis. In 1902 he was elected a member of the Russian Academy of Sciences, but his election was soon withdrawn for political reasons, an event that led to the resignations of Chekhov and Korolenko from the academy. Gorky founded a publishing business called Znaniye (Knowledge), which led to the emergence of the Znaniye school of fiction, which aimed to give a forum, insofar as censorship conditions permitted, to young writers with revolutionary proclivities whose work was "tendentious," a word that has commonly been used as a term of praise by Russian critics and readers. Gorky took a prominent part in the 1905 revolution, was arrested in the following year, and was again quickly released, partly as the result of protests from abroad. He toured America in the company of his mistress, an event that led to his partial ostracism there and to a consequent reaction on his part against the United States as expressed in stories about New York City, *Gorod zholtogo dyavola* (1906; "The City of the Yellow Devil").

Exile and Revolution. On leaving Russia in 1906, Gorky spent seven years as a political exile, living mainly in his villa on Capri, which became an intellectual centre for politically disaffected Russians. Meanwhile, although his writings continued to enjoy the favour of ordinary Russian readers, he had lost much of his former popularity with the intelligentsia, who were becoming conscious of Gorky's defects. Though still essentially in alliance with Lenin's movement, he was somewhat out of favour even there because of his espousal of a religio-philosophical trend called *bogostroitelstvo* ("God-building"), preached in his novel *Ispoved* (1908; *A Confession,* 1910) and regarded as a heresy by more orthodox Marxists. Politically, Gorky was a nuisance to his fellow Marxists because of his insistence on remaining independent, but his great influence was a powerful asset, which from their point of view outweighed such minor defects.

He returned to Russia in 1913, and during World War I he agreed with the Bolsheviks in opposing Russia's participation in the war. He opposed the Bolshevik seizure of power in November 1917, and went on to attack the victorious Lenin's dictatorial methods in his newspaper *Novaya zhizn* ("New Life") until July 1918, when his protests were silenced by censorship on Lenin's orders. From 1919 onward Gorky cooperated with Lenin's government, also helping to relieve the miseries of his fellow writers during the early post-Revolutionary years. He was often able to see that they received payment, if only for work such as translating. He also did much during that time to ensure the preservation of works of art from destruction.

Last period. In the decade ending in 1923 Gorky's greatest masterpiece appeared. This is the autobiographical trilogy *Detstvo* (1913–14; *My Childhood,* 1915), *V lyudyakh* (1915–16; *In the World,* 1917), and *Moi universitety* (1923; *My Universities,* 1952). The title of the last volume is sardonic because Gorky's only university had been that of life, and his wish to study at Kazan University had been frustrated. This long work is one of the finest autobiographies in Russian. Dealing only with Gorky's childhood and early manhood and showing his strength as a later relatively extroverted writer, who had to some extent turned his back on the excessive philosophizing of his early period, it reveals him as an acute observer of detail with a flair for describing his own family, his numerous employers, and a panorama of minor but memorable figures. It is hardly the story of Gorky himself, for seldom was an autobiography more reticent (even his attempted suicide receives only a line or two). The book is permeated with a wonder at the mystery, cruelty, and colour of life, which, it might seem, Gorky was now less eager to understand or interpret, being content only to portray. But it does contain many messages, which he now tends to imply rather than preach openly: protests against motiveless cruelty, continued emphasis on the importance of toughness and self-reliance, and musings on the value of hard work often couched in a highly rhetorical style.

The trilogy was finished in his villa in Sorrento, Italy, to which Gorky emigrated during 1921–28. He made excursions to Germany and elsewhere but did not return to Russia. His health was poor and he was disillusioned by post-Revolutionary life in Russia. In 1928 he yielded to pressures to return, and the lavish official celebration there of his 60th birthday was beyond anything he could have expected. In the following year he returned to the U.S.S.R. permanently and lived there until his death. His return coincided with the establishment of Stalin's ascendancy, and Gorky became a prop of Stalinist political orthodoxy. He was now more than ever the undisputed leader of Soviet writers, and when the Soviet Writers' Union was founded in 1934 he became its first president. At the same time he helped to found the literary method of Socialist Realism, which was imposed on all Soviet writers, and which obliged them—in effect—to become outright political propagandists.

Gorky remained active as a writer, but almost all his later fiction is concerned with the period before the Revolution. In *Delo Artamonovykh* (1925; *The Artamonov Business,* 1948), one of his best novels, he showed his continued interest in the rise and fall of pre-Revolutionary Russian capitalism. There were more plays—*Yegor Bulychov i drugiye* (1932); *Dostigayev i drugiye* (1933; "Dostigaev and Others"; *The Last Plays,* 1937)—but the most generally admired work is a set of reminiscences of Russian writers —*Vospominaniya o Tolstom* (1919; *Reminiscences of Leo Nikolaevich Tolstoy,* 1920) and *O pisatelyakh* (1928; "*About Writers*"). The memoir of Tolstoy is so lively and free from the hagiographical approach traditional in Russian studies of their leading authors that it has sometimes been acclaimed as Gorky's masterpiece. Almost equally impressive is Gorky's study of Chekhov. He also wrote pamphlets on topical events and problems in which he glorified the most brutal aspects of Stalinism.

Some mystery attaches to Gorky's death, which occurred suddenly in 1936 while he was under medical treatment. Whether his death was natural or not is unknown, but it came to figure in the trial of Bukharin and others in 1938, at which it was claimed that Gorky had been the victim of an anti-Soviet plot by the "Bloc of Rightists and Trotskyites." The former police chief Yagoda, who was among the defendants, confessed to having ordered his death. (R.F.Hi./Ed.)

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Görlitz, city, Saxony *Land* (state), southeastern Germany, on the Neisse River, opposite the Polish town of Zgorzelec (which before 1945 was part of Görlitz), east of Dresden. It originated as the Slav settlement of Gorelić (first mentioned in 1071) and was chartered in 1303, when it belonged to Bohemia. A member of the Federation of Lusatian Cities after 1346, it became the capital and cultural centre of Oberlausitz (Upper Lusatia). The seat of a duchy in 1377–96, it was transferred from Bohemia to Saxony in 1635 and to Prussia in 1815. Notable buildings include SS. Peter and Paul's Church (1423–97), a reproduction of the Holy Sepulchre (1481–89), the remains of a 14th-century fortress, and many 16th-century houses.

Görlitz reached an economic peak in the Middle Ages, when it was known for textile craftsmanship; the introduction of linen to the town's textile industry produced a great boost to the economy, resulting in some fine Baroque buildings. A railway junction in an important lignite-mining region, it is the commercial centre of Upper Lusatia. Industries include a nationally owned vehicle-building works, where railway cars are manufactured, and machinery, textile, electrotechnical, and wood factories. Pop. (1989 est.) 77,609.

Gorlovka, city, Donetsk *oblast* (administrative region), Ukrainian Soviet Socialist Republic, in the centre of the Donets Basin industrial area on the headwaters of the small Korsun River. Gorlovka was founded in 1867 as a mining settlement beside the newly constructed railway from Kharkov to Taganrog. Several other small mining settlements were incorporated into Gorlovka, which became a town in 1932 and is now one of the largest coal-mining centres of the area, especially for coking coal. Its many pits include some of the deepest of this field, and their waste heaps are dominant landmarks. There is also a large engineering industry making coal-mining machinery and a chemical complex. A network of railways links Gorlovka to neighbouring towns, including Nikitovka, where there is a major mercury mine. There is a teacher-training institute. Pop. (1983 est.) 339,000.

Gorno-Altay autonomous oblast, also spelled GORNO-ALTAI, formerly (1922–48) OYROT AUTONOMOUS OBLAST, administrative region of Altay *kray* (territory), southern Russian Soviet Federated Socialist Republic, in the Altai Mountains. It is bounded on the south by Mongolia and China. Its area of 35,750 sq mi (92,600 sq km) embraces a complex series of ranges and high plateaus, divided by deep valleys and broad basins, that attain a maximum height of 14,783 ft (4,506 m) in Mt. Belukha. Steppe vegetation in the basins gives way to dense coniferous forest on the mountain slopes and to alpine meadow, bare rock, and ice on the summits. The *oblast,* centred on the city of Gorno-Altaysk, was formed in 1922 for the Mongol Oyrat people for whom it was named until 1948; today about two-thirds of the inhabitants are Russian. Some gold and mercury are mined, but the economy is largely agricultural. In the valleys oats, other grains, and vegetables are grown, but the raising of cattle, sheep, goats, horses, and yaks on the mountain and valley pastures is dominant. Fur hunting and timber working are also carried on. Pop. (1983 est.) 177,000.

Gorno-Altaysk, also spelled GORNO-ALTAJSK, or GORNO-ALTAISK, formerly (until 1932) ULALA, or (1932–48) OYROT TURA, city and administrative centre of Gorno-Altay autonomous *oblast* (region), Altay *kray* (territory), southern Russian Soviet Federated Socialist Republic. It is situated in the foothills of the Altai Mountains and on the Mayma River near its confluence with the Katun. It is an agricultural centre and has a sawmilling industry and cloth factories. Teacher-training and veterinary colleges and a historical institute are located there. It became a city in 1928. Pop. (1971 est.) 35,000.

Articles are alphabetized word by word, not letter by letter

Gorno-Badakhshan autonomous oblast, also spelled GORNO-BADACHŠAN, *oblast* (administrative region) of the Tadzhik Soviet Socialist Republic, occupying an area of 24,600 sq mi (63,700 sq km) in the Pamir mountains, on the Soviet frontier with China and Afghanistan. The *oblast* was formed in 1925, and its administrative centre is Khorog. The mountains, which rise to a height of 24,590 ft (7,495 m) at Communism Peak in the west, are intersected by deep ravines, down which flow tributaries of the Pyandzh River, forming much of the frontier with Afghanistan. The overwhelming majority of the population lives in the narrow river valleys in the west, in which they grow grain and fruit on irrigated terraces, while yak and fat-tailed sheep are pastured by Kirgiz on the bleak, sparsely inhabited high plateau in the east. Pop. (1983 est.) 140,000.

Goroka, town, administrative headquarters of Eastern Highlands province, Papua New Guinea, southwestern Pacific. Proclaimed a town in 1953, Goroka is a centre of European settlement in the central highlands. It has an airport and also lies on the Highlands Highway, an important truck route leading 110 mi (180 km) east to Kainantu and Aiyura, eventually reaching the coast at Lae. Coffee, passion fruit, vegetables, timber, pigs, and cattle from the vicinity are transported through Goroka. The town has an animal husbandry station, and a large biennial agricultural show is held there. Goroka is a growing resort centre because of its mile-high elevation. Pop. (1984 est.) 20,900.

Görres, (Johann) Joseph von (b. Jan. 25, 1776, Koblenz, Trier—d. Jan. 29, 1848, Munich), German writer who was one of the leading figures of late German Catholic Romanticism and of Catholic political journalism. Sympathetic to the ideals of the French Revolution, he published a republican journal, *Das rote Blatt* ("The Red Page"; renamed *Rübezahl*), in 1817.

Görres, oil painting by Joseph Anton Settegast

By courtesy of the Staatsbibliothek, Berlin

After an unsuccessful visit to Paris in 1799 as a political negotiator for the Rhenish provinces, Görres became disillusioned and withdrew from active politics. He taught natural science in Koblenz and then lectured at Heidelberg (1806–07), where he became acquainted with the leaders of German Romanticism, particularly Achim von Arnim and Clemens Brentano, with whom he edited the *Zeitung für Einsiedler* ("Journal for Hermits," renamed *Tröst Einsamkeit*; "Consolation Solitude"), the organ for the Heidelberg Romantics. His interest in German folk literature awakened by this contact with the Romantic movement, he rediscovered and popularized old German literature in his *Die teutschen Volksbücher* (1807; "The German Folkbooks"), a collection of late medieval narrative prose. He also expressed the characteristically Romantic fascination with the Orient in his *Mythengeschichte der asiatischen Welt* (1810; "Mythical Stories of the Asiatic World").

In 1808 Görres returned to Koblenz, where he lived quietly until the national struggle against Napoleon led him to found the newspaper *Rheinische Merkur* (1814). Considered to be the most influential journal of the time, it turned first against Napoleon and,

after his fall, against the reactionary politics of the German states, all of which led to its suppression in 1816. With the publication of his pamphlet "Teutschland und die Revolution" (1819; "Germany and the Revolution"), he was forced to flee to Strasbourg and to Switzerland, where he lived in poverty for several years. In 1824 he formally returned to the Roman Catholic Church and in 1827 became professor of history at Munich, where he formed a circle of liberal Catholic scholars. A vigorous Catholic spokesman in several controversies, he wrote the monumental *Christliche Mystik*, 4 vol. (1836–42; "Christian Mysticism"). In 1876 the Görres-Gesellschaft (Görres Society) was founded in his honour to advance Catholic studies.

Gorrie, John (b. Oct. 3, 1803, Charleston, S.C., U.S.—d. June 16, 1855, Apalachicola, Fla.), U.S. physician who discovered the cold-air process of refrigeration as the result of experiments to lower the temperature of fever patients by cooling hospital rooms.

In 1842 Gorrie designed and built an air-cooling apparatus for treating yellow-fever patients. His basic principle—that of heating a gas by compressing it, cooling it by sending it through radiating coils, and then expanding it to lower the temperature further—is the one most often used in refrigerators today. Giving up medical practice to engage in time-consuming experimentation with ice making, he was granted the first U.S. patent for mechanical refrigeration in 1851. He did not profit from his invention. A long tour of Southern cities in an effort to secure financial support for a factory to manufacture his inventions proved fruitless, and he returned to Apalachicola.

Gorrio, Tobia (Italian poet and composer): *see* Boito, Arrigo.

Gorter, Herman (b. Nov. 26, 1864, Wormerveer, Neth.—d. Sept. 15, 1927, Brussels), most outstanding Dutch poet of the 1880 literary revival, a movement nourished by aesthetic and "art for art's sake" ideals. Gorter's early poetry, with its intensely sensuous imagery and alluring air of spontaneity, embodies and often transcends the aesthetic ideals of the movement.

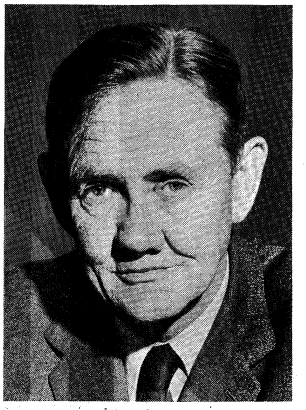
In 1889 Gorter contributed to the movement's periodical *De nieuwe gids* ("The New Guide") with his first and most important poem, "Mei" ("May"). In describing with Impressionist imagery the beauty of the Dutch spring landscape on the arrival of the personified May, her joy and subsequent disillusion, Gorter symbolized his own spiritual development: from orgiastic abandonment in nature to a quieter, metaphysical longing for peace within humanity.

In his sensitive *Verzen* of 1890 he moved from the retrospection of "Mei" to a direct communication of immediate spiritual and sensuous experience, producing some of the most remarkable poetry in the language.

Later, Gorter rejected the individualism of the 1880 movement, turning to Communist ideals; his Marxist-inspired *Pan* (1916) looks to a new utopia, but his involvement is of a visionary rather than of a practical nature.

Gorton, Sir John Grey (b. Sept. 9, 1911, Melbourne), statesman who, as prime minister of Australia (1968–71), maintained his country's military commitment in Vietnam and expanded the role of the federal government in education, science, and taxation.

After distinguished service as a pilot in the Royal Australian Air Force in World War II, Gorton was elected to national office in 1949 as a senator for Victoria. He directed a re-equipment program as minister of the navy (1958–63) and then served as minister of works (1963–66). He administered the government scientific research program from 1962 to 1968, and in 1966 he was named



Gorton, 1971
By courtesy of the Australian Information Service

the first minister for education and science. Following Harold Holt's death in 1967, he became prime minister, leading a coalition of the Liberal and Country parties.

As prime minister, Gorton maintained Australian troops in South Vietnam, although he was less absolute in adhering to American policy than was his predecessor. Gorton sponsored legislation extending educational and employment opportunities for Aborigines. He resigned in March 1971, losing a Liberal Party vote of confidence, but served as minister for defense in the subsequent administration of William McMahon. Later he left the Liberal Party and became an independent critic of national affairs. He was knighted in 1977.

Gortyn, also called GORTYNA, ancient Greek city toward the western end of the southern plain (Mesara) of Crete (near modern Áyioi Dhéka). Although unimportant in Minoan times, Gortyn displaced Phaestus as the dominant city in the Mesara. It shared or disputed control of the island with Knossos until the Roman annexation in 67 BC. Its importance then was from its control of the sea route between east and west through its ports of Matalon and Leben.

"Code" of Gortyn, archaic inscription on slabs used to build a Roman odeum of the 1st century
Josephine Powell, Rome

The region has been the centre of Italian archaeological research on Crete since 1884, when the great civic inscription, or "code," of Gortyn was discovered. The code is the most extensive monument of Greek law before the Hellenistic Age. Later excavations disclosed most of the plan and public buildings of the Roman city, which was the administrative capital of the Roman province of Crete and Cyrenaica.

Görtz, Georg Heinrich, Freiherr von (baron of) (b. 1668, Franconia—d. March 12, 1719, Stockholm), German statesman who was a key financial and diplomatic adviser to King Charles XII of Sweden.

In the service of the dukes of Holstein-Gottorp from 1698, Görtz was responsible for maintaining the separate states of Schleswig and Holstein when they were in danger of being incorporated into Denmark in 1713. His efforts to promote Charles Frederick of Holstein-Gottorp as a candidate for the throne of the childless Charles XII of Sweden led to his meeting Charles in 1714 and entering his service as a financial adviser.

Görtz skillfully secured the revenues needed by the King to wage the protracted Great Northern War (1700–21). Görtz also engaged in diplomatic missions for Charles among the English Jacobites, the Prussians, and the Russians. In 1717 Görtz was briefly imprisoned by the Dutch, at the request of George I of England, because of his dealings with the Jacobites.

Görtz, portrait by an unknown artist; in Gripsholm Castle, Sweden
By courtesy of the Svenska Portrattarkivet, Stockholm

In 1718 Görtz represented Sweden at the Åland congress, during which he went to Stockholm to confer with Charles XII—unaware that the King had died. He was arrested on orders from Frederick of Hesse-Kassel, who feared that Görtz would support Charles Frederick of Holstein-Gottorp for the throne over Frederick's wife Ulrika Eleonora, sister of Charles II. Used as a scapegoat by anti-absolutist forces in Sweden who did not want to sully the name of Charles XII, Görtz was found guilty of having alienated Charles from his people. In what is generally considered a judicial murder, Görtz was executed.

goryō, in Japanese religion, vengeful spirits of the dead. In the Heian period (AD 794–857) *goryō* were generally considered to be spirits of nobility who had died as a result of political intrigue and who because of their ill will for the living brought about natural disasters, diseases, and wars. The identities of the *goryō* were determined by divination or necromancy. Many were appeased by being granted the status of gods (Japanese *goryō-shin*, "*goryō* deities"). A notable example is Sugawara Michizane, a 9th-century minister who died in exile and came to be venerated as the god Tenjin. Later the belief arose that anyone could become a *goryō* by so willing at the moment of his death or by meeting with accidental death under unusual circumstances. Various magical practices developed in the 9th–10th century to ward off the consequences of evil spirits, such as the Buddhist recitation of *nembutsu* (invoking the name of the Buddha Amida) to send off angry spirits to Amida's paradise; the exorcising of spirits by Shugen-dō (mountain ascetic) rites; and the use of *in-yo* magic, derived from Shintō and Taoism. Belief in the power of *goryō* has survived, particularly among the rural population of Japan, and special memorial services continue to be performed to appease victims of untimely death.

Görz (Italy): *see* Gorizia.

Gorzów Wielkopolski, *województwo* (province), western Poland, established 1975, comprising an area of 3,276 sq mi (8,484 sq km). It is bordered on the west along the Oder River by Germany, on the northwest by Szczecin province, on the north by Koszalin province, on the east by Piła and Poznań provinces, and on the south by Zielona Góra province. The province and its capital city of the same name are often called simply Gorzów. In the Middle Ages the area of the modern province formed part of the Polish defense system along the western frontier of the region. In the 14th and 15th centuries the area experienced a period of prosperity from its corn (maize) and wheat production and from waterborne trade via the Noteć and Warta rivers flowing through what is now the heart of the province. During the Thirty Years' War (1618–48), Gorzów suffered great devastation; few historic buildings dating from that period have survived. The province today, one of the least densely populated in Poland, has an economy based on agriculture (rye, potatoes, wheat, sugar beets), textile manufacturing, wood-pulp processing (the wood from forests that cover more than half of the province), and chemical and electrical-machinery production. Numerous health spas are located in forests and along the banks of the province's main rivers. The town of Kostrzyn and Gorzów Wielkopolski (*q.v.*) city, the provincial capital, are inland ports handling cargo shipped from the Baltic Sea about 100 mi (160 km) to the north. Pop. (1982 est.) 461,800.

Gorzów Wielkopolski, German LANDSBERG AN DER WARTHE, city, capital of Gorzów *województwo* (province), northwestern Poland, on the Warta River. Gorzów Wielkopolski began as a castle in the Wielkopolska, or Great Poland, region that was overcome by the margraves of Brandenburg in 1257. The town developed as a commercial centre during the 14th and 15th centuries because of trade with Poland (mainly grain) and the operation of a regular fair. Destroyed during the Thirty Years' War (1618–48), the town was rebuilt and grew during the 18th century because of its textile industries and, during the 19th century, with the building of rail lines. Synthetic textile products, lumber milling, and food processing are economically important. Pop. (1982 est.) 109,000.

Gosainthan, Wade–Giles romanization HSI-HSIA-PANG-MA FENG, Pinyin XIXIABANGMA FENG, Tibetan SHISHA PANGMA, one of the world's highest mountains (26,286 ft [8,012 m]), in the Himalayas of southern Tibet, China, near the Nepal border. The Trisūli River cuts a gorge to the west of the mountain, forming an important trade route. The glacier- and snow-covered peak was first scaled by a Chinese expedition in 1964. Gosainthan comes from a Sanskrit word meaning "place of God," while Shisha Pangma is Tibetan for "range above the grassy plain."

Goschen (of Hawkhurst), George Joachim Goschen, 1st Viscount (b. Aug. 10, 1831, London—d. Feb. 7, 1907, Seacox Heath, Kent, Eng.), British economist and administrator, who worked for both Liberal and Conservative governments in the late 19th century.

The son of William Henry Goeschen (or Göschen), a London banker of German origin, he was educated in Saxony, at Rugby, and at Oriel College, Oxford. He became prominent in the banking world early and was made a director of the Bank of England at 27. His *Theory of the Foreign Exchanges* (1861) was long famous.

Goschen entered Parliament in 1863 as a Liberal and made his mark at once in the House of Commons, becoming a junior minister in November 1865. In William Gladstone's great Cabinet of 1868 Goschen was at first president of the Poor Law Board, where he projected useful reforms, and then, from March 1871 to February 1874, first lord of the Admiralty. He and the French negotiated (1876) with the khedive in Cairo the decree that established the dual Anglo-French control of Egyptian bonds.

Goschen stoutly opposed Benjamin Disraeli's policy in the eastern crisis in 1876–78. He did not join Gladstone's government in 1880 because he disapproved of the impending extension of the franchise, but he did accept the post of special ambassador to Constantinople and helped to settle various Balkan frontier questions in 1880–81. He found himself more and more at variance with progressive Liberals, and, when Gladstone declared for Irish Home Rule, Goschen opposed him vigorously. But he lost his seat in the election of July 1886 and only returned to the House of Commons in February 1887. When Lord Randolph Churchill resigned in December 1886, Goschen took his place as chancellor of the Exchequer ("I forgot Goschen," said Churchill) and operated a successful conversion of the national debt in 1888. He was in opposition from 1892 to 1895, and returned to the Admiralty as first lord in Lord Salisbury's coalition Cabinet (1895–1902), where he supervised large expansions of the fleet. He retired with a viscountcy in 1900.

Goscinny, René (b. Aug. 4, 1926, Paris—d. Nov. 5, 1977, Paris), French writer who is best known for the comic strip "Astérix", which he created with illustrator Albert Uderzo.

Goscinny was reared and educated in Buenos Aires and later worked on children's books in New York City. In 1954 he returned to Paris to direct a press agency and soon became a writer for the "Lucky Luke" comic strip. In 1957 he met Uderzo, a cartoonist, and collaborated with him on the short-lived "Benjamin et Benjamine" and, a year later, on the somewhat more successful "Oumpah-Pah le Peau-Rouge" ("Oumpah-Pah the Redskin").

In 1959, coincidental with Goscinny's founding of the French humour magazine *Pilote*, the pair began publishing *Astérix*, a comic strip that concerned itself with the adventures of a diminutive Gallic tribesman at the time of Caesar's conquest of Gaul. The title character, Astérix, and his friend Obélix belonged to the only unconquered tribe, the "Invincible Gauls." The Romans they opposed were generally made to look stupid and clumsy. Coinciding as it did with Charles de Gaulle's rise to power in France, the strip reflected certain political sentiments that were widespread at the time. It became widely popular and brought substantial success to both Goscinny and Uderzo. Goscinny was the scriptwriter of several other French comic strips, including "Les Dingodossiers" (1965–67), with Marcel Gotlib, and also was a principal in a French publishing firm. He was made a Chevalier of Arts and Letters by the Minister of Culture, André Malraux, in 1967. The "Astérix" strip was translated into 15 languages, and after its appearance in book form (1959) it sold more than 18,000,000 copies worldwide.

Gosford, city, east central New South Wales, Australia, at the north end of the Brisbane Water branch of Broken Bay. Surveyed and founded in 1839 and named after the 2nd earl of Gosford, it was merged in 1886 with the privately owned village of East Gosford to form a municipality. Gosford became a shire in 1947 and a city in 1980. Principal city of the Broken Bay district and a suburb of Sydney (32 mi [51 km] southwest), to which it is linked by electric trains and the Pacific Highway, Gosford is also a resort and service centre of an area producing mixed farm crops and citrus and passion fruits and manufacturing building materials. West of Gosford is Old Sydney Town Heritage Park, a reconstruction of Sydney as it was in 1810. The town of Woy Woy is nearby. Pop. (1981) 94,369.

Gosford, Archibald Acheson, 2nd earl of, BARON WORLINGHAM (b. Aug. 1, 1776, England—d. March 27, 1849, Armagh, County Armagh, Ire.), governor in chief of British North America in 1835–37, who alienated English- and French-speaking colonists in Canada.

Acheson entered politics in 1798 as member for Armagh in the Irish Parliament. After the union of Great Britain and Ireland (1800), he became member for Armagh in the British House of Commons, where he served until he inherited his father's title in 1807. In 1811 he entered the British House of Lords as a representative peer for Ireland; he supported the Whig policy of conciliating Ireland.

After being made lord lieutenant of Armagh in 1832 and a peer of the United Kingdom (Baron Worlingham) in 1835, Gosford was appointed governor in chief of British North America. He served as a royal commissioner inquiring into the state of affairs in Lower Canada (now Quebec) and recommended a policy of "conciliation without concession" toward French-Canadians. By 1837 he recognized the failure of his conciliation policy, and he resigned that November, leaving Canada just before the French-Canadian rebellion in Lower Canada (1838). In the House of Lords he unsuccessfully opposed the Act of Union (1840), which united Upper and Lower Canada (Ontario and Quebec).

goshawk, any of the more powerful accipiters, or true hawks (*i.e.*, belonging to the genus *Accipiter*), primarily short-winged, forest-dwelling bird catchers, of which the northern goshawk (*Accipiter gentilis*) is best known. Originally called "goose hawk," perhaps because of its size and its finely barred gray plumage, this bird reaches about 60 centimetres (2 feet) in length with a 1.3-m (4.3-ft) wingspread. It has long been used in falconry, where it once was reserved for the higher clergy. It takes game as large as foxes and grouse. In the wild it occurs in temperate to boreal forests throughout the Northern Hemisphere, although it has become rare in the British Isles and is declining in North America.

Northern goshawk (*Accipiter gentilis*)
Karl H. Maslowski

Occurring in the Southern Hemisphere are several other goshawks of the genus *Accipiter*—including *A. novaehollandiae* of Australia, which is either gray or snowy white with

a black beak and ruby-red eyes—and several birds of other genera also called goshawks: the red goshawk (*Erythrotriorchis radiatus*), a rare Australian bird, brown with relatively long wings and short tail; the chanting goshawks of Africa (two species of *Melierax*), named for their piping calls during breeding season, large, long-winged, strongly patterned birds of open country that forage on the ground, chiefly for lizards; and the closely related Gabar goshawk (*Melierax,* or *Micronisus, gabar*), also widespread in Africa but a smaller bird of the forests.

Goshen, city, seat (1831) of Elkhart County, northern Indiana, U.S., on the Elkhart River, 24 mi (39 km) east-southeast of South Bend. Settled in 1828–30 and named for the biblical land, it has a large Amish and Mennonite community. Goshen is a trade centre for poultry and diversified farming; manufactures include furniture, boats, mobile homes, and electronic controls. Goshen College (1894) is one of two Mennonite four-year colleges in the United States. A stone tablet marks the site of old Ft. Beane, a settler's refuge from Indians. Lake Wawasee summer and winter resort area is 15 mi southeast. Inc. 1868. Pop. (1980) 19,665.

Gosho Heinosuke (b. Feb. 1, 1902, Tokyo—d. May 1, 1981, Shizuoka, Japan), Japanese motion-picture director and writer famous for films concerning the everyday lives of middle-class people. He is also noted for adapting Japanese literary works to the screen and for his creative use of silence in sound pictures, subtle pictorial symbols, and rapid sequences of scenes.

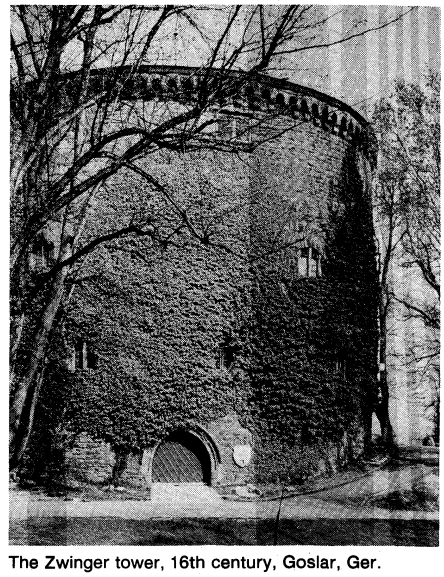
After graduating from Keio University in Tokyo, he became an assistant director at the Shōchiku Motion Picture Company in Tokyo. Within two years he was an independent director. In 1927, at the age of 25, he directed his first commercial success, *Sabishiki ranbomono* (*The Lonely Roughneck*).

Gosho's *Madamu to nyōbō* (*The Neighbour's Wife and Mine,* 1931), the first important Japanese talking picture, was a film about the home lives of white-collar workers in which he handled both silence and sound in a truly cinematic manner. After 1950 he helped to raise this genre to its highest expression in pictures that won international recognition at film festivals throughout the world; *e.g., Entotsu no miero basho* (1953; *Where Chimneys Are Seen*), *Kiiroi karasu* (1957; *The Yellow Crow*), *Maria of the Ant Village* (1958), and *When Woman Loves* (1960). He portrayed the hopes and despairs of everyday life with a simplicity of style that made his films realistic statements about life in modern Japan.

Throughout his career Gosho translated into the cinematic medium, with artistic results, such Japanese literary works as *Ikitoshi ikerumono* (1934; *Everything That Lives*), *Ōsaka no yado* (1954; *An Inn at Osaka*), and *Take kurabe* (1955; *Growing Up*).

Gosiute, also spelled GOSHIUTE, ethnolinguistic group of Western Shoshoni Indians formerly living west of the Great Salt Lake in the arid region of the North American Great Basin. They were often reported in the 19th century to have lived wretched lives, subsisting with difficulty in the desert wasteland; the reports were probably exaggerated, however, and some later reports told of their cultivation of crops and employment with white settlers. Descendants still live in the area.

Goslar, city, Lower Saxony *Land* (state), north-central Germany, at the northern foot of the Harz Mountains. Founded in 922 to protect rich silver mines discovered in the Rammelsberg, it became a favourite residence of the early Holy Roman emperors. The scene of frequent meetings of the Reichstag (legislative assembly) in the 11th and 12th centuries, it joined the Hanseatic League in the 13th



The Zwinger tower, 16th century, Goslar, Ger.
Schuster—De Wys Inc.

century. After obtaining an imperial provostship in 1290, it was an imperial free city until annexed by Prussia in 1802. It passed to Westphalia in 1807, to Prussia in 1814, to Hanover in 1815, and, with the Hanoverian kingdom, back to Prussia in 1866. Hitler made it the headquarters of the Nazi agricultural organization in 1936. It was undamaged in World War II and so received many refugees from other towns.

Parts of the old city walls remain, as do the 16th-century towers, particularly the Breites Tor (Broad Gate), Zwinger, and Achtermann. There are interesting stone and half-timbered buildings from the 13th–16th century and guildhalls belonging to the bakers' and cloth merchants' guilds; the latter (1494) is now the Kaiserworth Hotel. The Imperial Palace (*c.* 1040, restored late 19th century) was built by Emperor Henry III, whose tomb is in the St. Ulrich Chapel. The 12th-century town hall, later rebuilt, contains a unique homage chamber. The cathedral (consecrated 1050) was demolished in 1819, but surviving medieval monastery and parish churches include the Neuwerkkirche, St. James's, the Market Church, and the Frankenberg Church. There are museums of natural science, art, cultural history, and hunting and forestry.

Goslar is also an important tourist base for the Harz Mountains. In addition, it has a large men's clothing factory, chemical plants, and other industries. Pop. (1989 est.) 45,614.

Goślicki, Wawrzyniec, Latin pseudonym LAURENTIUS GRIMALUS (b. *c.* 1530, near Płock, Pol.—d. Oct. 31, 1607, Ciążeń), Roman Catholic bishop and diplomat whose political writings were precursory to Catholic liberalism.

In 1569 he joined the royal chancery and served two Polish kings, Sigismund II Augustus and Stephen Báthory. Successively appointed bishop of Kamieniec Podolski (1586), Chełm (1590), Przemyśl (1591), and Poznań (1601), he was the only prelate who, in 1587, signed the Compact of Warsaw granting equal rights to all Poles in matters of religion.

Under his Latin name of Laurentius Grimalus, Goślicki published (1568) in Venice his principal work, *De optimo senatore.* The first English edition appeared in 1598 as *The Counsellor Exactly Pourtraited;* it was immediately banned, as was the second, shortened edition, *A Common-wealth of Good Counsaile* (1607). In 1733 a more nearly correct translation by William Oldisworth appeared under the title *The Accomplished Senator.* Opposing absolute monarchy and supremacy of the people, Goślicki recommended that the senate should stand between the sovereign and the people, controlling the sovereign and representing the people. He was one of the earliest political theorists to advocate the right of revolt against tyranny. W.J. Stankiewicz' *Accomplished Senator of Laurentius Gosliciuss* was published in 1946.

Gosnold (town, Massachusetts, U.S.): *see* Elizabeth Islands.

Gosnold, Bartholomew (b. *c.* 1572, Grundisburgh, Suffolk, Eng.—d. Aug. 22, 1607, Jamestown, Va.), English explorer and colonizer.

The eldest son of an English country squire, Bartholomew Gosnold attended Cambridge University before marrying and settling at Bury St. Edmunds in the late 1590s. In 1602 the Earl of Southampton defrayed most of the expenses for fitting out the ship "Concord," which Gosnold commanded on a voyage of exploration to the New World.

Gosnold reached the North American coast in lower Maine, then sailed southward to a peninsula that he named Cape Cod. During that voyage to New England he also explored the coastal waters along Nantucket Sound, Martha's Vineyard, and Narragansett Bay. He returned to England with a cargo of lumber, sassafras, and furs.

Gosnold worked energetically to promote the colonization of North America following his return to England. After James I had granted the Virginia Charter in 1606, Gosnold was appointed vice admiral of the London Merchants' fleet of three ships that sailed from England on December 20 of that year. When the vessels reached Cape Henry in April 1607, Gosnold was appointed a member of the resident council for the new settlement. He opposed establishing the settlement on Jamestown Island, but was overruled by Edward Wingfield, president of the council. Gosnold died during an epidemic of malaria.

Gospel, any of four biblical narratives covering the life and death of Jesus Christ. Written, according to tradition, respectively by Matthew, Mark, Luke, and John (the four evangelists), they are placed at the beginning of the New Testament and make up about half the total text. The word gospel is derived from the Anglo-Saxon term god-spell, meaning "good story," a rendering of the Latin *evangelium* and the Greek *euangelion*, meaning "good news" or "good telling." Since the late 18th century the first three have been called the Synoptic Gospels, because the texts, set side by side, show a similar treatment of the life and death of Jesus Christ. *See also* Diatessaron; individual gospels by author.

gospel music, a form of black American music derived from church worship services and from spiritual (*q.v.*) and blues singing. Gospel music spread through song publishing, concerts, recordings, and radio and television broadcasts of religious services from the Great Depression days of the 1930s.

The immediate impetus for gospel music seems to have been the rise of Pentecostal churches at the end of the 19th century. Pentecostal shouting is related to speaking in tongues and to circle dances of African origin. Recordings of Pentecostal preachers' sermons were immensely popular among American blacks in the 1920s, and recordings of them along with their choral and instrumental accompaniment and congregational participation persisted, so that ultimately gospel reached the white audience as well. The voice of the black gospel preacher was affected by black secular performers, and vice versa. Taking the scriptural direction "Let everything that breathes praise the Lord" (Psalms, 150), Pentecostal churches welcomed timbrels, pi-

anos, organs, banjos, guitars, other stringed instruments, and some brass into their services. Choirs often featured the extremes of female vocal range in antiphonal counterpoint with the preacher's sermon. Improvised recitative passages, melismatic singing, and extravagant expressivity characterize gospel music.

Other forms of gospel music have included the singing and acoustic guitar playing of itinerant street preachers; individual secular performers, sometimes accompanied by bands; and harmonizing male quartets, usually singing a cappella, whose acts included dance routines, frenzied emotions, and stylized costumes.

Among the most prominent of gospel music practitioners were Thomas A. Dorsey, born in 1899, a prolific and best-selling songwriter whose works include, most notably, "Precious Lord"; the Rev. C.A. Tindley (1851–1933), composer of "I'll Overcome," which was transformed into the anthem of the U.S. civil rights movement "We Shall Overcome"; the Rev. C.L. Franklin of Detroit, who issued more than 70 albums of his sermons and choir after World War II; blind Rev. Gary Davis (1896–1972), a wandering preacher and guitar soloist; Sister Rosetta Tharpe, whose guitar and vocal performances took gospel into nightclubs and concert theatres in the 1930s; Roberta Martin, based in Chicago with a choir and a school of gospel singing; Mahalia Jackson (1911–72), who toured internationally and was often broadcast on television and radio; the Soul Stirrers, from which the popular singer Sam Cooke came; and Andrae Crouch in the 1970s.

Gosplan, abbreviation of GOSUDARSTVENNYY PLANOVYY KOMITET, English STATE PLANNING COMMITTEE, central board that supervises various aspects of the planned economy of the Soviet Union by translating into specific national plans the general economic objectives outlined by the Communist Party and the government. Established in February 1921, Gosplan was originally an advisory council to the government, its functions limited to influencing the level and direction of state investments. It assumed a more comprehensive planning role in 1928, when the First Five-Year Plan, which called for rapid industrialization and a drastic reduction of the private sector of the economy, was adopted. Frequent economic reorganizations have since altered Gosplan's role.

Gosport, district (borough), county of Hampshire, England, on a peninsula between Portsmouth Harbour and The Solent, opposite the Isle of Wight. It has an area of 11 sq mi (27 sq km). Gosport prospered from the 16th century with the rising importance of the Royal Navy. Primarily a victualling station, it flourished in the Napoleonic Wars and later shared in the naval development of Portsmouth. It was a major embarkation area for the Allied invasion of France in 1944 and suffered considerable air bombardment. Pop. (1982 est.) 76,500.

Gossaert, Jan (*c.* 1478–*c.* 1532): *see* Mabuse, Jan.

gossamer-winged butterfly, any of numerous insects belonging to the family Lycaenidae (order Lepidoptera), including several hundred species commonly called coppers, blues, and hairstreaks. All are small to medium-sized butterflies (wingspan one to three centimetres [0.4–1.2 inches]), agile and delicate. In males the upper wing surfaces are usually brightly coloured and iridescent. Underwing patterns of both sexes are spotted or streaked and often have false eye-markings and trailing filaments on the hind wings that serve as decoys for predators. Food plants include trees, shrubs, and annual legumes. Larvae of some species are carnivorous and may require a diet of aphids or ant larvae; the latter may be devoured while adult ants take secretions from special so-called milk glands on the butterfly larva.

gossan, also spelled GOZZAN, rust-coloured oxide minerals (usually limonite) that cap an ore deposit; they thus may be used as clues to the existence of subsurface ore deposits, especially if distinctive boxworks are present.

In addition to limonite (a mixture of hydrous iron oxide minerals), gold and silver in the native (natural, nearly pure) state and various sulfate, carbonate, and silicate minerals occur in gossans. The limonite occurs as the residuum when sulfide minerals are dissolved from the outcrops; it is either indigenous (*i.e.*, fixed at the site of the original sulfide mineral) or transported. Indigenous limonite indicates the presence of copper, whereas transported limonite indicates its absence or its presence in very low proportion to iron. *See* boxwork.

Gosse, Sir Edmund (b. Sept. 21, 1849, London—d. May 16, 1928, London), English translator, literary historian, and critic who introduced the work of Ibsen and other continental writers to English readers. His *Father and Son* (1907), a minor classic of autobiography, recounts with grace, irony, and wit his escape from the dominance of a puritanical father to the world of letters.

While pursuing scholarly occupations at the British Museum, the Board of Trade (where

Edmund Gosse, detail of an oil painting by John Singer Sargent, 1886; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

he was translator for some 30 years), and the House of Lords (librarian 1904–14), he published translations of Ibsen (*Hedda Gabler*, 1891; with W. Archer, *The Master Builder*, 1892); literary histories (*18th Century Literature*, 1889; *Modern English Literature*, 1897); and critical essays (*e.g.*, *French Profiles*, 1905). He was influential in his day and enjoyed the friendship of such distinguished contemporaries as James, Hardy, Kipling, Shaw, and Max Beerbohm. Gosse was knighted in 1925.

Gosse, Philip Henry (b. April 6, 1810, Worcester, Worcestershire, Eng.—d. Aug. 23, 1888, St. Mary Church, Devon), English naturalist who invented the institutional aquarium and compiled the first descriptive catalog of British marine invertebrates.

While staying at St. Mary Church on the Devon coast (1852), he became interested in local marine life. He subsequently built the first successful aquarium for the long-term housing of marine animals, which he described in *The Aquarium* (1854). Gosse's interest in marine biology led to the publication of his most important works, *Manual of Marine Zoology*, 2 vol. (1855–56), a comprehensive work on the subject, and *Actinologia Britannica* (1858–60), concerning sea anemones in British waters. As a member of the Plymouth Brethren, a very conservative Christian sect, Gosse rejected all evolutionary concepts; these views were set forth in *Life* and *Omphalos* (both 1857).

Retiring to St. Mary Church, he pursued significant research on the microscopic aquatic rotifers. Gosse is also known for such popular biological works as *Introduction to Zoology*

Philip Henry Gosse, portrait miniature by W. Gosse, 1839; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

(1843), *Evenings at the Microscope* (1859), and *A Year at the Shore* (1865).

Gossec, François-Joseph (b. Jan. 17, 1734, Vergnies, Hainaut—d. Feb. 16, 1829, Passy, near Paris), one of the principal composers of 18th-century France, whose symphonies and chamber works helped shape the orchestral forms of the Classical period in France.

He went to Paris in 1751 and in 1754 succeeded Jean-Philippe Rameau as director of the orchestra of the wealthy amateur La Pouplinière. There he came under the influence of Johann Stamitz, the pre-Classical symphonist, then in La Pouplinière's employ. In 1754 he performed the first of his 30 symphonies. Like later symphonies of the Classical period, it was in four movements with a minuet. His chamber works include both trio sonatas (a Baroque form) and string quartets (a Classical form). Later, as musical director to the Prince de Condé, he also composed operas. After the Revolution (1789), he composed hymns and chants for outdoor performance, celebrating the Revolution and its ideals, among them "Hymne à l'Être suprême" and "Le Triomphe de la République." In 1773 he became director of the Concert Spirituel, and in 1795, on the founding of the Paris Conservatoire, he became an inspector and teacher there.

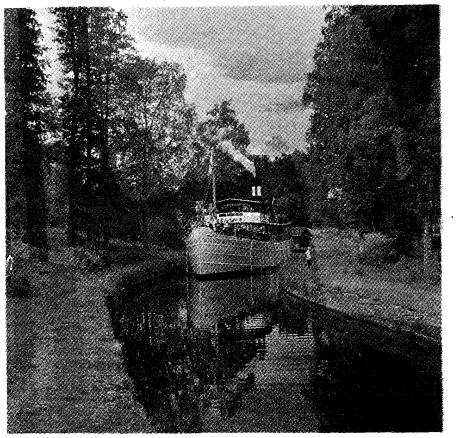
Gossec was an experimenter in choral and orchestral writing. He expanded the French orchestra to include horns and clarinets and experimented with novel combinations of instruments and voices. He also worked with massive sonorities: his *Te Deum* used 1,200 singers and 300 wind instruments. His compositions also include a requiem, an oratorio, *La Nativité*, and other choral works.

Gosset, Louis-André: *see* Gill, André.

Gossuin DE METZ (fl. 13th century): *see* Gautier de Metz.

Got, Bertrand de (pope): *see* Clement V.

Göta Canal, artificial waterway that crosses Sweden to connect the lake Vänern with the Baltic. For most of its course it passes through lakes, providing inland navigation from Göteborg to Stockholm. The Göta River (Göta älv) drains Vänern and, with locks to surmount the falls at Trollhättan, is part of the waterway. The first section to be canalized (Trollhätte Canal) was completed in 1800, allowing seagoing craft to pass from Göteborg to Karlstad and other ports on Vänern. The Göta Canal proper leads from Sjötorp to Viken on the other major Swedish lake, Vättern, and thence to Mem on Slätbaken, an inlet of the Baltic, using on the way the small lakes Boren and Roxen. The navigation distance from Göteborg to Stockholm is about 360 mi (580 km) by the canal route and 590 mi (950 km) on the Baltic. The voyage by canal takes about



Göta Canal, in Sweden
Picturepoint, London

2½ days. The Göta Canal has 47 mi (76 km) of artificial works and includes 58 locks.

Götaland, major region of southern Sweden, encompassing the *landskap* (provinces) of Västergötland, Dalsland, Östergötland, Småland, Öland, Gotland, Bohuslän, Skåne, Halland, and Blekinge (*qq.v.*). Its land area of 33,692 sq mi (87,262 sq km) places it in size between Sweden's other two regions, the smaller Svealand in central Sweden and the larger Norrland in the north. As early as AD 150 the inhabitants of the region, Götarna, were mentioned by the classical geographer Ptolemy. Later, migrations weakened the region, and eventually it was conquered by Svealand, to the north. The region became the cultural centre of Sweden after about 1000, with the triumph of Christianity over paganism while neighbouring areas were still pagan. Näs Castle on Visingsö, an island in Vättern (the second largest lake in Sweden), was a royal residence from *c.* 1100 to *c.* 1200. During the Middle Ages the towns of Skänninge and Söderköping, both in the *landskap* of Östergötland, were leading centres for the conduct of state and church matters.

The region has a diversified economy, including both agriculture and industry. Leading agricultural crops are grain, potatoes, and sugar beets; there is also livestock raising. Fishing is important in the coastal *landskap.* Industries include automobile assembling, shipbuilding, and stone quarrying, as well as manufacture of glass, paper, and cloth. Götaland has been the most densely populated region of Sweden since the mid-18th century, when it had 60 percent of the population. Pop. (1984 est.) 3,984,336.

Gotarzes, also spelled GODARZ, name of Parthian kings, grouped below chronologically and indicated by the symbol •.

• **Gotarzes I** (fl. early 1st century BC), king of Parthia (reigned 91–87 or 91–81/80 BC); he first appeared as "satrap of satraps" under the Parthian king Mithradates II in a Greek inscription at Bīsitūn, Iran. A name carved nearby, Gotarses Geopothros (Son of Gew), may also represent him (or Gotarzes II, according to some scholars). While Mithradates was preoccupied with Rome, Gotarzes established himself as an independent monarch in Babylonia, and after Mithradates' death he remained, with his queen, Asibatum, as sole ruler of the Parthian Empire. Not long afterward, however, Mithradates' son Orodes I asserted his hereditary right against Gotarzes, and contemporary records show that by 80 BC Orodes had replaced Gotarzes.

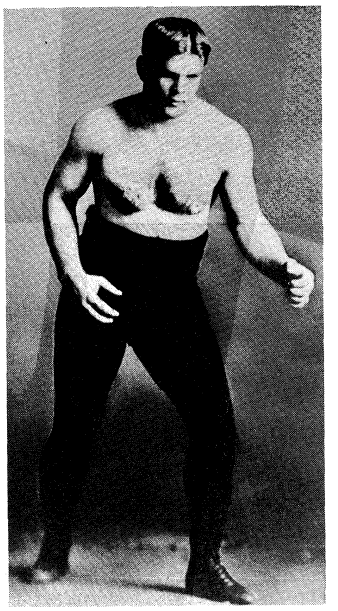
• **Gotarzes II** (d. AD 51), king of Parthia (reigned *c.* AD 38–51). Gotarzes killed his brother Artabanus, but a second brother, Vardanes, was able to expel him to the province of Hyrcania. Although fear of the nobles reconciled the two for a time, they soon renewed their fighting, which continued until Vardanes' murder (*c.* 47). Thereafter Gotarzes

Gotarzes II, coin, 1st century AD
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

ruled unopposed. Later another rival, the Roman nominee Meherdates, was defeated near Karafto in Kurdistan. Not long afterward, however, Gotarzes died either by assassination or of disease.

Gotch, Frank (b. April 27/28, 1878, Humboldt, Iowa, U.S.—d. Dec. 16, 1917), U.S. professional freestyle, or catch-as-catch-can, wrestler, sometimes considered the greatest in the history of the sport.

Gotch won the world championship from Tom Jenkins in 1905, lost to Fred Beall in 1906, but quickly recaptured the title from Beall and retained world honours until his retirement in 1913. Among his 154 victories in



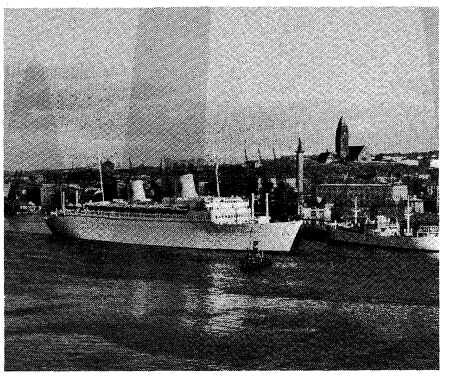
Gotch
AP/Wide World Photos

160 recorded matches were two triumphs over the great Estonian champion George Hackenschmidt in 1908 and 1911. Standing 5 feet 11 inches and weighing 210 pounds, he was smaller than most of his opponents, but he had extraordinary strength and a comprehensive knowledge of holds.

Göteborg, also spelled GOTHENBURG, Sweden's chief seaport and second largest city, on the Göta älv (Göta River) estuary. It is the capital of the *län* (county) of Göteborg och Bohus.

The city was founded by King Charles IX in 1603, on the site of earlier medieval settlements; the location was strategic because the Göta älv estuary was Sweden's only direct outlet to the Atlantic at that time. Göteborg was destroyed in the Kalmar War with Denmark in 1611–13, but it was refounded by King Gustavus II Adolphus in 1619 and chartered two years later. Many of the early inhabitants were Dutch, who built canals and laid out the city centre. Göteborg's prosperity increased in the early 18th century with the development of the Swedish East India Company, and during Napoleon's continental blockade the port became Europe's chief market for British goods. A second period of wealth started with the completion in 1832 of the Göta Canal and the beginning of a transoceanic shipping service.

Reminders of the past are the forts Skansen Lejonet and Skansen Kronan and the moat that still encircles the old part of the city. The cathedral (1633; rebuilt 1815–25 and restored 1956–57) and the Kristine Church (1648; rebuilt 1780) are notable landmarks. There are cultural, maritime, and natural history museums. Among the larger parks are Slottskogen, the botanical gardens, Trädgårdsföreningen



Harbour of Göteborg, Swed.
Authenticated News International

(the Garden Society), and Liseberg, an amusement park. The city is the seat of a state university (1891) and a technical university (Chalmers; 1829).

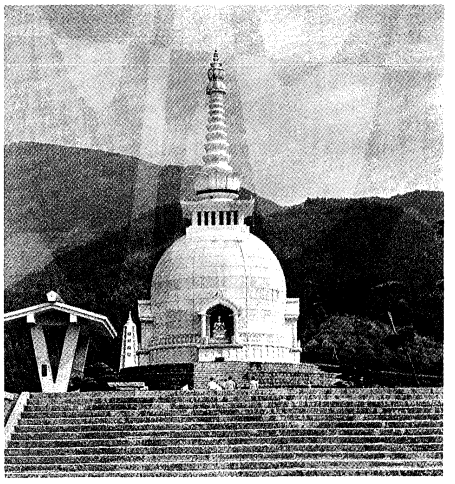
Principal exports are paper and timber, together with their by-products; imports include mineral oils, fruit, and iron. The shipbuilding yards on the island of Hisingen to the north are Sweden's largest. Other industries are food processing and the production of ball bearings, automobiles, and textiles. Göteborg is connected to the rest of Sweden by the Göta Canal and railway lines; the nearby Torslanda Airport accommodates both domestic and international flights. Pop. (1984 est.) mun., 424,186.

Göteborg och Bohus, *län* (county) of southwestern Sweden, on the Skagerrak and Kattegat (straits). Its land area of 1,985 sq mi (5,141 sq km) consists of the traditional *landskap* (province) of Bohuslän and part of that of Västergötland. Although its soil is poor and its vegetation suitable only for sheep grazing, the *län* has granite outcrops that are of value for quarrying. The principal industries, however, centre on fishing and boatbuilding. Numerous seaside resorts have made it a noted tourist area. Göteborg (*q.v.*), the capital, is Sweden's major port and second largest city. Pop. (1984 est.) 709,651.

Consult the INDEX *first*

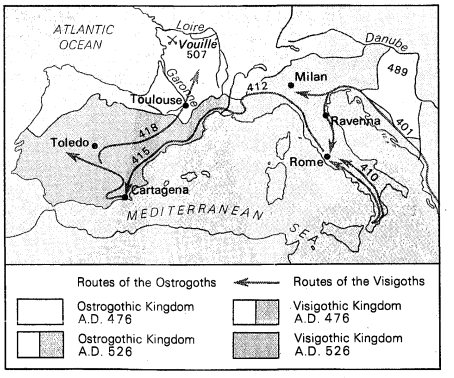
Gotemba, city, Shizuoka *ken* (prefecture), Honshu, Japan, on the eastern foot of Fuji-san. Best known as a recreational and tourist centre, the city has a picturesque setting and serves as a base for the ascent of Fuji-san. Because of the high elevation of 1,500 ft (450 m), cultivation in the surrounding area is limited to mulberry trees for silkworm breeding. The

raising of hogs and poultry was introduced after World War II. The city contains a large shooting range used by the Japanese Ground Self-Defense Force. Pop. (1985) 74,882.



Buddhist stupa, Gotemba, Japan
FPG—EB Inc.

Goth, member of a Germanic people whose two branches, the Ostrogoths and the Visigoths, for centuries harassed the Roman Empire. According to their own legend, reported by the mid-6th-century Gothic historian Jordanes, the Goths originated in southern Scandinavia and crossed in three ships under their king Berig to the southern shore of the Baltic Sea, where they settled after defeating the Vandals and other Germanic peoples in that area. Tacitus states that the Goths at this time were distinguished by their round shields, their short swords, and their obedience toward their kings. Jordanes goes on to report that they migrated southward from the Vistula region under Filimer, the fifth king after Berig and, after various adventures, arrived at the Black Sea.



Migrations and kingdoms of the Goths in the 5th and 6th centuries AD

This movement took place in the second half of the 2nd century AD, and it may have been pressure from the Goths that drove other Germanic peoples to exert heavy pressure on the Danubian frontier of the Roman Empire during the reign of Marcus Aurelius. Throughout the 3rd century Gothic raids on the Roman provinces in Asia Minor and the Balkan peninsula were numerous, and in the reign of Aurelian (270–275) they obliged the Romans to evacuate the trans-Danubian province of Dacia. Those Goths living between the Danube and the Dnestr rivers became known as Visigoths, and those in what is now the Ukraine as Ostrogoths. For their subsequent histories, *see* Ostrogoth; Visigoth.

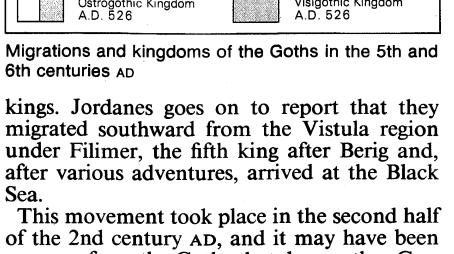
Gotha, city, Thuringia *Land* (state), central Germany. It lies on the northern edge of the Thuringian Forest, 13 miles (21 km) west of Erfurt. First mentioned as the Frankish villa Gotaha in 775, when it was given to the abbey of Hersfeld, it was fortified in 930 and chartered in 1189–90. The city passed to the landgraves of Thuringia in 1247 and to the Saxon House of Wettin in 1264. From 1640 to 1825 it was the residence of the dukes of Saxe-Gotha, and from 1826 to 1918, with Coburg, it became the residence of the dukes of Saxe-Coburg-Gotha. In 1875 it was the scene of the congress that united the Eisenach and the Lassalle political groups into the Socialist Labour Party of Germany; the party adopted the Gotha Program, which was sharply criticized by Karl Marx. The old inner town is dominated by the former ducal palace of Friedenstein (1643), which has extensive art, historical, and geographical collections. Also notable are the 12th-century Margarethen-Kirche (St. Margaret's Church, often altered), the town hall (1567–77), the former ducal Summer Palace of Friedrichsthal (1708–10), and a Gymnasium Ernestinum (preparatory school) founded in the 17th century. The theatre maintained by the dukes of Gotha since 1683 is still in use.

From the 18th century to World War II, Gotha was the seat of the geographical–cartographical publishing house of Justus Perthes (now the nationally owned Hermann Haack publishers), which first published (1763) the *Gothaische Hofkalender* ("Gotha Almanac"), a widely used annual reference book. The city was also the home of many insurance companies from the 1900s until the 1940s. Gotha is now a rail junction, and its manufactures include machinery, vehicles, textiles, chemicals, soap, china, and rubber goods. Pop. (1989 est.) 57,365.

Gothenburg (Sweden): *see* Göteborg.

Gothic alphabet, writing system invented in the 4th century AD by Ulfilas, an Arian bishop, for recording the Gothic language; this writing system should not be confused with "Gothic script," a form of the Latin alphabet. The Gothic alphabet had 27 letters, 19 or 20 of which were derived from Greek uncial script, 5 or 6 modified slightly from Latin, and 2 either borrowed from runic script or invented independently. The writing system generally corresponded to Latin and Greek scripts, but there were some differences in phonetic values and in the order of the letters.

Ulfilas translated the Bible into Gothic in the 4th century, using his Gothic alphabet. Although his original translation has not survived, several documents of the 5th and 6th centuries reproduce fragments of his work.



The Pater Noster according to the Codex Argenteus

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The most important of these is the Codex Argenteus, which is written in gold and silver on purple-red parchment. These written materials in Gothic not only preserve the Gothic alphabet but are also the only record of the Gothic language, which is now extinct.

Gothic art, the painting, sculpture, architecture, and music characteristic of the second of two great international eras that flourished in western and central Europe during the Middle Ages. Gothic art evolved from Romanesque art and lasted from the mid-12th century to as late as the end of the 16th century in some areas. The term Gothic was coined by classicizing Italian writers of the Renaissance, who attributed the invention (and what to them was the nonclassical ugliness) of medieval architecture to the barbarian Gothic tribes that had destroyed the Roman Empire and its classical culture in the 5th century AD. The term retained its derogatory overtones until the 19th century, at which time a positive critical revaluation of Gothic architecture took place. Although modern scholars have long realized that Gothic art has nothing in truth to do with the Goths, the term Gothic remains a standard one in the study of art history.

Architecture was the most important and original art form during the Gothic period. The principal structural characteristics of Gothic architecture arose out of medieval masons' efforts to solve the problems associated with supporting heavy masonry ceiling vaults over wide spans. The problem was that the heavy stonework of the traditional arched barrel vault and the groin vault exerted a tremendous downward and outward pressure that tended to push the walls upon which the vault rested outward, thus collapsing them. A building's vertical supporting walls thus had to be made extremely thick and heavy in order to contain the barrel vault's outward thrust.

Medieval masons solved this difficult problem about 1120 with a number of brilliant innovations. First and foremost they developed a ribbed vault, in which arching and intersecting stone ribs support a vaulted ceiling surface that is composed of mere thin stone panels. This greatly reduced the weight (and thus the outward thrust) of the ceiling vault, and since the vault's weight was now carried at discrete points (the ribs) rather than along a continuous wall edge, separate widely spaced vertical piers to support the ribs could replace the continuous thick walls. The round arches of the barrel vault were replaced by pointed (Gothic) arches which distributed thrust in more directions downward from the topmost point of the arch.

Since the combination of ribs and piers relieved the intervening vertical wall spaces of their supportive function, these walls could be built thinner and could even be opened up with large windows or other glazing. A crucial point was that the outward thrust of the ribbed ceiling vaults was carried across the outside walls of the nave, first to an attached outer buttress and then to a freestanding pier by means of a half arch known as a flying buttress. The flying buttress leaned against the upper exterior of the nave (thus counteracting the vault's outward thrust), crossed over the low side aisles of the nave, and terminated in the freestanding buttress pier, which ultimately absorbed the ceiling vault's thrust.

These elements enabled Gothic masons to build much larger and taller buildings than their Romanesque predecessors and to give their structures more complicated ground plans. The skillful use of flying buttresses made it possible to build extremely tall, thin-walled buildings whose interior structural system of columnar piers and ribs reinforced an impression of soaring verticality.

Three successive phases of Gothic architecture can be distinguished, respectively called early, High, and late Gothic.

Early Gothic. This first phase lasted from the Gothic style's inception in 1120–50 to about 1200. The combination of all the aforementioned structural elements into a coherent style first occurred in the Île-de-France (the region around Paris), where prosperous urban populations had sufficient wealth to build

the great cathedrals that epitomize the Gothic style. The earliest surviving Gothic building was the abbey of Saint-Denis in Paris, begun in about 1140. Structures with similarly precise vaulting and chains of windows along the perimeter were soon begun with Notre-Dame de Paris (begun 1163) and Laon Cathedral (begun 1165). By this time it had become fashionable to treat the interior columns and ribs as if each was composed of a bunch of more slender parallel members. A series of four discrete horizontal levels or stories in the cathedral's interior were evolved, beginning with a ground-level arcade, over which ran one or two galleries (tribune, triforium), over which in turn ran an upper, windowed story called a clerestory. The columns and arches used to support these different elevations contributed to the severe and powerfully repetitive geometry of the interior. Window tracery (decorative ribwork subdividing a window opening) was also gradually evolved, along with the use of stained (coloured) glass in the windows. The typical French early Gothic cathedral terminated at its eastern end in a semicircular projection called an apse. The western end was much more impressive, being a wide facade articulated by numerous windows and pointed arches, having monumental doorways, and being topped by two huge towers. The long sides of the cathedral's exterior presented a baffling and tangled array of piers and flying buttresses. The basic form of Gothic architecture eventually spread throughout Europe to Germany, Italy, England, the Low Countries, Spain, and Portugal.

In England the early Gothic phase had its own particular character (epitomized by Salisbury Cathedral) that is known as the early English Gothic style (*c.* 1200–1300 AD). The first mature example of the style was the nave and choir of Lincoln Cathedral (begun in 1192).

Early English Gothic churches differed in several respects from their French counterparts. They had thicker, heavier walls that were not much changed from Romanesque proportions; accentuated, repeated moldings on the edges of interior arches; a sparing use of tall, slender, pointed lancet windows; and nave piers consisting of a central column of light-coloured stone surrounded by a number of slimmer attached columns made of black purbeck marble.

Early English churches also established other stylistic features that were to distinguish all of English Gothic: great length and little attention to height; a nearly equal emphasis on horizontal and vertical lines in the stringcourses and elevations of the interior; a square termination of the building's eastern end rather than a semicircular eastern projection; scant use of flying buttresses; and a piecemeal, asymmetrical conception of the ground plan of the church. Other outstanding examples of the early English style are the nave and west front of Wells Cathedral (*c.* 1180–*c.* 1245) and the choirs and transept of Rochester Cathedral.

High Gothic. The second phase of Gothic architecture began with a subdivision of the style known as Rayonnant (1200–1280 AD) on the Continent and as the Decorated Gothic (1300–75 AD) style in England. This style was characterized by the application of increasingly elaborate geometrical decoration to the structural forms that had been established during the preceding century.

During the period of the Rayonnant style a significant change took place in Gothic architecture. Until about 1250, Gothic architects concentrated on the harmonious distribution of masses of masonry and, particularly in France, on the technical problems of achieving great height; after that date, they became more concerned with the creation of rich visual effects through decoration. This decoration took such forms as pinnacles (upright members, often spired, that capped piers, buttresses, or other exterior elements), moldings, and, especially, window tracery. The most characteristic and finest achievement of the Rayonnant style is the great circular rose window adorning the west facades of large French cathedrals; the typically radial patterns of the tracery inspired the designation Rayonnant for the new style. Another typical feature of Rayonnant architecture is the thinning of vertical supporting members, the enlargement of windows, and the combination of the triforium gallery and the clerestory until walls are largely undifferentiated screens of tracery, mullions (vertical bars of tracery dividing windows into sections), and glass. Stained glass—formerly deeply coloured—became lighter in colour to increase the visibility of tracery silhouettes and to let more light into the interior. The most notable examples of the Rayonnant style are the cathedrals of Reims, Amiens, Bourges, Chartres, and Beauvais.

The parallel Decorated Gothic style came into being in England with the general use of elaborate stone window tracery. Supplanting the small, slender, pointed lancet windows of the early English Gothic style were windows of great width and height, divided by mullions into two to eight brightly coloured main subdivisions, each of which was further divided by tracery. At first, this tracery was based on the trefoil and quatrefoil, the arch, and the circle, all of which were combined to form netlike patterns. Later, tracery was based on the ogee, or S-shaped curve, which creates flowing, flamelike forms. Some of the most outstanding monuments of the Decorated Gothic style are sections of the cloister (*c.* 1245–69) of Westminster Abbey; the east end, or Angel Choir, of Lincoln Cathedral (begun 1256); and the nave and west front of York Minster (*c.* 1260–1320).

Late Gothic. In France the Rayonnant style evolved about 1280 into an even more decorative phase called the Flamboyant style, which lasted until about 1500. In England a development known as the Perpendicular style lasted from about 1375 to 1500. The most conspicuous feature of the Flamboyant Gothic style is the dominance in stone window tracery of a flamelike S-shaped curve.

In the Flamboyant style wall space was reduced to the minimum of supporting vertical shafts to allow an almost continuous expanse of glass and tracery. Structural logic was obscured by the virtual covering of the exteriors of buildings with tracery, which often decorated masonry as well as windows. A profusion of pinnacles, gables, and other details such as subsidiary ribs in the vaults to form star patterns further complicated the total effect.

By the late Gothic period greater attention was being given to secular buildings. Thus, Flamboyant Gothic features can be seen in many town halls, guild halls, and even residences. There were few churches built completely in the Flamboyant style, attractive exceptions being Notre-Dame d'Épine near Châlons-sur-Marne and Saint-Maclou in Rouen. Other important examples of the style are the Tour de Beurre of Rouen Cathedral and the north spire of Chartres. Flamboyant Gothic, which eventually became overly ornate, refined, and complicated, gave way in France to Renaissance forms in the 16th century.

In England the parallel Perpendicular Gothic style was characterized by a predominance of vertical lines in the stone tracery of windows, an enlargement of windows to great proportions, and the conversion of the interior stories into a single unified vertical expanse. The typical Gothic pointed vaults were replaced by fan vaults (fan-shaped clusters of tracery-like ribs springing from slender columns or from pendant knobs at the centre of the ceiling). Among the finest examples of the Perpendicular Gothic style are Gloucester Cathedral (14th–15th centuries) and King's College Chapel, Cambridge (1446–1515).

Sculpture. Gothic sculpture was closely tied to architecture, since it was used primarily to decorate the exteriors of cathedrals and other religious buildings. The earliest Gothic sculptures were stone figures of saints and the Holy Family used to decorate the doorways, or portals, of cathedrals in France and elsewhere. The sculptures on the Royal Portal of Chartres Cathedral (*c.* 1145–55) were little changed from their Romanesque predecessors in their stiff, straight, simple, elongated, and hieratic forms. But during the later 12th and the early 13th centuries sculptures became more relaxed and naturalistic in treatment, a trend that culminated in the sculptural decorations of the Reims Cathedral (*c.* 1240). These figures, while retaining the dignity and monumentality of their predecessors, have individualized faces and figures, as well as full, flowing draperies and natural poses and gestures, and they display a classical poise that suggests an awareness of antique Roman models on the part of their creators. Early Gothic masons also began to observe such natural forms as plants more closely, as is evident in the realistically carven clusters of leaves that adorn the capitals of columns.

Monumental sculptures assumed an increasingly prominent role during the High and late Gothic periods and were placed in large numbers on the facades of cathedrals, often in their own niches. In the 14th century, Gothic sculpture became more refined and elegant and acquired a mannered daintiness in its elaborate and finicky drapery. The elegant and somewhat artificial prettiness of this style was widely disseminated throughout Europe in sculpture, painting, and manuscript illumination during the 14th century and became known as the International Gothic style. An opposite trend at this time was that of an intensified realism, as displayed in French tomb sculptures and in the vigorous and dramatic works of the foremost late Gothic sculptor, Claus Sluter.

Gothic sculpture evolved into the more technically advanced and classicistic Renaissance style in Italy during the 14th and early 15th centuries but persisted until somewhat later in northern Europe.

Painting. Gothic painting followed the same stylistic evolution as did sculpture; from stiff, simple, hieratic forms toward more relaxed and natural ones. Its scale grew large only in the early 14th century, when it began to be used in decorating the retable (ornamental panel behind an altar). Such paintings usually featured scenes and figures from the New Testament, particularly of the Passion of Christ and the Virgin Mary. These paintings display an emphasis on flowing, curving lines, minute detail, and refined decoration, and gold was often applied to the panel as background colour. Compositions became more complex as time went on, and painters began to seek means of depicting spatial depth in their pictures, a search that eventually led to the mastery of perspective in the early years of the Italian Renaissance. In late Gothic painting of the 14th and 15th centuries secular subjects such as hunting scenes, chivalric themes, and depictions of historical events also appeared. Both religious and secular subjects were depicted in manuscript illuminations—*i.e.,* the pictorial embellishment of handwritten books. This was a major form of artistic production during the Gothic period and reached its peak in France during the 14th century. The calendar illustrations in the *Très Riches Heures du duc de Berry* (*c.* 1416) by the Limburg brothers, who worked at the court of Jean de France, duc de Berry, are perhaps the most eloquent statements of the International Gothic style as well as the best known of all manuscript illuminations.

Manuscript illumination was superseded by printed illustrations in the second half of the 15th century. Panel and wall painting evolved gradually into the Renaissance style in Italy during the 14th and early 15th centuries but retained many more of its Gothic characteristics until the late 15th and early 16th centuries in Germany, Flanders, and elsewhere in Northern Europe.

Gothic language, extinct East Germanic language spoken by the Goths, who originally lived in southern Scandinavia but migrated to eastern Europe and then to southern and southwestern Europe. The language is especially important for the study of the history of the Germanic language family because its records, except for a few scattered runic inscriptions, antedate those of the other Germanic languages by about four centuries. Gothic occurred in two dialects: Ostrogothic (in eastern Europe and later in Italy) and Visigothic (in east central Europe and later in Gaul and Spain), grouped according to tribes. Most of the modern knowledge of Gothic is derived from the remains of the translation of the Bible into Gothic that was made by Ulfilas (*q.v.*) in the 4th century AD for the Visigothic tribes living along the lower Danube. The surviving manuscripts are copies probably made in northern Italy during the period of Ostrogothic rule (493–554). The language died out among the Ostrogoths after the fall of their kingdom in Italy in the 6th century; in Spain it is doubtful whether or not Gothic survived among the Visigoths until the Arab conquest in 711.

Gothic has many archaic features, among which are dual number (a plural form expressing two persons or things as distinct from three or more), reduplication (repetition of part of a word) in one class of verbs, special vocative case forms in two classes of nouns, and passive voice forms in the verbs. These occur seldom, if at all, in the other Germanic languages that began to appear in writing several centuries later. Gothic also shows no trace of the umlaut found in the later Germanic languages.

Gothic persisted longer in the Crimea than in Spain and Italy. In 1560–62 a Flemish diplomat, Ogier Ghislain de Busbecq, then serving in Constantinople as the ambassador from Ferdinand I of Austria, collected a number of words and phrases from the Crimean Goths showing that their language was still essentially a form of Gothic.

As for the other East Germanic languages, little is known of Gepidic, Rugian, and Burgundian, but some knowledge of Vandalic and Ostrogothic, as well as Visigothic, is provided by the names recorded in Greek and Latin writings. *See also* Gothic alphabet.

Gothic novel, European Romantic, pseudomedieval fiction having a prevailing atmosphere of mystery and terror. Its heyday was the 1790s, but it underwent frequent revivals in subsequent centuries. Called Gothic because its imaginative impulse was drawn from medieval buildings and ruins, such novels commonly used such settings as castles or monasteries equipped with subterranean passages, dark battlements, hidden panels, and trapdoors. The vogue was initiated in England by Horace Walpole's immensely successful *Castle of Otranto* (1765). His most respectable follower was Ann Radcliffe, whose *Mysteries of Udolpho* (1794) and *Italian* (1797) are among the best examples of the genre. A more sensational type of Gothic romance exploiting horror and violence flourished in Germany and was introduced to England by Matthew Gregory Lewis with *The Monk* (1796). Other landmarks of Gothic fiction are William Beckford's Oriental romance *Vathek* (1786) and Charles Robert Maturin's story of an Irish Faust, *Melmoth the Wanderer* (1820). The classic horror stories *Frankenstein* (1818), by Mary Wollstonecraft Shelley, and *Dracula* (1897), by Bram Stoker, are in the Gothic tradition but without the specifically Gothic trappings.

Easy targets for satire, the early Gothic romances died of their own extravagances of plot, but Gothic atmospheric machinery continued to haunt the fiction of such major writers as the Brontë sisters, Edgar Allan Poe, Nathaniel Hawthorne, and even Dickens in *Bleak House* and *Great Expectations*. In the second half of the 20th century, the term was applied to paperback romances having the same kind of themes and trappings similar to the originals.

Gothic Revival, architectural style that drew its inspiration from medieval architecture and competed with the Neoclassical revivals in the United States and Great Britain. Only isolated examples of the style are to be found on the Continent.

The earliest documented example of the revived use of Gothic architectural elements is Strawberry Hill, the home of the English writer Horace Walpole. As in many of the early Gothic Revival buildings, the Gothic was used here for its picturesque and romantic qualities without regard for its structural possibilities or original function. Another early example of the tendency toward ornamentation and decoration was Fonthill Abbey, designed by James Wyatt, a country house with a tower 270 feet (82 m) high. Nothing could more clearly illustrate both the impracticality of usage and the romantic associations with medieval life.

The earliest manifestations of an interest in the medieval era were in the private domain, but by the 1820s public buildings in England were also being designed in the Gothic mode. Perhaps no example is more familiar than the new Houses of Parliament (1840), designed by Sir Charles Barry and A.W.N. Pugin. In that large cluster of buildings, the haphazard picturesque quality of the early revival was replaced by a more conscientious adaptation of the medieval English style. Other structures built around mid-century were within this basic pattern. Later, the desire for more elegant and sumptuous landmarks created the last flowering of the style.

In the United States, the style also can be divided into two phases. The early one, rich but comparatively unscholarly, was exemplified by Richard Upjohn's Trinity Church (New York City, 1840). This style, as in England, was favoured by the wealthy for their country estates. The later style, archaeologically more correct, inspired such structures as Renwick's St. Patrick's Cathedral (New York City, 1859–79) and was to dominate public building.

There were several reasons for the change of direction from Neoclassicism to the Gothic Revival, but three stand out as, by far, the most important. The first, sparked by the general Romantic revolution, was the literary interest in medieval times that produced Gothic tales and romances. By setting their stories in medieval times, authors such as Walpole and especially Sir Walter Scott helped to create a sense of nostalgia and a taste for that period. The ruins of medieval castles and abbeys depicted in landscape paintings were another manifestation of this spirit. The second was the writing of the architectural theorists who were interested, as part of church reform, in transferring the liturgical significance of Gothic architecture to their own times. The third, which strengthened this religious and moral impetus, was the writings of John Ruskin, whose *Seven Lamps of Architecture* (1849) and *Stones of Venice* (1853) were widely read and respected. Ruskin stated that the quality of medieval craftsmanship reflected the morally superior way of life of the medieval world and urged a return to the conditions operative in the earlier period.

The writings of the French architect Eugène-Emmanuel Viollet-le-Duc provided the inspiration to sustain the Gothic Revival movement. His own work, however, was often weak Gothic, and his restorations were frequently fanciful.

The Gothic Revival was to remain one of the most potent and long-lived of the 19th-century revival styles. Although it began to lose force after the third quarter of the 19th century, buildings such as churches and institutions of higher learning were constructed in the Gothic style in England and in the United States until well into the 20th century. Only when new materials and concern for functionalism began to take hold did the Gothic Revival disappear.

The Houses of Parliament, London, Gothic Revival buildings designed by Sir Charles Barry and A.W.N. Pugin, 1840
A.F. Kersting

Gothic script: *see* black letter.

Gothicus: *see* Claudius Gothicus.

Gotland, island, *län* (county), and coextensive *landskap* (province), Sweden, in the Baltic Sea. The island is 1,212 square miles (3,140 square km) in area. Several wide bays indent the island's low coastline, which is characterized by limestone columns, while the interior is an undulating plateau of Silurian limestone, some of which lacks good drainage. Bogs are found in areas having a clay cover; conifers occur particularly on the steep cliffs of the west. Visby (*q.v.*) is the administrative centre.

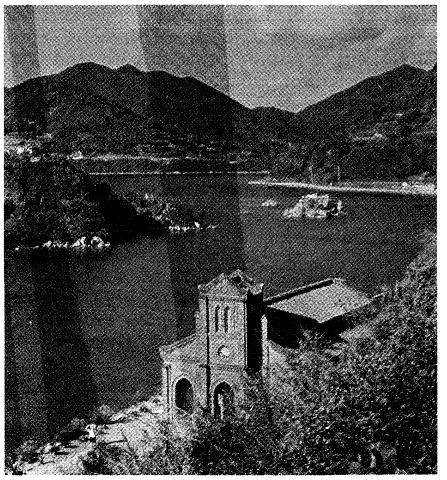
As early as the Bronze Age, Gotland's inhabitants traded extensively with peoples on the southern and eastern shores of the Baltic. Later they were in contact with Rome and with the Islāmic and Byzantine empires. By the 12th century AD Gotland's traders, representing an essentially independent peasant society on the island, had their trading house at Novgorod, Russia, and dominated the routes between Russia and western Europe. This activity attracted German merchants, who settled in the major town, Visby, and brought it into the Hanseatic League. Until the mid-14th century most of the Novgorod trade passed through the island, creating a prosperity undisturbed by the strong antagonism that grew between the German citizens of Visby and the indigenous Scandinavian peasantry.

Since about 900 Gotland had been a part of Sweden, paying an annual tax for protection but otherwise remaining an independent peasant community with its own language and culture. In 1361, however, the Danish king Valdemar IV Atterdag, tempted by the riches of the island, conquered it in a famous battle outside the walls of Visby. Thereafter the trade routes shifted and Gotland declined. For the next three centuries it was variously controlled by Denmark, Hanseatic and other privateers, and Teutonic Knights. When it was awarded again to Sweden, in 1645, it was impoverished, but under Swedish rule condi-

tions improved. Toward the end of the 19th century it was fortified strongly because of its strategic importance.

Primary production on the island is based on agriculture (grains and sugar beets, diversified market gardening, and flower cultivation), as well as on stone quarrying and fishing. There is a large cement factory and some other industry. Tourism is significant. Sheep grazing is important on Fårö, a sandy island to the north. Pop. (1984 est.) 55,987.

Gotō-rettō (Japanese: Gotō Archipelago), archipelago, in the East China Sea, lying off the western coast of Kyushu, Nagasaki *ken* (prefecture), Japan. There are more than 100 islands, of which 34 are inhabited. They have



Dousake Cathedral on the shore of Fukue-jima, an island of the Gotō-rettō, Japan

Orion Press—FPG/EB Inc.

a total area of 266 sq mi (689 sq km), stretching about 60 mi (100 km) from northeast to southwest. The islands were a gateway to Japan for the introduction of Chinese culture.

The five largest and most densely settled islands are Fukue-jima, Hisaka-jima, Naru-shima, Wakamatsu-jima, and Nakadōri-shima. All have mountainous interiors. Intensive dry-land farming is practiced on terraces and slopes; rice is irrigated on the few slender coastal plains. Fishing (mackerel and cuttlefish) is the main activity for ports, including Fukue (Fukue-jima) and Narao (Nakadōri-shima). The economy of the northern half of the archipelago, centred on Sasebo, Kyushu, is based on fishing. Agriculture (barley, loquats, and sweet potatoes) predominates in the southern islands, which are connected by regular ferry service to Nagasaki. Pop. (1970) 43,400.

Gotō Shimpei, HAKUSHAKU (Count) (b. July 25, 1857, Muzusawa, Rikuchū Province, Japan—d. April 13, 1929, Tokyo), statesman who, together with Gen. Kodama Gentarō, successfully modernized the Taiwanese economy and made the island of Taiwan a financially independent colony of Japan.

After receiving his M.D. degree in Germany, Gotō became a member of the Public Health Bureau in Japan. Imprisoned on a poisoning charge, he was soon released and rose rapidly within the government. After his country's seizure of Taiwan during the Sino-Japanese War (1894–95), he was made the director of the civil administration of the island. He quickly restored order by reestablishing the old Chinese *pao-chia* system of mutual responsibility and integrating it with a modern police force. He reorganized the colony's land ownership and taxation system and inaugurated a series of public health measures. He fostered the construction of railways, roads, and ports; helped develop light industry, especially sugar mills; and introduced a unified currency and measurement system. At the same time, he encouraged Japanese social and linguistic dominance of the area. Gotō's belief in the urgency of Japanese expansion into Asia found further outlet when he was appointed first head of the South Manchurian Railroad in 1906.

Gotō's success led him to prominence in the Japanese government; he joined the Cabinet as minister of communications in 1908 and later served as home and foreign minister and also as mayor of Tokyo.

Gotō Shōjirō, HAKUSHAKU (Count) (b. April 13, 1838, Tosa Province, Japan—d. Aug. 4, 1897, Tokyo), one of the leaders of the Meiji Restoration, the 1868 overthrow of feudal authority in Japan, and a major proponent of restructuring the new government along Western parliamentary lines. He was the cofounder of the first political party in Japan.

The chief councillor to the head of the feudal fief of Tosa, in 1867 Gotō persuaded his lord to pressure the Shogun, or feudal military dictator of Japan, to resign his office. The Shogun complied, but it soon became clear that radicals from other fiefs would accept nothing less than a total alteration in the existing power structure. Gotō then joined the rebels, assuring the success of the projected coup. Whereas he and most other rebel leaders had previously advocated the expulsion of all foreigners from Japan, Gotō, as a leader in the new government, became a forceful exponent of the adoption of Western ways.

Piqued at the lack of Tosa men in the administration, Gotō resigned and helped found the Aikoku Kōtō (Public Party of Patriots), an independent political club advocating the introduction of popular participation in the government. In 1881 he cofounded the first Japanese political party, the Jiyūtō (Liberal Party), based on Rousseauean democratic doctrines. After the movement was discontinued briefly, Gotō reorganized it as a league calling for revision of Japan's treaties with the West. Upon the promulgation of the constitution and co-optation of the party leaders, he joined the government in March 1889 as communications minister.

gotra, lineage segment within an Indian caste that prohibits intermarriage by virtue of the members' descent from a common mythical ancestor, an important factor in determining possible Hindu marriage alliances. The name (Sanskrit: "cattle shed") indicates that the contemporary lineage segment acted as a joint family, holding possessions in common. *Gotra* originally referred to the seven lineage segments of the Brahmans (priests), who trace their derivation from seven ancient seers: Atri, Bharadvāja, Bhṛgu, Gotama, Kaśyapa, Vasiṣṭha, and Viśvāmitra. An eighth *gotra* was added early on, the Agastya, named after the seer intimately linked up with the spread of Vedic Hinduism in southern India. In later times the number of *gotra*s proliferated when a need was felt to justify Brahman descent by claiming for one's line a Vedic seer.

The practice of forbidding marriage between members of the same *gotra* was intended to keep the *gotra* free from inherited blemishes and also to broaden the influence of a particular *gotra* by wider alliances with other powerful lineages. The system was, to some extent, adopted by non-Brahman groups in order to take on some of the social prestige accorded Brahmans. Originally, the Kshatriyas (warrior-nobles), too, had their own dynasties, the principal traditional ones being the Lunar and the Solar dynasties, to which the heroes of the Sanskrit epics the *Mahābhārata* and the *Rāmāyaṇa* respectively belonged. The epics do not present a sufficiently clear picture to determine the exogamy of such lineages; marriage alliances appear rather to have been motivated by territorial considerations. In later times, the Kshatriyas and the Vaiśyas (merchant-traders) also adopted the concept of *gotra* in a fashion, by assuming for their groups the *gotra* of their adjacent Brahman *gotra*s or those of their gurus (spiritual guides), but this innovation was never very influential.

Gottescalc OF ORBAIS: *see* Gottschalk of Orbais.

Gottesfreunde (Christian fellowship): *see* Friends of God.

Gottfried (German personal name): *see under* Godfrey, except as below.

Gottfried VON STRASSBURG (fl. 1210), one of the greatest medieval German poets, whose courtly epic *Tristan und Isolde* is the classic version of this famous love story.

The dates of his birth and death are unknown, and the only information about him consists of references to him in the work of other poets and inferences from his own work. The breadth of learning displayed in *Tristan und Isolde* reveals that he must have enjoyed the fullest education offered by the

Gottfried von Strassburg (right of centre), miniature from the Heidelberger Liederhandschrift; in the Universitätsbibliothek, Heidelberg, Ger.

By courtesy of the Universitatsbibliothek, Heidelberg, Ger.

cathedral and monastery schools of the Middle Ages. Together with the authoritative tone of his writing, this background indicates that, although not himself of noble birth, he spent his life in the society of the wellborn. *Tristan* was probably written about 1210. Gottfried is thus a literary contemporary of Hartmann von Aue, Walther von der Vogelweide, and Wolfram von Eschenbach.

The Celtic legend of Tristan and Iseult (German: Isolde) reached Germany through French sources. The first German version is that of Eilhart von Oberg (*c.* 1170), but Gottfried, although he probably knew Eilhart's poem, based his own work on the Anglo-Norman version of Thomas of Brittany (1160–70).

Gottfried's moral purpose, as he states it in the prologue, is to present to courtiers an ideal of love. The core of this ideal, which derives from the romantic cult of woman in medieval courtly society, is that love (*minne*) ennobles through the suffering with which it is inseparably linked. This ideal Gottfried enshrines in a story in which actions are motivated and justified not by a standard ethic but by the conventions of courtly love. Thus, the love potion, instead of being the direct cause of the tragedy as in primitive versions of the Tristan story, is sophisticatedly treated as a mere outward symbol of the nature of the lovers' passion—tragic because adulterous but justified by the "courts of love" because of its spontaneity, its exclusiveness, and its completeness.

Although unfinished, Gottfried's is the finest of the medieval versions of the Tristan legend and one of the most perfect creations of the

medieval courtly spirit, distinguished alike by the refinement and elevated tone of its content and by the elaborate skill of its poetic technique. It was the inspiration for Richard Wagner's opera *Tristan und Isolde* (1859).

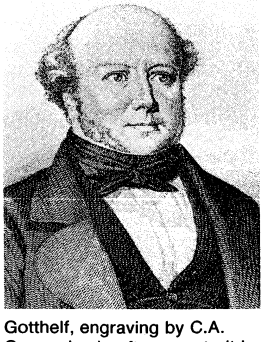
Gotthard, SAINT, also spelled GODEHARD (b. *c.* 960, near Niederaltaich, Bavaria [Germany]—d. May 4, 1038, Hildesheim; canonized 1131; feast day May 4), abbot and archbishop, who helped foster the development of Hildesheim and who played an important role in the imperial campaign to reform and reorganize the Bavarian church.

He was educated in the monastery school of Niederaltaich and at the court of Archbishop Frederick of Salzburg, Austria, one of his chief patrons. Frederick made him provost of the canons at Niederaltaich, where, already ordained priest, Gotthard became a Benedictine monk (990), provost, and abbot (996/997). His work there so impressed the Holy Roman emperor Henry II that he appointed Gotthard to reform many monasteries, including Hersfeld and Tegernsee, both in modern Germany, and Kremsmünster in Austria.

In 1022 Henry nominated Gotthard as successor to the great prelate Bernward, bishop of Hildesheim. Gotthard's episcopate was a zealous one: he restored the cathedral, consecrated more than 30 churches, promoted and reformed education, tightened asceticism, founded schools, and established a hospice for the sick and the poor at nearby Sankt Moritz. In 1132 his relics were transferred from the cathedral to a Benedictine monastery in Hildesheim founded in his honour by the celebrated abbot St. Bernard of Clairvaux.

Several German churches have designated him their patron. His extant letters and a contemporary life by his disciple Wolfher are printed in *Monumenta Germaniae Historica* (ed. G.H. Pertz). A modern hagiography by O.J. Blecher appeared in 1931.

Gotthelf, Jeremias, pseudonym of ALBERT BITZIUS (b. Oct. 4, 1797, Morat, Switz.—d. Oct. 22, 1854, Lützelflüh), Swiss novelist and short-story writer whose vivid narrative works



Gotthelf, engraving by C.A. Gonzenbach, after a portrait by J.F. Dietler

Archiv fur Kunst und Geschichte, Berlin

extol the virtues of Bernese rural people and defend traditional church and family life.

The son of a pastor, Bitzius studied theology at Bern and Göttingen and took part in the political activities that brought to an end the rule of the aristocracy in Bern. After becoming pastor of Lützelflüh, in the Emmental, in 1832, he made great efforts to enlighten the local people and tried to bring about universal education. He founded an institution for the neglected.

When radical tendencies began to appear in Swiss liberalism, Bitzius became more conservative. His desire to preserve Christian beliefs in a world threatened by materialism stimulated him to begin writing. His *Der Bauernspiegel* (1837; "Mirror of the Peasants") was followed by other works dealing with rural people, including *Leiden und Freuden eines Schulmeisters,* 2 vol. (1838–39; *The Joys and Sorrows of a School-master,* 1864), *Die Armennot* (1840; "Needs of the Poor"), and *Uli der Knecht* (1841; *Ulric the Farm Servant,* 1888). Although his purpose was didactic, he showed exceptional literary talent. His 13 novels and more than 50 short stories reveal not only his genius as an epic writer and his poetic gifts but also his intense interest in people. Psychological observation, imagination, and creative power of language enabled him to achieve vivid portraits.

His complete works, in 24 volumes, were edited by R. Hunziker and H. Bloesch, with supplementary volumes of letters, sermons, political writings, and juvenilia (1911–37).

Göttingen, city, Lower Saxony *Land* (state), central Germany, on the Leine River. First mentioned as Gutingi in 953, it was chartered *c.* 1211 and was a powerful member of the Hanseatic League in the 14th century. After accepting the Reformation in 1531, it suffered in the religious wars of the 16th and 17th centuries. The establishment there in 1737 of the Georg-August-Universität zu Göttingen by George II of England (the elector George Augustus of Hanover) began a new period of prosperity. The university soon became one of the most famous in Europe. Political disturbances, however, including the expulsion (1837) of seven professors, the Göttinger Sieben, reduced its prosperity. Strong mathematics and physics faculties led to its revival in the late 19th century. The university library is one of the richest collections in Germany. In the city are also several museums, theatres, and a botanical garden.

Virtually undamaged in World War II, Göttingen is surrounded by ramparts; many old streets with medieval half-timbered houses, the 14th-century town hall, and several Gothic churches survive. Predominantly a university city, it also has diversified industry including printing and the manufacture of optical and precision instruments. Pop. (1989 est.) 118,-073.

Göttingen, University of, German in full GEORG-AUGUST-UNIVERSITÄT ZU GÖTTINGEN, one of the most famous universities in Europe, founded in Göttingen, Germany, in 1737 by George II of England in his capacity as Elector of Hanover. In the late 18th century it was the centre of the Göttinger Hain (*q.v.*), a circle of poets who were forerunners of German Romanticism. Its reputation suffered in 1837 when seven professors, the Göttinger Sieben, were expelled for political protest, but by the late 19th century its Mathematical Institute, headed at various times by Carl Friedrich Gauss, P.G.L. Dirichlet, Bernhard Riemann, and David Hilbert, was attracting students from all over the world. In the 20th century its faculty of physics included the Nobel Prize winners Max Born, James Franck, Werner Heisenberg, and Max von Laue, who were responsible for some of the most important discoveries and developments in modern physics.

Göttinger Hain, also called GÖTTINGER HAINBUND, English GÖTTINGEN GROVE, a literary association of the German "sentimentality" era (1740–80), credited with the reawakening of homely, folkish, and nature themes in the German lyric and popular national poetry. Members were the young poets—mostly students at the university at Göttingen—H.C. Boie, J.H. Voss, Ludwig Hölty, J.F. Hahn, K.F. Cramer, the brothers Stolberg, and J.A. Leisewitz. Founded in 1772, the group took its name from Friedrich Gottlieb Klopstock's ode *Der Hügel und der Hain* ("The Hill and the Grove"), in which the grove is metaphorically the abode of the German bards, vis-à-vis the hill as home of the Greek Parnassians, an opposition which the Hain felt aptly symbolized their poetic goals. The *Göttinger Musenalmanach* ("Göttingen Muses Journal"), published from 1770, became the literary organ for the circle and the archetype for many similar German literary journals.

The poets of the Göttinger Hain had in common a desire to free poetry from the confines of the Rationalism of the Enlightenment and from social convention; they attempted to make poetry free from foreign, especially French, examples. They idealized Klopstock and attempted to embody in their work a dynamic enthusiasm for the spirit in his poetry. Their ideals were patriotic, religious, and ethical. The group disbanded after 1774.

Gottlieb, Adolph (b. March 14, 1903, New York City—d. March 4, 1974, New York City), painter important as an early and outstanding member of the New York school of Abstract Expressionists.

After study at the Art Students League of New York and in Paris, he returned to New York in 1923 to attend Parsons School of Design, Cooper Union, and the Educational Alliance Art School.

Early in the 1940s Gottlieb developed his pictograph style, in which cryptic forms, often derived from mythology and primitive art, were used in a rectilinear, gridlike pattern. Characteristic examples are "Evil Omen" (1946) and "Romanesque Façade" (1949; Krannert Art Museum, University of Illinois, Champaign). During the 1950s he painted abstract landscapes, which, in turn, led to his second principal style, called "bursts," in which sunlike, static orb forms float above jagged areas. The lower element was often made up of smears, blots, and other forms characteristic of Action painting. The paintings became simpler and more monumental and used a limited number of colours. Examples are "Triad" (1959; Mr. and Mrs. Alexander Lerner Collection), "Expanding" (1962; Art Institute of Chicago), and "Orb" (1964; Dallas Museum of Fine Arts, Texas).

Gottman, Jean(-Iona) (b. Oct. 10, 1915, Kharkov, Ukraine, Russian Empire), French geographer who introduced the concept and term megalopolis for large urban configurations.

A research assistant in human geography at the Sorbonne (1937–41), he was consultant to the Foreign Economic Administration in Washington, D.C. (1942–44), and taught at Johns Hopkins University, Baltimore (1943–48), and the University of Paris (1948–56). He was research director (1956–61) of the Twentieth Century Fund, Inc., a public affairs foundation, and from 1960 served as director of the École Pratique des Hautes Études. In 1968 he became professor of geography at Oxford University. He wrote *A Geography of Europe* (1950) and *Megalopolis: The Urbanized Seaboard of the United States* (1961).

Gottschalk OF ORBAIS, Gottschalk also spelled GOTTESCALC, GODESCALC, or GODESCALCHUS (b. *c.* 803, Saxony—d. *c.* 868, Hautvillers, near Reims, Fr.), monk, poet, and theologian whose teachings on predestination shook the Catholic Church in the 9th century.

Of noble birth, he was an oblate (*i.e.*, a child dedicated to monastic life by its parents) in the Benedictine abbey of Fulda. Over the objection of his abbot and eventual lifelong enemy, Rabanus Maurus, Gottschalk requested release from his monastic obligations; this was granted (829) by a synod at Mainz. Maurus then demanded that the Carolingian emperor Louis I the Pious force Gottschalk back into monastic life, and he settled at the monastery of Orbais, Fr. He was irregularly ordained a priest at Reims (*c.* 838).

At the Synod of Mainz (848), he was condemned for heresy by Archbishop Maurus,

who placed him under the jurisdiction of the powerful archbishop Hincmar of Reims. Unable to obtain Gottschalk's recantation at a synod held in the Frankish royal residence of Quiercy, near Noyon, Hincmar deposed and imprisoned him at the abbey of Hautvillers. Hincmar subsequently combated Gottschalk's predestination doctrine in several treatises and at several synods.

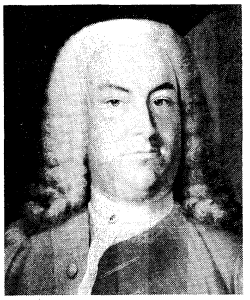
Holding that Christ's salvation was limited and that his power of redemption extended only to the elect, Gottschalk taught that the elect went to eternal glory and the reprobate went to damnation. A work by Gottschalk, *De praedestinatione* ("Of Predestination"), was discovered at Bern, Switz., in 1930.

Gottschalk, Louis Moreau (b. May 8, 1829, New Orleans, La., U.S.—d. Dec. 18, 1869, Rio de Janeiro, Braz.), the first American pianist to achieve international recognition and the first American composer to utilize Latin-American and Creole folk themes and rhythms.

Son of an English-German father and an aristocratic Creole mother, Gottschalk was a child prodigy on several instruments. In Paris from age 13 he became a favourite of the aristocracy.

After playing in concerts throughout Europe, Gottschalk made his New York City debut in 1853. He toured the United States and West Indies and spent several years as a vagabond in the Caribbean. In 1865 he began a South American tour that ended abruptly in his death while conducting at a festival of his works. His compositions include *Gran Tarantella* for piano and orchestra, *La Bamboula* and other piano pieces, and vocal works, many typical of early 19th-century sentimental salon music. Although, like Frédéric Chopin, he was a pianist and composer in the Romantic tradition, Gottschalk lacked Chopin's harmonic inventiveness and was more superficial. His music underwent a revival in the mid-20th century. He was the author of *Notes of a Pianist* (1881).

Gottsched, Johann Christoph (b. Feb. 2, 1700, Judithenkirch, near Königsberg, Prussia [now Kaliningrad, Russian S.F.S.R.]—d. Dec. 12, 1766, Leipzig, Saxony [Germany]), literary theorist, critic, and dramatist who introduced French 18th-century classical standards of taste into the literature and theatre of Germany.



Gottsched, detail of an oil painting by L. Schorer, 1744

By courtesy of the Karl-Marx University Library, Leipzig

After studying at Königsberg, Gottsched was appointed professor of poetry at the University of Leipzig in 1730, becoming professor of logic and metaphysics there in 1734.

Earlier, in 1725 and 1726, Gottsched had published *Die vernünftigen Tadlerinnen* ("The Reasonable Female Critics"), a journal aimed at improving the intellectual and moral standards of women. A second journal, *Der Biedermann* (1727–29; "The Honest Man"), undertook the broader task of introducing the new rationalist creed to German letters. In 1730 he brought out his most important theoretical work, *Versuch einer kritischen Dichtkunst vor die Deutschen* ("Essay on a German Critical Poetic Theory"), the first German treatise on the art of poetry to apply the standards of reason and good taste advocated by Nicolas Boileau, the foremost exponent of classicism in France.

Gottsched's poetic theory, circumscribed largely by artificial rules, proved to have little lasting influence upon later German literature. His most enduring achievement resulted from his collaboration with the actress Caroline Neuber, which led to the establishment of the Leipzig school of acting and criticism. Following classicist models, they effectively transformed the nature of the German theatre from a type of low entertainment, delighting in coarse sensual appeal, into a respected vehicle for serious literary effort. Gottsched's *Deutsche Schaubühne*, 6 vol. (1741–45), containing chiefly translations from the French, provided the German stage with a classical repertory to replace the improvisations and melodramas previously popular. His own dramatic efforts, however, are considered to be little more than mediocre tragedies in the classical style. His concern for style, advanced by his *Ausführliche Redekunst* (1728; "Complete Rhetoric") and *Grundlegung einer deutschen Sprachkunst* (1748; "Foundation of a German Literary Language"), helped to regularize German as a literary language.

Gottwald, Klement (b. Nov. 23, 1896, Dědice, Moravia, Austria-Hungary [now in Czechoslovakia]—d. March 14, 1953, Prague, Czech.), Czechoslovak Communist politician and journalist, successively deputy premier (1945–46), premier (1946–48), and president (1948–53) of Czechoslovakia.

The illegitimate son of a peasant, Gottwald was sent to Vienna at the age of 12 to become an apprentice carpenter and cabinetmaker. By the age of 16 he had become a socialist. During World War I he served in the Austro-Hungarian army, deserting, however, to the Russians before the end of the war. When he returned to the new state of Czechoslovakia in 1918, he joined the left wing of the Czechoslovak Social Democratic Party, the wing that in 1921 became the Communist Party of Czechoslovakia (Komunistická Strana Československa; KSČ); Gottwald was a charter member. Soon he was editor of the party newspaper in Bratislava, *Hlas Ludu* ("Voice of the People"), and later of *Pravda* ("Truth"). In 1925 he was elected to the central committee of the KSČ and moved to Prague, and in 1927 he became the party's secretary-general. From 1929 he was a member of the Czechoslovak parliament.

After the Munich Agreement of October 1938, Gottwald went to Moscow, where he later made several broadcasts to the Czechoslovak underground movement. In 1945 he became deputy premier in a provisional government appointed by President Eduard Beneš with the approval of Moscow. In March 1946 he became chairman of the KSČ, and on July 3 he became the nation's premier. On June 14, 1948, after Beneš's resignation under threat and pressure, Gottwald was inaugurated as president of the republic.

Gottwald quickly consolidated his position. Czechoslovakia was compelled to adopt a Soviet and Stalinist model of government; the Communist Party of Czechoslovakia substituted itself for the state. Political purges began in 1950, resulting in the judicial executions of about 180 party officials, including the party's first secretary, Gottwald's rival Rudolf Slánský.

Gottwald caught a chill at Joseph Stalin's funeral (March 9, 1953) and succumbed to pneumonia five days later.

Gottwaldov (city, Czechoslovakia): *see* Zlín.

Götz WITH THE IRON HAND: *see* Berlichingen, Götz von.

Götz, Hermann (b. Dec. 7, 1840, Königsberg, Prussia [now Kaliningrad, Russian S.F.S.R.]—d. Dec. 3, 1876, Hottingen, near Zürich, Switz.), composer whose only enduring work is his comic opera based on William Shakespeare's *Taming of the Shrew*.

In 1863 Götz became organist at Winterthur, Switz., and about that time formed a lasting friendship with Johannes Brahms. From 1870 he lived at Zürich, where he was music critic. His opera *Der widerspänstigen Zähmung* (1874; *The Taming of the Shrew*) achieved immediate success for its spontaneous style and lighthearted characterization. His other works include a less successful opera, *Francesca da Rimini* (1877; completed by Ernst Frank), chamber and choral works, an overture, a piano concerto, and a symphony.

gouache, painting technique in which a gum is added to watercolours, producing an opaque effect. In watercolour the tiny particles of pigment become enmeshed in the fibre of the paper; in gouache the colour lies on the surface of the paper, forming a continuous layer, or coating. A gouache is characterized by a directly reflecting brilliance. When applied with bristle brushes it is possible to achieve a slight but effective impasto (thick-coated) quality; with sable brushes, a smooth, flawless colour field is obtained.

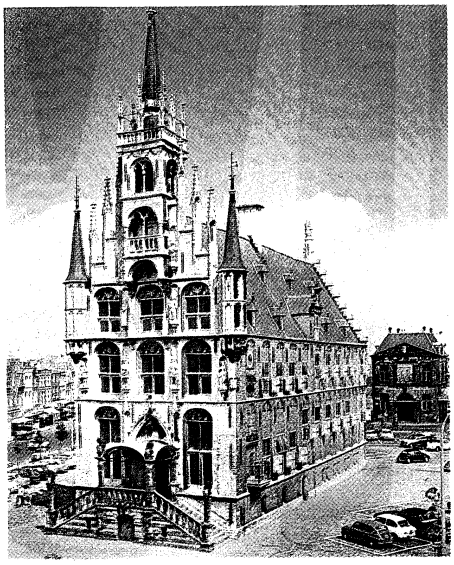
A painting technique of great antiquity, gouache was used by the Egyptians. It was a popular medium with Rococo artists such as François Boucher (1703–70). Contemporary

"Bishopsgate Entrance to Windsor Great Park," gouache painting by Paul Sandby, 1801; in Windsor Castle, Eng.

Reproduced by gracious permission of Her Majesty Queen Elizabeth II

painters use gouache alone or in combination with watercolour and other mediums.

Gouda, *gemeente* (municipality), Zuidholland *provincie* (province), western Netherlands, at the confluence of the Gouwe and IJssel rivers in a fertile polder district. Chartered in 1272, it was a centre of the medieval cloth trade and was known in the 17th and 18th centuries



The Gothic town hall, Gouda, Neth.
Van Phillips—Shostal/EB Inc.

for its clay pipes (still produced). The city is famous for Gouda cheese, still traded at a weekly cheese market, but now as a tourist attraction. Pottery, stearine candles, and treacle wafers are manufactured, and flax and hemp are processed. Historic landmarks include the Gothic town hall (1449; restored 1947–52), the Weighhouse (1668), and the Grote Kerk (St. John's Church; rebuilt after a fire in 1552), celebrated for its 64 magnificent stained-glass windows (1556–1603). The Moriaan Museum houses a collection of pipes and pottery, and there is a municipal museum. Erasmus received his early education (before 1475) at Gouda and took holy orders at the nearby monastery of Stein. Pop. (1983 est.) 59,179.

Gouda, semisoft cow's-milk cheese of The Netherlands, named for the town of its origin. Gouda is traditionally made in flat wheels of 10 to 12 pounds (4.5 to 5.4 kilograms), each with a thin, natural rind coated in yellow paraffin. So-called baby Goudas are produced in smaller wheels of 10 to 20 ounces (310–620 grams). Gouda has a smooth-textured interior of pale ivory colour. Flavours are bland and creamy, except for aged Gouda, which is darker gold in colour, stronger and saltier in flavour, and harder in texture. Low-fat Goudas are also produced.

Gouda is one of the oldest of European cheeses, probably dating to the 12th century, and is widely imitated in other cheese-producing countries. True Gouda has "Holland" stamped on the rind; farm-made Gouda, more pronounced in character than factory-made versions, bears an imprint of the word "Boerenkaas," which means "farmer's cheese."

Goudimel, Claude (b. *c.* 1510, Besançon, Fr.—d. Aug. 28?, 1572, Lyon), French composer noted for his settings of the metrical psalms.

He worked in Besançon, Paris, Metz, and Lyon, where he was killed in the St. Bartholomew's Day Massacre as it spread from Paris to the provinces. Although he also wrote chansons and Latin church music, Goudimel is remembered for his vernacular psalm settings. His first collection (1551–56) set several psalms in the style of motets. In his 1564 setting of the complete psalm cycle, the traditional melody is usually in the treble voice. The 1565 book, again a complete cycle, is written in the simplest note-against-note style, with the melody in the tenor voice. It proved enormously popular and was widely adopted by Reformed churches.

Goudsmit, Samuel Abraham (b. July 11, 1902, The Hague—d. Dec. 4, 1978, Reno, Nev., U.S.), Dutch-born U.S. physicist who, with George E. Uhlenbeck (*q.v.*), a fellow graduate student at the University of Leiden, Neth., formulated (1925) the concept of electron spin, leading to major changes in atomic theory and quantum mechanics. Of this work Isidor I. Rabi, a Nobelist in physics, remarked, "Physics must be forever in debt to those two men for discovering the spin." Later it was recognized that spin is a fundamental property of neutrons, protons, and other elementary particles.

A faculty member of the University of Michigan (1927–46) and Northwestern University, Ill. (1946–48), Goudsmit worked on radar research at the Massachusetts Institute of Technology, Cambridge (1941–44), and was head of Alsos, a secret mission that followed the advancing Allied forces in Europe to determine the progress of Germany's atomic bomb project.

From 1948 to 1970 Goudsmit was a member of the staff of Brookhaven National Laboratory, Upton, N.Y., and then joined the University of Reno, Nevada. His works include *The Structure of Line Spectra,* with Linus Pauling (1930); *Atomic Energy States,* with Robert F. Bacher (1932); *Alsos* (1947); and *Time,* with Robert Claiborne (1966).

Goudy, Frederic W(illiam) (b. March 8, 1865, Bloomington, Ill., U.S.—d. May 11, 1947, Marlboro, N.Y.), U.S. printer and typographer who designed more than 100 typefaces outstanding for their strength and beauty.

Goudy taught himself printing and typography while working as a bookkeeper. In 1895, in partnership with a teacher of English, C. Lauren Hooper, he set up the Camelot Press in Chicago, which printed the *Chap-book,* widely praised for its fine design, for Stone & Kimball publishers. He sold the first typeface he designed, called Camelot, to a Boston printer for $10. In 1903, in association with his wife, Bertha, and with Will Ransom, he started the

Goudy
A. Burton Carnes

Village Press in Park Ridge, Ill. Goudy moved the Village Press to Massachusetts in 1904 and to New York City in 1906. After several more moves, Goudy and the Village Press came to rest in 1923 in Marlboro, N.Y. The workshop and associated type foundry burned in 1939.

Goudy taught at the Art Students League (1916–24) and New York University (1927–29). From 1920 to 1940 he was art director of the Lanston Monotype Machine Company. He produced such faces as Goudy Old Style, Kennerley, Garamond, and Forum for the American Type Founders and Lanston companies. He was the author of *The Alphabet* (1918), *Elements of Lettering* (1922), *Typologia* (1940), and the autobiographical *A Half-Century of Type Design and Typography, 1895–1945* (1946).

Gough, Sir Hubert de la Poer (b. Aug. 12, 1870, London—d. March 18, 1963, London), World War I commander of the British 5th Army, which bore the brunt of the great German offensive in March 1918.

He joined the 16th Lancers in 1889 and served in the Tirah Expedition in India (1897) and in the South African War (1899–1902). He commanded the 3rd Cavalry Brigade in 1914 and opposed the use of force at the Curragh to compel Ulster to accept Home Rule.

In France, Gough became commander of the 5th Army on its formation (1916) and took part in the battles of the Somme (1916) and Ypres (1917). In March 1918 his army was compelled to withdraw with considerable loss under heavy German pressure. Although his skillful handling of the battle led to the eventual stemming of the German advance, the

Sir Hubert Gough
Camera Press—Publix

government blamed him for temporary German successes and insisted on his removal. He retired in 1922 with the rank of general and received the award of the Knight Grand Cross of the Bath in 1937.

Gough, Sir Hugh, also called (1846–49) BARON GOUGH, or (from 1849) 1ST VISCOUNT GOUGH (b. Nov. 3, 1779, Limerick, County Limerick, Ire.—d. March 2, 1869, St. Helen's, near Dublin), British soldier prominent in the Peninsular War and in India, who was said to have commanded in more general actions than any British officer except the Duke of Wellington.

The son of a lieutenant colonel in the Limerick city militia, Gough obtained a commission in the British Army at age 13. He took part in the British occupation of the Cape of Good Hope in 1796 and campaigned in the West Indies in 1797–1800. A major by purchase at 25, he commanded the Royal Irish Fusiliers regiment in Portugal and Spain during the Peninsular War (1808–14). He was severely wounded at Talavera (1809), led his forces to victory at Barrosa (1811), helped defend Tarifa, and captured the baton of the French marshal Jean-Baptiste Jourdan at Vitoria (1813). He was knighted in 1815 and pensioned, and for 20 years he saw action only briefly, against the peasantry of southern Ireland (1821–24). As a major general, he was given command in Mysore, India, in 1837 and led the expedition to China in the first Opium War (1839–42). He was appointed commander in chief in India in 1843 and defeated the Marāthā army that year and then the Sikhs in the Sikh Wars in 1845–46 and in 1848–49.

Gough suffered unexpectedly heavy losses against the Sikhs; his tactics were criticized, and he was replaced by Sir Charles Napier. Gough was made a baron after the First Sikh War (1846) and raised to a viscountcy after the second (1849); he returned home to the

thanks of both houses of Parliament. In 1855 he was appointed colonel of the Royal Horse Guards and in 1862 was made field marshal.

Gough Island, island associated with the Tristan da Cunha (*q.v.*) island group.

Gouin, Sir (Jean) Lomer (b. March 19, 1861, Grondines, Canada East—d. March 28, 1929, Quebec), Canadian politician and statesman who was premier of the province of Quebec from 1905 to 1920.

Gouin was called to the bar in 1884 and made queen's counselor in 1900. Elected as a

Gouin

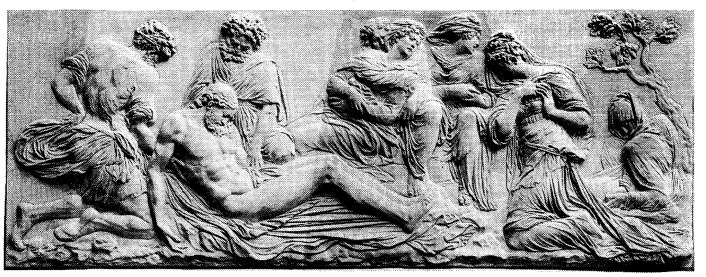
By courtesy of the Archives Nationales du Quebec

Liberal to the Quebec legislature in 1897, he served as Quebec's minister of public works (1900–04) and then as premier and attorney general (1905–1920). He was knighted in 1908. In 1917, during World War I, he refused to join the dominion prime minister, Sir Robert Borden, in a coalition government formed to implement military conscription.

In 1921 Gouin had the support of Montreal Conservatives, who considered him their special representative in W.L. Mackenzie King's government. He served as the dominion minister of justice in 1921–24 and represented Canada in the fourth League of Nations assembly in 1924. Opposing King's tariff concessions to western Progressives, Gouin resigned his federal post in 1924. He became lieutenant governor of Quebec in 1929.

Goujon, Jean (b. *c.* 1510, Normandy?, Fr.—d. *c.* 1568), French Renaissance sculptor of the mid-16th century.

The earliest record of Goujon's activity as an architectural sculptor dates from 1540 at Rouen. His mature mastery was first reflected



"Deposition," marble relief by Jean Goujon; in the Louvre, Paris

Giraudon—Art Resource/EB Inc.

in a screen relief depicting the deposition of Christ from the cross (1544–45; Louvre). Created for the church of Saint-Germain l'Auxerrois, Paris, this work marked the beginning of his collaboration with architect Pierre Lescot and exemplifies his personal version of Mannerism, a 16th-century development in art characterized generally by subjectively conceived representation and a rarefied, elegant distortion and artificiality. An excellent example of Goujon's Mannerism is his masterpiece, the set of six relief figures of nymphs (1547–49) that originally ornamented the Fontaine des Innocents in Paris. The elongated figures of these nymphs, confined within narrow rectangular panels, are exquisitely adorned with a linear play of rippling draperies. Goujon's reliefs on the court facade of the old Louvre (*c.* 1549–53) were marred by inept restoration in the 19th century. The later of these, in the attic portion, show a bolder relief, freer from his earlier architectural restraint. The great hall inside contains his most ambitious sculpture, especially the gallery caryatids carved in the round, which were also falsified by restoration. Goujon's career after 1562 remains obscure, though as a Protestant he may have fled the hostile Catholic atmosphere of Paris.

Goulart, João (Belchior Marques), byname JANGO (b. March 1, 1918, São Borja, Braz.—d. Dec. 6, 1976, Corrientes Province, Arg.), reformist president of Brazil (1961–64) until he was deposed.

The son of a wealthy rancher, Goulart graduated from the law school of Pôrto Alegre University in 1939. As a protégé of Getúlio Vargas, the populist president of Brazil (1930–45, 1951–54), Goulart was elected to the Rio Grande do Sul state legislature in 1946 and later became the state's secretary of justice and the interior. In 1953 and 1954 he served under President Vargas as minister of labour, industry, and commerce and worked for labour legislation reform. He was Pres. Juscelino Kubitschek's vice-president from 1956 to 1961. Again elected vice-president in 1960, he took over the presidency in 1961 after the resignation of Pres. Jânio Quadros, in spite of strong opposition by the military, who accused Goulart of Communist sympathies. During his administration he irritated the United States by strengthening ties with Communist countries and by undertaking a program of radical reforms. He won passage of a law limiting foreign companies' export of their profits, tried to persuade Congress to approve a controversial land-redistribution program, and on the eve of his ouster proposed a package of reforms that would have benefited the working class. Goulart presided over an economy crippled by galloping inflation, and he was constantly beset by criticism from both the far left and the military. He was deposed by a military coup in 1964 and died in exile at his ranch in northern Argentina.

goulash (Hungarian *gulyás*), traditional stew of Hungary. The origins of goulash have been traced to the 9th century, to stews eaten by Magyar shepherds. Before setting out with their flocks, they prepared a portable stock of food by slowly cooking cut-up meats with onions and other flavourings until the liquids had been absorbed. The stew was then dried in the sun and packed into bags made of sheep's stomachs. At mealtime, water was added to a portion of the meat to reconstitute it into a soup or stew.

The paprika that is indispensible for flavouring the modern goulash was added to the formulation in the 18th century. The classic "kettle goulash" is prepared by frying cubes of beef or mutton with onions in lard. Garlic, caraway seeds, tomatoes, green peppers, and potatoes complete the stew. *Székely gulyás,* another Hungarian specialty, is a stew of pork and sauerkraut flavoured with tomatoes, onions, caraway seeds, and sour cream.

Goulburn, principal city of the Southern Tablelands, southeastern New South Wales, Australia, at the confluence of the Wollondilly and Mulwaree rivers. It was established on a site chosen in 1818 by the explorer Hamilton Hume and was originally named Goulburn Plains after Henry Goulburn, then under secretary of state for the colonies. Surveyed in 1828 and founded in 1833 as a garrison and convict town, it was declared a municipality in 1859 and a city in 1864. Linked to Sydney (about 100 mi [160 km] northeast) and Canberra (50 mi southwest) by rail and the Hume Highway, the town serves a district producing wool, wheat, potatoes, fruits, and cattle. Its industries include wool and stock trading, railway workshops, tanneries, slaughterhouses, and textile and clothing factories. Goulburn has one of the largest prisons in the state, a psychiatric hospital, the Goulburn College of Advanced Education, the Argyle College of Technical and Further Education, and Anglican and Roman Catholic cathedrals. Pop. (1981) 21,755.

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Goulburn Islands, group of islands in the Arafura Sea off the northern coast of Arnhem Land in Northern Territory, Australia. They comprise South Goulburn Island (30 sq mi [78 sq km]), lying 2 mi (3 km) offshore across Macquarie Strait; North Goulburn Island (14 sq mi), 10 mi offshore; and some small sandy islets. Perhaps sighted in 1644 by the Dutch navigator Abel Tasman, they were named in 1818 by Capt. Phillip Parker King after Henry Goulburn, then British under secretary for the colonies. Now part of Arnhem Land Aboriginal Reserve, the islands, under the auspices of a Uniting Church mission station, produce pearl shell, tropical fruits and vegetables, and native handicrafts—the latter for the tourist trade. Pop. (1981) 2,431.

Goulburn River, river, together with the Campaspe and Loddon rivers, draining most of central Victoria, Australia. Rising on Mt. Singleton in the Eastern Highlands northeast of Melbourne in Fraser National Park, the Goulburn flows generally north for 352 mi (563 km) through the Eildon, Goulburn, and Waranga reservoirs and Lake Nagambie to join the Murray River 7 mi northeast of Echuca. The principal settlements in its valley are Seymour and Shepparton. The river, crossed by the explorers Hamilton Hume and William Hovell in 1824, was named for a British under secretary for the colonies. Pastoralism was the dominant land use in the region until succeeded by wheat farming in the 1870s. Irrigation, introduced in the 1880s, is now controlled by the Goulburn–Campaspe–Loddon Irrigation System (642,000 ac [260,000 ha]) and allows fruit and vegetable farming, dairying, and sheep-raising to be practiced in the area. Irrigation, however, has caused a rise in water tables consisting of saline groundwater, and as a result the increased salinity of the soil has become a problem.

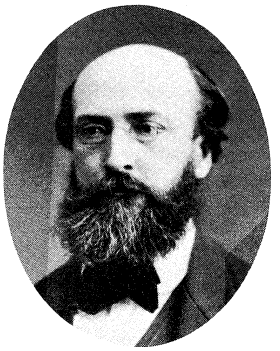
Gould, Augustus A(ddison) (b. April 23, 1805, New Ipswich, N.H., U.S.—d. Sept. 15, 1866, Boston), naturalist and physician, pioneer of American conchology, or the study of shells, and one of the first authorities on the invertebrate animals of New England.

One of Massachusetts' leading medical men, Gould became a specialist in the study of mollusks; he also published many works on crustaceans and insects. His most important publication, the *Report on the Invertebrata of*

Massachusetts (1841), greatly encouraged the study of mollusks in the United States. He was co-author of *Principles of Zoology* (1848) with the naturalist Louis Agassiz.

Gould, Benjamin Apthorp (b. Sept. 27, 1824, Boston—d. Nov. 26, 1896, Cambridge, Mass., U.S.), American astronomer whose star catalogs helped fix the list of constellations of the Southern Hemisphere.

Gould was one of the first to use the telegraph to determine longitudes. This he did by simultaneously finding the Sun's direction at two sites, one for which the longitude was known, and comparing the findings to compute the unknown longitude. From 1852 until 1867 he was in charge of the longitude department of the U.S. Coast Survey. In 1866 he made use of the Atlantic cable to establish the difference of longitude between the observatories at Greenwich, Eng., and Washington, D.C.



Benjamin Apthorp Gould
By courtesy of the Lick Observatory Archives, Santa Cruz, Calif.

After publishing a treatise in 1859 on the positions and proper motions (the motions of stars with respect to the other stars) of the circumpolar stars that were used as standards by the U.S. Coast Survey, he was invited by the government of Argentina to found and direct the National Observatory at Córdoba in 1868. Two years later he began his observations and in 1874 completed his *Uranometria Argentina* (1879; "An Argentine Uranometry"). In 1884 he published a zone catalog, covering 73,160 stars in a particular portion of the sky, and one year later a general catalog of 32,448 stars in the Southern Hemisphere.

Gould, Chester (b. Nov. 20, 1900, Pawnee, Okla., U.S.—d. May 11, 1985, Woodstock, Ill.), American cartoonist who created "Dick Tracy," the detective-action comic strip that became the first popular cops-and-robbers series.

Gould studied cartooning through a correspondence school, briefly drew sports cartoons in Oklahoma, then worked for the *Chicago Daily News*. "Dick Tracy" was first distributed in 1931 by the Chicago Tribune–New York News Syndicate, Inc.; its underlying code of "crime doesn't pay" and its support of tough and often violent law enforcement were widely appealing. Drawn with hard outlines and bright colours and accurate in the details of crime and criminal investigation, the comic strip features Dick Tracy, a clean-cut, plainclothes detective with a hard, jutting jaw line, whose methods, reminiscent of Sherlock Holmes, made him the nemesis of a gallery of grotesquely caricatured criminals. Gould retired from the strip in 1977.

Gould, Glenn Herbert (b. Sept. 25, 1932, Toronto—d. Oct. 4, 1982, Toronto), Canadian pianist known for impeccable technique and brilliant, if often unorthodox, performances.

He studied piano from the age of three, began composing at five, and entered the Royal Conservatory of Music of Toronto at 10, earning its associate degree in 1946. In 1952 Gould isolated himself and developed an individual style of interpretation and playing posture with his head only just above the level of the keyboard. His debut performances (1955) in New York City and Washington, D.C., earned him critical success and a recording contract.

His preferred repertoire consisted of the contrapuntal pieces of the Baroque, Classical, and Modern periods, notably omitting the lush works of 19th-century Romanticism. In 1964 he gave up a successful concert career to construct "perfect" performances in the recording studio. In his last years, Gould conducted, produced radio and television documentaries, scored motion pictures, and wrote numerous periodical articles.

Gould, Jay, original name JASON GOULD (b. May 27, 1836, Roxbury, N.Y., U.S.—d. Dec. 2, 1892, New York City), U.S. railroad executive and financier whose speculation in gold caused the panic of "Black Friday" (Sept. 24, 1869), when the price, in paper money, of $100 in gold specie, after being driven up to $163.50 by market bidding, fell to $133 when the U.S. treasury placed $4,000,000 in specie on the market.

First employed as a surveyor, Gould became manager in 1863 of the Rensselaer and Saratoga Railway. He bought and reorganized the Rutland and Washington Railway and in 1868 was elected president of the Erie Railway, which he and James Fisk controlled. Gould and Fisk admitted William "Boss" Tweed, then a state senator, to the directorate and in return received his support in the New York legislature. A fraudulent stock sale in 1868–70 led to litigation, and Gould was forced out of the company.

Jay Gould
By courtesy of the New York Historical Society

An able financial manipulator, he realized a large profit when he relinquished control of the Union Pacific Railroad. Investments in the Missouri Pacific Railroad helped build up the "Gould system" of railways in the southwestern states, and later investments brought him control of the Western Union Telegraph Company and New York City's elevated railways.

George Jay Gould (1864–1923), his eldest son, was also a prominent railway owner and became president of the Missouri Pacific, the Texas and Pacific, and several other railways.

Helen Miller Gould Shepard (1868–1938), Jay's eldest daughter, became widely known as a philanthropist and for her gifts to U.S. Army hospitals during the war with Spain.

Gould, John (b. Sept. 14, 1804, Lyme Regis, Dorsetshire, Eng.—d. Feb. 3, 1881, London), English ornithologist whose large, lavishly illustrated volumes on birds commanded ever-mounting prices among bibliophiles.

Gould learned taxidermy at Windsor Castle, where his father was foreman of gardeners. In 1827 he became taxidermist to the Zoological Society of London. The arrival of a collection of exotic bird skins from the Himalayas in 1830 enabled him to produce the first of many folio volumes, *A Century of Birds from the Himalaya Mountains* (1831–32). Gould's sketches were transferred to the lithographer's stone by his wife, the former Elizabeth Coxon, whose artistic talents were to enhance many of his works until her death in 1841. The five-volume *Birds of Europe* (1832–37) and *Monograph of the Ramphastidae (Toucans)* (1834) were so successful that the Goulds were able to spend two years (1838–40) in Australia, where they made a large collection of birds and mammals. The collection resulted in Gould's most famous work, *The Birds of Australia*, 7 vol. (1840–48; supplements 1851–69) and in *Mammals of Australia,* 3 vol. (1845–63). He was elected Fellow of the Royal Society in 1843. Gould's lifetime work comprised more than 40 volumes, with more than 3,000 coloured plates. His many scientific papers, mostly devoted to descriptions of new species, established his professional reputation, but he is best known today for his folios.

Gould, Morton (b. Dec. 10, 1913, Richmond Hill, N.Y., U.S.), U.S. composer, conductor, and pianist noted for his synthesis of popular idioms with traditional forms of composition and orchestration.

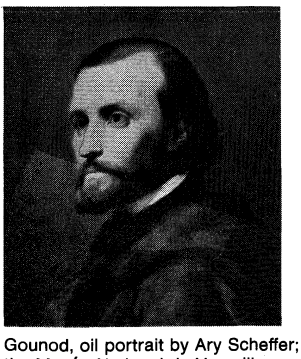
Gould studied piano with Abby Whiteside and composition with Vincent Jones at the New York Institute of Musical Art. After working as a radio accompanist, he arranged and conducted a series of programs devoted to the more popular classical literature and thereafter composed and conducted for films, television, the theatre, and recordings. He became a popular guest conductor with many major U.S. symphony orchestras. His compositions often utilize American themes and include musical comedies, ballets, numerous orchestral works, and some pieces for piano. His *American Salute* for orchestra (1947), based upon the popular "When Johnny Comes Marching Home," is an important piece in the popular contemporary repertoire.

Gouldian finch, colourful species of grass finch (*q.v.*).

Goulimine (Morocco): *see* Guelmim.

Gounod, Charles(-François) (b. June 17, 1818, Paris—d. Oct. 18, 1893, Saint-Cloud, near Paris), French composer noted particularly for his operas, of which the most famous is *Faust.*

Gounod's father, François Gounod, was a painter of some distinction, and his mother, a woman of wide education, was a capable pianist and gave Gounod his early training in music. He was educated at the Lycée Saint-Louis, where he remained until 1835. After taking his degree in philosophy, he began to study music with the Bohemian composer Anton Reicha. On Reicha's death Gounod entered the Paris Conservatoire, where he studied under Fromental Halévy and Jean-François Lesueur. Three years later his cantata *Fernand* won him the Prix de Rome for music, an award that entailed a three-year stay in Rome at the Villa Medici.



Gounod, oil portrait by Ary Scheffer; in the Musée National de Versailles
By courtesy of the Musee National de Versailles

In Italy Gounod devoted a great deal of his attention to the works of Giovanni da Palestrina, an Italian Renaissance composer, and was so deeply influenced by him that he wrote a mass in imitation of Palestrina's style; it was among his earliest important compositions. From Rome he proceeded to Vienna, where a mass and requiem, composed in Italy, were performed in 1842 and 1843. Returning to Paris, he passed through Prague, Dresden, Ger., and Berlin. He also spent four days in Leipzig, Ger., with Felix Mendelssohn and heard a performance of Mendelssohn's *Scottish Symphony* as well as a Mendelssohn recital of organ works by Johann Sebastian Bach in the Thomas Church.

In Paris, Gounod became organist and choirmaster at the church of the Missions Étrangères, and for two years he mainly studied theology. In 1846 he entered the seminary of Saint-Sulpice but in 1847 decided against taking holy orders. A requiem and a *Te Deum* that he had started writing the previous year remained unfinished, and he turned to composing for the operatic stage.

The reception of his earliest operas, *Sapho* (1851) and *La Nonne sanglante* (1854; "The Bloody Nun"), was not very enthusiastic, in spite of favourable reviews by the composer Hector Berlioz. In his *Messe de Sainte-Cécile* (1855) he attempted to blend the sacred with a more secular style of composition. An excursion into comic opera followed with *Le Médecin malgré lui* (1858; *The Mock Doctor*), based on Molière's comedy. From 1852 Gounod worked on *Faust,* the production of which, on March 19, 1859, marked a new phase in the development of French opera. This work has continued to overshadow all of Gounod's subsequent stage works, including *Philémon et Baucis* (1860), *La Colombe* (1860; "The Dove"), the fairly successful *Mireille* (1864), based on a Provençal poem by Frédéric Mistral, *Roméo et Juliette* (1867), and his later oratorios.

In 1852 Gounod had become conductor of the Orphéon Choral Society in Paris, for which he wrote a number of choral works, including two masses. From 1870 he spent five years in London, formed a choir to which he gave his name (and which later on became the Royal Choral Society), and devoted himself almost entirely to the writing of oratorios. *Gallia,* a lamentation for solo soprano, chorus, and orchestra, inspired by the French military defeat of 1870, was first performed at the Albert Hall, London, at the opening of the International Exhibition in London on May 1, 1871, and the oratorios *La Rédemption* and *Mors et Vita* (*Life and Death*), at the Birmingham festival, in 1882 and 1885. He was made a *grand officier* of the Legion of Honour in 1888.

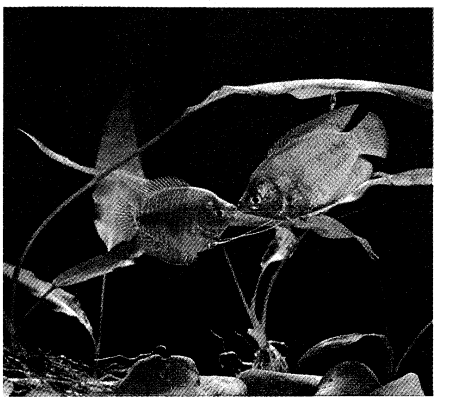
Gounod's melodic vein is unmistakably original, though often oversentimental. He knew how to write for the voice and for the orchestra; but in his operas his sense of musical characterization, though rarely devoid of charm, is often excessively facile and the religiosity displayed in his sacred music too often superficial. His *Meditation* (*Ave Maria*) superimposed on Bach's *Prelude in C Major* (from *The Well-Tempered Clavier,* Book I) illustrates both his inventiveness and ease as a melodist and his naïveté in matters of style. Yet Gounod's music owed to this very naïveté its prestige among the Neoclassicist musicians of the 1920s, who admired Gounod for having been a "pure" (nonphilosophical and nonliterary) composer. Even the composer Igor Stravinsky, in his *Poétique musicale,* praised not only *Faust* but also *Le Médecin malgré lui, La Colombe,* and *Philémon et Baucis.*

(F.Go.)

BIBLIOGRAPHY. There are very few books in English on Gounod. James Harding, *Gounod* (1973), provides a popular introduction to his life and musical career, and contains a list of works and a bibliography.

gourami, any of several of the freshwater, tropical, labyrinth fishes (order Perciformes), especially *Osphronemus goramy,* an East Indian fish used and cultured as food; it has been introduced elsewhere. This species is a compact, oval fish with a long, filamentous ray extending from each pelvic fin. It attains a weight of about 9 kg (20 pounds). As an adult, it is brown or gray with a paler belly; when young, it is dark-banded and reddish brown. It is the only member of the family Osphronemidae.

Other gourami, several of them popular in home aquariums, are Asian members of different genera and families. They are generally rather deep-bodied and small-mouthed. With the exception of the kissing gourami, sole member of the family Helostomatidae, they are of the family Belontiidae and are characterized by an elongated ray in each pelvic fin. Common species include the giant gourami (*Colisa fasciata*), a blue-green and reddish brown fish 12 cm (4.75 inches) long; the dwarf gourami (*C. lalia*), 6 cm long, brightly striped in red and blue; the kissing



Dwarf gourami (*Colisa lalia*)
Jane Burton—Bruce Coleman Ltd.

gourami (*Helostoma temmincki*), a greenish- or pinkish-white fish noted for its "kissing" activities; and the three-spot, or blue, gourami (*Trichogaster trichopterus*), a dark-spotted, silvery or blue species.

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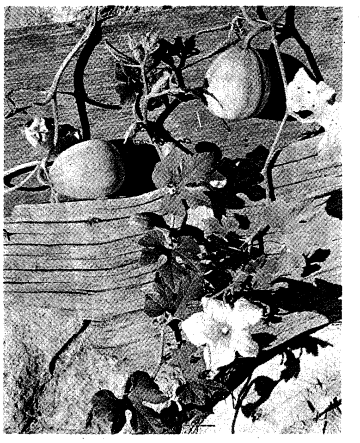
gourd, any of the hard-shelled ornamental fruits of certain members of the gourd family, Cucurbitaceae, the single family of the order Cucurbitales.

In the past, the term gourd was applied only to the fruits of the species *Cucurbita pepo,* variety *ovifera,* the yellow-flowered gourd, and the species *Lagenaria siceraria,* the bottle, or white-flowered, gourd; both are trailing annual herbs. Many varieties of these species are cultivated as ornamentals and for the utensils, bottles, and pipes that can be made from the fruits of *L. siceraria.* Other species, such as the Chinese watermelon, or wax gourd (*Benincasa hispida*), teasel gourd (*Cucumis dipsaceus*), snake gourd (*Trichosanthes anguina*), and dishcloth gourd and sponge gourd (species of the genus *Luffa*), are now included botanically in the term gourd.

The yellow-flowered gourd is native to northern Mexico and eastern North America but has been cultivated for many centuries. It can no longer be found in the wild. Many of the smaller fruits are banded, striped, mottled, warted, or strangely shaped. Nest egg, pear-shaped, bicolour, spoon, and ladle gourd are common names for some forms of this species. The large, triangular-shaped leaves are often deeply lobed. Both stems and leaves are covered with short bristles. The flowers are large and showy. Both male and female flowers are borne on the same plant, but the male flowers appear about a week before the female flowers and are located toward the ends of the runners.



Yellow-flowered gourd (*Cucurbita pepo,* variety *ovifera*)
John H. Gerard from The National Audubon Society Collection/Photo Researchers—EB Inc.

The white-flowered gourd often has extremely large fruits. Some may attain a length of a metre (3 feet) or more, and fruits with diameters of half a metre are not uncommon. Traditionally the *Lagenaria* gourds served many purposes, being used for cutlery, utensils, scoops, ladles, containers of all sorts, fishnet floats, whistles, and rattles.

Gourd seeds should be planted in a warm, sunny location as soon in the spring as danger from frost has passed, for they require a long growing season to mature fruit and are killed by the first frost of autumn. Well-drained, fertile soil and a trellis, fence, or wall to provide support for the vines aid in the development of well-shaped, unblemished fruits.

Gourgaud, Gaspard (b. Nov. 4, 1783, Versailles, Fr.—d. July 25, 1852, Paris), French soldier and historian who accompanied Napoleon Bonaparte into exile at St. Helena and wrote important historical and biographical works about Napoleon.

Gourgaud rose through the ranks of the French imperial army, was wounded a number of times, and apparently saved Napoleon

Gourgaud, lithograph by C. Chasselat, 1821
By courtesy of the Bibliotheque Nationale, Paris

from a pistol wound at the Battle of Brienne (January 1814). After a brief flirtation with royalist forces following Napoleon's abdication in 1814, he rejoined the Emperor

during his "Hundred Days" and then voluntarily accompanied him into exile at St. Helena. Gourgaud's two-volume *Sainte-Hélène; Journal inédit de 1815 à 1818* (1899; *The St. Helena Journal of General Baron Gourgaud,* 1932) remains one of the basic accounts of the Emperor's last years.

Gourgaud returned to France in 1821, reentered the army, and continued to rise in rank. He wrote a number of valuable historical works, including *Campagne de dix-huit cent quinze* (1818; "The Campaign of 1815"); *Napoléon et la grande armée en Russie* (1824; *Napoleon and the Grand Army in Russia,* 1825), and *Réfutation de la vie de Napoléon par Sir Walter Scott* (1827; "Refutation of Sir Walter Scott's Life of Napoleon"). In 1849 Gourgaud, by then a baron and a peer of France, was elected to the Legislative Assembly, where he became an influential supporter of Louis-Napoléon (later Napoleon III).

Gourma, also called GOURMANTCHÉ (people): *see* Gurma.

Gourmont, Rémy de (b. April 4, 1858, Bazoches-en-Houlmes, Fr.—d. Sept. 27, 1915, Paris), novelist, poet, playwright, and philosopher who was one of the most intelligent contemporary critics of the French Symbolist movement. His prolific writings, many of which were translated into English, disseminated the Symbolist aesthetic doctrines.

After studying law at Caen, he accepted a position in 1881 at the Bibliothèque Nationale, where he developed his wide interests and erudition before being dismissed in 1891 for publishing an allegedly unpatriotic article in the *Mercure de France,* a journal he had helped to found.

His 50 volumes, which compare in scope and tone with those of the 18th-century skeptical Philosophes, are mainly collections of essays. They include: (1) *Epilogues* (1903–13), a running commentary on contemporary events and persons; (2) *Promenades littéraires* (1904–27) and *Promenades philosophiques* (1905–09; Eng. trans. of selections, *Philosophic Nights in Paris,* 1920), literary and philosophical essays; and (3) books devoted to studies of style, language, and aesthetics.

Gourmont believed in the relativity of all truths; his strength as a critic was grounded in the completely aesthetic basis of his literary critiques. His approach to literature later influenced the 20th-century poets Ezra Pound and T.S. Eliot. His novels—including *Sixtine: Roman de la vie cérébrale* (1890; *Very Woman,* 1922), *Les Chevaux de Diomède* (1897; *The Horses of Diomedes,* 1923), *Le Songe d'une femme* (1899; *The Dream of a Woman,* 1927), and *Un Coeur virginal* (1907; *A Virgin Heart,* 1921)—have been criticized because the characters seem at times more intellectual symbols than human beings.

Jean de Gourmont (1877–1928), brother of Rémy, also contributed to the *Mercure de France.* He wrote some poems and a novel, *La Toison d'or* (1908; "The Golden Fleece").

Gouro (people): *see* Guro.

Goursat, Édouard-Jean-Baptiste (b. May 21, 1858, Lanzac, Fr.—d. Nov. 25, 1936, Paris), French mathematician and theorist whose contribution to the theory of functions, pseudo- and hyperelliptic integrals, and differential equations influenced the French school of mathematics.

Goursat was educated at the École Normale Supérieure, receiving his doctorate in 1881. In that same year he accepted a position on the faculty of science in Toulouse. Four years later he returned to the École Normale Supérieure, where he remained until 1897, when he left to teach mathematical analysis at the University of Paris. For several decades Goursat travelled between Paris and other major universities in France lecturing and tutoring.

His detailed analysis of Augustin Louis Cauchy's work led to the Cauchy–Goursat theorem. He was a member of the French Academy of Science and the author of *Leçons sur l'integration des équations aux dérivées partielles* (1890–98); *Théorie des fonctions algébriques et leur intégrales* (1894); *Cours d'analyse mathémastique* (1902–05); and *Leçons sur le problème de pfaff* (1922).

gout, hereditary metabolic disorder characterized by recurrent acute attacks of severe inflammation in one or more of the joints of the extremities. Gout results from the deposition, in and about the joints, of salts of uric acid, which is present in marked excess throughout the body. Uric acid is the metabolic end-product of purines and normally is steadily excreted into the urine. The biochemical defect that leads to abnormal concentration of the substance in the body is not yet known. Although gout is probably inborn, the initial attack of acute joint inflammation, or gouty arthritis, usually does not appear until middle age. Any peripheral joint may be affected, but, for some reason, the joint at the base of the big toe is especially susceptible. Heat, redness of the skin, and extreme tenderness and pain of the affected joints are symptoms. An attack, even when untreated, may subside in a week or two. Attacks may come and go without apparent reason, but there are a number of precipitating factors, including acute infection, emotional upset, diuresis, surgery, trauma, and the administration of certain drugs. Precipitation of microscopic amounts of uric acid in the joint cartilage precedes the first attack. In some cases, continued deposition of uric acid salts may cause knobby deformities and may also occur in cartilage that is not associated with the joints, such as the rim of the ear. The classic treatment for an acute attack of gouty arthritis is the administration of colchicine (*q.v.*). More recent medications include allopurinol (4-hydroxypyrazalopyrimidine) and related compounds, which inhibit the synthesis of uric acid in the body.

Gout is one of the oldest diseases in medical literature, as colchicine is one of the oldest drugs in therapeutics. Nor is the condition uncommon; it accounts for at least 5 percent of all significant problems in the field of systemic arthritis. It is uncommon, however, in women; the male–female ratio is 20:1.

Gouthière, Pierre (b. 1732, Bar-sur-Aube, Fr.—d. 1813/14, Paris), metalworker who was among the most influential French craftsmen in the 18th century.

Mantel clock of bronze, chased and gilt by Pierre Gouthière, 1771, after a design by Louis-Simon Boizot; in the Wallace Collection, London

Reproduced by permission of the trustees of the Wallace Collection, London; photograph, J.R. Freeman & Co. Ltd.

In 1758 Gouthière obtained his diploma as a master gilder and married the widow of his former employer. He collaborated with most of the eminent cabinetmakers and interior designers of his day. The severity of his designs were counterbalanced by the grace of his molding. He invented the process of dull gilding.

Gouthière's personal reputation was established in 1769 with a magnificent jewel chest for the future queen Marie-Antoinette. From then onward he did work at Fontainebleau and for the Duc d'Aumont in Paris, Madame du Barry at Louveciennes, and the Comte d'Artois at Bagatelle. Nevertheless he ran into financial difficulties and became bankrupt in 1788. The French Revolution completed his downfall.

Gouthière's immense prestige is partly explained by a public sale (1782) in Paris, where Louis XVI and Marie-Antoinette acquired many of his works formerly in the collection of the Duc d'Aumont.

Gouvion-Saint-Cyr, Laurent, marquis de (b. April 13, 1764, Toul, Fr.—d. March 17, 1830, Hyères), French soldier and statesman who distinguished himself in the Napoleonic Wars (1800–15) and, as minister of war in 1817–19, was responsible for reorganizing recruitment procedures in the French Army.

Gouvion-Saint-Cyr, engraving by François-Séraphin Delpech after a portrait by P.-L.-H. Grévedon, 1824

By courtesy of the Bibliotheque Nationale, Paris

An artist as a young man, Gouvion in 1792 enthusiastically joined the French Revolutionary armies. His heroic performance in Germany at the battles of Mainz and Mannheim (1795) won him promotion to the rank of general, and he subsequently served in Egypt and Italy. In 1801 Napoleon Bonaparte appointed him ambassador to Spain, where he played an important role in Napoleon's extended but inconclusive campaign in the Iberian Peninsula. Gouvion participated in the Russian campaign (1812), and his victory at the Battle of Polotsk gained him a marshal's baton. In 1813 he commanded an unsuccessful defense of Dresden and then voluntarily withdrew from military and political affairs for almost two years.

In 1815 and then again in 1817 King Louis XVIII appointed Gouvion minister of war. Although his past service to the republic and the empire undermined his credibility with the reactionary-royalist "ultra" party, Gouvion proceeded with a substantial reform program that included a recall to service of former Napoleonic officers, inducements for enlistment, a rationalization of promotion procedures, and the introduction of a lottery to fill quotas. Forced into retirement when the liberal ministry fell to "ultra" pressures, Gouvion wrote important historical works: *Mémoires sur les campagnes des armées du Rhin et de Rhin-et-Moselle . . .* (1829) and *Mémoires pour servir à l'histoire militaire sous le Directoire, le Consulat, et l'Empire* (1831).

Govardhan (fl. 17th century, India), a noted Mughal painter born into imperial service,

the son of a Hindu painter, Bhavanī Dās. His work spanned the reigns of the emperors Akbar, Jahāngīr, and Shāh Jahān. Several examples of his work have survived, and they are sufficient to establish him as a painter of great ability, fond of rich, sensuous colour and softly modelled forms. Govardhan was one of the illustrators of the *Bābur-nāmeh* in the British Museum and the artist of the "Assembly of *Gulāb-pāshī*," dated 1615, in the Reza Library, Rāmpur, India. Fine portraits by him are in the Jahāngīr albums now in the collections of various American and European museums. Few Mughal painters depicted with such insight the many human types found in India.

Gove Peninsula, peninsula extending from the northeastern corner of Arnhem Land, Northern Territory, Australia, into the Arafura Sea. An estimated 200,000,000 tons of bauxite were discovered there in 1952. A Swiss-Australian consortium began mining operations in 1971 and opened a reduction plant to produce alumina in 1972. The company built the town of Nhulunbuy to house the miners and plant workers. The Peninsula is part of an Aboriginal reserve, and the mining company pays royalties to the Aboriginal Benefits Trust Fund.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Governador Island, Portuguese ILHA DO GOVERNADOR, island, the largest island (12 sq mi [31 sq km]) in the Baía (bay) de Guanabara, southeastern Brazil. Linked to the mainland and Rio de Janeiro by bridge, it is the site of a naval air station and shipyards. The international airport of Galeão, opened there in 1977, is about 10 mi (16 km) from Rio de Janeiro's centre.

Governador Valadares, also called (until 1939) FIGUEIRA, city, eastern Minas Gerais state, Brazil, on the left bank of the Rio Doce, at 545 ft (166 m) above sea level. The city was made the seat of a municipality in 1937. It is an agricultural trade centre (*feijão* [beans], rice, sugarcane, coffee, and livestock). Sawmills and food-processing plants are in the city, and mica and beryl are mined in the area. Governador Valadares is one of the most famous gem trading centres in Brazil. Gem minerals include amethyst, chrysoberyl, brazilianite, topaz, and quartz. The city is on the Belo Horizonte–Vitória railway and on the Rio de Janeiro–Salvador highway. It can also be reached by air. Pop. (1980 prelim.) 173,699.

government, the political system by which a nation or community is administered and regulated.

The subject of government is treated in a number of articles in the MACROPAEDIA. For a survey of governmental systems, *see* Government, Forms of. For a treatment of the legal structures of governments, *see* Constitution and Constitutional Government; Constitutional Law; Crime and Punishment; Judicial and Arbitrational Systems; Legal Systems, The Evolution of Modern Western; Police. For a treatment of fiscal and administrative operations, *see* Government Finance; Public Administration; Taxation; Social Welfare. For political aspects, *see* Political Parties and Interest Groups; Political Systems; Public Opinion. For a treatment of ethical and philosophical issues in the theory of government, *see* Censorship; Human Rights; Ideology; Propaganda; Socio-Economic Doctrines and Reform Movements, Modern. For a treatment of urban government in particular, *see* Cities. For information on specific governments, *see* Index under names of individual political units.

For a description of the place of government in the circle of learning, and for a list of both MACROPAEDIA and MICROPAEDIA articles on the subject, *see* PROPAEDIA: Part Five, Division IV.

Attempts have sometimes been made to classify governments as existing either for the public good or for the self-interest of the governors. In fact (contrary to theories put forth by such thinkers as Gaetano Mosca, author of *The Ruling Class*), governmental functioning always depends upon some combination of consent and constraint. Even primitive governments, in which religious and governmental functions were often unified in the person of a priest-king, allowed for some manifestation of the wills of the governed in decision making. What differentiates primitive from later governments is that the primitive one usually lacks writing, currency, or autonomous administrative institutions.

Primitive government evolved most straightforwardly into Asian despotism, which persisted as the dominant form of government on that continent until the 20th century. These despotisms usually developed as the consequence of one tribe conquering much territory and superimposing its leadership over the governments of the subjugated tribes. Contrary to common belief, an Oriental despot did not generally exercise very tight control over his subjects; rather, under such a regime, a great diversity of governmental practices pertained in different parts of the territory, and a generally liberal attitude toward human creativity is attested by the great cultures that flourished under them. Oriental despotism lasted as long as the economies of Asia rested on manual labour and handicrafts; it became obsolete when the introduction of modern industry brought a need for more elaborate governmental organization.

Plato and Aristotle, the earliest Western comprehensive theorists of government whose work has survived, divided governments into those in which power was held by individuals, by groups, and by all citizens and also classified governments according to whether or not the rulers were enlightened. The evolution of governments in the ancient Greek city-states followed just such a numerical progression; beginning as monarchies under tribal kings, they became military aristocracies, then plutocracies which gradually extended citizenship to more and more classes. (It is important to keep in mind, however, that these societies relied extensively on non-citizen or slave labour.) Conflicts arose among aristocratic, plutocratic, and democratic factions within cities; as the different city-states underwent transitions at different rates, Athens became the bastion of democratic and Sparta the bastion of aristocratic power. Each faction tried to overcome the other in the Peloponnesian Wars (431–404 BC), and the result was a general weakening of Greek power and the eventual subjugation of Greece to Rome.

In *The Republic*, Plato argued that a society is best ruled by a single individual; in the *Laws*, he amended his theory to state that the authority of the individual ruler might beneficially be largely replaced by a set of laws and the ideal government would rely on a single executive for some decisions, a group for others, and all the citizenry for the rest. Such a division of power came to pass to a significant degree under the Roman republic. There, the power of the two consuls was offset by that of the Senate, a legislative body representing first only the aristocratic classes but eventually all classes of citizens.

Before the Roman Empire devolved into tyranny and collapsed, Roman law, beset with the problem of Christianity, had become the first in history to declare the principle of separation of church and state. Thus, in medieval and Renaissance Europe, national governments coexisted with religious governments to which their authorities were in many respects subordinate. Niccolò Machiavelli, Jean Bodin, Thomas Hobbes, and other theorists who wrote to support secular governmental authority against that of the church, originated the concepts of nation and state (the philosophic and spiritual projection of the nation) as counterparts to the ecclesiastical concepts of the visible and invisible church. Since then, national government has come to have definitive centrality.

As states have grown and human technologies developed, the functions of governments have grown increasingly more complex and extensive. Under the absolute monarchies, which represented the dominant form of government in Europe from the 16th to the 18th century, the task of coordinating the administration of royal decrees was carried out by a growing class of bookkeepers, letter writers, and annalists. The evolution of this class produced the bureaucracy that is central to the orderly functioning of modern governments, be they constitutional or totalitarian. In constitutional systems, powers of legislation and enforcement are divided among executive, legislative, and judicial components; and the ability of any one person to continue to hold power is subject to periodical recourse to an electorate. Legislators are elected in each of the discrete districts which together make up the territory served by the government; the chief executive is chosen either in a direct election throughout the territory (as in the United States) or by the legislature (as in Great Britain).

Totalitarian dictatorship is perhaps the most distinctively modern form of government. Generally, a dictatorship is established when an organized minority seizes power by force or fraud and rapidly assumes complete control over the government. A mass party grows out of this original group and looks to it for the reconstruction of society; it is the existence of this mass party that distinguishes these governments from historical tyrannies or absolutist states. Opposition to the dictator is stifled by the imposition of state control over all forms of expression including science, religion, and the arts; the institution of secret police and spying networks; and the suppression or destruction of all opposing political parties. Because of the atomization of society resulting from these measures (even the family may be atomized), revolutionary organization can find no structured base, and no totalitarian dictatorship has ever been defeated from within.

Government, Instrument of, the document that established the English Protectorate and under which Great Britain was governed from December 1653 to May 1657. The first detailed written constitution adopted by a modern state, the Instrument attempted to provide a legal basis for government after the parliamentary failures in the wake of the English Civil War. In effect, it legitimized the power of Oliver Cromwell and his generals.

Consisting of 42 articles drafted by Maj. Gen. John Lambert, the Instrument was accepted by Cromwell on Dec. 16, 1653. Executive authority was vested in a "lord protector of the Commonwealth" and a state council of up to 21 members, 15 of whom were named in the Instrument itself. The protector and the council were appointed for life; the protectorate was not hereditary. Cromwell and the council were given authority to pass edicts in the absence of Parliament and provided with a fixed income for state expenses together with an additional sum sufficient to maintain the navy and an army of 30,000. Additional levies required Parliament's consent.

The Instrument created a single-chamber

Parliament whose members were returned from districts reformed in favour of the gentry. Parliament was to meet first in September 1654 and every three years thereafter, except in the case of war. Roman Catholics and those implicated in the Irish rebellion were permanently disenfranchised. Religious toleration was denied to Roman Catholics and upholders of episcopacy.

The Instrument proved unsatisfactory to both radicals and Royalists, and Parliament refused to accept it as the basis of its authority. In May 1657 the second Protectorate Parliament replaced the Instrument with a modified version called the Humble Petition and Advice; but this new constitution scarcely outlived Cromwell, who died the following year.

government budget, a forecast of governmental expenditures and revenues for the ensuing fiscal year, which may or may not correspond to the calendar year. With the exception of primitive economies, the budget is the key instrument for the expression and execution of government economic policy.

A brief treatment of government budgets follows. For full treatment, *see* MACROPAEDIA: Government Finance.

Government budgets have wide implications for the national economy. By their very nature they effect a redistribution of income; by their scale they may promote or retard economic growth in general or in certain areas of the economy. They are, therefore, political as well as economic documents and are products of the overt and covert political processes by which competing interests in any nation achieve agreement. There are various practical approaches to budgeting, including the administrative budget, which emphasizes the expenditures of ongoing government operations; the capital budget, which gives separate treatment to public works projects and their special financing requirements; the unified budget as used by the federal government in the United States; and so on.

In the United States the federal budget is the responsibility of the president and is prepared by his Office of Management and Budget. Traditionally, the U.S. budget deals mainly with expenditure programs, and revenues are covered only briefly. The size of the expected budget deficit or surplus is regarded as very important, particularly in its potential effect on interest rates, employment, and other factors. An important aspect of the budgetary process is the greater influence of the Congress compared with British and European legislatures. The U.S. budget is submitted in January for the fiscal year commencing in July. It is then considered in great detail by several subcommittees of the House of Representatives and to a limited degree by the Appropriations Committee of the Senate. Minor amendments to the budget are quite common, but the influence of the Congress is more significant than the amendments suggest, for often Congress has greatly influenced the scope of the budget while it was being prepared.

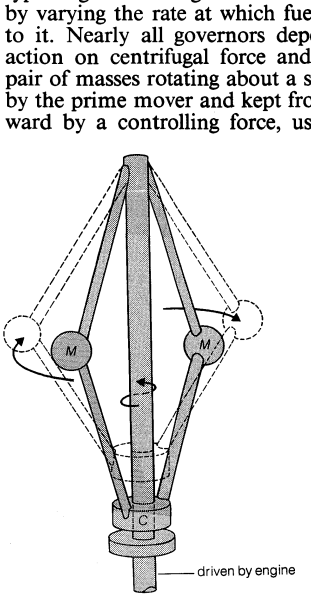
In Great Britain the preparation of the budget is the function of the Treasury, which is headed by the chancellor of the Exchequer. It is presented to the Parliament by the chancellor, usually in the spring. Limited discussion of the budget takes place in Cabinet meetings while it is being prepared, but final details may be withheld from the full Cabinet until the budget day. The emphasis of the British budget is on taxation and the state of the economy. Estimates of expenditures in detail are published separately, either on the same day as the budget or a few weeks in advance. Parliamentary committees discuss and criticize expenditure estimates but do not have the power to amend the budget.

In the Soviet Union and other Communist states the budgeting process has a much broader scope, since all economic activity is either carried out by state enterprises or is subject to close central control. The two main sources of revenue are the profits of state-owned enterprises and turnover taxes. The budget is drawn up by the ministry of finance and is presented annually for approval. It is essentially a part of the national economic plan, and the operations and activities of the state corporations are monitored by reference to the economic plan.

Government of India Acts, succession of measures passed by the British Parliament between 1773 and 1935 to regulate the government of India. The first several acts—passed in 1773, 1780, 1784, 1786, 1793, and 1830—were generally known as East India Company acts. Subsequent measures—chiefly in 1833, 1853, 1858, 1919, and 1935—were entitled Government of India acts. The act of 1773, also known as the Regulating Act, set up a governor general of Ft. William in Bengal with supervisory powers over Madras and Bombay. Pitt's India Act (1784), named for the British prime minister William Pitt the Younger, established the dual system of control by the British government and the East India Company, by which the company retained control of commerce and day-to-day administration but important political matters were reserved to a secret committee of three directors in direct touch with the British government; this system lasted until 1858.

The act of 1813 broke the company's trade monopoly and allowed missionaries to enter British India. The act of 1833 ended the company's trade, and that of 1853 ended the company's patronage. The act of 1858 transferred most of the company's powers to the crown. The acts of 1919 and 1935 were comprehensive enactments, the former giving legal expression to the Montagu–Chelmsford reforms and the latter to the results of constitutional discussions in 1930–33.

governor, in technology, device that automatically maintains the rotary speed of an engine or other prime mover within reasonably close limits regardless of the load. A typical governor regulates an engine's speed by varying the rate at which fuel is furnished to it. Nearly all governors depend for their action on centrifugal force and consist of a pair of masses rotating about a spindle driven by the prime mover and kept from flying outward by a controlling force, usually applied



Flyball governor

by springs. With an increase in speed, the controlling force is overcome and the masses move outward; the movement of the masses is transmitted to valves supplying the prime mover with its working fluid or fuel. The Figure shows the conical pendulum governor, invented by James Watt for controlling steam engines. The revolving masses are balls attached to a vertical spindle by link arms, and the controlling force consists of the weight of the balls. If the load on the engine decreases, the speed will increase, the balls *M* will move out, and the member *C* will slide up the vertical spindle and reduce the steam admitted to the engine, thus reducing the speed. An increase in the load will have the opposite effect. Modern governors are used to regulate the flow of gasoline to internal combustion engines and the flow of steam, water, or gas to various types of turbines. *Compare* flywheel.

Governors Island, island in Upper New York Bay, New York City, U.S., situated off the tip of Manhattan Island. Its area is about 173 ac (70 ha). Known as Pagganck to the Indians, it was acquired (1637) by the Dutch, who called it Nooten (Nutten). In 1698 it was reserved for colonial governors and was later used as a sheep farm and quarantine station. Since 1794 it has served as a military installation. Fortifications on Governors Island include Ft. Jay (1794; reconstructed 1806); Castle Williams (1807–11), which housed Confederate prisoners during the Civil War; and South Battery (1812). The U.S. Coast Guard Eastern Area Command Headquarters and Training Centre are there, and until 1966 the island was the site of the U.S. 1st Army headquarters.

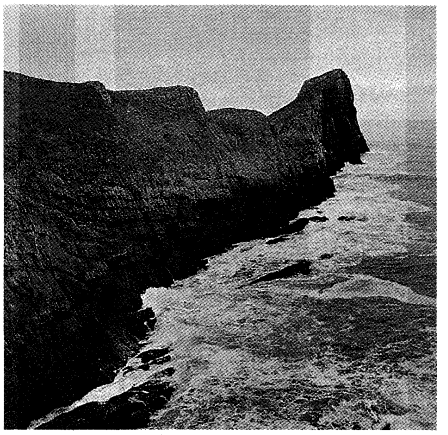
Gow, Niel (b. March 22, 1727, Inver, Perthshire, Scot.—d. March 1, 1807, Inver), violinist known for his publications of old Scottish melodies.

Gow taught himself the violin and became renowned as a player of Scottish dance music. Between 1784 and 1792 a number of his strathspey reels were published in three collections; some of the melodies were original, some traditional, some adaptations of traditional airs. His sons William, John, and Andrew contributed pieces to their father's collections, and John and Andrew became music publishers in London. His fourth son, Nathaniel (1766–1831), was also known as a violinist and composer of Scottish dances. Nathaniel prepared his father's collections for publication and published his own airs, reels, and strathspeys in three more collections (1808–22). He also published a four-volume *Complete Repository of the Original Scotch Slow Tunes* (1799–1817). Nathaniel's son, Niel the younger (1795-1823), was also a composer; his song "Flora Macdonald's Lament" became highly popular.

Gower, Welsh GŴYR, peninsula in Swansea district, West Glamorgan county, Wales, extending southwest into the Bristol Channel. The old Welsh province of Gŵyr, from which the name is derived, also included extensive tracts to the north.

Gower is mainly a plateau 150–450 ft (45–140 m) in height, into which many short streams have incised narrow, steep-sided valleys. Above the rolling plateau surfaces are some ridges, such as that from Penclawdd to Swansea, across the neck of the peninsula, and the Cefn Bryn ridge in the west. The picturesque south coast has a succession of limestone cliffs and coves that attract tourists. Mumbles, a popular resort area at Oystermouth, takes its name (from French *mamelles,* "breasts") from two small islands off the coast. Farther west are large stretches of sand dunes—*e.g.,* Llangennith and Whitford Burrows, the latter, together with parts of the south coast cliffs, being now in the care of the National Trust. The north coast, which bounds the Burry Inlet of Carmarthen Bay, is marshy and attracts fewer visitors.

From Paleolithic times the peninsula has been occupied by humans; a skeleton discovered in a cave in 1823 is Paleolithic in age, and barrows and megaliths are evidence of later prehistoric communities. Traces of a Roman villa have been found at Oystermouth,



Worms Head on the south coast of the Gower Peninsula, West Glamorgan
A.J. Huxley

man villa have been found at Oystermouth, and Celtic monks founded cells in the early Middle Ages. With the Norman Conquest of Gower (*c.* 1100), the southern and western peninsula received an influx of Flemish and other settlers and came to be known as Gower Anglicana, to distinguish it from the remainder, Gower Wallicana, where Welsh traditions and people survived.

Today the Gower is an agricultural area, with dairying and, in places, market gardening. In 1956 it was officially designated an area of outstanding natural beauty, and tourism has become increasingly important. The eastern section has become part of the Swansea metropolitan area. Pop. (1973 est.) Gower rural district, 17,220.

Gower, John (b. 1330?—d. 1408, London?), medieval English poet in the tradition of courtly love and moral allegory, whose reputation once matched that of his contemporary and friend Geoffrey Chaucer, and who strongly influenced the writing of other poets of his day. After the 16th century his popularity waned, and interest in him did not revive until the middle of the 20th century.

It is thought from Gower's language that he was of Kentish origin, though his family may have come from Yorkshire, and he was clearly a man of some wealth. Allusions in his poetry and other documents, however, indicate that he knew London well and was probably a court official. At one point, he professed acquaintance with Richard II, and in 1399 he was granted two pipes (casks) of wine a year for life by Henry IV as a reward for complimentary references in one of his poems. In 1397, living as a layman in the priory of St. Mary Overie, Southwark, London, Gower married Agnes Groundolf, who survived him. In 1400 Gower described himself as "senex et cecus" ("old and blind"), and on Oct. 24, 1408, his will was proved; he left bequests to the Southwark priory, where he is buried.

Gower's three major works are in French, English, and Latin, and he also wrote a series of French *balades* intended for the English court. The *Speculum meditantis,* or *Mirour de l'omme,* in French, is composed of 12-line stanzas and opens impressively with a description of the devil's marriage to the seven daughters of sin; continuing with the marriage of reason and the seven virtues, it ends with a searing examination of the sins of English society just before the Peasants' Revolt of 1381: the denunciatory tone is relieved at the very end by a long hymn to the Virgin.

Gower's major Latin poem, the *Vox clamantis,* owes much to Ovid; it is essentially a homily, being in part a criticism of the three estates of society, in part a mirror for a prince, in elegiac form. The poet's political doctrines are traditional, but he uses the Latin language with fluency and elegance.

Gower's English poems include *In Praise of Peace,* in which he pleads urgently with the king to avoid the horrors of war, but his greatest English work is the *Confessio amantis,* essentially a collection of exemplary tales of love, whereby Venus' priest, Genius, instructs the poet, Amans, in the art of both courtly and Christian love. The stories are chiefly adapted from classical and medieval sources and are told with a tenderness and the restrained narrative art that constitute Gower's main appeal today.

Gowon, Yakubu (b. Oct. 19, 1934, Nigeria), statesman and soldier who seized control of Nigeria in 1966 and led his forces to victory in the bitter Nigerian Civil War (1967–70) and held power until 1975.

A career army officer from a small Northern Region tribe, the Angas, Gowon was trained in England (Royal Military Academy, Sandhurst) and in Ghana and twice saw service in the Congo. After the coup of January 1966, as the senior surviving Northern officer, he was appointed chief of staff. He took a minor role in the Northern military countercoup of July 1966 and emerged as the compromise head of the new government.

Gowon promised, but was unable to deliver an early return to civilian rule. Meanwhile, the Ibos of the Eastern Region were becoming increasingly disaffected because of massacres of Ibos in the Northern Region and because of Gowon's refusal to give their leader, Odumegwu Ojukwu, army command in the East. On May 27, 1967, Gowon declared a state of emergency and divided Nigeria into 12 states, carving up the four regions and cutting the Ibos off from their port. Three days later the East declared itself the independent state of Biafra.

Gowon did not try to take personal responsibility for the army, whose three divisions fought the Civil War essentially independently of one another. After the government victory in January 1970, a remarkable reconciliation took place between victors and vanquished, largely attributable to Gowon's personal influence. By the mid-1970s he was emerging as a leader of the entire continent of Africa. On July 29, 1975, however, while Gowon was on a diplomatic mission in Uganda, the army removed him from office. Unable to return to his country, he took refuge in Great Britain.

Gowrie, John Ruthven, 3rd earl of (b. *c.* 1577—d. Aug. 5, 1600, Gowrie House, Perth, Perthshire, Scot.), alleged Scottish conspirator, one of the principals in the mysterious "Gowrie Conspiracy" of 1600, slain in the presence of James VI (afterward James I of Great Britain).

The second son of William, 4th Lord Ruthven and 1st earl of Gowrie (1541?–84), he succeeded his elder brother, James, the 2nd earl, in 1588. After an excellent education at the University of Edinburgh, he went abroad to continue his studies at Padua. While abroad he earned the friendship of the reformer Theodore Beza, and his return to Scotland in 1600 was welcomed by the party of the Presbyterian ministers. Shortly after his return he annoyed James VI by opposing in the convention of estates the King's proposals for taxation. On Aug. 5, 1600, he and his younger brother, Alexander Ruthven (1580?–1600), were slain in mysterious circumstances at Gowrie House in Perth.

Certain facts are well established. As James VI was setting out from Falkland to hunt early on August 5, he was accosted by Alexander Ruthven and after the hunt accompanied him to Gowrie House. Later, James's retinue were preparing to leave when they saw the King struggling at a turret window and heard his cry for help. They thereupon forced an entrance to the turret, and in ensuing struggles Gowrie and his brother were killed.

James's story was that Alexander enticed him to Perth to examine an unknown man with a pot of gold whom he had found and secretly imprisoned. When the King and Alexander had gone up to the turret, Alexander locked the door and threatened James with a dagger, and after some argument there was a struggle. A third man who was present disobeyed Alexander and in fact assisted the King. This man mysteriously disappeared from the scene, only to reemerge some days later and confirm the King's evidence.

In spite of an inquiry on an unprecedented scale, involving several hundred witnesses, the true explanation of the "Gowrie Conspiracy" was a mystery at the time and will probably remain so. James's story was received with incredulity by the majority of his own contemporaries. The balance of probabilities strongly suggests that the Ruthvens miscarried in a plot to seize the King's person. Yet for such a plot no clear motive can be found in contemporary politics or in the careers and characters of the principal participants.

Goya (y Lucientes), Francisco (José) de (b. March 30, 1746, Fuendetodos, Spain—d. April 16, 1828, Bordeaux, Fr.), consummately Spanish artist whose multifarious paintings, drawings, and engravings reflected contemporary historical upheavals and influenced important 19th- and 20th-century painters. The series of etchings "Los desastres de la guerra" ("The Disasters of War," 1810–14) records

Francisco de Goya, self-portrait from "Los caprichos" series, etching, *c.* 1798
By courtesy of the Biblioteca Nacional, Madrid

the horrors of the Napoleonic invasion. His masterpieces in painting include "The Naked Maja" and "The Clothed Maja" (*c.* 1800–05).

Early training and career. Goya began his studies in Zaragoza with José Luzán y Martínez, a local artist trained in Naples, and was later a pupil, in Madrid, of the court painter Francisco Bayeu, whose sister he married in 1773. He went to Italy to continue his studies and was in Rome in 1771. In the same year he returned to Zaragoza, where he obtained his first important commission for frescoes in the cathedral, which he executed at intervals during the next 10 years. These and other early religious paintings made in Zaragoza are in the Baroque–Rococo style then current in Spain and are influenced in particular by the great Venetian painter Giovanni Battista Tiepolo, who spent the last years of his life in Madrid (1762–70), where he had been invited to paint ceilings in the royal palace.

Goya's career at court began in 1775, when he painted the first of a series of more than 60 cartoons (preparatory paintings; mostly preserved in the Prado, Madrid), on which he was engaged until 1792, for the Royal Tapestry Factory of Santa Bárbara. These paintings of scenes of contemporary life, of aristocratic and popular pastimes, were begun under the

direction of the German artist Anton Raphael Mengs, a great exponent of Neoclassicism who, after Tiepolo's death, had become undisputed art dictator at the Spanish court. In Goya's early cartoons the influence of Tiepolo's decorative style is modified by the teachings of Mengs, particularly his insistence on simplicity. The later cartoons reflect his growing independence of foreign traditions and the development of an individual style, which began to emerge through his study of the paintings of the 17th-century court painter Diego Velázquez in the royal collection, many of which he copied in etchings (*c.* 1778). Later in life he is said to have acknowledged three masters: Velázquez, Rembrandt, and, above all, nature. Rembrandt's etchings were doubtless a source of inspiration for his later drawings and engravings, while the paintings of Velázquez directed him to the study of nature and taught him the language of realism.

In 1780 Goya was elected a member of the Royal Academy of San Fernando, Madrid, his admission piece being a "Christ on the Cross," a conventional composition in the manner of Mengs but painted in the naturalistic style of Velázquez' "Christ on the Cross," which he doubtless knew. In 1785 he was appointed deputy director of painting at the Academy and in the following year painter to the king, Charles III. To this decade belong his earliest known portraits of court officials and members of the aristocracy, whom he represented in conventional 18th-century poses. The stiff elegance of the figures in full-length portraits of society ladies, such as "The Marquesa de Pontejos," and the fluent painting of their elaborate costumes also relates them to Velázquez' court portraits, and his representation of "Charles III as Huntsman" (private collection) is based directly on Velázquez' royal huntsmen.

Period under Charles IV. The death of Charles III in 1788, a few months before the outbreak of the French Revolution, brought to an end the period of comparative prosperity and enlightenment in which Goya reached maturity. The rule of reaction and political and social corruption that followed—under the weak and stupid Charles IV and his clever, unscrupulous queen, Maria Luisa—ended with the Napoleonic invasion of Spain. It was under the patronage of the new king, who raised him at once to the rank of court painter, that Goya became the most successful and fashionable artist in Spain; he was made director of the Academy in 1795 (but resigned two years later for reasons of health) and first court painter in 1799. Though he welcomed official honours and worldly success with undisguised enthusiasm, the record that he left of his patrons and of the society in which he lived is ruthlessly penetrating. After an illness in 1792 that left him permanently deaf, his art began to take on a new character, which gave free expression to the observations of his searching eye and critical mind and to his newly developed faculty of imagination. During his convalescence he painted a set of cabinet pictures said to represent "national diversions," which he submitted to the Vice Protector of the Academy with a covering letter (1794), saying, "I have succeeded in making observations for which there is normally no opportunity in commissioned works, which give no scope for fantasy and invention." The set was completed by "The Madhouse" in 1794, a scene that Goya had witnessed in Zaragoza, painted in a broad, sketchy manner, with an effect of exaggerated realism that borders on caricature. For his more purposeful and serious satires, however, he now began to use the more intimate mediums of drawing and engraving. In "Los caprichos," a series of 80 etchings published in 1799, he attacked political, social, and religious abuses, adopting the popular imagery of caricature, which he enriched with highly original qualities of invention. Goya's masterly use of the recently developed technique of aquatint for tonal effects gives "Los caprichos" astonishing dramatic vitality and makes them a major achievement in the history of engraving. Despite the veiled language of designs and captions and Goya's announcement that his themes were from the "extravagances and follies common to all society," they were probably recognized as references to well-known persons and were withdrawn from sale after a few days. A few months later, however, Goya was made first court painter. Later he was apparently threatened by the Inquisition, and in 1803 he presented the plates of "Los caprichos" to the King in return for a pension for his son.

While uncommissioned works gave full scope for "observations," "fantasy," and "invention," in his commissioned paintings Goya continued to use conventional formulas. His decoration of the church of San Antonio de la Florida, Madrid (1798), is still in the tradition of Tiepolo; but the bold, free execution and the expressive realism of the popular types used for religious and secular figures are unprecedented. In his numerous portraits of friends and officials a broader technique is combined with a new emphasis on characterization. The faces of his sitters reveal his lively discernment of personality, which is sometimes appreciative, particularly in his portraits of women, such as that of "Doña Isabel de Porcel," but which is often far from flattering, as in his royal portraits. In the group of "The Family of Charles IV," Goya, despite his position as court painter, has portrayed the ugliness and vulgarity of the principal figures so vividly as to produce the effect of caricature.

The Napoleonic invasion and period after the restoration. In 1808, when Goya was at the height of his official career, Charles IV and his son Ferdinand were forced to abdicate in quick succession, Napoleon's armies entered Spain, and Napoleon's brother Joseph was placed on the throne. Goya retained his position as court painter, but in the course of the war he portrayed Spanish as well as French generals, and in 1812 he painted a portrait of "The Duke of Wellington." It was, however, in a series of etchings, "Los desastres de la guerra" (first published 1863), for which he made drawings during the war, that he recorded his reactions to the invasion and to the horrors and disastrous consequences of the war. The violent and tragic events, which he doubtless witnessed, are represented not with documentary realism but in dramatic compositions—in line and aquatint—with brutal details that create a vivid effect of authenticity.

On the restoration of Ferdinand VII in 1814, after the expulsion of the invaders, Goya was pardoned for having served the French king and reinstated as first court painter. "The 2nd of May 1808: The Charge of the Mamelukes" and "The 3rd of May 1808: The Execution of the Defenders of Madrid" were painted to commemorate the popular insurrection in Madrid. Like "Los desastres," they are compositions of dramatic realism, and their monumental scale makes them even more moving. The impressionistic style in which they are painted foreshadowed and influenced later 19th-century French artists, particularly Manet, who was also inspired by the composition of "The 3rd of May." In several portraits of Ferdinand VII, painted after his restoration, Goya evoked—more forcefully than any description—the personality of the cruel tyrant, whose oppressive rule drove most of his friends and eventually Goya himself into exile. He painted few other official portraits, but those of his friends and relations and his "Self-Portraits" (1815) are equally subjective. Some of his religious compositions of this period, the "Agony in the Garden" and "The Last Communion of St. Joseph of Calasanz" (1819), are more suggestive of sincere devotion than any of his earlier church paintings. The enigmatic "black paintings" with which he decorated the walls of his country house, the "Quinta del Sordo" (1820–23, now in the Prado) and "Los proverbios" or "Los disparates," a series of etchings made at about the same time (though not published until 1864), are, on the other hand, nightmare visions in expressionist language that seem to reflect cynicism, pessimism, and despair.

Last years. In 1824, when the failure of an attempt to establish a liberal government had led to renewed persecution, Goya applied for permission to go to France for reasons of health. After visiting Paris he settled in voluntary exile in Bordeaux, where he remained, apart from a brief trip to Madrid, until his death. There, in spite of old age and infirmity, he continued to record his impressions of the world around him in paintings, drawings, and the new technique of lithography, which he had begun to use in Spain. His last paintings include genre subjects and several portraits of friends in exile: "Don Juan Bautista de Muguiro," "Leandro Fernández de Moratín," and "Don José Pío de Molina," which show the final development of his style toward a synthesis of form and character in terms of light and shade, without outline or detail and with a minimum of colour.

Assessment. Though there is little evidence for the legends of Goya's rebellious character and violent actions, he was undoubtedly a revolutionary artist. His enormous and varied production of paintings, drawings, and engravings, relating to nearly every aspect of contemporary life, reflects the period of political and social upheavals in which he lived. He had no immediate followers, but his many original achievements profoundly impressed later 19th-century French artists—Eugène Delacroix was one of his great admirers—who were the leaders of new European movements, from Romanticism and Realism to Impressionism; and his works continued to be admired and studied by the Expressionists and Surrealists in the 20th century.

(E.Ha.)

MAJOR WORKS. *Paintings.* Religious: "The Adoration of the Name of God" (1772; cathedral of Nuestra Señora del Pilar, Zaragoza); "Christ on the Cross" (1780; Prado, Madrid); "The Queen of Martyrs" (1780–81; cathedral of Nuestra Señora del Pilar); "St. Bernardino of Siena" (1782–83; San Francisco el Grande, Madrid); "The Annunciation" (1785; private collection, Spain); "The Taking of Christ" (1798; Cathedral, Toledo); "A Miracle of St. Anthony of Padua" and other scenes (1798; San Antonio de la Florida, Madrid); "SS. Justa and Rufina" (1817; Cathedral, Seville); "The Last Communion of St. Joseph of Calasanz" (1819; Escuelas Pías de San Antón, Madrid); "Agony in the Garden" (1819; Escuelas Pías de San Antón). Portraits: "The Count of Floridablanca and Goya" (1783; Banco Urquijo, Madrid); "The Marquesa de Pontejos" (*c.* 1786; National Gallery of Art, Washington, D.C.); "Manuel Osorio de Zúñiga" (1788; Metropolitan Museum of Art, New York City); "Family of the Duke of Osuna" (1788; Prado); "The Marquesa de la Solana" (*c.* 1794–95; Louvre, Paris); "The Duchess of Alba" (1797; Hispanic Society of America, New York City); "Ferdinand Guillemardet" (1798; Louvre); "La Tirana" (1799; Academy of San Fernando, Madrid); "Queen Maria Luisa, on Horseback" (1799; Prado); "The Family of Charles IV" (1800; Prado); "The Naked Maja" and "The Clothed Maja" (*c.* 1800–05; Prado); "Doña Isabel de Porcel" (*c.* 1806; National Gallery, London); "General Manuel Romero" (*c.* 1810; private collection, Chicago); "The Duke of Wellington" (1812; National Gallery, London); "Mariano Goya" (*c.* 1812–14; private collection, Madrid); "Ferdinand VII in an Encampment" (*c.* 1814; Prado); "Self-Portrait" (1815; Academy of San Fernando); "Portrait of Don Juan Antonio Cuervo" (1819; Cleveland Museum of Art); "Self-Portrait with Doctor Arrieta" (1820; Minneapolis

Institute of Arts, Minnesota); "Leandro Fernández de Moratín" (1824; Museo de Bellas Artes, Bilbao, Spain); "The Milkmaid of Bordeaux" (1825–27; Prado); "Don Juan Bautista de Muguiro" (1827; Prado); "Don José Pío de Molina" (1827–28; Reinhart Collection, Winterthur). History, allegory, and genre: "Tapestry Cartoons" (1775–92; Prado); "The Madhouse" (1794; Virginia Meadows Museum and Elizabeth Meadows Sculpture Court, Dallas, Texas); "Allegory of the City of Madrid" (1810; Casa del Ayuntamiento, Madrid); "The Colossus" ("The Panic," *c.* 1810–12; Prado); "Time and the Old Women" (*c.* 1810–12; Musée des Beaux-Arts, Lille, Fr.); "The Majas on the Balcony" (*c.* 1812; Metropolitan Museum of Art); "Young Women with a Letter" (*c.* 1814–18; Musée des Beaux-Arts, Lille); "The 2nd of May 1808 in Madrid: The Charge of the Mamelukes" (1814; Prado); "The 3rd of May 1808: The Execution of the Defenders of Madrid" (1814; Prado); "The Forge" (*c.* 1819; Frick Collection, New York City); "The Black Paintings from the Quinta del Sordo" (1820–23; Prado).

Drawings, engravings, and lithographs. The largest and most important collection of drawings of all periods is in the Prado, Madrid.

Etchings. "Los caprichos" (1797–98); "Los desastres de la guerra" (1810–14); "La tauromaquia" (1815–16); "Los disparates" or "Los proverbios" (*c.* 1820–24).

Lithographs. "The Bulls of Bordeaux" (1824–25).

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Paintings. Valentín de Sambricio, *Tapices de Goya* (1946), the definitive work on Goya's tapestry cartoons, with all the relevant documents, and illustration of all the paintings; Enrique Lafuente Ferrari, *The Frescos in San Antonio de la Florida in Madrid* (Eng. trans. 1955), a historical and critical study of the frescoes, illustrated in colour; F.J. Sánchez Cantón, *Goya and the Black Paintings,* with an appendix by Xavier de Salas (1964), a well-documented account of Goya's career with a detailed study of the "black paintings" and a history of the "Quinta del Sordo," with large and detailed colour illustrations; and Josep Gudiol i Ricart, *Goya: Biography, Analytical Study, and Catalogue of His Paintings* (Eng. trans. 1971), a detailed study of Goya's life and work accompanied by a critical catalog of his paintings (fully illustrated).

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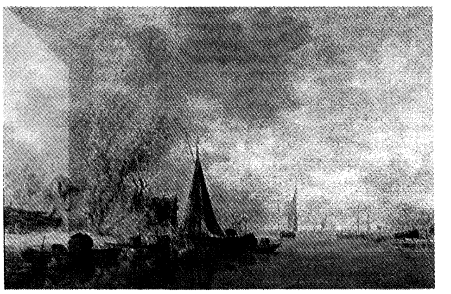
Goyathlay (Apache Indian leader): *see* Geronimo.

Goyaz (Brazil): *see* Goiás.

Goyen, Jan Josephs(zoon) van, Goyen also spelled GOIJEN (b. Jan. 13, 1596, Leiden, Neth.—d. April 27, 1656, The Hague), painter and etcher, one of the most gifted landscapists in the Netherlands during the early 17th century.

He learned painting under several masters at Leiden and Haarlem and settled at The Hague



"River Scene," oil on canvas by Jan van Goyen, 1634; in the Fogg Art Museum, Harvard University

By courtesy of the Fogg Art Museum, Harvard University, bequest of James P. Warburg

about 1631. To support his family he worked as an auctioneer and appraiser of art.

Many of his earlier pictures, from 1620 to *c.* 1630, show the influence of Esaias van der Velde, his teacher in 1616. These landscapes are highly detailed, have strong local colour, and often serve as a stage for genre scenes. His characteristic style developed from the 1620s, when his compositions became simplified and his technique broadened. A use of low horizons gave his landscapes a Baroque sense of spatial expansiveness. His concern with rendering natural light and the depiction of subtle atmospheric effects, however, are the principal identifying features of van Goyen's tonal landscapes.

Though he visited France once or twice, van Goyen chiefly confined himself to the scenery of Holland. Mostly painted in oil on wood panels, his landscapes are largely preoccupied in capturing the muted moods of sky and water. He often represented the reaches of the Rhine, Waal, and Maas rivers and sometimes painted the dunes of Scheveningen or the sea at the mouth of the Rhine and Schelde. He liked to depict the tranquillity of river life and inshore calm, rarely painting seas stirred by more than a slight breeze. Van Goyen also excelled in panoramas of Dutch cities, favouring views of Leiden and The Hague—*e.g.*, "View of Leiden" (1643; Alte Pinakothek, Munich)—and in the depiction of Lowlands winter scenes—"Winter Landscape" (1650; Berlin). A prolific draftsman, he also executed a substantial number of landscape etchings.

Goyer, Salomon de (painter): *see* Ruysdael, Salomon van.

Gozo, Latin GAULUS, Maltese GHAUDEX, or GHAUDESH, second largest of the Maltese islands (after the island of Malta), in the Mediterranean Sea, 3¼ mi (5¼ km) northwest of the nearest point of Malta. It is 9 mi long and 4½ mi wide and has an area of 26 sq mi (67 sq km). Its principal town, Victoria,

The ruined Ggantija temple on Gozo island, Malta

Atlas Photo

formerly called Rabat, stands near the middle of the island on one of a cluster of steep, conical hills in an intensively cultivated district. The megalithic ruined temple Ggantija, to the east of Victoria, is notable. Considered to be more fertile than Malta, Gozo is largely agricultural, producing fruit, vegetables, grapes, and livestock. Fishing is also important, and there is a cottage lace industry. The island is linked with Malta by ferry service. Gozo is held to be the island of Ogy'gia, in Greek legend, where the sea nymph Calypso entertained Odysseus. Pop. (1983 est.) 21,773.

Gozzi, Carlo, Conte (Count) (b. Dec. 13, 1720, Venice—d. April 4, 1806, Venice), poet, prose writer, and dramatist, a fierce and skillful defender of the traditional Italian commedia dell'arte form against the dramatic innovations of Pietro Chiari and Carlo Goldoni. Admired in Italy and elsewhere in Europe, Gozzi's dramas became the basis of many subsequent theatrical and musical works.

Born into a noble but poor family, the younger brother of Gasparo Gozzi (*q.v.*), Carlo joined the army. On his return to Venice in 1744, he wrote satires and miscellaneous prose and joined the reactionary Accademia dei Granelleschi, a group determined to preserve Italian literature from being corrupted by foreign influences. Gozzi's own crusade was to revive the traditional commedia dell'arte (*q.v.*). He began by attacking Carlo Goldoni, author of many fine realistic comedies, first in a satirical poem, *La tartana degli influssi* (1747), and then in an exotic commedia dell'arte play, *L'amore delle tre melarance* (performed 1761; "The Love of the Three Oranges"), in which he personified Goldoni as a magician and Pietro Chiari as a wicked fairy.

Conte Carlo Gozzi, engraving by Bernardino Corniani

By courtesy of the Biblioteca Nazionale, Florence

Following the immense success of this play, Gozzi wrote nine other *fiabe* (fantastic plays; literally, "fairy tales"), based upon puppet plays, Oriental stories, popular fables, fairy stories, and the works of such Spanish dramatists as Tirso de Molina, Calderón de la Barca, and Miguel de Cervantes. Outstanding among these *fiabe* are *Il re cervo* (performed 1762; *The King Stag*), *Turandot* (performed 1762), *La donna serpente* (performed 1762; "The Snake Woman"), and *L'augellin belverde* (performed 1765; "The Pretty Little Green Bird").

Popular for a time in Italy, Gozzi's *fiabe* had an even more lasting influence elsewhere in Europe, particularly in Germany, where they were published in 1777–78. Johann Wolfgang Goethe, Friedrich Schiller, Gotthold Ephraim Lessing, and the Schlegels all admired them: Schiller turned *Turandot* into a serious play; Friedrich von Schlegel compared Gozzi to Shakespeare. *Turandot* was used later as the basis for operas by Ferruccio Busoni (performed 1917) and Giacomo Puccini (performed 1926); *L'amore delle tre melarance* provided the basis for Sergey Prokofiev's opera *The Love for Three Oranges* (performed 1921).

Gozzi also wrote a vivid, if immodest, autobiography, *Memorie inutili* (1797; *The Memoirs of Carlo Gozzi*).

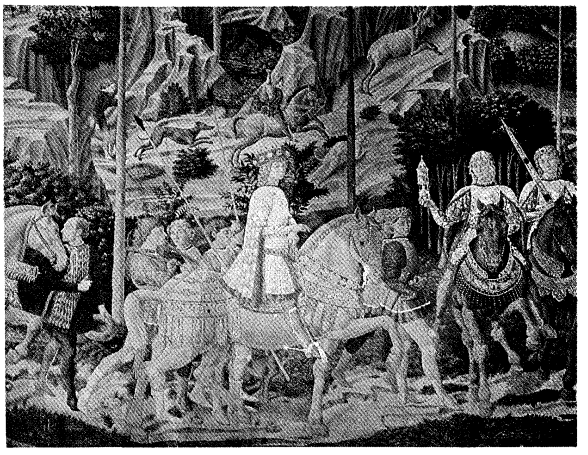
Gozzi, Gasparo, Conte (Count) (b. Dec. 4, 1713, Venice—d. Dec. 27, 1786, Padua, Venetia [Italy]), Italian poet, prose writer, journalist, and critic, remembered for a satire that revived interest in Dante and for his two periodicals, which brought the journalistic style of the 18th-century English essayists Joseph Addison and Richard Steele to Italy.

An early member, with his dramatist brother Carlo Gozzi, of the purist Accademia dei Granelleschi, Gasparo Gozzi became known for verse satires and *Difesa di Dante* (1758; "Defense of Dante"), an attack on the critic Saviero Bettinelli for preferring Virgil to Dante as a model for Italian poets. More important was his publication and, in large part, his writing of two periodicals similar in style to those of Addison and Steele: *La Gazzetta Veneta* (1760–61; modern edition, 1943), a chronicle of Venetian life; and *L'Osservatore* (1761–62; modern edition, 1897), a literary, philosophical, and theatrical review containing character sketches and satirical works.

Gozzi also wrote a romance, some occasional verse, translations of French works, and many letters. He was a press censor in 1762 and an educational official in 1764.

Gozzoli, Benozzo, also called BENOZZO DI LESE (b. 1420, Florence—d. Oct. 4, 1497, Pistoia [Italy]), early Italian Renaissance painter whose masterpiece, a fresco cycle in the chapel of the Medici-Riccardi Palace, Florence, reveals a new interest in nature (a careful study of realistic detail in landscape and the costumed figure) and in the representation of human features as definite portraiture.

Gozzoli's formative collaborations include those with Lorenzo and Vittorio Ghiberti on the third bronze door of the Baptistery, Florence, and with Fra Angelico (1447) on some frescoes in the chapel of Pope Nicholas V, Vatican, and on the ceiling of the Chapel of San Brizio in the cathedral at Orvieto. At Viterbo (after 1453) he painted nine frescoes of scenes from St. Rose's life. After painting an altarpiece at Perugia for Collegio Gerolominiano (1456) and visiting Rome in 1458, he returned to Florence, where he painted the frescoed chapel of the Medici-Riccardi Palace (dating from 1459 to 1460). Gozzoli's work as a whole has a rather empty facility, but in the latter commission, his "Procession of the Magi" reveals an artist of great decorative talent, with a pronounced gift for landscape and portraiture. By 1463 he was working at San Gimignano on a cycle of 17 scenes from the life of St. Augustine in the choir of San Agostino (last scene signed and dated 1465) and on a fresco of St. Sebastian (1464). Between 1469 and 1485 he painted his most extensive commission, a series of 25 frescoes of Old Testament scenes for the Campo Santo (cemetery), Pisa.



Detail with Lorenzo de' Medici from "Procession of the Magi," fresco by Gozzoli, 1459; in the Medici-Riccardi Palace, Florence

SCALA—Art Resource/EB Inc.

GPU, early Soviet political police agency, a forerunner of the KGB (*q.v.*).

Gqoba, William Wellington (b. 1840, near Gaga, Cape Colony [now in South Africa]—d. April 26, 1888), poet, philologist, and journalist, a dominant literary figure among 19th-century Bantu writers, whose poetry reflects the effects of missionaries and education on the Bantu people.

During his short career Gqoba pursued a number of trades: wagonmaker, clerk, teacher, translator of Xhosa and English, and pastor. During 1884–88 he was editor of *Isigidimi samaxosa* ("The Kaffir Express"), to which he contributed articles on the history of the Xhosa people.

Fame came to Gqoba after the composition of his two long didactic poems, "The Discussion Between the Christian and the Pagan" and "The Great Discussion on Education," both influenced in style by his fellow South African Tiyo Soga's translation of *Pilgrim's Progress* into Xhosa. In the first poem the traditional conflict is set up between the pleasures and riches of life supported by the pagan and the ascetic life advocated by the Christian. Although the Christian's argument is much less convincing, he wins in the end. The second poem depicts a group of young intellectuals who are critical of the educational practices of their day; but, again, the moderate Christian position, which wins out, seems to many less convincing than the radical one.

Graaf, Reinier de, Reiner also spelled REGNIER (b. July 30, 1641, Schoonhoven, Neth.—d. Aug. 17, 1673, Delft), Dutch physician who discovered the follicles of the ovary (known as Graafian follicles), in which the individual egg cells are formed. He was also important for his studies on the pancreas and on the reproductive organs of mammals.

Reinier de Graaf, engraving by an unknown artist

Archiv fur Kunst und Geschichte, West Berlin

Obtaining his M.D. at the University of Angers, Fr., in 1665, he settled in Delft (1667), where he established a medical practice and privately pursued his research. He was the first to use the word "ovary" to refer to the female mammalian gonad, and he was the first to note the morphological changes that the ovary undergoes in the course of ovulation.

Graaff, Simon de (b. Aug. 24, 1861, Lisse, Neth.—d. Oct. 2, 1948, Oegstgeest), Dutch statesman who, as colonial minister (1919–25), reorganized the administration of the Dutch East Indies and had the Indies' constitution revised so conservatively that it aroused nationalist fervour there.

De Graaff began his career in the Dutch East Indies' Ministry of the Interior and by 1913 was a member of the Council of the Indies. After de Graaff became colonial minister, he revived an old plan of his to create provinces and restructure the administrative hierarchy. De Graaff also enacted the paternalistic Village Regulation, which made the village the instrument of Indonesian welfare, providing schools, banks, advice, and other services. It served only to turn villagers, who were more concerned with autonomy, against the Dutch.

Graaff-Reinet (historical district, South Africa): *see* Swellendam and Graaff-Reinet.

Graaff-Reinet, town, south-central Cape Province, South Africa. It lies along the Sundays River, in the arid upland plateau area called the Great Karroo. Founded in 1786 by one of the last governors of the Dutch East India Company, the town is well-planned with many restored homes and public buildings constructed in the old Cape Dutch style of architecture. Graaff-Reinet is now a marketing centre for the surrounding sheep-raising area, and irrigated grapes and citrus fruits are also grown. The majority of the population are Coloureds (people of mixed race). Pop. (1985) 18,106.

Grabau, Amadeus William (b. Jan. 9, 1870, Cedarburgh, Wis., U.S.—d. March 20, 1946, Peking), American geologist and paleontologist, known for his work on world stratigraphic deposits and the deciphering of Earth history.

Grabau was a member of the faculty of the Massachusetts Institute of Technology, Cambridge, from 1892 until 1897 and of the Rensselaer Polytechnical Institute from 1899 until 1901, when he became a professor at Columbia University. In 1919 he became a

professor at the Peking National University and served as the chief paleontologist for the Chinese Geological Survey.

Grabau traced the evolution of certain groups of invertebrates and developed the pulsation and polar control theories that state that the crustal features of the Earth were caused by the rhythmic rise and fall of sea level. He wrote *North American Index Fossils* (1909, 1910), *Principles of Stratigraphy* (1913), *Textbook of Geology,* 2 vol. (1920–21), *Silurian Fossils of Yunnan* (1920), *Ordovician Fossils of North China* (1921), *Paleozoic Corals of China* (1921), *Stratigraphy of China* (1924–25), *Migration of Geosynclines* (1924), *Early Permian Fossils of China* (1934), and *Rhythm of the Ages* (1940).

Grabbe, Christian Dietrich (b. Dec. 11, 1801, Detmold, Westphalia—d. Sept. 12, 1836, Detmold), German dramatist whose plays anticipated Expressionism and film technique.

Grabbe studied law in Leipzig and made unsuccessful attempts at acting and directing in Berlin. After quarrelling with the poet Heinrich Heine and members of Young Germany (a politically radical literary movement) and failing in attempts to get help from the Romantic writer Ludwig Tieck, he became

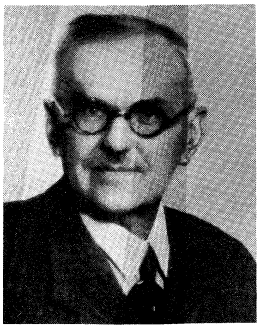
Grabbe, portrait after a lithograph by Weibezahl
Historia-Photo

a solicitor and then a military justiciary in Detmold. He was unhappily married in 1833 and was fired from his job in 1834 for negligence. After several months of poverty in Frankfurt, he went to Düsseldorf, where he lived as a free-lance writer with the help of Karl Leberecht Immermann, with whom he later quarrelled also. Although he had been successful in finding publishers for his plays, his dissipated life led to an early death from alcoholism and tuberculosis.

Grabbe's most important poetic work, *Napoleon oder die Hundert Tage* (1831; "Napoleon or the Hundred Days"), exemplifies the boldly experimental form of his plays, in which he avoided continuous action by the use of a series of vividly depicted and contrasting scenes. His tragedy *Don Juan und Faust* (1829) is an imaginative and daring attempt to combine the two great works of Mozart and Goethe. Like many of his plays, it exceeded the practical demands of the theatre. Among his most enduring is the mordant satire, *Scherz, satire, ironie und tiefere bedeutung* (1827; *Comedy, Satire, Irony and Deeper Meaning,* 1955). He is also known for *Abhandlung über Shakespeare-manie* (1827; "Essay on Shakespeare Mania"), in which he attacks Shakespeare and advocates an independent national drama. His other major works are the tragedy *Herzog Theodor von Gothland* (1827; "Duke Theodor of Gothland"), noted for its scenes of violence; and two plays about Hohenstaufen rulers, *Kaiser Friedrich Barbarossa* (1829) and *Kaiser Heinrich VI* (1830).

graben (geology): *see* horst and graben.

Grabski, Władysław (b. July 7, 1874, Borowo, near Łowicz, Pol., Russian Empire—d. March 1, 1938, Warsaw), political economist, prime minister of Poland (1920, 1923–25), and statesman who reorganized Poland's monetary and financial system.



Grabski, 1924
By courtesy of S. Kirkor, London

A Socialist in his youth, Grabski later joined the National Democracy Party and was elected a member of three successive sessions of the Duma (1906–12), the legislative body of the Russian Empire, of which Poland was then a part. After Poland had become detached from Russia, Grabski was elected to the Polish constituent assembly (January 1919) but was soon sent to join the Polish delegation at the peace conference in Paris. Returning to Warsaw, he became minister of agriculture in December 1919. From June 23 to July 24, 1920, he was prime minister and in this capacity went to Spa, Belg., to ask the Allied Supreme Council for immediate aid in arms and munitions to enable Poland to defend itself against Soviet Russia. He served as minister of finance in the Cabinet of National Defense until November 1920 and again from January to September 1923. On Dec. 19, 1923, he became prime minister again. He succeeded in stabilizing the Polish economy by the creation of a new Polish currency (Feb. 1, 1924), the gold-based złoty, to stop inflation, and the foundation of the Bank of Poland (April 15, 1924). In the summer of 1925, however, he was faced with a new crisis. Germany launched a "tariff war" on Poland, and the Deutsche Bank sold large quantities of the new Polish currency in the money markets of Berlin and Vienna. The złoty lost almost 50 percent of its original gold value, prices rose, and unemployment increased, forcing Grabski's resignation on Nov. 13, 1925. After General Józef Piłsudski's coup d'etat of May 1926, Grabski retired from active politics, becoming a professor at the Warsaw Agricultural School. His numerous published works included his own account of his greatest achievement, *Dwa lata pracy u podstaw państwowości naszej, 1924–25* (1927; "Two Years' Work at the Foundation of Our State, 1924–25"), and a summary of his democratic political philosophy, *Idea Polski* (1935; "Poland's Mission").

Graça Aranha, José Pereira da (b. June 21, 1868, São Luís, Braz.—d. Jan. 26, 1931, Rio de Janeiro), Brazilian novelist and diplomat, best remembered for his novel *Canaã* (1902; *Canaan,* 1920), in which he explored the conflicts of the Brazilian ethnic melting pot through the varied perspectives and problems of two German immigrants. With its philosophical digressions and lyrical descriptions, *Canaã,* a "novel of ideas," was influential in introducing readers throughout the world to the beauties of the Brazilian landscape and the problems of Brazilian society.

Widely travelled in Europe as a diplomat and distinguished in Brazil as a founding member of the Brazilian Academy of Letters, Graça Aranha was a prominent spokesman for social, political, and artistic reform throughout his literary and public career. His innovating spirit did not decline with age: in the 1920s he was closely associated with young radicals of the Modernist movement in Brazil, and in 1924 he resigned in protest from the Academy because he felt its standards were formalistic and stifling. Constantly experimenting in his own work with avant-garde literary techniques, he adopted the Modernist idiom, employing elliptical sentences and inventing new words in a novel published the year before his death, *A viagem maravilhosa* (1929; "The Marvelous Journey"). His aesthetic views were further publicized in his essays *A estética da vida* (1925; "The Aesthetics of Life") and *O espírito moderno* (1925; "The Modern Spirit").

Gracchus, Gaius Sempronius (b. 160–153 BC?—d. 121 BC, Grove of Furrina, near Rome), Roman tribune (123–122 BC), who reenacted the agrarian reforms of his brother, Tiberius Sempronius Gracchus, and who proposed other measures to lessen the power of the senatorial nobility.

Gaius Sempronius was the son of a Roman aristocrat whose family had regularly held the highest offices of state for the past century and was connected to the most powerful political families of the day. Like his older brother, Gaius was educated in the new Greek enlightenment, a movement that emphasized literature, oratory, and philosophy. He was not long deterred from public life by his brother's murder in a political riot. Though barely 22 years old, he joined in the immediate outcry against the senator Scipio Nasica (accused as one of those responsible for the violence), and he acted energetically as land commissioner in executing his brother Tiberius' agrarian law. He became quaestor, a magistrate usually concerned with finance, in 126 at the normal age, after lengthy military service. When in 124 an intrigue against him at Rome delayed his already overdue recall from Sardinia, he asserted his independence by returning unsummoned and counterattacked his critics, underlining the honesty of his administration.

The contentious tone forecast a vigorous politician, and his candidacy for the tribunate of 123 brought out great crowds of voters, though the opposition of family enemies prevented him from receiving the highest number of votes. As tribune he soon showed himself bent on exploiting his legislative power to the maximum. Gaius realized that, by fostering sectional advantages, the influence of the wealthy upper class of landowners and businessmen outside the Senate—later known as Roman knights because of their liability to cavalry service—could be largely detached from its traditional support of the senatorial aristocracy and combined with the votes of the poorer citizens to carry radical reforms that no single group could manage by itself. But his purpose was not democratic, for none of his measures intended the permanent replacement of the Senate and the annual officers of state by the popular Assembly. He used the Assembly not as an administrative body but as the source of legislative reform. This is seen clearly in his regulation for the annual assignment of provinces to the consuls, the most important policy-making moment in the Roman year. By securing passage of this law he ensured that the provinces would be allocated before the consuls were elected, thereby preventing the Senate from using the allocation of provinces as a means of punishing consuls of whom it disapproved and rewarding those of whom it did approve. As an aristocrat Gaius had no intention, however, of subordinating the consuls and other magistrates to the detailed control of the Assembly.

The true understanding of Gaius is obscured by the uncertainty of the chronological order of his measures in 123 and 122. But, despite

minor confusions, it is clear that Gaius completed the whole of his program that touched the government of the Roman state before he turned to a different problem—the relationship between Rome and her Italian allies—early in his second tribunate and that his bill for the extension of the franchise to the independent peoples of Italy was his last legislative proposal. His preceding measures were criticized by the extreme conservatives as a general attempt to "destroy aristocracy and set up democracy," but they did not satisfy the radicals either.

The measures of 123 were concerned with the abuse of power and with the extension of his brother's economic policy. He began with a demonstration against the enemies of Tiberius: the family vendetta was a regular part of Roman politics. He then formulated a bill that would have denied further office to magistrates deposed by the Assembly. Though Gaius did not press this proposal, it deterred his colleagues from using their vetoes against him. A law forbidding the establishment of political tribunals by the Senate without the sanction of the Assembly was intended to prevent a recurrence of the judicial murders committed by the political court set up to punish the supporters of Tiberius in 132.

A second law, concerned with judicial corruption, sought to provide independent juries for the "extortion court." This court had been created only 26 years earlier to curb the malpractices of Roman governors by enabling provincial subjects to sue for the restitution of monies taken improperly from them. Hitherto the jurors of this court had been senators, who had failed to protect the provincials against extortion through their own private interest in the fleecing of provinces. The judiciary law of Gaius excluded senators from the juries altogether and replaced them by Roman knights, who were expected to be more impartial. Considerable portions survive of the text of what must be either the actual judiciary law of Gaius or a revised version modelled closely upon it. These show the same determination and ingenuity as his laws about special tribunals in their attempt to stop corruption and abuse in the working of the court. The exclusion of all magistrates and senators is minutely regulated, and no qualified juror may sit on a case if he and the accused person are members of the same club or confraternity. Lengthy clauses exactly regulated the distribution and collection of voting tablets and the counting of the vote. This attention to detail is the hallmark of all the work done by Gaius about which there is any substantial information.

Two measures served partisan interests. The first established a beneficial system for the basic food supply of the now overgrown metropolis of Rome, where urban employment and prices were equally irregular. The second bill transferred the lucrative farming of taxes in the new province of Asia from local businessmen, who farmed the taxes on behalf of the Roman governor, to financial syndicates of Roman knights who dealt directly with the treasury at Rome, thus creating a monopoly for the Roman financiers. Both measures suggest a positive bid for the votes of persons domiciled at Rome. The rural population was wooed by two other measures: one transferred payments for military clothing from the conscript peasantry to the Roman treasury, and the second, modifying the law of Tiberius, proposed the establishment of self-governing communities of colonists. This innovation led in later times to the widespread settlement of Roman colonies that latinized southern Europe.

Though in late summer of 123 popular enthusiasm swept Gaius into a second tribunate, for which he had not originally intended to stand, his judiciary bill was subsequently passed by the vote of only 18 of the 35 voting groups of the Assembly. In so close a situation his successes are the more remarkable. But he had a yet more difficult project in mind for the next year. The greatest of Roman problems at this time concerned the management of the allies in Italy, who occupied two-thirds of the peninsula. They provided the larger part of the Roman armies that held the world in fee, yet these peoples were treated with increasing disdain and severity by the Roman aristocracy, though they were akin in race, language, and customs.

Gaius proposed a complex solution of the Italian question. The Latin-speaking allies, whose communal life was akin to that of Rome, were to be incorporated into the Roman state as full citizens and organized in locally self-governing municipalities, and the Italic peoples of non-Latin stocks were to have the intermediate status of the Latin allies. This ingenious measure shows the disinterested yet committed character of Gaius as a statesman. Such an enlargement of the Roman state was, however, intensely unpopular with Romans of all classes. Gaius' persistence at once weakened his popular following, strengthened the political opposition, and in the end wrecked his career.

Gaius' position at Rome was not helped by his departure for two months to Africa to manage the foundation of a colony of 6,000 settlers at Carthage. Among the business classes, who had nothing more to gain from Gaius, his support was weakened by the alienation of the numerous corn merchants whose profits had been decreased. On his return Gaius tried by a series of demonstrations to restore his popular following. He moved his residence from an aristocratic quarter down to the plebeian streets around the Forum, insisted on the right of the common people to watch the public games without charge, and tried, though ineffectively, to prevent the execution of a consular decree forbidding Italians to remain in Rome during the vote on the enfranchisement bill. Altogether, opposed by senatorial opinion and shorn of his equestrian supporters, Gaius was a more isolated and a more demagogic figure than in 123. The enfranchisement bill was rejected, and Gaius failed to secure a third tribunate at the elections of 122.

In adversity Gaius showed the same stubborn determination as his brother to maintain a good cause at all costs. Like Tiberius he fell defending the agrarian colonization that was the basis of their position. In 121 a tribune proposed the dissolution of the great colony of Carthage. Helped by the remnant of his plebeian supporters, Gaius organized an illegal counterdemonstration. In the fracas one of Gaius' party was killed, and the Gracchans retired uneasily to the Aventine Hill, traditional asylum of the Roman plebeians in an earlier age.

The Senate seized the opportunity to pass a novel decree, which urged the consuls to protect the state from any harm. Gaius, appalled, sought a parley. But the consul Lucius Opimius, refusing any negotiations, organized a heavily armed force composed largely of Roman knights and assaulted the Aventine. Massacre followed, as did the suicide of Gaius. But most of his legislation survived, and his unfinished projects were remembered, becoming the basis of politics in the next generation. His rejected unification of Italy was finally conceded in 89 BC, after a destructive and unnecessary civil war that came close to destroying the foundations of Roman power. Hardly any substantial reform was proposed in the last century of the republic that did not owe its conception to the political intelligence of Gaius Gracchus.

Gracchus, Tiberius Sempronius (b. 169–164 BC?—d. June 133 BC, Rome), Roman tribune (133 BC) who sponsored agrarian reforms to restore the class of small independent farmers and who was assassinated in a riot sparked by his senatorial opponents. His brother was Gaius Sempronius Gracchus.

Born into an aristocratic Roman family, Tiberius Sempronius was heir to a nexus of political connections with other leading families—most notably with the Cornelii Scipiones, the most continuously successful of the great Roman houses—through his mother, Cornelia, daughter of the conqueror of Hannibal, and through his sister Sempronia, wife of Scipio Aemilianus, the destroyer of Carthage. He was equally associated with the great rivals of the Scipios, the Claudii Pulchri, through Tiberius' wife, Claudia, daughter of Appius Claudius Pulcher, the contemporary head of the house.

He was educated in the new Greek enlightenment that had been adopted by the more liberal families after the Roman conquest of the Hellenistic kingdoms, and this gave form and clarity to his natural talent for public speaking. The Stoic teacher Blossius had special influence with Tiberius, but the central Stoic doctrine of duty merely enhanced his natural determination and obstinacy. Other Greek associates may have instructed him in the democratic theory that later coloured his speeches.

As a Roman aristocrat, Tiberius began a normal military career, serving as a junior officer with distinction under Scipio Aemilianus in the war with Carthage (147–146 BC), and in due course went as quaestor, or paymaster, with the consul Mancinus to the protracted colonial warfare in Spain (137 BC). There his personal integrity and family reputation enabled him to save a Roman army from total destruction at Numantia by an honourable compact with the Spanish tribesmen. But, at the insistence of Aemilianus, the agreement was disavowed by the Senate at Rome, and Mancinus, the defeated consul, though not his staff and his troops, was returned to his captors. This setback alienated Tiberius from the Scipionic faction in the Senate and drew him closer to his Claudian friends.

His military experience had shown him the latent weakness of Rome. Its manpower was stretched to the limit to maintain its hegemony over the Mediterranean world, while its sources in Italy were beginning to contract. The primitive subsistence economy that in past centuries had nourished a large population of poor peasants was being eroded by new factors, notably the development of large estates owned by magnates enriched in the imperialist wars and devoted to cash crops worked by slaves and day labourers. The landowning peasantry, who alone were thought useful for military service, were declining in numbers, while the landless citizenry were increasing.

Tiberius sought a solution of the manpower problem in a large-scale revival of the traditional Roman policy, abandoned only in the last 30 years, of settling landless men on the extensive public lands acquired by the Roman state during the former conquest of Italy. Much of this land had fallen irregularly but effectively into the hands of the Roman gentry, who regarded it wrongly as their private property. Tiberius, with the support of a small but powerful group of consular senators, primarily of the Claudian faction, who shared his concern and also looked for political advantage from sponsoring such a scheme, concocted a bill for the redistribution of the public lands to landless labourers in plots of viable size. The novelty lay only in the scale of the scheme, which was not limited to a defined area of land or number of persons, and in the institution of a permanent executive of land commissioners. Opposition from vested interests was certain, but Tiberius hoped to pacify it by a generous provision allowing the

great occupiers of public land to retain large portions in private ownership.

To implement this measure Tiberius secured the legislative office of tribune, for 133 BC, which was not an essential part of a senatorial career. Tribunes at this period normally legislated in the People's Assembly on the advice of the Senate, but more than once in recent years tribunes had passed reformist measures without senatorial approval. Tiberius in 133 had the support of the sole consul in Rome—Publius Mucius Scaevola, who had helped to draft the agrarian bill—and of several other leading senators, mostly of the Claudian faction, whose authority could be expected to deflate opposition while hordes of peasants flocked to Rome to use their votes. When, after lengthy public debate, the bill was presented to the voters, the tribune Octavius used his right of veto to stop the proceedings in the interest of the great occupiers. When he refused to give way, Tiberius vainly sought belated approval from the Senate. That should have been the end of the matter, but Tiberius, convinced of the necessity of his bill, devised a novel method of bypassing the veto: a vote of the Assembly removed Octavius from office, contrary to all precedent. The bill was then passed. But the deposition of Octavius alienated many of Tiberius' supporters, who saw that it undermined the authority of the tribunate itself; they rejected the unfamiliar justification, devised by Tiberius, that tribunes who resisted the will of the people ceased to be tribunes.

Fresh complications arose from the lack of financial provision in the agrarian law for the equipment of the new landholders. Tiberius expected the Senate to make the traditional allocation of funds, but Scipio Nasica, an elderly senator from the Scipionic faction, succeeded in limiting these to a derisory sum. Tiberius countered by a second outrageous proposal, of which he failed to see the implication. The King of Pergamum, a city in Anatolia, on his death in 134 had bequeathed his fortune and his kingdom to the Roman state. Tiberius by a fresh bill claimed these monies in the name of the people and assigned them to the land commissioners, thus interfering with the Senate's traditional control of public finance and foreign affairs. The storm over Tiberius' methods continued to rage. He was threatened with prosecution after the end of his tribunate, when he would have no formal means of protecting his law and would be liable to prosecution before the Centuriate Assembly, in which the wealthier classes had a voting advantage. The charge would have been violation of the immunity of the tribune Octavius.

Lacking the self-assurance to realize that the people were unlikely either to repeal the agrarian law or to pass sentence against its champion, Tiberius sought refuge in yet another impropriety. He proposed to stand for election to a second tribunate in 132, although reelection had not been practiced for 300 years and was widely believed to have been barred by an ambiguous statute. In the Senate the embittered opposition, again led by Nasica, tried to induce the consul Scaevola to stop the elections by force. Scaevola replied evasively that he would see that nothing illegal was done. Meanwhile, in the Assembly, Tiberius and the other tribunes were at loggerheads over the conduct of the election. An abortive vote had shown that the success of Tiberius was assured if only the election could be completed. He expected no violence and made no preparations against it. Enraged by the attitude of the Consul, Nasica and his associates stormed out of the Senate, equally unarmed. Seizing sticks and staves they precipitated a riot. It may well have begun as an attempt to disperse the electoral meeting, but it ended with the clubbing to death of Tiberius and the indiscriminate killing of some scores of citizens.

The political fault lay with Tiberius. After presentation of the agrarian bill, he failed to act in prudent collaboration with his senatorial supporters, and he added to his troubles by dubious initiatives that were bound to offend the bulk of senatorial opinion. So Scaevola and the others abandoned him and effected a compromise. The Senate recommended that the land commission continue, and, though in 132 it set up a political court that punished many of the lesser followers of Tiberius, it also encouraged Nasica, who barely escaped prosecution, to leave Italy.

Grace, Greek CHARIS, plural CHARITES, Latin GRATIA, in Greek religion, one of a group of goddesses of fertility. The name refers to the "pleasing" or "charming" appearance of a fertile field or garden. The number of Graces varied in different legends, but usually there

The three Graces, relief sculpture from Thasos, Greece, 5th century BC; in the Louvre, Paris

By courtesy of the Musee du Louvre, Paris; photograph, Cliche Musees Nationaux, Paris

were three: Aglaia (Brightness), Euphrosyne (Joyfulness), and Thalia (Bloom). They are said to be daughters of Zeus and Hera (or Eurynome, daughter of Oceanus) or of Helios and Aegle, a daughter of Zeus. Frequently the Graces were taken as goddesses of charm or beauty in general and hence were associated with Aphrodite, the goddess of love; Peitho, her attendant; and Hermes, a fertility and messenger god. In works of art they were represented in early times draped, later as nude female figures. Their chief cult centres were at Orchomenus in Boeotia, Athens, Sparta, and Paphos. The singular Gratia or Charis is sometimes used to denote the personification of Grace and Beauty.

grace, in Christian theology, the spontaneous, unmerited gift of the divine favour in the salvation of sinners, and the divine influence operating in man for his regeneration and sanctification. The English term is the usual translation for the Greek *charis,* which occurs in the New Testament about 150 times (two-thirds of these in writings attributed to Paul). Although the word must sometimes be translated in other ways, the fundamental meaning in the New Testament and in subsequent theological usage is that contained in the Letter of Paul to Titus: "For the grace of God has appeared for the salvation of all men" (2:11). From the time of the early church, Christian theologians have developed and clarified the biblical concept of grace.

The word grace is the central subject of three great theological controversies: (1) that of the nature of human depravity and regeneration (*see* Pelagianism), (2) that of the relation between grace and free will (*q.v.*; *see also* predestination; Arminianism), and (3) that of the "means of grace" between Catholics and Protestants, *i.e.*, whether the efficacy of the sacraments as channels of the divine grace is dependent on good works performed or dependent on the faith of the recipient.

Christian orthodoxy has taught that the initiative in the relationship of grace between God and man is always on the side of God. Once God has granted this "first grace," however, man does have a response to give and a responsibility for the continuance of the relationship. Although the ideas of grace and of merit are mutually exclusive, neither Augustine nor the Protestant defenders of the principle of justification by "grace alone" could avoid the question of reward of merit in the relationship of grace. In fact, some passages of the New Testament seem to use *charis* for "reward." The Roman Catholic theology of grace stresses the habitual character of the life created by the gift of grace and therefore ascribes merit to obedience to the law of God; classical Protestantism spoke of a cooperating grace after conversion as a way of including man's activity in the life of grace, but it avoided language that would suggest that man earns something by his obedience in grace.

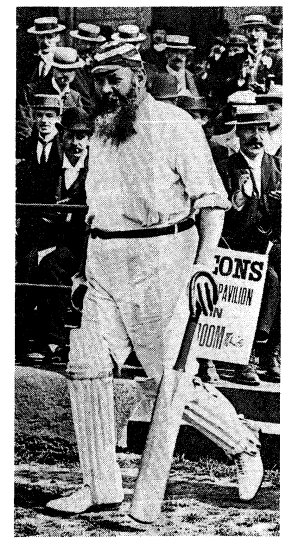
Catholics, Eastern Orthodox, and some Protestants agree that grace is conferred through the sacraments, "the means of grace." Reformed and Free Church Protestantism, however, has not bound grace as closely to the sacraments as have Catholics, Eastern Orthodox, Anglicans, and Lutherans.

Baptists speak of ordinances rather than of sacraments and —as do evangelical Christians and those in the Reformed and Free Church traditions generally—insist that participation in grace occurs on the occasion of personal faith and not at all by sacramental observance.

Grace OF MONACO, PRINCESS: *see* Kelly, Grace.

Grace, Pilgrimage of (English uprising): *see* Pilgrimage of Grace.

Grace, William Gilbert (b. July 18, 1848, Downend, Gloucestershire, Eng.—d. Oct. 23, 1915, London), greatest cricketer in Victorian England, whose dominating physical presence, gusto, and inexhaustible energy made him a national figure. He evolved the modern principles of batting and achieved many notable performances on rough and unpredictable wickets, such as are unknown to modern players.



William Gilbert Grace, 1899

W.W. Rouch & Co.

In his career in first-class cricket (1865–1908), Grace scored 54,896 runs, registered 126 centuries (100 runs in a single innings), and, as a bowler, took 2,876 wickets. In 84 matches for Gentlemen versus Players he amassed 6,000

runs and took 271 wickets. In August 1876 he scored, in consecutive innings, 344 out of 546 for Marylebone Cricket Club versus Kent; 177 out of 262 for the Gloucestershire county team versus Nottinghamshire; and 318, not out, for Gloucestershire versus Yorkshire. In 1880 he was on the English team that played the first Test match against Australia in England. Late in life he could still handle a bat: in his last match, on July 25, 1914, when he was 66, his score was 69, not out, for Eltham.

The legend of Grace presents him as shaggy and ponderous, with a huge yellow cap atop a swarthy, bearded face. In his heyday, however, he possessed an athletic figure and was a swift runner. Although he practiced medicine, cricket was his life, to the extent that a biography (by A.A. Thomson, 1957) is entitled simply *Great Cricketer*. Of him, the famous bowler J.C. Shaw remarked: "I puts the ball where I likes, but he puts it where he likes." His brother Edward Mills (1841–1911) was also a redoubtable cricketer.

Grace, William R(ussell) (b. May 10, 1832, Queenstown [now Cobh], County Cork, Ire.—d. Mar. 21, 1904, New York City), American shipowner and founder of W.R. Grace & Co., for many years a dominant influence on the economy of South America's west coast and today a multibillion-dollar conglomerate.

Grace ran away to New York at the age of 14 but later returned to Ireland. In 1850 he visited Callao, Peru, where he entered the shipping house of Bryce & Co. as a clerk, becoming a partner two years later. In 1854 the firm became Bryce, Grace & Co. and within a few years controlled much of the shipping along the coasts of Peru and Chile. His health declining, Grace turned the management of the firm over to his brother and left Peru in 1865.

In 1868 he organized the shipping firm of W.R. Grace & Co. in New York, serving ports on three continents and in the process winning a substantial portion of the U.S.–South American trade. Grace was the main arms supplier to Peru before and during its unsuccessful war with Chile in 1879–83, and after the war he assumed the country's staggering war debt. In return, his company received huge concessions from Peru in the form of silver mines, oil and mineral deposits, and guano deposits. Grace also invested extensively in commodities and real estate in Peru and Chile and had numerous other business interests both in the United States and abroad.

Grace became interested in politics and was twice elected mayor of New York, in 1880 and 1884. In 1892 he established the first direct steamship service between New York and Peru. He was a major contributor to the Irish famine relief effort in 1880.

Grace & Company, in full W.R. GRACE & COMPANY, leading American industrial company, with international interests in chemical products and natural resources. Headquarters are in New York City.

The company grew out of a Peruvian land and resource enterprise formed by William R. Grace in 1854. In 1865 Grace moved the business headquarters to New York, where the company expanded into shipping. The company was incorporated in the United States in 1899, and by the 1940s it held a half-interest in Panagra, a Latin-American airline.

Under president Peter Grace, the company changed from an agricultural and transportation firm with heavy South American investment to a diversified chemical giant. The shift away from Latin-American operations began in 1950; in 1970 the company's Peruvian industries were nationalized, and what had once constituted two-thirds of the company's sales by the end of the 1970s had been reduced to nothing. During the same period, the sale of chemicals and chemical products increased to more than half of annual revenues.

The chemical division produces a wide range of chemicals including fertilizers, ammonia, nitric acid, and hospital germicides. The company also has energy holdings in both natural gas and coal and operates drilling rigs, terminals, storage, and pipeline facilities.

grace note, musical note constituting or being part of an ornament. *See* appoggiatura.

Gracián (y Morales), Baltasar (b. Jan. 8, 1601, Belmonte de Calayatud, Spain—d. Dec. 6, 1658, Tarazona), philosopher and writer known as the leading Spanish exponent of

Gracián, drawing
Archivo Mas, Barcelona

conceptism (*conceptismo*), a style of dealing with ideas that involves the use of terse and subtle displays of exaggerated wit.

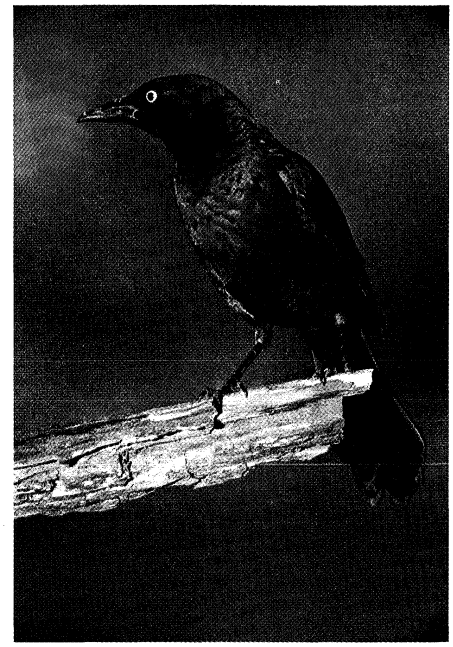
After studying at Calayatud and Zaragoza, Gracián entered the Jesuit order at the age of 18 and later became rector of the Jesuit college at Tarragona. His early works—*El héroe* (1637; *The Hero*), *El discreto* (1646; *The Compleat Gentleman*), and *El oráculo manual y arte de prudencia* (1647; *The Oracle*)—were largely efforts to educate people in the ethics of worldly life. His literary ideas on conceptism and the art of conceited writing (writing that continually shocks the reader by the use of startling metaphor) were clearly set forth in *Agudeza y arte de ingenio* (1642, 2nd ed. 1648; "Subtlety and the Art of Genius"). In defiance of his superiors, he published pseudonymously *El criticón* (1651, 1653, 1657; *The Critick*), a three-part philosophical novel, considered by the 19th-century German pessimistic philosopher Arthur Schopenhauer one of the most important books ever written. In it he examined society from the standpoint of a savage and gave the clearest statement of his pessimistic philosophy with its emphasis on willpower and struggle.

Gracias, city, southwestern Honduras. It lies in the valley of the Mejocote River at an elevation of 2,352 feet (717 m) above sea level, at the foot of Las Minas Hill in the Celaque Mountains. Founded in 1536, it is one of the oldest cities in Honduras. During the 16th and 17th centuries, it was a major mining and administrative centre, but it declined in the 18th century. Destroyed in 1915 by an earthquake, it has been rebuilt. Gracias is now the commercial centre for the surrounding agricultural lands, which yield corn (maize), wheat, rice, potatoes, and coffee; it also has a sawmill. Pop. (1983 est.) mun., 17,204.

Graciosa Island, Portuguese ILHA GRACIOSA, volcanic island, northernmost of the central Azores, east-central Atlantic. Part of the Angra do Heroísmo *distrito* ("district") of Portugal, the 23-square-mile (60-square-kilometre) island reaches a height of 1,338 feet (408 m) at the summit of Enxôfre Caldera, a volcanic crater. Dense vegetation is supported by the volcanic soils, and wine grapes, fruit, cereals, and cattle are raised. They are marketed through the principal settlements, Santa Cruz (north) and Praia. Discovered in 1451, the island may have been named Graciosa because it is less mountainous than other islands in the vicinity, including Terceira (35 miles [56 km] southeast). Graciosa Cave is a well-known cavern, with volcanic formations. Pop. (1987 est.) 5,600.

grackle, also called CROW-BLACKBIRD, any of several species belonging to the family Icteridae (order Passeriformes) that have iridescent black plumage and long tails. Grackles use their stout, pointed bills to snap up insects, dig grubs from the soil, and kill small vertebrates, including fishes and baby birds; they can also crack hard seeds. Most grackles nest in colonies; after breeding, they form large flocks and may damage crops.

The common grackle (*Quiscalus quiscula*) of North America is about 30 cm (12 inches) long. In the great-tailed and boat-tailed grackles (*Cassidix mexicanus* and *C. major*), the male has a long, deeply keeled tail: his total length may be 43 cm (17 inches). These



Common grackle (*Quiscalus quiscula*)
Thase Daniel

species are found in drylands of the southwestern United States to Peru and in salt marshes from New Jersey to Texas; the latter population, locally called jackdaws, is a separate species (*C. minor*). For the grackle of southern Asia, *see* mynah.

Grade, Lew, BARON GRADE OF ELSTREE, original name LEWIS WINOGRADSKY (b. Dec. 25, 1906, Tokmak, Russia), Russian-born British motion-picture, television, and theatrical producer.

The son of a Jewish tailor's assistant, he immigrated with his family to England in 1912 and dropped out of school at age 14 to help in the family business. At age 20 he changed his name to Grade and went into vaudeville as a charleston dancer. Soon he began representing other theatrical performers as a talent agent, and with his brother Leslie he went on to build Lew and Leslie Grade Ltd., which became the largest talent agency in Europe in the years after World War II. In the 1950s Grade became involved in British commercial television; the company he formed went on to produce several action-adventure series, including *Robin Hood, The Saint, The Avengers, The Prisoner,* and *Danger Man* (U.S. title *Secret Agent*). The best-known series he produced was the phenomenally popular *The Muppet Show.*

Grade was also one of the few successful British motion-picture producers in the late

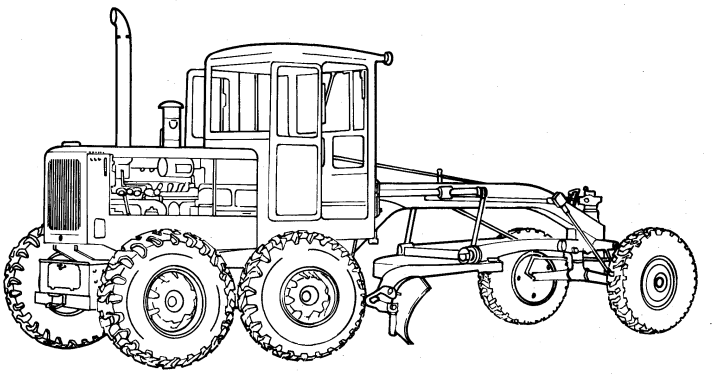
20th century, producing such films as *Desperate Characters* (1971), *The Tamarind Seed* (1974), *The Return of the Pink Panther* (1975), *The Eagle Has Landed* (1976), *The Boys From Brazil* (1978), *Autumn Sonata* (1978), *On Golden Pond* (1981), and *Sophie's Choice* (1982). He was knighted in 1969 and was created a life peer in 1976.

grade scale, in sedimentology, division of a continuous range of particle sizes into a series of discrete groups, called grades. Several such scales have been devised for the purpose of standardizing terms and providing a basis for statistical analysis. On most scales, the finest particles are designated clay, followed by silt and then sand; other grades, which vary from scale to scale, include granules, gravel, pebbles, cobbles, and boulders. The size limits for each grade vary from scale to scale. The Table gives several representative grade scales.

The scale devised (1898) by the American sedimentary petrologist J.A. Udden was adapted (1922) by C.K. Wentworth, who expanded the definitions of the various grades to conform with actual usage by researchers; most sedimentologists have adopted the Udden scale with the Wentworth modifications but with the elimination of the granule class.

graded school, also called GRADE SCHOOL, an elementary or secondary school in which the instructional program is divided into school years, known as grades or forms. At the end of each academic year, pupils move from one grade to the next higher in a group, with only an occasional outstanding achiever allowed to "skip" a grade, or advance beyond his fellows to a still higher grade. The practice of grading began in Germany as early as the 16th century and thence spread worldwide.

grader, in excavation, precision finishing vehicle for final shaping of surfaces on which pavement will be placed. Between its front and rear wheels a grader carries a broad mechanically or hydraulically controlled blade that can be extended from either side. Either end of the blade can be raised or lowered. Graders may be used for shallow ditching, but most models are used to assist other earth-moving equipment and to smooth roads, fills, and cuts.



Grader
By courtesy of Caterpillar Tractor Co.

gradient wind, hypothetical wind that accounts for air flow along a curved trajectory. It is an extension of the concept of geostrophic wind—*i.e.,* the wind assumed to move along straight and parallel isobars (lines of equal pressure). The gradient wind represents the actual wind better than does the geostrophic wind, especially when the wind speed and trajectory curvature are large, as they are in hurricanes and jet streams.

Whereas the geostrophic wind can be computed from the pressure distribution along a constant level surface or the slope distribution of a constant pressure surface, computation of the gradient wind also involves a knowledge of curvature (changes in wind direction). This information may be derived from the curvature of the isobars. Around a low-pressure centre, the pressure-gradient force directed inward balances the Coriolis force and the centrifugal force, both directed outward; because the Coriolis force acts to the wind's right in the Northern Hemisphere and to its left in the Southern, the wind blows counterclockwise along the curved isobars in the Northern Hemisphere and clockwise in the Southern Hemisphere. In contrast, around a high-pressure centre, the Coriolis force directed inward balances the centrifugal force and the pressure-gradient force, both directed outward; in this case, the wind blows clockwise in the Northern Hemisphere and counterclockwise in the Southern Hemisphere.

Grady, Henry Woodfin (b. May 24, 1850, Athens, Ga., U.S.—d. Dec. 23, 1889, Atlanta, Ga.), American journalist and orator who helped bring about industrial development in the South, especially through Northern investments, after the Reconstruction period (1865–77).

In 1876 Grady became a special reporter in Georgia for *The New York Herald,* and three years later he bought a quarter interest in *The Atlanta Constitution,* which under his leadership (1879–89) became the newspaper of largest circulation in the South.

Both in the *Constitution* and in his nationally

Grady
By courtesy of the Library of Congress, Washington, D.C.

Representative sedimentary grade scales

diameter millimetres	Hopkins (1899)	Udden (1914)	Wentworth (1922)	U.S. Bureau of Soils	diameter millimetres
2048			boulders		2048
1024					1024
512		boulders vc			512
256		c	cobbles		256
128		f			128
64		vf			64
32		vc			32
16		c	pebbles		16
8		gravel f			8
4		vf	granules		4
2	gravel	vc	vc	gravel	2
1		c	c	c	1
1/2	c	sand f	sand m	sand m	1/2
1/4	0.32	vf	f	f	1/4
1/8	sand m	vc	vf	0.1 vf	1/8
1/16	0.1 f	c		0.05	1/16
1/32	0.032	silt f	silt	silt	1/32
1/64	c	vf			1/64
1/128	0.01 silt m	vc		0.005	1/128
1/256	0.0032	c	clay		1/256
1/512	f	clay f		clay	1/512
1/1024	0.001	vf			1/1024
1/2048	clay				1/2048

publicized speeches, he promoted industrialization and crop diversification as means of revitalizing the South, and he urged a reasonable accommodation on the race issue. His most famous speech was in December 1886, when he spoke of "The New South" in New York City.

Graebe, Carl (b. Feb. 24, 1841, Frankfurt am Main—d. Jan. 19, 1927, Frankfurt am Main), German organic chemist who, assisted by Carl Liebermann, synthesized (1868) the orange-red dye alizarin, which quickly supplanted the natural dye madder in the textile industry.

A graduate of the University of Heidelberg, Graebe was a lecturer-assistant to Robert Wilhelm Bunsen. Later at Berlin, as a student of Adolf von Baeyer, who himself synthesized indigo, Graebe was directed to attempt the synthesis of alizarin. He showed it to be derived from a coal tar substance, anthracene, and prepared it from anthraquinone, a compound related to anthracene. He secured a patent for the process in June 1869. Professor at Königsberg (1870–77) and Geneva (1878–1906), Graebe introduced the chemical prefixes ortho-, meta-, and para- to indicate the structures of the three possible isomers of compounds in which two chemical groups are attached to the benzene ring.

Graebner, (Robert) Fritz (b. March 4, 1877, Berlin—d. July 13, 1934, Berlin), German ethnologist who advanced the theory of the *Kulturkreise,* or culture complex, which postulated diffusions of primitive culture spheres derived from a single archaic type. His scheme launched the culture-historical school of ethnology in Europe and stimulated much field research.

While a research assistant at the Royal Museum of Ethnology, Berlin (1899–1906), he classified the South Seas collection and, together with Bernhard Ankermann, a specialist in African ethnology, developed two lectures (1904) in which he sought to interpret the history of Oceania from a geographical diffusion of groupings of cultural traits. Mapping the diffusion, Graebner recognized the occurrence of cultural linkages and arranged traits into clusters, or complexes, and proposed a sequence of diffusions.

Graebner joined the Rautenstrauch-Joest Museum, Cologne, in 1906; later he attempted to apply the principles of *Kulturkreise* to larger areas. His *Methode der Ethnologie* (1911; "Method of Ethnology"), considered the foundation of the culture-historical approach to ethnology, offered guidelines for the study of cultural affinities and provided a model for the critical analysis and interpretation of ethnological sources.

While interned in Australia during World War I, he made a comparison of Indo-European, Hamito-Semitic, Mongolian, and Polynesian myths and studied various calendrical systems. These efforts were a significant preliminary for *Das Weltbild der Primitiven* (1924; "The World View of the Primitives"), in which he presented a broad historical theory, conceiving an archaic "advanced culture" that had spread throughout much of the world. He was director of the Cologne museum until illness forced his resignation in 1928.

Graeco- (combining form): *see under* Greco-.

Graetz, Heinrich (b. Oct. 31, 1817, Xions, Prussia—d. Sept. 7, 1891, Munich), German author of a major history of the Jews that became the first standard work in the field.

Greatly influenced by his studies with the renowned scholar Rabbi Samson Raphael Hirsch, Graetz became a teacher at the Breslau (now Wrocław, Pol.) seminary (1854), which taught a Conservative Judaism compatible with his belief that a Jewish theology should attempt to moderate between Orthodox literalism and Reform liberalism. He retained that post until the end of his life.

After his appointment (1869) to the faculty of Breslau University, Graetz began work on his 11-volume *Geschichte der Juden von den ältesten Zeiten bis auf die Gegenwart* (1853–76; "History of the Jews from Oldest Times to the Present"); a condensed English version was published as *History of the Jews,* 6 vol. (1891–98).

His work greatly influenced future historians of Judaism, although many of them criticized it. The Jewish historian Simon Dubnow (1860–1941), for example, while admitting his indebtedness to Graetz, found fault with the confusion provoked by Graetz's synchronic approach to chronology. Graetz had related the history of all Jews in the same period, even though they lived in different countries and observed different traditions. Dubnow also censured Graetz for his "spiritual" interpretation of history, an approach that he believed ignored the effects of economic and sociological factors.

Graf, Oskar Maria (b. July 22, 1894, Berg am Starnberger See, Ger.—d. June 28, 1967, New York City), German regional novelist and poet known for novels and sketches of Bavarian peasant life, such as *Kalender-Geschichten,* 2 vol. (1929, rev. 1957; "Calendar Histories"). Graf's writing is marked by frank realism and by his own socialist and pacifist beliefs, but these are tempered by humorous affection for his subjects.

Graf had only a limited education. He had been an apprentice baker but went to Munich at age 16, where he supported himself with a variety of menial jobs. He was a soldier at the Russian front during World War I. After his return he joined a revolutionary socialist group and participated in a strike by munitions workers and in the November Revolution that resulted in the short-lived Socialist Republic of Bavaria. After its demise in 1919, Graf worked as a director for the Munich Workers' Theatre before turning to writing. In 1933 Graf fled Germany, and in 1938 he left Europe and eventually settled in New York. His early work centres on themes of social revolution and protest, ideas that were never totally absent from his work, but he found his genre in stories of Bavarian folk life. He was concerned about the effects of modernity on traditional lives. Those fears are voiced in several novels about the future, in particular his utopian novel, *Die Eroberung der Welt* (1949; "The Conquest of the World"), reissued as *Die Erben des Untergangs* (1959; "The Heirs of the Ruins").

Consult the INDEX *first*

Graf, Urs (b. *c.* 1485, Solothurn, Switz.—d. 1527, Basel), Swiss draftsman, engraver, and goldsmith, known for his drawings, woodcuts, and etchings.

The son of a goldsmith, Hugo Graf, he probably studied first under his father and later at Basel, following the style of Albrecht Dürer and of Dürer's assistant, the German painter and draftsman Hans Baldung-Grien. Settling in Basel in 1509, Graf executed his masterpiece as a goldsmith, a reliquary of St. Bernard for the monastery of St. Urban in 1514, subsequently lost. Best known for his many drawings, Graf is represented by 100 extant woodcuts, a number of engravings, etchings, and nielli (engravings inlaid with niello, a silver sulfide or mixture of sulfides), and 200

"Girl Crossing a Stream," pen and ink drawing by Urs Graf, 1513; in the Albertina, Vienna

By courtesy of the Bild-Archiv, Osterreichische Nationalbibliothek, Vienna

drawings, most of them dated and signed with his monogram.

Graf Spee, in full ADMIRAL GRAF VON SPEE, German pocket battleship of 10,000 tons launched in 1936, more heavily gunned than any cruiser and with a top speed of 25 knots and an endurance of 12,500 miles.

After sinking several merchant ships in the Battle of the Atlantic, it was sighted on Dec. 13, 1939, off the Río de la Plata estuary by a British search group consisting of the "Exeter," the "Ajax," and the "Achilles," commanded by Commo. H. Harwood. At 6:14 AM Harwood's three ships attacked, but in a little more than an hour the "Graf Spee" had damaged the "Exeter" and driven off the other two cruisers. The "Graf Spee" then made off in the direction of Montevideo, where its commander, Capt. Hans Langsdorff, obtained permission to stay for four days to repair damage. The British devoted the period to intense diplomatic and intelligence activity in order to keep the "Graf Spee" in harbour while they brought up heavy reinforcements. On December 17, however, when the "Graf Spee" put to sea again, only the "Cumberland" had arrived to reinforce the "Ajax" and the "Achilles." The fight that the British had anticipated never took place: Captain Langsdorff, believing that a superior force awaited him, had his crew scuttle their ship; three days later Langsdorff shot himself.

Gräfe, Albrecht (Friedrich Wilhelm Ernst) von (b. May 22, 1828, Berlin—d. July 20, 1870, Berlin), German eye surgeon, considered the founder of modern ophthalmology.

Albrecht was the son of Karl Ferdinand von Gräfe, a noted surgeon. The creator of one of Europe's leading eye clinics (1850), Albrecht was first to recognize the importance to diagnosis of the German physiologist Hermann Helmholtz' ophthalmoscope (a perforated mirror used to inspect the interior of the eye). Working at the University of Berlin (1853–70), Gräfe developed several effective surgical remedies for eye disorders. He introduced (1857) iridectomy (surgical removal of part of the iris) for alleviation of glaucoma, a disease resulting in opacity of the lens; showed (1860) that blindness and visual defects connected with cerebral disorders are often traceable to optic neuritis, or inflammation of the optic nerve; and developed (1867) a surgical treatment for cataract by extraction of the lens.

He is best known for his description (1864)

of "Gräfe's sign" for exophthalmic goitre—failure of the upper eyelid to follow the eyeball when looking downward. Among his writings is *Handbuch der gesammten Augenheilkunde,* 7 vol. (1874–80; "Manual of Comprehensive Ophthalmology").

Gräfe, Karl Ferdinand von (b. March 8, 1787, Warsaw—d. July 4, 1840, Hannover, Hanover, Ger.), German surgeon who helped to create modern plastic surgery. A superintendent of German military hospitals during the Napoleonic Wars (1800–15), he also served as professor of surgery and director of the surgical clinic at the University of Berlin (1810–40). He improved the English surgeon Joseph Carpue's adaptation of the "Indian method" and revived the 16th-century surgeon Gasparo Tagliacozzi's "Italian method" of plastic surgery on the nose. The Indian method uses a skin graft from the forehead and the Italian from the upper arm. Gräfe also developed an operation for repairing a cleft palate and made technical improvements in the administration of blood transfusions. Gräfe's son, Albrecht, became a noted eye surgeon.

Karl von Gräfe, engraving by G. Metzeroth, c. 1845, after a portrait by an unknown artist

Archiv fur Kunst und Geschichte, West Berlin

graffito, plural GRAFFITI, any casual writing, rude drawing, or marking on the walls of buildings, as distinguished from a deliberate writing known as an inscription. Graffiti, either scratched on stone or plaster by a sharp instrument or, more rarely, written in red chalk or black charcoal, are found in great abundance; *e.g.,* on the monuments of ancient Egypt. The subject matter of the scribblings includes scrawls, rude caricatures, election addresses, and lines of poetry. Apparently, private owners of property felt the nuisance of the defacement of their walls: at Rome near the Porta Portese (formerly Porta Portuensis) was found an inscription begging persons not to scribble (*scariphare*) on the walls.

Graffiti are important to the paleographer as illustrating the forms and corruptions of the various alphabets used by the people, and may guide the archaeologist to the date of the building. Their chief value, however, is twofold. First, they are important to the linguist because the language of graffiti is closer to the spoken language of the period and place than usual written language; the linguist also learns about other languages, as in the case of the ancient Greek mercenaries who scribbled their names, in the Cypriote dialect and syllabary, on an Egyptian sphinx, or the Greek "tourist" from Pamphylia who carved his name on the great pyramid at Giza. Second, graffiti are invaluable to the historian for the light they throw on the everyday life of the man in the street of the period and on intimate details of customs and institutions. The graffiti dealing with the gladiatorial shows at Pompeii are in this respect particularly noteworthy.

The most famous graffito is that generally accepted as representing a caricature of Christ upon the cross found on the walls of the Domus Gelotiana on the Palatine in Rome in 1857 (now in the Museo Preistorico Etnografico Luigi Pigorini of the Collegio Romano).

In some ways graffiti may be thought of as a form of folk art. Twentieth-century preoccupation with the accidental and other manifestations of the unconscious has stimulated an interest in this form of self-expression, and the techniques and content of graffiti have influenced several contemporary artists. Graffiti achieved a notorious prominence in New York City in the late 20th century. Large, elaborate, and multicoloured graffiti created with spray paint on building walls and subway cars were both hailed as an innovative art form by aesthetes and condemned as a nuisance by the general public.

graft, (medicine): *see* transplant.

graft, in horticulture, the act of placing a portion of one plant (bud or scion) into or on a stem, root, or branch of another (stock) in such a way that a union will be formed and the partners will continue to grow. This term includes budding (bud grafting) and grafting proper (scion grafting and approach grafting or inarching). Budding and grafting proper differ only in the amount of plant material placed on the stock.

In modern horticulture grafting is used for a variety of purposes: to repair injured trees, to produce dwarf trees and shrubs, to strengthen plants' resistance to certain diseases, to retain varietal characteristics, to adapt varieties to adverse soil or climatic conditions, to ensure pollination, to produce multifruited or multiflowered plants, and to propagate certain species (such as hybrid roses) that can be propagated in no other way.

In theory any two plants that are closely related botanically and that have a continuous cambium can be grafted. Grafts between species are often successful, between genera occasionally so, between families nearly always failures. Within the genus the closeness of botanical relationship is not an infallible guide as to probable success, but in the absence of recorded experience it is the best available. The ability of two plants to continue to grow or be compatible when joined together by the asexual practice of grafting is mediated by many complex physiological and environmental factors.

Compatibility or congeniality in grafting is of various degrees. Apple grafted on oak fails immediately; apple grafted on pear may grow well for one or two years but gradually weakens and dies. Some lilacs exist for a number of years on privet stocks but fail ultimately. The common apricot is, other things being equal, the best stock for apricot varieties, but in moist soils in cool regions apricot trees flourish better on certain plum stocks than on apricot. These differences in adaptability of closely related plants that can be successfully grafted permit a greater degree of adjustment to soil conditions than would ordinarily be possible.

The establishment of union between grafted components is effected through the formation of a loose growth of cells (callus) contributed by both elements. These cells fuse into a mass so continuous in compatible grafts that the precise location of the line of union is frequently impossible to determine, even microscopically. Just as in wound healing, union proceeds more rapidly if the wounded areas are protected against drying out; and, in most forms of grafting, rapid knitting is essential to maintenance of life in the scion.

The principles involved in grafting are based on the matching of scion and stock cambiums (meristematic tissue, the cells of which are undifferentiated and capable of frequent cell division). Cambial tissue in most woody trees and shrubs is an inconspicuous single cell layer covering the central core of wood and lying directly beneath the bark.

The success or failure of any grafting operation is based upon the compatibility of each plant part, closeness of fit, and cambial contact. The union is initially held in place by pressure exerted by the stock, by grafting tape, or by rubber budding strips applied over the point of union.

Budding is effected by raising or removing a segment of bark of the stock and inserting a segment of the scion, containing a bud, into the wound thus made. In bud grafting involving fruit trees, the bark is lifted away from around an upright or inverted T-shaped incision, and the bud is then inserted under the bark and tied securely in place. Grafting, on the other hand, usually involves the use of the complete circumference of a plant as the scion. Certain types of grafts thus may necessitate sawing through the trunk and inserting the scion in vertical slits made between the bark and wood of the trunk's bared core.

Grafton, city and port, northeastern New South Wales, Australia, 42 mi (68 km) from the mouth of the Clarence River (and its Pacific outport of Yamba), in the North Coast district. The site was first settled in 1838 when the area was exploited by cedar getters. The city was proclaimed in 1885 and increased in size in 1956 by merging the municipalities of Grafton and South Grafton (both named after the Duke of Grafton) on opposite banks of the river (bridged in 1932). The district is a communications hub, lying at the junction of the Pacific and Gwydir highways, with air and rail links to Brisbane, Queensland, and Sydney (314 mi southeast), and is accessible from the sea by boats of moderate draft. The locale yields sugarcane, fruits, timber, corn (maize), dairy products, vegetables, oysters, and prawns. Industries include meat and dairy processing, brewing, and mining (coal, asbestos, limestone). Grafton is the seat of an Anglican bishop. The city is noted for its wide, tree-lined streets and for its annual Jacaranda Festival. Pop. (1981) 17,005.

Grafton, city, seat (1878) of Taylor County, northern West Virginia, U.S., on the Tygart Valley River, just southeast of Fairmont. Settled in 1852 by construction crews of the Baltimore and Ohio Railroad, who named it as the "graftin' on" point for branch rail lines, it was chartered in 1856. During the Civil War, as a key rail centre it was occupied by both Confederate and Federal troops. About 4,000 Federal soldiers camped there before the battle of Philippi (June 3, 1861), and Bailey Thornsbury Brown, reputedly the first Federal soldier to be killed in the war, was shot (May 22, 1861) there by Confederate sentries; he is buried at Grafton in the state's only national cemetery.

The celebration of Mother's Day is said to have started in Grafton when Anna Jarvis observed the anniversary of her mother's death in 1908 at the Andrews Methodist Church. Manufactures include textiles, glass, paper, and foundry products. Tygart Dam (completed 1938 to control Monongahela River flooding) and Tygart Lake State Park are nearby. Inc. 1899. Pop. (1980) 6,845.

Grafton, Augustus Henry Fitzroy, 3rd duke of (b. Oct. 1, 1735—d. March 14, 1811, Euston Hall, Suffolk, Eng.), British prime minister (1768–70) and a prominent figure in the period of the American Revolutionary War.

Grandson of the 2nd duke, Charles Fitzroy (1683–1757), and great-grandson of the 1st, he was educated at Westminster School and Peterhouse, Cambridge. He was secretary of state in 1765 under the Marquess of Rockingham but retired the following year. William Pitt formed a ministry in which Grafton was

first lord of the Treasury (1766). He led the ministry after Chatham's resignation in 1768. As a politician Grafton was diffident and ineffective. Political differences and the attacks of the press led to his resignation in January 1770. He was lord privy seal (1771–75) in Lord North's ministry but resigned because he was in favour of conciliatory action toward the American colonists. In the ministries (1782–83) of Lord Rockingham and Lord Shelburne he was again lord privy seal. In later years he was a prominent Unitarian.

Grafton, Henry Fitzroy, 1st duke of, also called (1672–75) EARL OF EUSTON (b. Sept. 20, 1663—d. Oct. 9, 1690, Cork, County Cork, Ire.), the second illegitimate son of Charles II of England by Barbara Villiers, duchess of Cleveland. After some initial hesitation he was officially recognized and became "the most popular and most able of the sons of Charles II."

He was provided for by a rich marriage in 1672 to Isabella, daughter and heiress of Henry Bennet, earl of Arlington, and at that time was created earl of Euston; in 1675 he was created duke of Grafton. He was brought up as a sailor and saw military service on the Continent and in the Barbary states. At James II's coronation he was lord high constable. In the rebellion of the Duke of Monmouth he commanded the royal troops in Somerset, but in 1688, with John Churchill (afterward duke of Marlborough), he seceded to William of Orange, in whose service he died after receiving a wound at the siege of Cork in Ireland. He was succeeded as 2nd duke by his son Charles (1682–1757).

Graham, Billy, byname of WILLIAM FRANKLIN GRAHAM, JR. (b. Nov. 7, 1918, Charlotte, N.C., U.S.), U.S. evangelist whose large-scale preaching tours, known as crusades, and friendship with numerous U.S. presidents brought him to international prominence.

The son of a prosperous dairy farmer, Graham attended rural public schools. He professed his "decision for Christ" at a revival meeting at the age of 16 and subsequently attended Bob Jones College (Cleveland, Tenn.) and Florida Bible Institute (near Tampa), both unaccredited Fundamentalist institutions. He began preaching in the Tampa area in 1938 and was ordained as a Southern Baptist minister a year later. Following graduation from Florida Bible Institute in 1940, he took a B.A. degree in anthropology from Wheaton (Illinois) College.

Graham's reputation as an evangelist grew steadily during and immediately after World War II as a result of his radio broadcasts, tent revivals, and featured appearances at George W. Wilson's "Youth for Christ" rallies in the United States and Great Britain. By 1950 he was widely regarded as Fundamentalism's chief spokesman. Through the Billy Graham Evangelistic Association he published his sermons, the magazine *Decision,* and numerous other works and conducted the widely televised international revival crusades that became his hallmark.

First invited to the White House by Harry S. Truman in 1949, Graham later became a frequent guest, confidant, and golf partner of presidents Dwight D. Eisenhower, Lyndon Johnson, and Richard M. Nixon.

Graham, Catharine Macaulay: *see* Macaulay, Catharine.

Graham, George (b. *c.* 1674, Horsgill, Cumberland, Eng.—d. Nov. 20, 1751, London), eminent watchmaker who invented the dead-beat escapement.

Graham was apprenticed to the renowned English watchmaker Thomas Tompion and eventually succeeded to Tompion's business and to his reputation as the best watchmaker of his time. He perfected the cylinder escapement designed by Tompion, which had been patented by Barlow, Houghton, and Tompion in 1695, as well as the dead-beat escapement, in which the escape wheel remains stationary when not moving forward. This combination produced a degree of accuracy surpassed only by Riefler 170 years later and was extensively adopted in the trade. Graham's timepieces were distinctive in that the ornamentation was made altogether subsidiary to the function.

During the terms of Edmond Halley and James Bradley as astronomers royal, Graham produced instruments to their specifications for the observatory at Greenwich. He also made astronomical devices for the French Academy of Sciences, and, for Charles Boyle, 4th earl of Orrery, he originated the device now called the orrery, a clockwork model showing the motions of the planets around the Sun.

Graham, James: *see* Montrose, James Graham, 5th earl and 1st marquess of.

Graham, Sir James (Robert George), 2ND BARONET (b. June 1, 1792, Netherby, Cumberland, Eng.—d. Oct. 25, 1861, Netherby), British politician, confidant and adviser of prime minister Sir Robert Peel, and the leading Peelite in the House of Commons after Peel's death (1850).

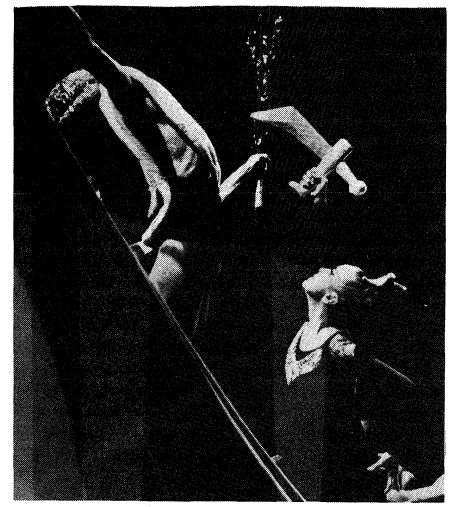
At first an advanced liberal member of the Whig Party, Graham helped to draft the first British electoral reform bill (1832). As first lord of the Admiralty (1830–34) in the 2nd Earl Grey's ministry, he reformed (1832) the administration of the Navy. As home secretary in Peel's second ministry (1841–46), he supported the repeal of the Corn Laws (tariffs on imported grain).

In the 4th Earl of Aberdeen's coalition government (1852–55) Graham once more served as first lord of the Admiralty. The navy's performance in the Crimean War (1853–56) was thought by some to reflect unfavourably on his stringent economy, but his earlier administrative streamlining spared the Navy much of the confusion that the British Army experienced in that war. He resigned shortly after the formation of the 3rd Viscount Palmerston's first ministry (1855–58). A notable biography is A.B. Erickson's *The Public Career of Sir James Graham* (1952).

Graham, Katharine, married name MRS. PHILIP L. GRAHAM (b. June 16, 1917, New York City), owner and publisher of *The Washington Post, Newsweek* magazine, and other U.S. publications. Katherine Graham succeeded her husband as president of the Washington Post Company upon his suicide in 1963, remaining in that post for 10 years. In 1973 she became chairman of the board and chief executive officer of the same company. She also owned several radio and television stations.

The daughter of the publisher Eugene Meyer and the educator Agnes Meyer, she attended Vassar College from 1934 to 1936, and then earned a bachelor of arts degree at the University of Chicago in 1938. In 1938 and 1939 she worked for the San Francisco *News.* She was a member of the board of directors of the Newspaper Publishers Association and a director of the Newspaper Advertising Bureau, Associated Press, the Trenton Times Corporation, and Newsweek, Inc. She received the John Peter Zenger Award in 1973.

Graham, Martha (b. May 11, 1893, Pittsburgh), influential U.S. dancer, teacher, and choreographer of modern dance, whose ballets and other works were intended to "reveal the inner man." Over more than 50 years she created more than 170 works, from solos to large-scale works, in most of which she danced herself.



Martha Graham as Clytemnestra
Martha Swope

Early life and works. Graham was one of three daughters of a physician who was particularly interested in the bodily expression of human behaviour. Her ancestry, on one side, went directly back to Myles Standish and, on the other, to what she herself has called "Black Irish," a combination that resulted in a strict Protestant upbringing but an early exposure to the ritual beauties of the Roman Catholic Church. After some time in the South, her family settled in Santa Barbara, Calif., where she discovered the rhythm of the sea and became acquainted with Oriental art, influences that were to be evident in her choreography throughout her career.

Her professional career began at Denishawn, the schools and dance company founded by Ruth St. Denis and Ted Shawn, where as a teenager she was introduced to a repertory and curriculum that, for the first time in America, explored the world's dances—folk, classical, experimental, Oriental, Occidental, and American Indian. She was entranced by the religious mysticism of St. Denis, but Shawn was her major teacher; he discovered sources of dramatic power within her and then channelled them into an Aztec ballet, *Xochitl.* The dance was a tremendous success both in vaudeville and in concert performance (in the latter, Shawn himself was her partner) and made her a Denishawn star.

She remained with Denishawn from 1916 to 1923, and, although she ultimately rebelled violently against its eclecticism, she later mirrored in her own works the Orientalism that pervaded the school, and she assumed something of St. Denis' attitude of a priestess when she herself became a senior dancer.

She eventually left Denishawn to become a featured dancer in the Greenwich Village Follies revue, where she remained for two years. Independence was not all she wanted, however; she was also searching for a new way of permitting the body to express itself in dance. In 1924 she went to the Eastman School of Music in Rochester, N.Y., to teach and to experiment.

Martha Graham made her New York City debut as an independent artist in 1926. Though some of the fruits of her experiments were discernible from the first, a good many of her dances, such as *Three Gopi Maidens* and *Danse Languide,* echoed her Denishawn past. The critics found her to be graceful and lyrical. All of that changed with her 1927 concert, and, for the next decade and more, her dances were to be referred to as ugly, stark, and obscure. The exotic costumes and rich staging of Denishawn were in the past. Among the dances of her 1927 program was *Revolt,* probably the first dance of protest and social comment staged in the United

States, which was set to the avant-garde music of Arthur Honegger. The audience was not impressed; dancers and theatregoers, famous and unknown, ridiculed her. Fanny Brice, the popular comedienne, satirized her in a revue. Graham herself later referred to this decade as "my period of long woolens," a reference to the plain jersey dress that she wore almost as a uniform.

A strong and continuing influence in her life was Louis Horst, musical director at Denishawn, who had left the school two years after Graham. He became her musical director, often composing pieces for her during her first two decades of independence; they remained close until his death in 1964. Among his most noted scores for her were those for the now historic *Frontier,* a solo dance, and *Primitive Mysteries,* written for Graham and a company of female dancers.

Frontier (1935) initiated the use of decor in her repertoire and marked the beginning of a long and distinguished collaboration with the noted Japanese-American sculptor Isamu Noguchi, under whose influence she developed one of her most singular stage innovations, the use of sculpture, or three-dimensional set pieces, instead of flats and drops. This production illustrated her concept of dance.

Maturity. For Martha Graham, the dance, though it is in part a narrative medium, can also, like the spoken drama, explore the spiritual and emotional essence of man. Thus, the choreography of *Frontier* symbolized the frontier woman's achievement of mastery over an uncharted domain. In *Night Journey* (1948), a work about the Greek legendary figure Jocasta, the whole dance-drama takes place in the instant when Jocasta learns that she has mated with Oedipus, her own son, and has borne him children. The work treats Jocasta rather than Oedipus as the tragic victim, and shows her reliving the events of her life and seeking justification for her actions. In *Letter to the World* (1940), a work about Emily Dickinson, several characters are used to portray different aspects of the poet's personality.

For more than 10 years Graham's company consisted solely of women, but her themes were beginning to call for men as well. She engaged Erick Hawkins, a ballet dancer, to join her company, and he appeared with her in a major work, *American Document* (1938). Though she and Hawkins ultimately were married, the marriage did not last.

In a career spanning more than half a century, Martha Graham created a succession of dances, ranging from solos to large-scale creations of full-program length such as *Clytemnestra* (1958). For her themes she almost always turned to human conflicts and emotions. The settings and the eras vary, but her great gallery of danced portraits never fails to explore the inner being. She created some dances from American frontier life, the most famous of which is *Appalachian Spring* (1944), with its score by Aaron Copland. Another source was Greek legend, the dances rooted in classical Greek dramas, stories, and myths. *Cave of the Heart* (1946), based on the figure of Medea, with music by Samuel Barber, was not a dance version of the legend but rather an exposure of the Medea latent in every woman who, out of consuming jealousy, not only destroys those she loves but herself as well. Later works by Graham also borrowed from Greek legend, including *Errand into the Maze* (1947), an investigation of hidden fears presented through the symbols of the Minotaur and the labyrinth; *Alcestis* (1960); *Phaedra* (1962); and *Circe* (1963). Biblical themes and religious figures also inspired her: *Seraphic Dialogue* (1955; Joan of Arc), *Embattled Garden* (the Garden of Eden), *Legend of Judith* (1962), and such fanciful abstractions as *Diversion of Angels* (1948) or *Acrobats of God* (1960). Her later works included *The Witch of Endor* (1965), *Cortege of Eagles* (1967), *The Archaic Hours* (1969), *Mendicants of Evening* (1973), *Lucifer* (1975), *The Owl and the Pussycat* (1978), and *Frescoes* (1980). In the early 1980s she created neoclassical dances, beginning with *Acts of Light* (1981).

Graham, whose stage presence was one of commanding stature and great dynamic force, was, in fact, a tiny woman. An indefatigable worker, quick-tempered, terrifying in her rages, she was also sunny, kind, and humorous and generous with her company and her students and friends. In 1970 she announced her retirement as a dancer but continued to create dances and to teach.

Assessment. Martha Graham created a dance technique rooted in the muscular and neuromuscular responses of the body to both inner and outer stimuli. Her technique is the most highly developed body-training method in the entire field of modern dance, requiring both unrelenting discipline and prodigious virtuosity.

Throughout most of her career she maintained a position as the foremost figure in U.S. modern dance, for, although movements that were once avant-garde became familiar, her art and craftsmanship can still startle and surprise. She instructed, or guided, generations of modern dance teachers both in the United States and abroad and toured Europe, the Orient, and the Middle East with her company. She strongly influenced succeeding generations of modern dancers, ballet choreographers, stagers of musicals and operas, creators of dance-dramas, and directors of motion pictures and television. From the "long woolens" of the 1920s, Martha Graham moved to some of the most opulent productions to be found in modern dance, with an accent on sculptured pieces and brilliant costumes and properties. She was the recipient of many awards and honours, including the Medal of Freedom, the highest civilian award in the United States. (W.T.)

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Graham, Otto (Everett, Jr.), byname AUTOMATIC OTTO (b. Dec. 6, 1921, Waukegan, Ill., U.S.), U.S. collegiate and professional football player and coach, best remembered as the quarterback of the Cleveland Browns during a 10-year period in which they won 105 games, lost 17, and tied 5 in regular-season play and won 7 of 10 championship games.

Graham was an all-around athlete in high school, competing in baseball, football, basketball, swimming, and track. At Northwestern University (Evanston, Ill.; 1941–43) he won three letters each in football and basketball and two in baseball. He was named All-American in football (1943) and in 1944 joined the Navy and trained as an aircraft pilot. He was sent to Colgate University (Hamilton, N.Y.), where he played basketball and was named All-American.

Graham began his professional career in sports playing for the Rochester Royals in the National Basketball League; he switched to football, playing for the Cleveland Browns (All America Football Conference, 1946–49; the National Football League [NFL], 1950–55). As a professional player he switched from his collegiate position at tailback to quarterback. He led his league as a passer in six seasons; in the 1950 NFL championship game, he passed for four touchdowns; in the 1954 championship game he passed for three and ran for three more. His career average yardage per pass of 8.63 yards was not surpassed until the 1980s. His passing average in 1955 was 10.55 yards. He was elected to the football Hall of Fame in 1965.

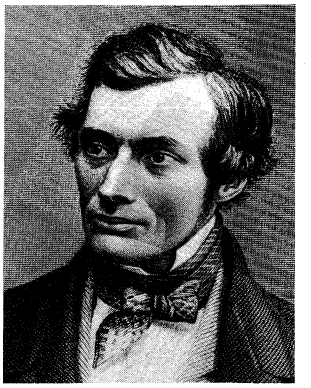
After retiring as a player he was head coach and athletic director of the U.S. Coast Guard Academy (New London, Conn.; 1959–66). He then served as general manager and coach of the NFL Washington Redskins (1966–68), returning in 1970 as athletic director of the Coast Guard Academy, attaining the rank of captain. He retired in 1984.

Graham, Sylvester (b. July 5, 1794, West Suffield, Conn., U.S.—d. Sept. 11, 1851, Northampton, Mass.), U.S. clergyman whose advocacy of a health regimen emphasizing temperance and vegetarianism found lasting expression in the graham cracker, a household commodity in which lay the origin of the modern breakfast-cereal industry.

After working at a variety of odd jobs, Graham became a Presbyterian minister in 1826 but preached little. He is best known for his advocacy of unsifted, coarsely ground wheat (graham) flour and his invention of the graham cracker (1829). At the height of his popularity, Graham lectured widely. He recommended a complete health regimen, including hard mattresses, cold showers, and a diet consisting of homemade bread (he was attacked once by a mob of bakers and butchers), rough cereals, fruits, and vegetables. Temperance (Graham) boardinghouses opened in New York City and Boston, and many Grahamites lived at Brook Farm (near Boston), a famous experiment in communal living.

Graham, Thomas (b. Dec. 20, 1805, Glasgow—d. Sept. 11, 1869, London), British chemist often referred to as "the father of colloid chemistry."

Educated in Scotland, Graham persisted in becoming a chemist, though his father disapproved and withdrew his support. He then made his living by writing and teaching. He was a professor at a school in Edinburgh



Thomas Graham, engraving by C. Cook after a photograph
BBC Hulton Picture Library

(1830–37) and at University College, London (1837–55), and was master of the mint (1855–69).

Graham's first important paper dealt with the diffusion of gases (1829). He developed "Graham's law" of the diffusion rate of gases and also found that the relative rates of the effusion of gases are comparable to the diffusion rates. From examining the diffusion of one liquid into another, he divided par-

ticles into two classes—crystalloids, such as common salt, having high diffusibility; and colloids, such as gum arabic, having low diffusibility. He devised dialysis, a method for separating colloids from crystalloids, and also proved that the process of liquid diffusion causes partial decomposition of certain chemical compounds. He invented many of the terms used in colloid chemistry.

In 1833 Graham studied the three forms of phosphoric acid, and from this work the concept of polybasic acids developed. In 1835 he reported on the properties of the water of crystallization in hydrated salts; he also obtained definite compounds of salts and alcohol, the "alcoholates," analogues of the hydrates. In his final paper he described palladium hydride, the first known instance of a solid compound formed from a metal and a gas.

Graham Land (Antarctica): *see* Antarctic Peninsula.

Graham of Claverhouse, John: *see* Dundee, John Graham of Claverhouse, 1st Viscount.

Grahame, Kenneth (b. March 8, 1859, Edinburgh—d. July 6, 1932, Pangbourne, Berkshire, Eng.), author of *The Wind in the Willows* (1908), one of the English classics of children's literature. Its animal characters—principally Mole, Rat, Badger, and Toad—combine captivating human traits with authentic animal habits. It is a story that adults have enjoyed as much as children.

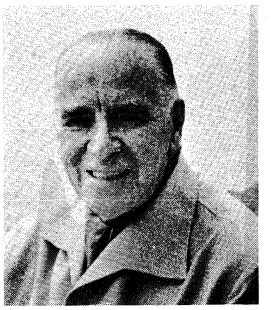
Orphaned at an early age, he went with his two brothers and his sister to live with his grandmother in England and attended St. Edward's School, Oxford. Money was lacking for him to go to the university; hence his family guided him into a career at the Bank of England, with which he stayed until ill health compelled him to retire in 1907. Meanwhile he contributed articles to such journals as the *St. James Gazette* and the *Yellow Book* and published collections of sketches, stories, and essays—*Pagan Papers* (1893), *The Golden Age* (1895), and *Dream Days* (1898)—all of which reveal his sensitive understanding of childhood.

Grahame
BBC Hulton Picture Library

The Wind in the Willows was dramatized by A.A. Milne as *Toad of Toad Hall* (1930) and became a frequently performed Christmas play.

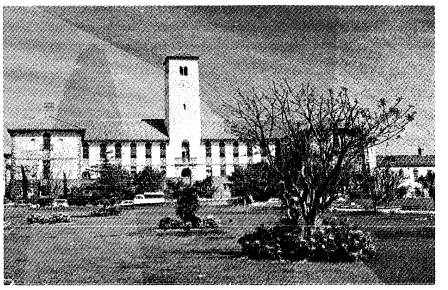
Grahame-White, Claude (b. Aug. 21, 1879, Bursledon, Hampshire, Eng.—d. Aug. 19, 1959, Nice, Fr.), English aviator who founded the first British flying school, in 1909, at Pau, Fr.

Educated at Bedford in engineering, Grahame-White owned one of the first gasoline-driven motorcars in England and worked at a motor engineering business in London until he became interested in aeronautics in 1909. On Jan. 4, 1910, he gained the first English aviator's certificate of proficiency. Also in 1910 he flew many flying races in Europe and in the United States, where he won the Gordon Bennett Cup. In 1911 Grahame-White joined a company to run the Hendon Aerodrome, near London. At the outbreak of World War I he was commissioned in the Royal Naval Air Service, but in August 1915 he was recalled to superintend the construction of government planes. He wrote on the history, technical development, and military use of aircraft. A biography by Graham Wallace appeared in 1960.



Grahame-White
Camera Press

Grahamstown, Afrikaans GRAHAMSTAD, city, southeastern Cape Province, South Africa, on the wooded slopes of the Suurberge near the source of the Kowie River. It was founded (1812) by Col. John Graham as a frontier garrison post near Xhosa territory, and British settlers arrived in 1820. The city contains many memorials to the "Kaffir Wars," which were fought in the vicinity. Grahamstown is noted for its old religious architecture, especially the Anglican Cathedral of St. Michael and St. George, which has a 150-ft (46-m) spire and includes part of the original church (1824–30); St. Patrick's Roman Catholic Church (1836); and the first Baptist and Methodist chapels in South Africa. Grahamstown is the site of Rhodes University (1904), the 1820 Settlers Memorial Museum (1965) and Nature Reserve, several important public and private schools, the Albany Museum (1855), the Public Library with its collection of rare 19th-century South African books, and the Leather Research Institute. Inc. city, 1950. Pop. (1978 est.) mun., 53,168.



The Administration Building of Rhodes University, Grahamstown, S.Af.
J. Allan Cash—EB Inc.

Grahn, Lucile (b. June 30, 1819, Copenhagen—d. April 4, 1907, Munich), choreographer and one of the most celebrated ballerinas of her time. Called "the Taglioni of the North," she was noted for lightness and technical virtuosity, especially in her pirouettes.

She studied under August Bournonville at the Royal Danish Ballet School in Copenhagen, made her debut in 1829, and danced the title roles in Bournonville's *Valdemar* (1835) and *La Sylphide* (1836), both of which he created for her. Quarrels with Bournonville led to her virtual exile from Denmark after 1839, but she enhanced her international reputation with guest performances in Paris, St. Petersburg, and London, where at Her Majesty's Theatre she danced with Marie Taglioni, Carlotta Grisi, and Fanny Cerrito in the historic 1845 production of Jules Perrot's *Pas de quatre.* Among her greatest roles were Giselle and Esmeralda.

Grahn was especially popular in Germany and Austria. After her marriage to the opera singer Friedrich Young (1856), she retired from dancing and became ballet mistress at the Leipzig State Theatre (1858–61) and at the Munich Opera (1869–75), where she choreographed opera ballets that included the "Bacchanale" in Wagner's *Tannhäuser.* At her death she left almost a million marks to Munich, and a street near the opera house was named Lucile Grahn Strasse.

Lucile Grahn in *La Cracovienne*, lithograph by Pierre-Émile Desmaisons, 1844
By courtesy of the Victoria and Albert Museum, London

Graian Alps, French ALPES GRÉES, or ALPES GRAIES, Italian ALPI GRAIE, northern segment of the Western Alps along the French-Italian border, bounded by Mont Cenis and the Cottian Alps (*qq.v.*; southwest), the Isère and Arc valleys (west), the Little St. Bernard Pass (north), and the Dora Baltea River Valley (northeast). Many of the peaks are glacier-covered and rise to more than 12,000 ft (3,660 m); the highest is Gran Paradiso (*q.v.*; 13,323 ft). The Savoy Alps (*q.v.*) are considered northwestern spurs of the range. The main activities of the region are mountain climbing and skiing.

Grail, also called HOLY GRAIL, object of legendary quest for the knights of Arthurian romance. The term evidently denoted a wide-mouthed or shallow vessel, though its precise etymology remains uncertain. Possibly inspired by classical and Celtic mythologies—which abound in horns of plenty, magic life-restoring caldrons, and the like—the first extant text to give such a vessel Christian significance as a mysterious, holy object was Chrétien de Troyes's late 12th-century unfinished romance *Perceval,* or *Le Conte du Graal,* which introduces the guileless rustic knight Perceval, whose dominant trait is innocence. In it the religious is combined with the fantastic. Early in the 13th century, Robert de Borron's poem *Joseph d'Arimathie,* or the *Roman de l'estoire dou Graal,* extended the Christian significance of the legend, while Wolfram von Eschenbach gave it profound and mystical expression in his epic *Parzival.* (In Wolfram's account the Grail became a precious stone, fallen from heaven.) Prose versions of Robert de Borron's works began to link the Grail story even more closely with Arthurian legend. A 13th-century German romance, *Diu Krône,*

made the Grail hero Sir Gawain, while the *Queste del Saint Graal* (which forms part of what is called the Prose *Lancelot*, or Vulgate cycle) introduced a new hero, Sir Galahad. This latter work was to have the widest significance of all, and its essence was transmitted to English-speaking readers through Malory's late 15th-century prose *Le Morte Darthur.*

Robert de Borron's poem recounted the Grail's early history, linking it with the cup used by Christ at the Last Supper and afterward by Joseph of Arimathea to catch the blood flowing from Christ's wounds as he hung upon the Cross. The *Queste del Saint Graal* went on to create a new hero, the pure knight Sir Galahad, while the quest of the Grail itself became a search for mystical union with God. Only Galahad could look directly into the Grail and behold the divine mysteries that cannot be described by human tongue. The work was clearly influenced by the mystical teachings of St. Bernard of Clairvaux, the states of grace it describes corresponding to the stages by which St. Bernard explained man's rise toward perfection in the mystical life. The work gained an added dimension by making Galahad the son of Lancelot, thus contrasting the story of chivalry inspired by human love (Lancelot and Guinevere) with that inspired by divine love (Galahad). In the last branch of the Vulgate cycle, the final disasters were linked with the withdrawal of the Grail, symbol of grace, never to be seen again.

Thus, the Grail theme came to form the culminating point of Arthurian romance, and it was to prove fruitful as a theme in literature down to the 20th century.

grain (agriculture): *see* cereal.

grain (botany): *see* caryopsis.

grain, in metallurgy, any of the crystallites (small crystals or grains) of varying, randomly distributed, small sizes that compose a solid metal. Randomly oriented, the grains contact each other at surfaces called grain boundaries. The structure and size of the grains determine important physical properties of the solid metal. Grains of a metal ingot can be elongated and locked together by rolling to improve the mechanical properties in the direction of grain length. Internal stresses at grain boundaries may be relieved by annealing to restore exhausted ductility in certain alloys or to harden other alloys.

grain, unit of weight equal to 0.065 gram, or 1/7,000 pound avoirdupois. One of the earliest units of common measure and the smallest, it is a uniform unit in the avoirdupois, apothecaries', and troy systems. The ancient grain, varying from one culture to the next, was defined as the weight of a designated number of dry wheat (or other edible grain) kernels taken from the middle of the ear. The Sumerian shekel equalled the weight of 180 wheat grains; the British silver penny sterling was set at the weight of 32 wheat grains. The metric grain of 50 milligrams is used to weigh precious stones.

grain alcohol: *see* ethyl alcohol.

Grain Coast, section of the western coast of the Gulf of Guinea, in Africa, extending approximately from Cape Mesurado to Cape Palmas—in present-day Liberia—on either side of the Cestos River. It was primarily a sphere of Afro-Portuguese trade. The name of the coast originates in the early trade in "grains of paradise," or the dried fruits of Guinea pepper (*Xylopia aethiopica*).

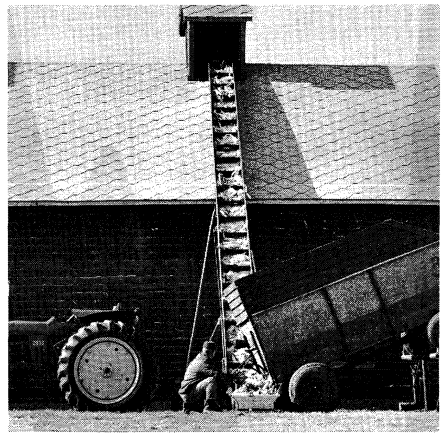
grain drill, machine for planting seed at a controlled depth and in specified amounts. The earliest known version, invented in Mesopotamia by 2000 BC, consisted of a wooden plow equipped with a seed hopper and a tube that conveyed the seed to the furrow. By the 17th century, metering systems were in use to ensure accuracy of the rate of planting; most consisted of wheels bearing small spoons that dipped into the seed hopper and guided it to the furrows in standard amounts.

Modern grain drills have a variety of metering systems and furrow openers. In general,

Grain drill in operation
By courtesy of International Harvester Co.

the metering device—spoon, cup, fluted roll, or other—passes the seed by tube to one of several furrow openers, forced into the soil by springs or weights, with a short length of chain dragged behind to cover the seed. Drill widths are determined by the number and spacing of furrow openers.

grain elevator, storage building for grain, usually a tall frame, metal, or concrete structure with an especially compartmented interior; also, the device for loading grain into a building. Early elevators were powered by animals; modern facilities use internal-combustion engines or electric motors. One prevalent mechanism consists of a hopper, a long rectangular open trough, and an endless vertical belt or chain with flights (crosspieces) for conveying the grain to the top of the stack. The force of gravity enables elevated grain to be unloaded quickly and easily from chutes. Usually located near railway lines, most grain elevators were until the 1930s owned by railroad companies; ownership today is generally



Flight grain elevator moving ear corn into a crib in a barn
By courtesy of John Deere

cooperative or private. The grain-storage facility on a farm is usually called the granary or crib.

grain weevil, also called GRANARY WEEVIL (*Sitophilus granarius*), insect of the family Curculionidae (order Coleoptera), a common pest of stored grain. This small brown weevil is about 3 to 4 millimetres long. The female bores a hole in an individual cereal grain and implants an egg in it. The fleshy white larva feeds on and then pupates inside the grain, which may be of dried corn (maize), oats, wheat, or allied plants. The adults also feed on cereal grains. When disturbed, the adult weevils feign death.

Grainger, Percy (Aldridge), original name GEORGE PERCY GRAINGER (b. July 8, 1882, Melbourne—d. Feb. 20, 1961, White Plains, N.Y.), Australian-born American composer, pianist, and conductor, also known for his work in collecting folk music, in the process of which he pioneered the use of wax-cylinder phonograph recording.

Grainger first appeared publicly as a pianist at age 10. He was educated at home in Melbourne by his mother. He studied piano with Louis Pabst in that city and later went to Frankfurt, where he attended the conservatory. While in Germany he took a few lessons from Ferruccio Busoni, the influential composer and teacher. In 1906 Grainger became a friend of Edvard Grieg, under whose influence he began collecting and notating English folk songs. He settled in the United States in 1914, performing for a few years with a U.S. Army band.

Grainger was deeply affected by the suicide of his mother in 1922. He returned to Aus-

Grainger, 1916
By courtesy of the Library of Congress, Washington, D.C.

tralia alone in 1924 and toured there as a pianist in 1926 and again in 1934–35. In 1932 he became head of the music department of New York University. In 1935 he founded the Grainger Museum at Melbourne, a museum of Australian music where much of his own work and some of his artifacts are preserved.

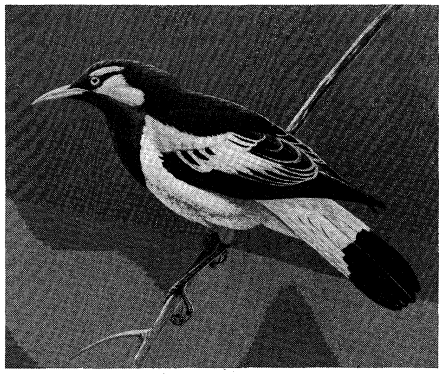
Grainger is probably best remembered for *Country Gardens* and for the orchestral work *Molly on the Shore,* both of which he considered "fripperies." Other orchestral works are *Shepherd's Hey* and *Mock Morris.* In his chamber works, notably the two *Hill Songs* for 23 and 24 solo instruments, he experimented with novel rhythmic and structural forms. He also worked with Dom Anselm Hughes on an edition of medieval English music.

grains of paradise, also called GUINEA GRAINS, or MELEGUETA PEPPER, pungent seeds of *Aframomum melegueta,* a reedlike plant of the family Zingiberaceae. Grains of paradise have long been used as a spice and traditionally as a medicine. The wine known as hippocras was flavoured with them and with ginger and cinnamon. The plant is native to tropical western Africa and to São Tomé and Príncipe islands in the Gulf of Guinea; it is cultivated in other tropical countries. Grains of paradise are exported from Ghana.

The seeds are contained in the acid pulp of the fruit and have a glossy, dark-brown husk, with a conical, light-coloured membranous caruncle at the base and a white kernel. They

contain a neutral essential oil and a viscid, brown resin.

Grallinidae, bird family (order Passeriformes) that includes the mudlark, apostlebird, and white-winged chough. The four species, generally restricted to Australia and New Zealand, are 19 to 50 centimetres (7½ to 20 inches) long. They are sometimes called mudnest builders; high in a tree they make bowl-shaped nests of mud, using hair, grass, or feathers as binder. Several birds cooperate in building each nest, and two or more females may lay their eggs in it. Grallinids are weak-winged birds that progress, in trees or on the ground, by walking. The mudlark (*Grallina cyanoleuca*) is a familiar open-country species.



Mudlark (*Grallina cyanoleuca*)
Painting by John P. O'Neill

gram (seed): *see* chick-pea.

gram, also spelled GRAMME, the basic metric unit of mass or weight, used especially in the centimetre-gram-second system of measurement. The gram mass is equal to 0.001 kilogram, or about 0.04 ounce. Abbreviated gm, or g, the gram is very nearly equal (it was originally intended to be equal; *see* metric system) to the mass of one cubic centimetre of pure water at its maximum density. The gram of force is equal to the weight of a gram of mass under standard gravity. For greater precision, the mass may be weighed at a point at which the acceleration due to gravity is 980.655 cm/sec^2.

gram stain, an important and widely used microbiological staining technique that greatly aids in the identification and characterization of a given bacterium or yeast. It was devised by a Danish physician, Dr. Hans Christian Gram, in 1884. A slide containing properly preserved specimens is treated with crystal-violet stain, followed by iodine solution, alcohol, and a counterstain, such as safranin. Bacteria that retain the crystal violet are termed gram positive; those that lose the violet but are counterstained red by the safranin are called gram negative.

The gram reaction reflects a fundamental distinction between these two groups, which is expressed by differences in their properties.

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grama grass, any of about 50 species of annual or perennial forage grasses constituting the genus *Bouteloua* (family Poaceae), native mostly to North America, with a few species in Central and South America. Grama grasses may grow in tufts or clumps or spread by creeping horizontal stems above or below ground.

Sideoats grama (*B. curtipendula*), blue grama (*B. gracilis*), black grama (*B. eriopoda*), and hairy grama (*B. hirsuta*) are the most important North American range species. Other common names include mat, needle, Parry, purple, Rothrock, six-weeks, and slender.

Sideoats grama (*Bouteloua curtipendula*)
A to Z Botanical Collection—EB Inc.

grāmadevatā (Sanskrit: "village deity"), type of folk deity widely worshipped in rural India. The *grāmadevatās*, often female figures, may have originated as agricultural deities; in South India and elsewhere they continue to be propitiated with animal sacrifices as a way of warding off and removing epidemics, crop failures, and other natural disasters.

The *grāmadevatās* coexist side by side with the Brahmanical gods of modern Hinduism. Many *grāmadevatās* are purely local deities. Spirits of the place (the crossroads, the boundary line), spirits of those who die a violent or untimely death, and tree and serpent spirits may also be treated as *grāmadevatās*. They are worshipped in the form of earthenware icons or shapeless stones, established in simple shrines or on platforms set up under a village tree, only occasionally in more imposing buildings.

Grāmadevatā, terra-cotta horses, votive offerings to the village god Aiyaṉar, Tamil Nadu state, India, 17th–18th century
From *The Everyday Art of India* by R.F. Bussabarger and B.D. Robins

An exceptional male village deity is Aiyaṉar, who in South India is the village watchman and whose shrine is always separate from those of the female goddesses. A similar male deity, known variously as Dharma-Ṭhakur, Dharma-Rāj, and Dharma-Rāy, is found in Bengali villages.

Gramineae (grass): *see* Poaceae.

grammar, rules of a language governing the sounds, words, sentences, and other elements and language features and their combination and interpretation; also, the study of these abstract features or a book presenting the rules.

A brief treatment of grammar follows. For full treatment, *see* MACROPAEDIA: Linguistics.

Contemporary linguists define grammar as the underlying structure of a language that any native speaker of that language knows intuitively. The systematic description of the features of a language is also a grammar. These features are the phonology (sound), morphology (system of word formation), syntax (patterns of word arrangement), and semantics (meaning) that all native speakers of a language control by about the age of six. Depending on the grammarian's approach, a grammar can be prescriptive (*i.e.*, provide rules for correct usage), descriptive (*i.e.*, describe how a language is actually used), or generative (*i.e.*, provide instructions for the production of an infinite number of sentences in a language). Each focusses on different features of a language and uses different data on which to build theory.

In Europe the Greeks were the first to write grammars. To them, grammar was a tool that could be used in the study of Greek literature; hence their focus on the literary language. The Alexandrians of the 1st century BC further developed Greek grammar in order to preserve the purity of the language. The earliest Greek grammatical terms are found in works of philosophy or rhetoric. Dionysus Thrax of Alexandria later wrote a treatise called *The Art of Grammar*, in which he analyzed literary texts in terms of letters, syllables, and eight parts of speech.

The Romans adopted the grammatical system of the Greeks and applied it to Latin. Except for Varro, of the 1st century BC, who believed that grammarians should discover structures, not dictate them, most Latin grammarians did not attempt to alter the Greek system and also sought to protect their language from decay. Whereas the model for the Greeks and Alexandrians was the language of Homer, the works of Cicero and Virgil set the Latin standard. The works of Donatus (4th century AD) and Priscian (6th century AD), the most important Latin grammarians, were widely used to teach Latin grammar during the Middle Ages. In medieval Europe, education was conducted in Latin, and Latin grammar became the foundation of the liberal arts curriculum. Many grammars were composed for students during this time. Aelfric, the abbot of Eynsham (11th century), who wrote the first Latin grammar in Anglo-Saxon, proposed that this work serve as an introduction to English grammar as well. Thus began the tradition of devising English grammar according to a Latin model.

The *modistae*, grammarians of the mid-13th to mid-14th century who viewed language as a reflection of reality, looked to philosophy for explanations of grammatical rules. The *modistae* sought one "universal" grammar that would serve as a means of understanding the nature of being. In 17th-century France a group of grammarians from Port-Royal were also interested in the idea of universal grammar. They claimed that common elements of thought could be discerned in grammatical categories of all languages. Unlike their Greek and Latin counterparts, the Port-Royal grammarians did not study literary language but claimed instead that usage should be dictated by the actual speech of living languages. The 20th-century linguist Noam Chomsky has called the Port-Royal group the first transformational grammarians.

By 1700 grammars of 61 vernacular languages had been printed. These were written primarily for purposes of reforming, purifying, or standardizing language and were put to pedagogical use. Rules of grammar usually accounted for formal, written, literary language only and did not apply to all the varieties of actual, spoken language. This prescriptive approach long dominated the schools, where the study of grammar came to be associated with "parsing" and sentence diagramming.

The simplification of grammar for classroom use contrasted sharply with the complex studies that scholars of linguistics were conducting about languages. During the 19th and early 20th centuries the historical point of view flourished. Scholars who realized that every living language was in a constant state of flux studied all types of written records of modern European languages to determine the courses of their evolution. They did not limit their inquiry to literary languages but included dialects and contemporary spoken languages as well. Historical grammarians did not follow earlier prescriptive approaches but were interested, instead, in discovering where the language under study came from.

As a result of the work of historical grammarians, scholars came to see that the study of language can be either diachronic (its development through time) or synchronic (its state at a particular time). The Swiss linguist Ferdinand de Saussure and other descriptive linguists began studying the spoken language. They collected a large sample of sentences produced by native speakers of a language and classified their material starting with phonology and working their way to syntax.

Generative, or transformational, grammarians, such as Noam Chomsky, of the second half of the 20th century have studied the knowledge that native speakers possess which enables them to produce and understand an infinite number of sentences. Whereas descriptivists like Saussure examined samples of individual speech to arrive at a description of a language, transformationalists first studied the underlying structure of a language. They attempted to describe the "rules" that define a native speaker's "competence" (unconscious knowledge of the language) and account for all instances of the speaker's "performance" (strategies the individual uses in actual sentence production). *See* generative grammar; transformational grammar.

The study of grammatical theory has been of interest to philosophers, anthropologists, psychologists, and literary critics over the centuries. Today, grammar exists as a field within linguistics but still retains a relationship with these other disciplines. For the most part, however, the development of grammatical theory has had little impact on the content of the grammar taught in schools or on how it is taught. For most people, grammar still refers to the body of rules one must know in order to speak or write "correctly."

grammar school, in Great Britain, secondary school that offers an academic course in preparation for university entrance and for the professions. Students usually begin attendance at age 12.

Before 1902, there was no system of publicly funded secondary education in Great Britain, and those students who were educated beyond the primary level attended either privately endowed grammar schools or public schools (which were also privately endowed, but were usually much older than the other grammar schools). The Education Act of 1902 established a system of new, publicly funded grammar schools and also provided government aid for some existing grammar schools. Technical training courses, attended mostly by those students who were not academically qualified for admission to the grammar schools, were also begun.

During the period between the two world wars, this system was modified. Students leaving primary school at age 11 were required to take a series of examinations called the eleven-plus (*q.v.*). Results of these tests determined a student's placement in a three-track secondary system. The highest scoring students were admitted to grammar schools and were likely to go on to university studies. The other students attended either modern schools, where they completed a course of higher level elementary studies and did not go on to university, or technical schools, whose most promising graduates were sometimes admitted to university.

Some British educators thought this system to be overly rigid, and after World War II many "comprehensive" schools, which combined elements of grammar, modern, and technical schools, were established, although many highly respected grammar schools survive. In the late 1960s the national eleven-plus exams were abolished.

gramme: *see* gram.

Gramme, Zénobe-Théophile (b. April 4, 1826, Jehay-Bodegnée, Belg.—d. Jan. 20, 1901, Bois-Colombes, Fr.), French electrical engineer and inventor (1869) of the Gramme dynamo, a continuous-current electrical generator that gave principal impetus to the development of electric power. Though the Gramme dynamo is occasionally employed in industry today, alternating-current machines have supplanted it as a power source for lighting.

An indifferent student, Gramme preferred to work with his hands. In 1856 he began work in a Paris factory that fabricated apparatus for the infant electrical industry. In 1869 he conceived the continuous-current dynamo and in 1871 showed to the Academy of Sciences a working model that produced much higher voltages than did previous dynamos. Later that year, in partnership with Hippolyte Fontaine, also an inventor, he began manufacturing his dynamo. In 1873 a Gramme dynamo was exhibited at the Vienna exhibition, where it was discovered that the device was reversible and could be used as an electric motor.

Gramont, Antoine-Agénor-Alfred, duc de (duke of) (b. Aug. 14, 1819, Saint-Germain-en-Laye, Fr.—d. June 18, 1880, Paris), French diplomat and statesman whose belligerent attitudes as foreign minister in 1870 helped push France, then diplomatically isolated and militarily unprepared, into a disastrous war with Prussia.

Gramont was a member of an old aristocratic family. He served with some merit in a variety of diplomatic posts during the Second Empire. He supported French intervention in Italy in 1860 and urged a French–Austrian alliance to head off Prussia.

Gramont became foreign minister in May 1870. His general hostility toward Prussia led him to a position of strong opposition toward the candidacy of a German prince for the Spanish throne. The bellicose telegram sent to the Prussian king, William I (July 12, 1870), demanding that Prussia renounce the candidacy, was in large part Gramont's work. When William refused and informed Chancellor Bismarck, Bismarck published a shortened, warped version of the correspondence (the "Ems" telegram), and the French government declared war.

Gramont resigned his post in August 1870 and went into political retirement. In 1872 he published *La France et la Prusse avant la guerre* ("France and Prussia Before the War"), a defense of his own activities in the events that precipitated the conflict.

Gramophone, trademark used from 1894 for an early phonograph (*q.v.*); invented by Émile Berliner; the term became generic for phonograph in Great Britain, as Victrola did in the United States.

Grampian, region of northeastern Scotland, created by the administrative reorganization of 1975, with an area of about 3,300 sq mi (8,550 sq km). It consists of the former county of the city of Aberdeen and former counties of Aberdeen, Kincardine, Banff, and most of Moray (*qq.v.*) and is divided into the districts of Moray, Banff and Buchan, Gordon, City of Aberdeen, and Kincardine and Deeside. The region's industry is diverse and includes agriculture, food processing, fishing, whisky distilling, textiles, boat building, and light engineering. Pop. (1982 est.) 490,270.

The River Fiddich, Glenfiddich, in Moray district, Grampian region, Scotland, near Dufftown; in the background is Auchindoun Castle

By courtesy of the British Tourist Authority

Grampians, mountain range extending southwest from the Great Dividing Range, southwest central Victoria, Australia. Composed mainly of hard sandstone, they are noted for deep gorges, fantastic weathered rock formations, and wildflowers. The highest peak, Mt. William, rises to 3,827 ft (1,166 m). Visited in 1836 by Maj. Sir Thomas Mitchell, surveyor general of New South Wales, the range was named after The Grampians of Scotland.

Grampians, The, mountains forming a part of the Highlands of Scotland. They derive their name from the Mons Graupius of the Roman historian Tacitus, the undetermined site of the battle in which the Roman general Agricola defeated the indigenous Picts (*c.* AD 84). The name is often applied to the entire mass of the Central Highlands between Glenmore and the wall-like southern edge that overlooks the Lowlands. More strictly it refers only to the latter striking relief feature. Its summits exceed 3,000 ft (915 m; Ben Alder 3,757 ft and Ben Lomond 3,192 ft).

grampus, the killer whale (*q.v.*); also, the Risso's dolphin (*Grampus griseus*).

Gramsci, Antonio (b. Jan. 23, 1891, Ales, Sardinia—d. April 27, 1937, Rome), intellectual and politician, a founder of the Italian Communist Party whose ideas still greatly influence Italian Communism.

In 1911 Gramsci began a brilliant scholastic career at the University of Turin, where he came in contact with the Socialist Youth Federation and joined the Socialist Party (1914). During World War I (1914–18), he studied Marxist thought and became a leading theoretician. He formed a leftist group within the Socialist Party and founded the newspaper *L'Ordine nuovo* ("The New Order"; May 1919); his group participated energetically in a futile general strike in Turin (1920).

Gramsci led a leftist walkout at the Socialist congress at Livorno (January 1921) to found the Italian Communist Party and then spent two years in the Soviet Union. Back in Italy, he became head of his party (April 1924) and was elected to the Chamber of Deputies. After his party was outlawed by the Fascists, Gramsci was arrested and imprisoned (1926). Re-

leased 11 years later because of poor health, he died in a Rome hospital. The letters he wrote from prison were published posthumously as *Lettere dal carcere* (1947).

Gran (Hungary): *see* Esztergom.

Gran Canaria, English GRAND CANARY, island, Las Palmas province, Spain, one of the Canary Islands in the North Atlantic. It has an area of 592 sq mi (1,533 sq km). The most fertile of the Canaries, it is nearly circular in shape and is characterized by the ravines that reach from the central mountain peak, Los Pechos (6,400 ft [1,950 m]), to the coast. The northern slopes, with their alpine climate, contrast strongly with the arid south. Considerable tracts are covered with native pine. The economy is primarily agricultural (bananas, tomatoes, tobacco), though there is manufacture of embroidery, pottery, and baskets. The sandy beaches of Las Canteras and Las Alcaravaneras, which flank the island's largest city and chief port, Las Palmas, account for a stable tourist trade. There are many mineral springs. Pop. (1981) 672,716.

Gran Chaco, alluvial plain in the interior of south central South America, a vast, arid, lowland bounded by the Andes Mountains on the west, by the Paraguay and Paraná rivers on the east, generally by the Llanos (plains) de Chiquitos and Bañados de Izozog, a marshy area in Bolivia on the north, and on the south by the Río Salado in Argentina. Its area is about 280,000 sq mi (725,000 sq km). The Gran Chaco has a widely scattered population of indigenous Indian groups including the Guaicurú, Lengua, Mataco, Vilela, Zamuco, and Tupí.

The following article summarizes information about the Gran Chaco; for full details, *see* MACROPAEDIA: South America.

Because of its alluvial character, the Gran Chaco is composed of extremely deep (up to 10,000 ft [3,050 m]) unconsolidated sandy and silty sediments. Most of the Chaco is poorly drained. All but the extreme northwestern sector is drained by the west-bank tributaries of the Paraguay and Paraná rivers.

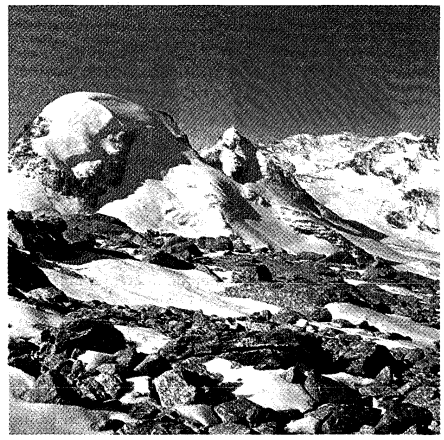
Gran Chaco's climate varies from tropical in the north to warm and temperate in the south. Average temperatures range from 65° to 75° F (18° to 25° C); the highest average annual rainfall is in the east, with 52 in. (1,320 mm). The eastern Chaco is characterized by clustered trees and shrubs interspersed with tall herbaceous savannas. To the west a wide transition zone grades into a dry forest of spiny, thorny shrubs and low trees. Chaco's wildlife is abundant. Among the large animals are the jaguar, puma, tapir, giant armadillo, capybara, red wolf, and guanaco. Reptiles are numerous with a variety of lizards, and there are at least 60 known species of snake.

Cattle grazing and cotton raising are the major economic activities in the Chaco. In the eastern Chaco large industrial plants have been established to process tannin. The other major economic activity is forestry, producing lumber and heavy timbers.

Gran Colombia, formal name REPUBLIC OF COLOMBIA (1822–30), short-lived republic, formerly the Viceroyalty of New Granada, including roughly the modern nations of Colombia, Panama, Venezuela, and Ecuador. In the context of their war for independence from Spain, revolutionary forces in northern South America, led by Simón Bolívar, in 1819 laid the basis for a regular government at a constitutional convention in Angostura (now Ciudad Bolívar, Venezuela). Their republic was definitely organized at the Congress of Cúcuta in 1821. Before then, the government had been military and highly centralized with direct executive power exercised by regional vice presidents while President Bolívar was campaigning. It was now reorganized as a centralized representative republic with its capital at Bogotá; Bolívar became president and Francisco de Paula Santander vice president. The constitution also called for a bicameral legislature elected from the three regions of the republic.

Gran Colombia had a brief, vigorous existence during the war. Subsequent civilian and military rivalry for public office and regional jealousies led to a rebellion in Venezuela in 1826. After ruling as dictator from 1828 to 1830, Bolívar convoked a convention to frame a new constitution. It was recognized only in Nueva Granada (Colombia and Panama). Bolívar resigned and left for the northern coast, where he died, near Santa Marta, on Dec. 17, 1830. By that time Venezuela and Ecuador had seceded from Gran Colombia. Thus, the unrealistically conceived and rather unwieldy state died with its principal architect.

Gran Paradiso, highest mountain, 13,323 ft (4,061 m), entirely within Italy and the culminating point of the Graian Alps (*q.v.*). The peak lies within a popular Alpine resort area and is the central attraction of the National



Mt. Ciarforon in the Gran Paradiso, Graian Alps, Italy
Titus—C.I.R.I.

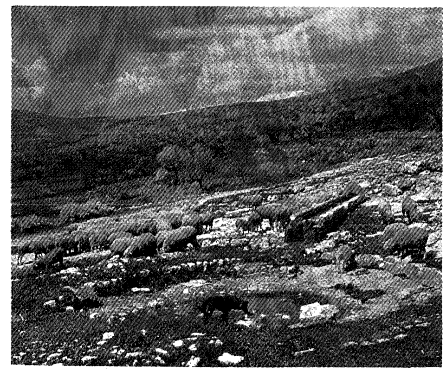
Park of Gran Paradiso (1922). In September 1860 the Englishman John Cowell became the first to reach the summit of the mountain.

Gran Paradiso National Park, park in northwestern Italy, established in 1836 as a hunting zone; in 1856 it became the Royal Hunting Reserve of the Gran Paradiso, and by a law passed in August 1947, the park received "autonomous organization" status. The park covers an area of 153,240 ac (62,000 ha) and extends along the upper Valle d'Aosta region at an elevation of about 3,000 to 13,000 ft (1,200 to 4,100 m). The terrain is typically alpine, with numerous glaciers, coniferous tree lined slopes, and alpine meadows and pastures scattered with rocks and scree.

Animal life includes ibex, chamois, ermine (stoat), weasels, hare, and golden eagles. Scientific research work done in the park includes the study of soil, of agricultural and climatological problems affecting the mountain economy of Italy, and of the park's animal inhabitants.

Gran San Bernardo, Colle del (Italy–Switzerland): *see* Great Saint Bernard Pass.

Gran Sasso d'Italia, English GREAT ROCK OF ITALY, mountain group, Abruzzi geographic region, central Italy, extending for about 22 mi (35 km) in a west-northwest–east-southeast direction and containing Corno Grande, or Monte (mount) Corno, the highest point (9,560 ft [2,914 m]) of the Apennines. The summit is snow-covered most of the year, and there is a small glacier on the north slope of Corno Grande. Wild boars still roam the Alpine region below the summit, and there



Sheep grazing on the slopes of the Gran Sasso d'Italia in Abruzzi region, Italy
M. Pedone—Shostal/EB Inc.

are some dense woods of beech and pine. The area is much frequented by winter sports enthusiasts and mountaineers.

Granada, Arabic GHARNĀṬA, kingdom founded early in the 13th century out of the remnants of Almoravid power in Spain by Abū 'Abd Allāh ibn Yūsuf ibn Naṣr al-Aḥmar, who became king as Muḥammad I (ruled 1232–73) and founded the Naṣrid dynasty. The kingdom comprised, principally, the area of the modern provinces of Granada, Málaga, and Almería. In 1246 Muḥammad I secured the recognition of Ferdinand III of Castile (his neighbour on all landed frontiers) in return for a vassalage which, though often ignored, remained in force until the kingdom's disappearance in 1492.

Granada's history is one of internal crises because of the existence of a powerful landowning nobility with which, from the first, the monarchy had to come to terms, and because of wars with Castile. Successive kings of Granada sought political support and military aid from Morocco. Moroccan recruits caused the kingdom to undergo an intense process of arabization, to cut itself off from all Castilian influences, and to develop an absolute form of government based on military support. The central government's economic resources depended mainly on the silk industry and on external trade; the latter flourished because of the fortunate position of the chief port, Málaga, on the route from the Mediterranean to the Atlantic. Granada paid close attention to the Strait of Gibraltar; for a whole century its rulers made efforts to secure control of the straits, allying to this end at different times with both Morocco and Castile. In 1306 Muḥammad III (ruled 1302–09), then in possession of Ceuta and Gibraltar, seemed to have succeeded, but a powerful coalition soon reduced him to the modest position of vassal of the king of Castile. After 1340, when the battle of Río Salado settled the question of the straits in Castile's favour, Granada adopted a policy of isolation, taking advantage of any propitious circumstance to strengthen its land frontiers. It was in this period that Yūsuf I (ruled 1333–54) and Muḥammad V (ruled 1354–59 and 1362–91) finished building the Alhambra.

Civil strife in Castile during the second half of the 14th century enabled Muḥammad V and Muḥammad VII (ruled 1392–1408) to develop a counteroffensive against Algeciras and the cities on the Guadalquivir, but from 1407 Castile took up the idea of conquering the kingdom of Granada as the last stage of the Reconquest. The campaign was a large and costly undertaking, conducted intermittently throughout the 15th century. Granada meanwhile disintegrated as a result of the internal struggles. The Catholic Monarchs took advantage of this disunity; the last king of Granada, Boabdil, or Muḥammad XI, who ruled from 1482 to 1492, surrendered his last stronghold, the city of Granada, on Jan. 2, 1492.

Granada, city, southwestern Nicaragua. It lies at the foot of Mombacho Volcano on the northwestern shore of Lake Nicaragua at 202 feet (62 m) above sea level. Granada was founded in 1523 by Francisco Hernández de Córdoba, and it soon became the economic hub of the region. As the longtime headquarters of the Conservative Party in Nicaragua, the city greatly influenced the political life of the country for many years. It was also a keen political and trade rival of León city, farther north, which was the centre of the Liberal Party. Nicaragua's national capital, Managua, was founded between the two older cities as a political compromise. Granada was raided by pirates from the Caribbean many times in the 17th century. William Walker, the U.S. filibuster, made Granada the centre of his attacks and his headquarters; he sacked and burned the city in 1857.

Granada is Nicaragua's third-largest city. It is typically Spanish in appearance and is laid out on a rectangular gridiron style. The houses are mostly of one story, but there are many fine mansions; the churches are massive, and some are ornate. Granada is an industrial centre, manufacturing furniture, soap, clothing, cottonseed oil, and rum. It is the terminus of the Pacific Railway, which leads from Corinto on the Pacific through Managua to the northwest. Granada is linked to other cities by highway and to Managua by expressway, and steamers service lakeside towns. Pop. (1985 est.) 88,636.

Granada, province, in the autonomous community (region) of Andalusia, southern Spain, on the Mediterranean coast. With an area of 4,838 square miles (12,531 square km), it is a relatively rich province. Its varied landscapes range from the arid zones of the Sierra Nevada in the north and centre to the fertile valleys and beaches of the Costa del Sol ("Coast of the Sun") in the south. The economy is predominantly agricultural with cereals as the most widely grown crop, although sugarcane and tobacco (the largest production in Spain) are also important. Olive and fruit trees (oranges, lemons, figs, almonds, and pomegranates) and vineyards are also common. The province's principal industries are agriculture-based and include sugar refining, although manufacturing is carried on in Granada (*q.v.*) city, the provincial capital.

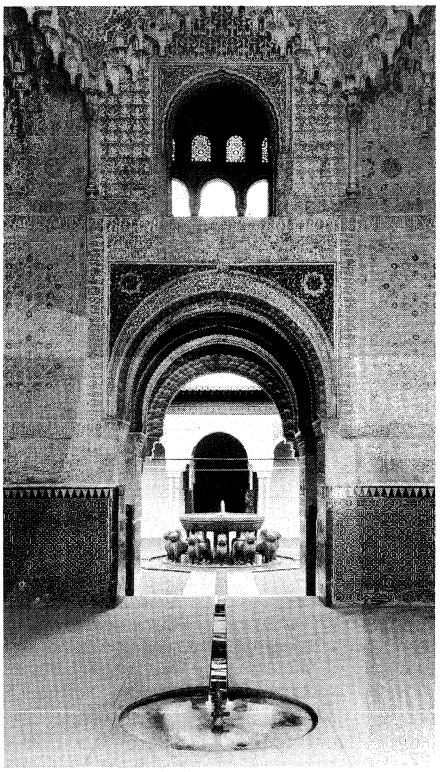
The province contains the lead mines of the Sierra de Gador (the richest in the world during the 19th century), and the Marquesado de Zenete region is one of Spain's largest producers of iron ore. The Granada coast (part of the Costa del Sol) includes the thriving beach resorts of Motril, Salobreña, and Almuñécar. Other important towns are Guadix, Loja, and Baza. Pop. (1986 est.) 793,450.

Granada, city, capital of Granada province, in the autonomous community (region) of Andalusia, southern Spain. It lies along the Genil River at the northwestern slope of the Sierra Nevada, 2,260 feet (689 m) above sea level. The Darro River, much reduced by irrigation works along its lower course, flows for about a mile into the city from the east before turning sharply southward to join the Genil. It is canalized and covered over along much of its course through the city.

The city's name may have been derived either from the Spanish *granada,* "pomegranate," a locally abundant fruit that appears on the city's coat of arms, or from its Moorish name, Karnattah (Gharnāṭah), possibly meaning "hill of strangers." Granada was the site of an Iberian settlement, Elibyrge, in the 5th century BC and of the Roman Illiberis. As the seat of the Moorish kingdom of Granada, it was the final stronghold of the Moors in Spain, falling to the Catholic monarchs Ferdinand II and Isabella I in January 1492.

At the centre of Granada stands the Gothic cathedral of Santa María de la Encarnación (1523–1703), containing the Royal Chapel (Capilla Real) with the tomb of Ferdinand and Isabella. In the northeast of the city is the Albaicín quarter, which is the oldest section of Granada. Albaicín is bounded on the south by the Darro River, and on the other side of the river is the hill upon which stands the famous Moorish palace, the Alhambra (*q.v.*), as well as the Alcazaba fortress that guarded it and the Generalife, which was the summer palace of the Moorish sultans. South of the city centre is the administrative and commercial section of Granada, while to the west is the modern residential sector.

One of Spain's most frequently visited tourist centres, Granada contains many notable architectural and artistic monuments. The city is the see of an archbishop, and it is dotted with fine Renaissance, Baroque, and Neoclassical churches, convents, monasteries, hospitals, palaces, and mansions. The aforementioned cathedral at the city's centre is profusely ornamented with jasper and coloured marble, and its interior contains many fine paintings and sculptures by Alonso Cano. The Cartuja, or Carthusian monastery (1516), stands in the north of the city. Near the restored monastery



Hall of the Two Sisters, with the Court of the Lions in the background, the Alhambra, Granada, Spain

By courtesy of the Spanish National Tourist Office

of San Jerónimo (1492) is the University of Granada, which received its charter in 1531 and is now housed in a former Jesuit college. Aside from the Alhambra building complex, the principal Moorish antiquities in the city are the 13th-century villa known as the Cuarto Real de Santo Domingo and the Alcazar Genil, which was built in the 14th century as a palace for Moorish queens.

Granada has an active trade in agricultural produce, and manufactures include liqueurs, soap, paper, and coarse linen and woolen fabrics. The city is the venue of an international festival of music and dance. Pop. (1982 est.) 244,995.

Granados, Enrique (b. July 27, 1867, Lérida, Spain—d. March 24, 1916, at sea), pianist and composer, a leader of the movement toward nationalism in late 19th-century Spanish music.

Granados made his debut as a pianist at 16. He studied composition in Barcelona with Felipe Pedrell, the father of Spanish nationalism in music. He studied piano in Paris in 1887. Returning to Barcelona in 1889, he established himself as a pianist of the front rank, and his 12 *Danzas españolas* won great

Granados

C. Cauboue—J.P. Ziolo

popularity. The first of his seven operas, *María del Carmen,* was produced in 1898. In 1900 Granados founded a short-lived classical concerts society and his own piano school, which produced many distinguished players. His interest in the 18th century is reflected in his *tonadillas,* songs written "in the ancient style." He wrote extensively and fluently for the piano, in a somewhat diffuse, Romantic style. His masterpieces, the *Goyescas* (1911–13), are reflections on Goya's paintings and tapestries. They were adapted into an opera that received its premiere in New York City in 1916. Returning home from this performance, Granados drowned when his ship, the *Sussex,* was torpedoed by a German submarine.

Granby, city, Montréal region, southern Quebec province, Canada, on the Yamaska Nord River. It is named after a village in Nottinghamshire, Eng. From its origins as a small woolen-milling town in 1851, the city has grown to become a large industrial and commercial centre linked to Montreal city, about 40 miles (64 km) to the west, by rail and toll roads. Manufactures include textiles, clothing, plastic and rubber goods, maple products, furniture and wood by-products, tobacco, and household appliances. The area is also a dairying and farming district. Granby maintains a school of arts and crafts, a classical college, and a zoo that is one of the largest and best known in Canada. Pop. (1981) 38,069.

Granby, John Manners, marquess of (b. Aug. 2, 1721—d. Oct. 18, 1770, Scarborough, Yorkshire, Eng.), British army officer, a popular British hero of the Seven Years' War (1756–63).

The eldest son and heir apparent of the 3rd duke of Rutland, he was styled the marquess of Granby by courtesy. He fought in Scotland

Marquess of Granby, portrait after Sir Joshua Reynolds, *c.* 1759; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

in 1746 and in Flanders the next year. Sent to Germany during the Seven Years' War, he was promoted to lieutenant general and, on Aug. 14, 1759, became commander of the British contingent of the allied forces. On July 31, 1760, he led the British cavalry to a spectacular victory over the French at Warburg in Westphalia, and on July 15–16, 1761, his troops repulsed two powerful French attacks on Vellinghausen (Kirchdenkern). Through the summer of 1762 he was in the centre of heavy fighting. In 1766 Granby was appointed commander in chief of the British Army, in which office he was attacked by the pseudonymous political writer "Junius." He died in debt after resigning most of his offices. In 1779 his eldest surviving son, Charles Manners, inherited the titles associated with the dukedom of Rutland.

Grand Alliance, War of the, also called WAR OF THE LEAGUE OF AUGSBURG (1689–97), the third major war of Louis XIV of France, in which his expansionist plans were blocked by an alliance led by England, the United Provinces, and the Austrian Habsburgs. The deeper issue underlying the war was the balance of power between the rival Bourbon and Habsburg dynasties. There was general uncertainty in Europe over the succession to the Spanish throne because that country's Habsburg ruler, the epileptic and partly insane king Charles II, was unable to produce heirs. Upon Charles's anticipated demise the inheritance would have to be through the female line, and through marriage alliances the Bourbons of France could justly contest for the succession with the Austrian Habsburgs, headed by the Holy Roman emperor Leopold I. The aggressive foreign policy Louis displayed in the War of the Grand Alliance was thus a form of jockeying for position in anticipation of the death of the last male heir of the Spanish Habsburg line.

In 1688 France had the strongest army in Europe, and its navy was larger than the combined navies of England and the United Provinces. Louis XIV wished to strengthen his influence among the German princes during the 1680s, when Leopold I was engaged in a war with the Turks. To oppose this, the League of Augsburg was formed on July 9, 1686, by Emperor Leopold, the electors of Bavaria, Saxony, and the Palatinate, and the kings of Sweden and Spain (in their capacity as princes of the Empire). This league proved to be ineffective because of the reluctance of the smaller princes to oppose France and the absence of provisions for combined military action.

When Louis XIV received news of the Austrian victory over the Turks at Mohács (August 1687), he planned a short French invasion of the Rhineland while Austria was still engaged in the east. Louis sent his forces into the Palatinate with the promised support of King James II of England and in the expectation that Louis's inveterate opponent, William of Orange, stadholder of the United Provinces of the Netherlands, would be preoccupied with his coming attempt to overthrow James and would thus be neutralized as an opponent of the French on the Continent. A French army marched into the Palatinate in October 1688. During the next year the area was thoroughly devastated.

Europe reacted swiftly. The emperor was able to hold the Turks in check and mobilize for a campaign in the west. Many German princes were aroused by Louis's actions and feared French annexations. Meanwhile, William had been quickly and completely successful in expelling James II from the English throne (January 1689), and the Jacobite counterrevolution that Louis supported in Ireland was crushed by William (now William III of England) at the Battle of the Boyne (July 1690). On May 12, 1689, the emperor concluded the Treaty of Vienna with the United Provinces for the avowed purpose of undoing the annexations of Louis XIV and restoring the peace settlements of Westphalia (1648) and of the Pyrenees (1659). During the next 18 months they were joined by England, Brandenburg, Saxony, Bavaria, and Spain. These formed the core of the Grand Alliance. The war also extended into the overseas colonies of the contending powers. England and France fought in the Americas (*see* King William's War) and in India, while the United Provinces and Brandenburg opposed the French on the Guinea Coast of Africa. Instead of a short venture in Germany, France was now forced to fight a nine-year-long, worldwide war, for which it was not prepared.

The war in Europe became largely a war of attrition, dominated by slow and careful sieges, such as the two sieges of Namur (1692, 1695). Major battles, such as the French victories at Fleurus (1690), Steenkerke (1692), and Neerwinden (1693), were comparatively rare and were never decisive enough to bring about a peace settlement. The Low Countries were the major battleground, with secondary theatres in Italy and Spain. William III led the Grand Alliance's forces in most of the campaigns in Flanders. The French position improved somewhat in the course of the land war but suffered more serious setbacks at sea, notably the passivity and deterioration of the French navy after its disastrous defeat at the hands of the Anglo-Dutch fleet at La Hougue (May 1692).

In January 1695 the French war effort was weakened by the death of their undefeated general, the duc de Luxembourg. The stalemated struggle was very costly to all participants, and the members of the Grand Alliance responded with alacrity when Louis XIV in 1695 opened secret, separate negotiations. Savoy, which had joined the League of Augsburg in 1687, signed a separate peace (Treaty of Turin) with Louis in June 1696. A movement for a general peace culminated in the Treaty of Rijswijk in September–October 1697. The treaty brought no resolution to the conflict between the Bourbon rulers of France and the Habsburgs, or to the English–French conflict; both were renewed four years later in the War of the Spanish Succession. The rise of England and Austria as effective counterforces to France and the development by William III of the strategy of building and maintaining the Grand Alliance stand out as the significant features of this war.

Grand Army of the Republic (GAR), patriotic organization of American Civil War veterans who served in the Federal forces, one of its purposes being the "defense of the late soldiery of the United States, morally, socially, and politically." Founded in Springfield, Ill., early in 1866, it reached its peak in membership (more than 400,000) in 1890; for a time it was a powerful political influence, aligning nearly always with Republican policy. In 1956 it was dissolved; its records went to the Library of Congress, Washington, D.C., and its badges, flags, and official seal to the Smithsonian Institution.

Grand Bahama, island, The Bahamas, lying just west of Great Abaco Island and 60 miles (100 km) east of West Palm Beach, Fla. It occupies an area of 530 square miles (1,373 square km). The island's economy is based on tourism (which experienced a dramatic boom in the 1960s), forest products (especially pine), and fishing. Important resort centres are Freeport, West End, Eight Mile Rock, and Pinder's Point. Freeport is a busy industrial and trade centre with cement and pharmaceutical plants and an oil refinery. Grand Bahama has one of the largest single-installation bunkering terminals in the Western Hemisphere. Pop. (1980 prelim.) 33,102.

Grand Banks, portion of the North American continental shelf in the Atlantic Ocean, lying southeast and south of Newfoundland (Canada). Noted as an international fishing ground, the banks extend for 350 miles (560 km) north to south and for 420 miles (675 km) east to west. They consist of a number of separate banks, chief of which are Grand, Green, and St. Pierre; and they are sometimes considered to include the submarine plateaus that extend southwestward to Georges Bank, east-southeast of Cape Cod, Mass., U.S. Depths average 180 feet (55 m), but many places reach 600 feet (180 m). The cold Labrador Current and the relatively warm Gulf Stream meet in the vicinity of the Grand Banks. Air masses passing over these contrasting water bodies often produce heavy fogs. Occasional icebergs and severe storms also add to the hazards of the area. The mingling of the cold and warm water, on the other hand, produces favourable conditions for the growth of plankton, on which fish depend directly or indirectly for their food supply. The Grand Banks were first officially reported in 1498 by John Cabot, the Italian explorer leading an English-sponsored expedition.

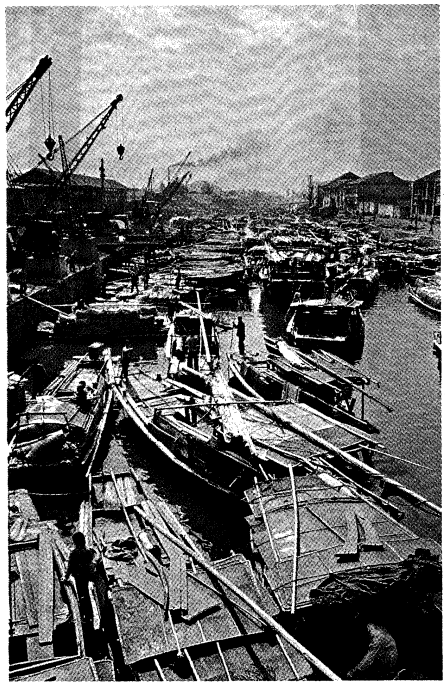
Among the most plentiful species of fish are cod, haddock, rosefish, various flatfish, herring, and mackerel. The extensive use of the area by trawler fleets from many nations in the mid-20th century created several international incidents, led to overfishing, and necessitated regulating the size of net mesh used so that the small fish could escape, thus safeguarding against depletion. In 1977 Canada extended its seaward fishing claim to encompass all areas within 200 nautical miles (370 km) of its shores, including most of the Grand Banks. Agreements between Canada and other countries accustomed to fishing within Canada's newly extended coastal fisheries jurisdiction were concluded and limited the catch of foreign countries to certain more abundant species that were beyond Canada's capacity to harvest. Also in the later 1970s, deposits of petroleum and natural gas were discovered in the Grand Banks; exploratory drilling commenced in the early 1980s.

Grand Bassa (town, Liberia): *see* Buchanan.

Grand-Bassam, city, southeastern Côte d'Ivoire (Ivory Coast). It lies at the mouth of the Komoé (Comoé) River at the eastern entrance to the Ebrié Lagoon. The site of a French trading post in the late 17th century and a military garrison established in 1843 among the Abure (Aboure) and Mbato peoples, it became the first capital (1893–1900) of the Côte d'Ivoire colony. Once an important Atlantic port (1901–50) for mahogany export, the city is still a major collecting point for timber, rubber, fish, pineapples, cocoa, coffee, bananas, and palm oil and kernels. Grand-Bassam was the site of the first Roman Catholic mission school (1895) in Côte d'Ivoire. Pop. (1975) 25,808.

Grand Canal, Wade-Giles romanization TA YÜN-HO, Pinyin DA YUNHE, series of waterways in North China that link Hang-chou in Chekiang Province with Peking. More than 1,050 miles (1,700 km) in length, it is the world's longest man-made waterway, though not all of it is, strictly speaking, a canal. It was built to enable successive Chinese regimes to transport grain and other necessities from the Yangtze and Huai river valleys to feed their capital cities.

The oldest part of the canal lies between the Yangtze and the city of Ch'ing-chiang (in Kiangsu Province), which was originally on the Huang Ho (Yellow River) when that river had a far more southerly course. This section, traditionally known as the Shan-yang Canal, in recent centuries has been called the



The Grand Canal at Wu-hsi, Kiangsu Province, China
Emil Schulthess—Black Star/EB Inc.

Southern Grand Canal (Nan-yün Ho). This ancient waterway was possibly constructed as early as the 4th century BC, was rebuilt in AD 607, and has been used ever since.

The Sui dynasty (581–618) built the first great canal system in 607–610, constructing a northeast–southwest link from the Huang Ho (when the Huang had a northern course) to the Huai Ho. Known as the New Pien Canal, it remained the chief waterway throughout the T'ang period (618–907) and in the early Sung period (960–1126).

The need for a major transport link again arose under the Yüan (Mongol) dynasty (1279–1368), whose capital at Peking required a grain-supply system. In 1282–83 it was therefore decided to build a new canal from the Huang Ho, which since 1195 had changed its course southward to usurp the former mouth of the Huai below Ch'ing-chiang, to the Ta-ch'ing Ho in northern Shantung Province, which was dredged to give an outlet to the sea. The mouth of the Ta-ch'ing, however, silted up almost immediately. An alternative canal, cut across the neck of the Shantung Peninsula from the harbour of Tsingtao to I-hsien, also proved impracticable and was abandoned. Eventually another stretch of canal, the Hui-t'ung Canal, was built to join Tung-a-chen on the Huang Ho with the Wei Ho at Lin-ch'ing. In this way, the modern Grand Canal came into being. During the Yüan period, however, canal transport was expensive and inefficient, and most grain went by sea.

At the beginning of the Ming dynasty (1368–1644) the capital was at Nan-ching (Nanking). After Peking again became the seat of government in 1403, the whole canal—including the section from Lin-ch'ing on the Wei to its junction with the Huang Ho, which was dredged and repaired—remained in operation until the 19th century. It comprised six main sections: (1) a short canal from the outskirts of Peking to T'ung-hsien; (2) a canalized river joining the Pai Ho to Tientsin and then joining the Wei Ho as far as Lin-ch'ing; (3) a section in Shantung rising over comparatively high ground from Lin-ch'ing to its highest point near Chi-ning and then falling again to a point near Suchow, a difficult stretch with a number of sluices and dams using water from a number of small rivers flowing off the T'ai Shan (mountains) and from the string of lakes southeast of Chi-ning; (4) a stretch from Su-chow that followed the southern course of the Huang Ho as far as Ch'ing-chiang; (5) a section from Ch'ing-chiang following the ancient Shan-yang Canal south to Chen-chiang on the Yangtze; (6) a section south of the Yangtze where the canal, there called the Chiang-nan Yün Ho, ran southeast then southwest for some 200 mi via Su-chou to Hang-chou.

In the 19th century a series of disastrous floods broke the dikes of the Huang Ho (which began to move to its present northern course), caused great problems in the section of the canal between Suchow and Ch'ing-chiang, and cut across the canal between Lin-ch'ing and Chi-ning. After the Taiping Rebellion (1850–64) and the Nien Rebellion (1853–68), the use of the canal as the major supply line to Peking was abandoned, and the canal gradually fell into disrepair in its northern sections. After 1934 the Chinese Nationalist government carried out extensive works on the canal between Ch'ing-chiang and the Yangtze; ship locks were constructed to allow medium-sized steamers to use this section, which was dredged and largely rebuilt.

New work was begun under Communist rule in 1958 to restore the whole system as a trunk waterway able to carry ships of up to 600 tons. Between 1958 and 1964 it was straightened, widened, and dredged, one new section 40 mi long was constructed, and modern locks were added. The canal can now accommodate medium-sized barge traffic throughout its length. The main traffic, however, is concentrated in the southern half. The canal is also used to divert water from the Yangtze to northern Kiangsu Province for irrigation, making possible double cropping of rice.

Grand Canal, Italian CANALE GRANDE, main waterway of Venice, Italy, following a natural channel that traces a reverse S-course from St. Mark's Basilica to Sta. Chiara church and divides the city into two parts. Slightly more than 2 mi (3 km) long and between 100 and 225 ft (30 and 70 m) wide, it has an average depth of 17 ft and connects at various points with a maze of smaller canals. These waterways carry the bulk of Venetian transportation by traditional gondolas and now mainly by motorboats and small steamers (*vaporetti*). The Grand Canal is lined on either side by palaces, churches, hotels, and other public buildings in Romanesque, Gothic, and Renaissance styles and is bridged at three points (at about the midpoint by the famous Rialto Bridge).

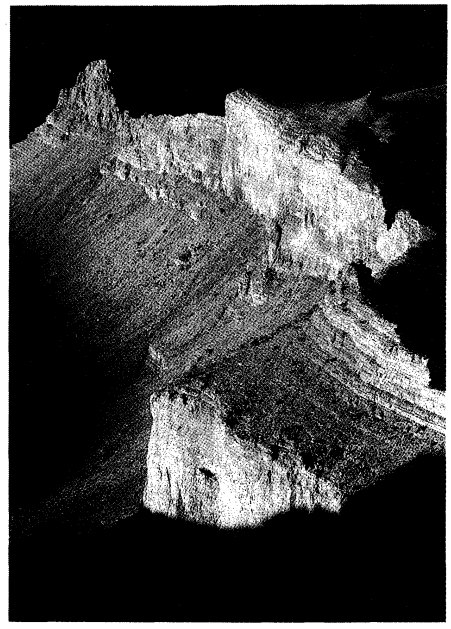
Grand Canal, with the Rialto Bridge in the background, Venice, Italy
Eric Carle—Shostal/EB Inc.

Grand Canal d'Alsace, English GREAT ALSACE CANAL, waterway along the Rhine River, in eastern France, begun in 1932 and completed after World War II. The canal is 30 mi (50 km) long and runs between Basel (Switz.) and Breisach (Ger.). It was built to improve navigation of the Rhine (hindered by a rapid current) and thus increase traffic upstream from Strasbourg. Electricity is generated through locks and weirs.

Grand Canary (Canary Islands, Spain): *see* Gran Canaria.

Grand Canyon, immense gorge cut by the Colorado River into the high plateaus of northwestern Arizona, U.S., noted for its fantastic shapes and coloration.

This broad, intricately sculptured chasm contains between its outer walls a multitude of imposing peaks, buttes, canyons, and ravines. It ranges in width from about 0.1 to 18 mi (0.2 to 29 km) and extends in a winding course from the mouth of the Paria River, near the northern boundary of Arizona, to Grand Wash Cliffs, near the Nevada line, a distance of about 277 mi, and it includes tributary side canyons and surrounding plateaus. The deepest and most impressively beautiful section, 56 mi long, is within Grand Canyon National Park, which encompasses the length of the river extending from Lake Powell to Lake Mead. In its general colour, the canyon is a red, but each stratum or group of strata has a distinctive hue—buff and gray, delicate green and pink, and, in its depths, brown, slate-gray, and violet. At 8,200 ft (2,500 m) above sea level, the North Rim is 1,200 ft higher than the South Rim.



Dana Butte, seen from near Hopi Point, at the south rim of the Grand Canyon
© Tom Bean 1981

The first sighting of the Grand Canyon by a European is credited to the Coronado expedition of 1540 and subsequent discovery to two Spanish priests, Francisco Garcés and Silvestre Vélez de Escalante, in 1776. In the early 1800s trappers examined it, and sundry government expeditions exploring and mapping the West began to record information about the canyon. By the 1870s, following the exploration of John Wesley Powell and others, extensive reports on the geography, geology, botany, and ethnology of the area were being published.

Grand Canyon National Park, containing 1,218,375 ac (493,076 ha), was created in 1919. Its area was greatly enlarged in 1975 by the addition of the former Grand Canyon

National Monument and Marble Canyon National Monument, and by portions of Glen Canyon National Recreation Area, as well as other adjoining lands. The North and South rims are connected by a paved road and by a transcanyon trail. Scenic drives and trails lead to all important features. Mule-pack trips and rides down the river in rafts and power-driven craft are intensively sought-after ways of viewing and experiencing the vast beauty of the canyon. Many pueblo and cliff-dweller ruins, with accompanying artifacts, indicate prehistoric occupation. There are five Indian tribes living on nearby reservations.

Geologic history. Although its awesome grandeur and beauty are the major attractions of the Grand Canyon, perhaps its most vital and valuable aspect lies in the time scale of Earth history that is revealed in the exposed rocks of the canyon walls. No other place on Earth compares with the Grand Canyon for its extensive and profound record of geologic events. Extending north from the Colorado River to Bryce Canyon, for instance, is a 23,000-foot (7,000-metre) section of rocks that are exposed in normal sequence from old to recent. The canyon's record, however, is far from continuous and complete. There are immense time gaps; probably several million years are unaccounted for by a gap in the strata in which either vast quantities of Earth materials were removed by erosion or there was little or no deposition of Earth materials. Thus rock formations of vastly different ages are separated only by a thin, distinct surface that reveals the vast unconformity in time.

Briefly summarized, the geologic history of the canyon strata is as follows. The crystallized, twisted, and contorted unstratified rocks of the inner gorge at the bottom of the canyon are granite and schist about four billion years old. Overlying these very ancient rocks is a layer of conglomerate rocks that are more than 600 million years old. On top of these are rock strata composed mostly of limestones, freshwater shales, and cemented sandstones that form much of the canyon's walls and represent a depositional period stretching over 300 million years. Overlying these canyon rocks is a thick sequence of Mesozoic-Era rocks (245 to 66.4 million years old) that form precipitous butte remnants and the vermilion, white, and pink cliff terraces of southern Utah but which have been entirely eroded away in the area of the Grand Canyon proper. Of relatively recent origin are overlying sheets of black lava and volcanic cones that occur a few miles southeast of the canyon, some estimated to have been active within the past 1,000 years.

The cutting of the mile-deep Grand Canyon by the Colorado River is one of the greatest events of Earth history. Its rapid velocity and large volume and the great amounts of mud, sand, and gravel it carries swiftly downstream account for the incredible cutting capacity of the river. Sediments carried by the Colorado River have been measured at an average of 500,000 tons per day. Conditions favourable to vigorous erosion were brought about by the uplift of the region, which steepened the river's path and allowed deep entrenchment. The depth of the Grand Canyon is due to the cutting action of the river, but its great width is explained by rain, wind, temperature, and chemical erosion, helped by the rapid wear of soft rocks, all of which steadily widened it. Amazingly, the canyon was cut by a reverse process, for the river remained in place and cut through the rocks as the land moved slowly upward against it. Only thus can be explained the canyon's east-to-west course across a south-facing slope and the presence of plateaus that stand across the river's course without having deflected it.

The most significant aspect of the environment that is responsible for the canyon is frequently overlooked or not recognized. Were it not for the arid climate in the surrounding area, there would be no Grand Canyon. Slope wash from rainfall would have removed the canyon walls, the stairstep topography would long ago have been excavated, the distinctive sculpturing and the multicoloured rock structures could not exist, the Painted Desert would be gone, and the picturesque Monument Valley would have only a few rounded hillocks.

Biological past and present. Plant and animal fossils are abundant in the Grand Canyon's sedimentary rocks, ranging from primitive algae in the lower strata to trees in the upper strata and from seashells and trilobites to the remains of dinosaurs (both bones and footprints), camels, horses, ground sloths, and elephants.

Animal life in the Grand Canyon area today is varied and abundant. The common animals are the many varieties of squirrels, coyotes, foxes, deer, badgers, bobcats, rabbits, chipmunks, and kangaroo rats. Plant life is also varied. In the bottom of the canyons are willows and cottonwoods, which require abundant water during the growing season. At the other end of the moisture scale are drought-resistant plants such as the yucca, agave, and numerous species of cactus.

On the canyon rims, north and south, there is a wide assortment of plant life. Typical of the South Rim is a well-developed ponderosa pine forest, with scattered stands of piñon pine and juniper. Bush vegetation consists mainly of scrub oak, mountain mahogany, and large sagebrush. On the North Rim, in the areas of moist and deep soil, are magnificent forest communities of ponderosa pine, white and Douglas fir, blue spruce, and aspen. Under less optimum conditions the plant life reverts to the desert varieties.

Grand Canyon Series, major division of rocks in northern Arizona dating from Precambrian time (3.8 billion to 570 million years ago). The rocks of the Grand Canyon Series consist of about 3,400 m (about 10,600 feet) of quartz sandstones, shales, and thick sequences of carbonate rocks. Spectacular exposures of these rocks occur in the Grand Canyon of the Colorado River in northwestern Arizona, where they overlie the strongly deformed and contorted Vishnu Schist, the angularity of which stands in bold contrast to the almost horizontal bedding of the Grand Canyon Series. The Grand Canyon Series actually dips slightly eastward and is separated from the overlying Cambrian sandstones by a major erosion surface unconformity. A conglomerate was deposited on the eroded surface of the Vishnu Schist. Limestones, shales, and sandstones occur over the conglomerate and are thought to represent shallow water deposits. Some reddish rocks are present and are thought to have been formed above sea level. The area of deposition was probably a large deltaic region that was slowly subsiding, allowing great thicknesses of sediment to accumulate near sea level. The presence of Precambrian organisms is indicated by calcareous algaelike structures in the carbonate rocks, as well as by tracks and trails of wormlike creatures in other rocks. Initially, in a generalized outline of the Precambrian history of the region, the Vishnu Schist was upraised, folded, and metamorphosed and then slowly eroded and worn down to a flat surface. The Grand Canyon Series was deposited perhaps as part of a slowly subsiding geosynclinal trough. The region was then subjected to uplift and tilting, and a Precambrian period of erosion for the Grand Canyon Series began. This action was later followed by a long period of deposition during the Paleozoic Era (570 to 245 million years ago) and then further erosion during the Cenozoic Era (beginning 66.4 million years ago) until the region assumed its modern configuration.

Grand Circuit, oldest continuing harness horse-racing series in the United States. It was begun in 1871 by Colonel Billy Edwards, a businessman from Cleveland, Ohio. The circuit, then known as the Quadrilateral Trotting Combination, held its first meetings in 1873 in Cleveland, in Utica and Buffalo, N.Y., and in Springfield, Mass. In the second half of the 20th century, the Grand Circuit was the premier American harness attraction, visiting more than 20 tracks in the United States and Canada and awarding a total purse of more than $4,000,000 in events for two- and three-year-old trotters and pacers.

Grand Conti, le: *see* Conti, François-Louis de Bourbon, prince de.

Grand Coulee Dam, gravity dam on the Columbia River in the state of Washington, U.S. It was originally a project of the Federal Bureau of Reclamation. The main structure was essentially completed in 1941 and is 550 feet (168 m) high above ground level and measures 4,173 feet (1,272 m) along its crest. More than 11,975,500 cubic yards (9,156,400 cubic m) of concrete are in the entire structure. The reservoir, Franklin D. Roosevelt Lake, has a capacity of about 9,562,000 acre-feet (11,795,000,000 cubic m). The largest and most complex of a series of dams on the Columbia River, the Grand Coulee provides irrigation to the Columbia Basin Project, assists in flood control, simplifies navigation, and furnishes hydroelectric power.

Grand Dauphin, le: *see* Louis de France *under* Louis (Spain).

Grand Dictionnaire encyclopédique Larousse (French: "Larousse Great Encyclopaedic Dictionary"), French encyclopaedia published in Paris (1982–85) by Librairie Larousse and based on earlier editions of Larousse encyclopaedias dating back to the *Grand Dictionnaire universal du XIXe siècle* ("Great Universal Encyclopaedia of the 19th Century"), inaugurated by the editor and lexicographer Pierre Larousse (1817–75).

Combining both encyclopaedic and dictionary entries, the 10-volume set contains up-to-date, concise, and specific articles on all varieties of persons, places, and things worldwide—191,288 articles in all. Illustrations are profuse and include maps, drawings, and photographs, virtually all in colour except for old prints available only in black and white. Bibliographies are arranged by entry and are grouped at the end of each letter of the alphabet.

grand duke, feminine GRAND DUCHESS, also called (in Russia) GRAND PRINCE, or GRAND PRINCESS, title of sovereign princes ranking between kings and dukes and of certain members of the Russian imperial family.

The first grand duchy of western Europe was that of Tuscany, the title grand duke being accorded by Pope Pius V to Cosimo de' Medici in 1569 and recognized, for Cosimo's son Francesco, by the Holy Roman Emperor Maximilian II in 1575. The title passed with Tuscany to the house of Habsburg-Lorraine

Grand duke or grand prince, grand duchess or grand princess
foreign-language equivalents

	masculine	feminine
Czech	velkovévoda	velkovévodkyně
German	Grossherzog	Grossherzogin
Hungarian	nagyherceg	nagyhercegno
Italian	granduca	granduchessa
Polish	wielki książę	wielka księżna
Russian	veliky knyaz	velikaya knyaginya
Serbo-Croatian	veliki vojvoda	velika vojvotkinja

in the 18th century. The reorganization of Germany and eastern Europe in the period of the Napoleonic Wars gave rise to new grand duchies; the Congress of Vienna respected some of the Napoleonic creations (notably Hesse–Darmstadt and Baden) and created others (including Saxe–Weimar, the two Mecklenburgs, Luxembourg, and Oldenburg).

The term grand duke is also commonly used to translate the early Russian title *veliky knyaz,* literally "grand prince" (*i.e.,* a prince who had other princes subject to him). This title was used beginning with the Kievan princes of the house of Rurik in the 10th century and was gradually assumed by the rulers of other principalities. The style of grand prince was eventually monopolized by the rulers of Muscovy, and from 1547 it was superseded by the title tsar for the sovereign. Among the Romanovs and especially after Peter I the Great's assumption of the title *imperator* (emperor), all descendants of the imperial house of Romanov bore the style *veliky knyaz* (masculine), or *velikaya knyaginya* (feminine), until 1886, when it was reserved for an emperor's sons, daughters, brothers, sisters, and grandchildren in the male line. The Romanov titles since about 1533 have conventionally been translated as "grand duke" and "grand duchess."

Grand Falls (Labrador, Canada): *see* Churchill Falls.

Grand Falls, town, Victoria county, northwestern New Brunswick, Canada, on the St. John River, 138 miles (222 km) northwest of Fredericton. It is horseshoe-shaped and was named for nearby Grand Falls, a cataract 75 feet (23 m) high, which has been harnessed to provide hydroelectric power for the provincial distribution system. The town is important as a shipping point in New Brunswick's potato-growing industry and produces potato starch and chips (crisps).

Originally a French settlement, it became a British military post in 1790. The town's "Broadway" was the former military parade ground. The original township of Colebrooke, named for Sir William Colebrooke, lieutenant governor of New Brunswick (1841–48), was incorporated in 1896 as the town of Grand Falls. Pop. (1986) 6,209.

Grand Falls, town, central Newfoundland, Canada. It lies along the Exploits River and the Trans-Canada Highway, 266 miles (428 km) northwest of St. John's. Grand Falls developed around a newsprint and pulp mill built in 1905 by the Anglo-Newfoundland Development Company. There is a large hydroelectric plant at the falls that gave the town its name. With adjacent Windsor (formerly Grand Falls Station), it is the commercial centre of the region and is a base for fishing (salmon and trout) and hunting (moose and caribou). Inc. 1961. Pop. (1986) 9,121.

Grand Forks, city, seat (1873) of Grand Forks county and the third largest city in North Dakota, U.S. It lies at the confluence of the Red River of the North and the Red Lake River, opposite East Grand Forks, Minn., 90 miles (145 km) south of the Canadian border, in the northeastern corner of the state. In the late 18th century French fur traders camped at the site, which they named Les Grandes Fourches ("The Grand Forks"). A North West Company post was built there in 1801. Permanent settlement began in 1871, and growth was assured when the Great Northern Railway arrived in 1880 and established a division point.

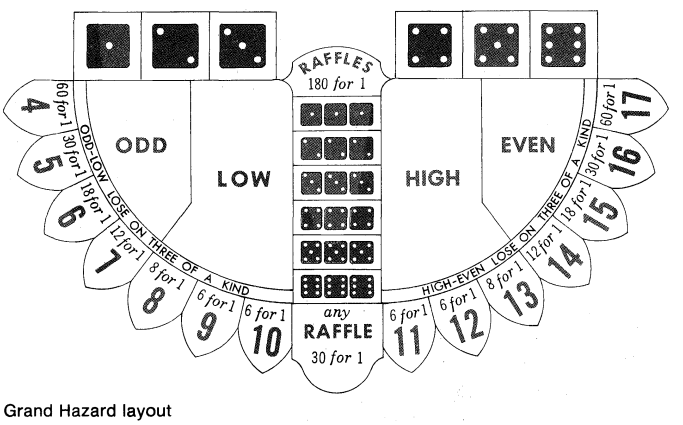
Grand Forks is primarily a trade (shipping) and processing centre for the produce (grains, potatoes, sugar beets, field seeds) grown in the surrounding fertile Red River valley. The city is an important transportation hub with some light-industrial development and is the site of the University of North Dakota (1883), which is headquarters of the state medical centre and state blood bank. The lignite-research laboratory of the U.S. Bureau of Mines, the state public-health laboratories, and a federal meteorological station are also located in the city. The adjacent Grand Forks Air Force Base and Minuteman missile complex are important economic assets. Inc. city, 1881. Pop. (1988 est.) 44,750.

Grand Guignol, short plays emphasizing violence, horror, and sadism, popular in Parisian cabarets in the 19th century, especially at the Théâtre du Grand Guignol. The tales of murder, rape, spectral haunting, and suicide were probably named Grand Guignol because their horrifying stories resembled the violent plots central to the shows featuring the puppet Guignol, the best-known puppet of the time. Although Grand Guignol was introduced into England in about 1908, it remained essentially a Parisian theatrical form.

Grand Harbour, small inlet on the east coast of Malta in the Mediterranean Sea. It is separated from Marsamxett harbour by Mount Sceberras, a rocky promontory on which Valletta, Malta's capital, is built.

With the growth of the Dockyard complex in the late 19th century, settlements around Grand Harbour increased. The harbour is the main port of entry for Malta and has container facilities and six drydocks.

Grand Hazard, dice game from which Chuck-a-Luck evolved. In the United States the game is often called Chuck-a-Luck. Grand Hazard should not be confused with the old English and French game of Hazard, from which the dice game Craps evolved.

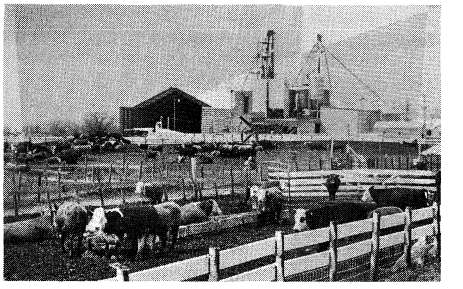


Grand Hazard layout

Equipment includes three dice and a chute, containing a series of inclined planes that tumble the dice as they fall. The only material difference between Grand Hazard and Chuck-a-Luck is in the layout: the Grand Hazard layout is more complex and provides spaces for wagering on odd or even, high or low, triples (called raffles), and any number the dice may total, from 4 to 17. The percentage in favour of the house when a player bets on any particular number varies considerably.

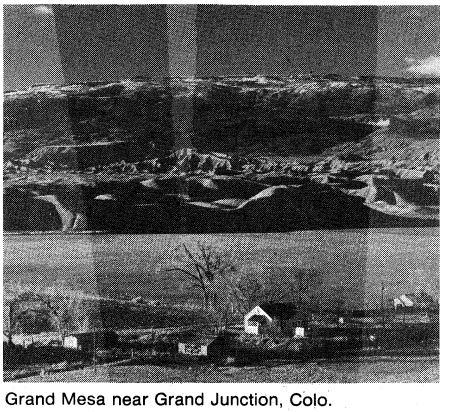
Grand Island, city, seat of Hall county, southeastern-central Nebraska, U.S., near the Platte River. The town's name comes from an island in the river called La Grande Île by early French-Canadian trappers.

The island was a landmark for travelers on the route west to Utah, Oregon, and California. A German settlement had been established near the river in 1857, but the present town was laid out 5 miles (8 km) north in 1866 to be on the Union Pacific Railroad, which was later crossed by the Burlington Northern line. The city has developed as a trade and transportation centre for an irrigated farming and livestock-raising region. Corn and sugar beets are the most important crops. One of the first beet-sugar plants in the country was located there. Other industrial and commercial operations include meat-packing, grain storage, and the production of feed, fertilizers, and farm equipment. The Stuhr Museum of the Prairie Pioneer is at the southwest edge of the city and has a reconstructed railroad town of the 1860s on its grounds. Stolley State Recreation Area is nearby. Inc. 1873. Pop. (1988 est.) 39,104.


A cattle feedlot in Grand Island, Neb.
Milt and Joan Mann from CameraMann

Grand Junction, city, seat (1883) of Mesa county, western Colorado, U.S. It lies in the Grand Valley (elevation 4,586 feet [1,398 m]), at the confluence of the Colorado and Gunnison rivers. Settled by ranchers in 1881 after the expulsion of the Ute Indians, it was first called Ute, then West Denver, and was finally named for the junction of the rivers. It developed as the centre of a mining and irrigated-farm region and as the transportation hub of the Colorado Plateau.

In the 1950s Grand Junction became a business headquarters for uranium production, along with local oil, gas, vanadium, gilsonite, and oil-shale resources. Nearby is the lake-studded Grand Mesa, the Colorado National Monument, and the Grand Mesa and Uncompahgre national forests. Grand Junction is the site of Mesa College (1925) and of an


Grand Mesa near Grand Junction, Colo.
Ben Walker—EB Inc.

area office of the U.S. Department of Energy. Inc. town, 1882; city, 1891. Pop. (1988 est.) 32,597.

grand jury, in Anglo-American law, a group summoned from a district to inquire into crimes within a particular jurisdiction. Through the grand jury, laymen participate in bringing suspects to trial. Though it holds judicial inquiries, the grand jury does not decide guilt or innocence. Its function is inquisitorial and accusatorial, unlike that of the petit jury, which tries cases. The grand jury is part of the court to which it is attached but enjoys greater independence than the petit jury. It is instructed by the court on questions of law and fact and cannot act until sworn, but its investigations are relatively free from supervision. Although the jury works with the prosecutor, it is not under his control.

The process begins with the random selection of a panel by the court. The jurors, generally numbering between 12 and 23, are chosen from this panel. The court may excuse a juror for any reason before the swearing in and for misconduct (*e.g.,* collusion with suspects) thereafter. The following criteria are involved in qualifying jurors: age, citizenship, conviction of certain crimes, conflict of interest or bias (*e.g.,* being a relative of a suspect), literacy, property ownership, length of residence, soundness of mind, occupation (*e.g.,* public officials are often excluded), and previous grand jury service.

Having been selected, the jurors take an oath to execute their duties honestly and diligently, and the court describes their function and specific matters in the case. The grand jury usually has a foreman elected from its number or appointed by the court.

Public officials (*e.g.,* a sheriff) provide information and summon witnesses for the jury. Its power over witnesses resembles that of a trial court. Witnesses must appear and usually must testify. Refusal may constitute contempt. Examination of witnesses is at the jury's discretion and need not involve the prosecutor, who cannot in any event interfere with deliberations and voting. Ordinarily, suspects may not call witnesses, present evidence, or appear before the jury.

The proceedings are secret and informal, although the court may lift secrecy in the interests of justice. Minutes of the proceedings are usually available to the prosecutor and the court, and sometimes to the accused. Unauthorized disclosure of grand jury proceedings is, in some places, an indictable offense, but a grand juror can never be held liable for his statements or vote, even if clearly without foundation.

The product of the investigation is a presentment or indictment, which is a formal announcement of criminal charge. The grand jury usually either absolves the suspect or charges him criminally. But occasionally (as in prison investigations) the jury may issue a report, which merely recommends corrective measures. The court can receive or reject such reports or delete portions that seem a guise for criticism of a public official.

The grand jury originated in medieval England; it was in use by the reign of Henry III (1216–72). It is distinctively a development of the common law (*i.e.,* law based on judicial decisions, as evolved in England and America). Initially, the grand jury both accused and tried suspects, but these functions were later separated. The grand jury's purpose was to prevent oppressive prosecution by the English crown through a citizens' hearing prior to actual prosecution.

The grand jury's significance has waned with the decline of the entire jury system. Some American statutes almost abolish it by making prosecution initiable without grand jury findings of fact. Some see the grand jury as a useless appendage when prosecutors are apt to act on their own. This criticism, however, ignores the problem of harassment prosecution, which can be investigated by a grand jury. Other critics argue that the grand jury actually aggravates the problem of a prosecutor's misuse of power because it allows him to exert undue influence on the jury and gives him publicity.

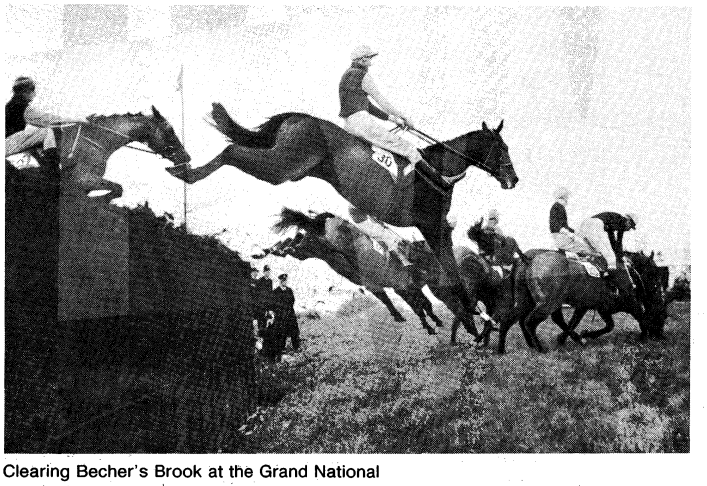
grand mal, type of epilepsy characterized by generalized convulsion, or grand mal (French: "great sickness") attack, whether or not of focal onset (originating in a specific area of the brain). A person undergoing a grand mal attack loses consciousness and falls to the ground. The fall is sometimes preceded by a shrill scream caused by forcible expiration as the respiratory and laryngeal muscles suddenly contract. After the fall, the body stiffens because of generalized tonic contraction of the muscles. The lower limbs are usually symmetrically extended and the upper limbs flexed. If the attack had a focal onset, the initial generalized contractions may be asymmetrical. During this tonic phase, which lasts less than a minute, respiration stops as the result of sustained contraction of the respiratory muscles, and pallor or cyanosis (turning blue) occurs. Following the tonic stage, clonic (jerking) movements occur in all four extremities. The tongue may be bitten during involuntary contraction of the jaw muscles, and urinary incontinence may occur. Following the clonic phase, the excessive discharging of the brain cells ceases, and the seizure proper terminates. Usually, the entire generalized seizure is over in less than five minutes. Immediately afterward, however, the individual is usually confused and sleepy and may have a headache. During the period of confusion he may undress for bed or walk into another room, but he will have no recollection either of the seizure proper or of his confused activity following it. In rare instances convulsions will follow one upon another without return of consciousness between attacks; this condition, called status epilepticus, can be fatal and requires prompt medical treatment. *See also* epilepsy.

Grand Manan Island, island in the Bay of Fundy, southwestern New Brunswick, Canada, near the entrance to Passamaquoddy Bay, 23 miles (37 km) southeast of Saint Andrews and 9 miles (14.5 km) off the Maine coast. It is about 15 miles (24 km) long, is nearly 7 miles (11 km) across at its widest point, and occupies about 55 square miles (142 square km). The island was visited in 1604 by the French explorer Samuel de Champlain, who mapped it as Menane (probably corrupted from the Malecite-Penobscot Indian *munan-an-nook* ["island place"]). As part of New France it was granted to the sieur de Perigny in 1693 but became British under the Treaty of Utrecht in 1713. After the American Revolutionary War the first permanent settlement was made by United Empire Loyalists. Claimed by the United States, it was "exchanged" in 1817 for the then British Moose Island in Maine. Along with Campobello and Deer islands to the north, it is now administered as a parish of Charlotte County, N.B.

Its rugged coastal scenery (including cliffs rising to 400 feet [122 m]) and ornithological attractions (including a rare puffin) were publicized in 1833 by John James Audubon, the naturalist. The island is now a summer retreat for artists and writers. There is some tourism, but fishing (lobster, herring, cod, haddock, pollock) is the main source of income. Villages, including Grand Harbour (site of the fine bird museum of Allen Moses [1881–1953], the "Island Bird Man"), are on the east coast, which offers safer anchorage. The unique dulse (edible seaweed) industry is concentrated at Dark Harbour. Grand Manan has ferry connections with Blacks Harbour, N.B. Pop. (1986 est.) 2,524.

Grand-Mère, city, Trois-Rivières (Three Rivers) region, south-central Quebec province, Canada, on the Saint-Maurice River. The name (French: "grandmother") was inspired by a rock in the river that, according to the Indians, resembled an old woman's profile. The rock was later moved ashore when a hydroelectric dam was built downstream above Trois-Rivières city. The city's economy is sustained by hydropower, upon which its pulp, paper, and garment industries depend. Tourism and winter sports are significant. Founded as a village in 1898 because of ample timber and waterpower, Grand-Mère has grown more slowly than Shawinigan, a few miles downstream. La Mauricie, a national park occupying 134,400 acres (54,390 hectares), is in the vicinity of Grand-Mère. Inc. town, 1901; city, 1910. Pop. (1986) 14,582.

Grand National, also called GRAND NATIONAL HANDICAP STEEPLECHASE, British horse race held annually over the Aintree course, Liverpool, in late March or early April; it attracts more attention throughout the world than any other steeplechase. The race was instituted in 1839 by William Lynn, a Liverpool innkeeper, and its present name was adopted in 1847. The Grand National poses difficulties and dangers to challenge the skill and spirit of the hardiest and most daring riders, professional and amateur. The course, an irregular triangle, must be covered twice for a distance of 4 miles, 855 yards (about 7,200 m), and a total of 31 jumps, among which the most spectacularly hazardous are those known as Becher's Brook and Valentine's Brook. Large numbers of horses are en-



Clearing Becher's Brook at the Grand National
AP/Wide World Photos

tered each year and are reduced at successive jumps until only a few are left at the finish. The Grand National is a handicap race, with weights ranging upward to 12 stone 7 pounds (175 pounds). The weights, the distance, and the big jumps demand horses of prodigious strength and stamina and usually of more than normal size. The winners frequently have cold blood (*e.g.,* the heavier draught breeds) mixed with Thoroughbred ancestry, although pure Thoroughbreds have won the Grand National on occasion.

Grand Old Party (United States): *see* Republican Party.

Grand Ole Opry, also called OPRY, country music show in Nashville, Tenn., U.S., which began weekly radio broadcasts in December 1925, playing traditional country or hillbilly music. Founded by George Dewey Hay, who had helped organize a similar program, the WLS "National Barn Dance," in Chicago, the show was originally known as the "WSM Barn Dance," acquiring its lasting name in 1926. It was largely Hay, called "the Solemn Ol' Judge," who determined the course of the Opry's development.

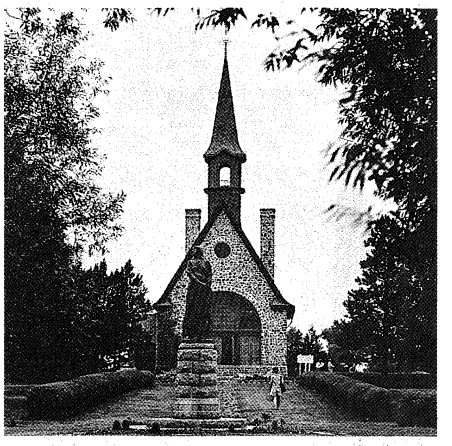
The show flourished through the heyday of radio and on into the television era. Such widening exposure led to tours of Opry stars and in the 1940s to Opry films. The music of the Opry developed from Uncle Dave Macon's ballads of rural labourers in the 1920s, through the string bands, cowboy music, and western swing of the 1930s, and back to the traditional music characterized by the career of Roy Acuff, who was promoted into stardom by the Opry in the late 1930s. After World War II, the honky-tonk style of Ernest Tubb, the bluegrass music of Bill Monroe with Earl Scruggs, the "rockabilly" music of Hank Williams, the crooning of Eddy Arnold and Tennessee Ernie Ford, and the singing of such female vocalists as Kitty Wells were all Opry staples, as were comedy routines, notably by Minnie Pearl. In 1941 the Opry became a live stage show at the Ryman Auditorium in Nashville; in 1974 the show moved to the Opryland amusement park and entertainment centre. The Opry initiated and promoted the creation of Nashville as the centre of country music.

Grand Portage National Monument, historic site in the northeastern corner of Minnesota, U.S., on Lake Superior near the Canadian border, 140 miles (225 km) northeast of Duluth. It was designated a national historic site in 1951 and a national monument in 1960, and it covers a 9-mile (14-kilometre) overland trail from Lake Superior's north shore that bypassed the obstacles to early canoe travel, notably the 70-foot- (21-metre-) high thundering Pigeon Falls, on the Pigeon River. Its name is French and means "great carrying place."

Used by Indians, explorers, and fur traders, the portage represented the end of travel on the Great Lakes and the beginning of the Northwest interior river and lake route. It was the site of a British North West Company trading post built in 1778 (a reconstructed stockade now occupies the site), but the portage declined after the company departed in 1803. The portage trail now bisects the reservation of the Grand Portage tribe of the Minnesota Chippewa Indians. During the summer, excursion boats ply between Grand Portage and nearby Isle Royale National Park.

Grand Pré, unincorporated place, Kings county, central Nova Scotia, Canada. It lies on the south shore of Minas Basin (an inlet of the Bay of Fundy). Settled in the late 17th century by Acadian French farmers, it served as their chief settlement until they were deported by the British in 1755 to Louisiana and other American colonies for refusing to pledge allegiance to England.

Grand Pré (French: "Great Meadow"), 46 miles (74 km) northwest of Halifax, was later occupied by New England farmers; and, although many Acadians made their way back to the region, they now form only a small minority of the population. A national historic park contains a replica of an Acadian church and a statue of Evangeline, the Acadian poetic heroine immortalized by Henry Wadsworth Longfellow. Pop. (1981) 305.



Statue of Evangeline (commemorating the heroine of Longfellow's poem) in front of the Acadian church in Grand Pré National Historic Park, Nova Scotia

By courtesy of the Canadian Government Travel Bureau, Ottawa; photograph, M. Milne

grand prince, feminine GRAND PRINCESS: *see* grand duke.

Grand Prix de Rome, also called PRIX DE ROME, any of a group of scholarships awarded by the French government to enable young French artists to study in Rome. It is so named because the students who win the grand, or first, prize in each artistic category go to study at the Académie de France in Rome. The *grands prix* were established in the 17th century and were still being awarded in the late 20th century.

As part of his official patronage of the arts, King Louis XIV established an art academy in Rome called the Académie de France. This move was prompted by Charles Le Brun, who had previously been instrumental in founding France's Royal Academy of Painting and Sculpture (Académie Royale de Peinture et de Sculpture) in Paris in 1648. In 1666 French statutes decreed that the newly established Grands Prix de Rome should preferably be awarded to prizewinning pupils from the Royal Academy. The original prizes were awarded to students of painting and sculpture. Prizes for architecture were awarded regularly after about 1720. Many of the greatest French artists and architects of the 18th century went to Rome as prizewinners, including the painters Antoine Coypel, Jean-Honoré Fragonard, and Jacques-Louis David and the sculptors François Girardon, Clodion, and Jean-Antoine Houdon.

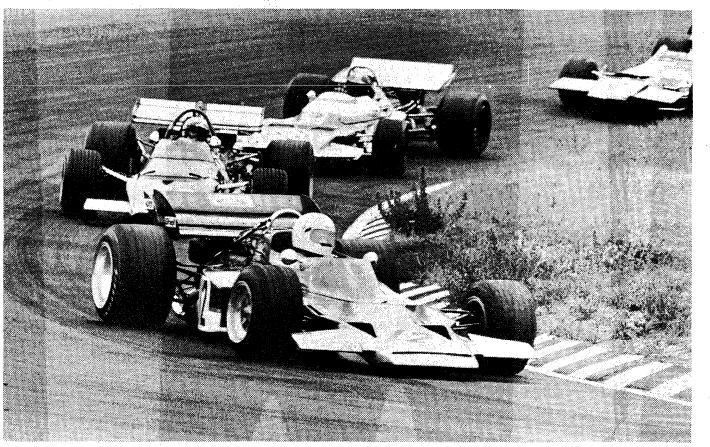
The Académie de France was closed during the French Revolution, from 1792 to 1801, and then reopened in its present building, the magnificent Villa Medici. In the 19th century prizes for engravers and musicians were added; the most famous prizewinners of that century were the painter J.-A.-D. Ingres, the sculptors Pierre-Jean David d'Angers and Jean-Baptiste Carpeaux, the architect Tony Garnier, and the composers Hector Berlioz, Charles Gounod, Georges Bizet, and Claude Debussy.

In the second half of the 20th century annual *grands prix* competitions were still held, the winner of the *grand prix* in each category being entitled to spend several years at the Académie de France in Rome. The prizes are now administered by the École des Beaux-Arts. The competitions remain open only to French citizens. The Prix de Rome competitions and awards have diminished in prestige and importance during the 20th century, however.

Grand Prix racing, automobile racing on closed highways or other courses somewhat simulating road conditions. Such racing began in 1906 and, in the second half of the 20th century, became the most popular kind of racing internationally. For the place of Grand Prix racing in the history of automobile racing, *see* automobile racing.

From the beginning, Grand Prix racing was national and controlled by automobile manufacturers under the supervision of what came to be called the Fédération Internationale de l'Automobile (FIA), which sets the specifications for all racing-car classes, including the Formula One for Grand Prix racing. The Formula One is generally smaller than the car used in speedway racing and is more maneuverable. All Grand Prix racing is for open-wheeled, single-seater (after 1924) cars, the engine size, fuel, and other elements being controlled by the FIA.

Grand Prix racing became popular worldwide from the 1950s, when world championships for drivers and for constructors (manufacturers) were established.



Grand Prix of The Netherlands, 1971

Media Press—Globe Photos

The term Grand Prix was early used for the most prominent automobile race of a country and was later used for other than Formula One car racing, as well as for events in other sports. The first such use in organized sport was probably as the name of the French Grand Prix horse race, first run in 1863. In

the present usage, Grand Prix races are literally those that apply to the World Championship of Drivers, although the term is used to describe other, less-illustrious events. More than 15 Grand Prix races are held yearly in countries throughout the world.

For winners of events relating to Grand Prix racing, *see* Sporting Record: *Automobile racing.*

Grand Rapids, city, seat (1836) of Kent county, western Michigan, U.S. It lies along the Grand River, 25 miles (40 km) east of Lake Michigan and 149 miles (240 km) west-northwest of Detroit. It was founded in 1826 by the Frenchman Louis Campau as a trading post where several important Ottawa Indian trails (which are now diagonal streets) converged at the rapids on the Grand River. Ample waterpower generated by the 18-foot (5.5-metre) fall of the river and the availability of valuable lumber from nearby pine and hardwood forests led to the establishment of many sawmills and woodworking (especially furniture-making) industries in the town.

Following the display of Grand Rapids furniture at the Philadelphia Centennial in 1876, the city gained a reputation as the furniture capital of America. Buyers the world over went to its furniture markets, first held in 1878. The diversification of its industry began with the advent of World War I, and metal-based manufacturing industries thereafter exceeded furniture in value and output. Nevertheless, Grand Rapids furniture produced by its skilled craftsmen has maintained its eminence in quality, style, and design. Grand Rapids has become the state's second largest city and is the principal trading centre of western Michigan, including a large area devoted to fruit farming and truck gardening.

The city's Public Museum (founded in 1854 as a gift of the lumber baron T. Stewart White) includes historical and contemporary furniture exhibits. The city's public library contains one of the country's most important collections of books on furniture design and manufacture.

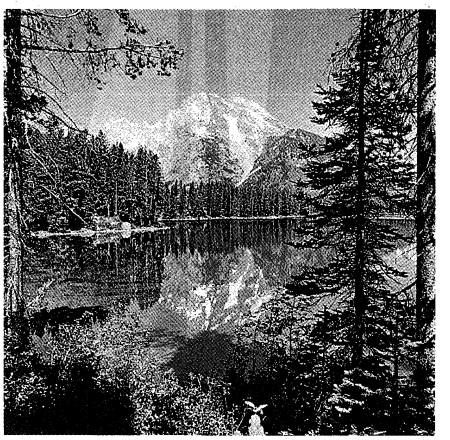
Calvin College and Theological Seminary (1876), Aquinas College (1886), Grand Rapids Junior College (1914), Davenport College of Business (1910), and Kendall School of Design are located there, while the Grand Valley State Colleges (1960) are in nearby Allendale. The city has some 50 parks, including a zoo.

Grand Rapids was the boyhood home of President Gerald R. Ford, who represented (1948–73) the congressional district that included the city. Inc. village, 1838; city, 1850. Pop. (1987 est.) city, 187,441; (1986 est.) metropolitan area (MSA), 648,800.

Grand River, river rising near Creston, Union county, south-central Iowa, U.S., and flowing in a southerly direction into Missouri. It merges with the Thompson River and Shoal, Medicine, and Locust creeks near Chillicothe, Mo., before joining the Missouri River near Brunswick after a course of 215 miles (346 km). As early as 1723 the Grand was referred to by the French as "La Grande Riviére," and in that year France established Fort D'Orleans just west of its mouth in an effort to secure military control of the Missouri. The fort was abandoned in 1728 and the site has since been obliterated by the changing course of the river.

Grand River, river formed by the confluence of the North and South forks in Perkins county, northern South Dakota, U.S. The Grand River flows southeast and a little south to join the Missouri River near Mobridge after a course of 209 miles (336 km). Shadehill Dam (1950) impounds a reservoir in the Grand's upper course.

Grand Teton National Park, spectacular glaciated mountain region in northwestern Wyoming, U.S. In 1950 most of Jackson Hole National Monument (a fertile valley) was incorporated into the park, which was established in 1950 and now covers 310,521 acres (125,663 hectares). The snow-covered peaks of its Teton Range (*q.v.*) reach a height of 7,000 feet (2,100 m) above the nearby Snake River valley. The range, whose highest peak, Grand Teton, is 13,747 feet (4,190 m) above sea level, began as a gigantic fault block uplifted from the Earth's crust; it is traversed by great glaciers that have slowly crunched their way down the stream-cut canyons. Melting as they reached the bottom, they deposited their cargo of rock and debris into accumulations known as moraines. These are often forested with the sharp-pointed Engelmann spruce and with straight, tall lodgepole pines. These woody stands line the shores of frigid glacial lakes of varying sizes that dot the region. The best-known of these is Jenny Lake, but there are others, such as Leigh, String, and Bradley lakes, some of which are fed from roaring torrents. The largest body of water in the park, Jackson Lake, is formed by a dam across the Snake River. The streams in the park abound in fish, while herds of buffalo, elk, and antelope roam at will. Throughout the warmer months a succession of different varieties of wildflowers appear, some beginning their bloom while still underneath the snow.



Mount Moran, reflected in Leigh Lake, Grand Teton National Park, Wyoming

By courtesy of the Wyoming Travel Commission

Grand Traverse Bay, northeastern arm of Lake Michigan, indenting the northwest coast of the Lower Peninsula of Michigan, U.S. The head of the bay (32 miles [52 km] long and 12 miles [19 km] wide) is divided into the East and West arms by Old Mission Peninsula (17 miles [27 km] long by 3 miles [5 km] wide), with Traverse City (*q.v.*) at its base. The Leelanau Peninsula lies west of the bay, which is noted for its year-round fishing. The bay's shores form an important summer-resort and cherry-growing region.

Grand Trunk Railway, early Canadian railway line, incorporated in 1852–53 to build a railway connecting the key cities of eastern Canada (the area now known as Ontario and Quebec) with the U.S. seacoast city of Portland, Maine. By completing its final link in July 1853 between Montreal and Portland, the Grand Trunk became North America's first international railroad. The main line within Canada, from Montreal to Toronto, opened in October 1856. The Grand Trunk Railway eventually became the main railway system of Quebec and Ontario.

During the period from 1867 to 1905 the Grank Trunk concentrated on taking over smaller, competing lines and on building rail connections to the northern U.S. rail system. The Grand Trunk was also in competition with the Great Western Railway until the two merged in 1882. Eventually, a western branch, the Grand Trunk Pacific, was constructed, but this new rail network proved so unprofitable that it passed into government receivership in 1919. As a result of the liabilities incurred by its Pacific subsidiary, the Grand Trunk Railway was nationalized and became part of the Canadian National Railways in the period 1919–23.

Grand Turk, chief island and seat of government of the British colony of the Turks and Caicos Islands in the West Indies, north of Hispaniola. The only town and port on the island is Cockburn Town, directly across Turks Island Passage from the colony's second port, Cockburn Harbour, on South Caicos Island. The chief economic resource was traditionally the production of salt by evaporation of seawater in artificial basins. The industry became increasingly unprofitable until it ceased altogether in 1964. The export of spiny lobster increased after 1971 with the introduction of new trapping methods and is the mainstay of the economy. Tourism and offshore banking are becoming more important. Pop. (1980) 3,098.

grand unified theory, also called GRAND UNIFICATION THEORY: *see* unified field theory.

Grand Union Flag, also called GREAT UNION FLAG, or CAMBRIDGE FLAG, American colonial banner first displayed by George Washington on Jan. 1, 1776. It showed the British Union Flag of 1606 in the canton. Its field consisted of seven red and six white alternated stripes representing the 13 colonies. The Stars and Stripes officially replaced it on June 14, 1777.

Grandbois, Alain (b. May 25, 1900, Saint-Casimir, Que., Can.—d. March 18, 1975, Quebec), French-Canadian poet whose use of unconventional verse forms, abstract metaphors of voyage and death, and colourful imagery influenced younger experimental poets.

Born of a wealthy family, Grandbois traveled widely until World War II forced his return to Canada in 1940. Much of his poetry was originally published in early volumes such as *Poèmes* (1934) and *Les Îles de la nuit* (1944; "The Isles of the Night"). Later collections include *Poèmes* (1963) and *Selected Poems* (1965), containing both the French originals and English translations. He also wrote biographies of Louis Jolliet, *Né à Québec* (1948; *Born in Quebec*), and Marco Polo, *Les Voyages de Marco Polo* (1942), and a volume of short tales, *Avant le chaos* (1945; "Before the Chaos").

Grandchamp and Taizé communities, two associated Protestant religious communities founded in the mid-20th century in Switzerland and France.

In the 1940s Roger Schutz, later the prior, founded a community of men at Taizé, a small village in Burgundy, Fr., for a life of worship and dedication in the traditional ways of celibacy, obedience, and community of goods. The first members came from the French and Swiss Reformed churches and were later joined by men of Lutheran as well as Reformed background from France, Switzerland, Germany, The Netherlands, Denmark, and Spain. Some of the brothers are ordained, and some are laymen who continue to exercise their professional skills in the context of the community's life.

In association with Taizé a community of sisters was founded at Grandchamp, near Neuchâtel, Switz. One of the aims of both of the communities, which observe the same rule, is to further Christian unity, notably by work with the ecumenical movement.

Grande, Canale (Venice): *see* Grand Canal.

Grande Cascade, set of cataracts in the Pyrenees range near the head of the Pau Stream in southern France. With a height of 1,450 feet (442 m), it is among the world's highest waterfalls.

Fed by water from Lake Glacé in Spain and by melting snow, its two main falls merge into one in spring and early summer, when the water volume is greatest. The Grande Cascade is in the Western Pyrenees National Park.

grande cuisine, the classic cuisine of France as it evolved from its beginnings in the 16th century to its fullest flowering in the lavish banquets of the 19th century. The classic cuisine prizes richness, suavity, balance, and elegant presentation. Unlike a peasant or bourgeois cuisine, in which bold, earthy tastes and textures are allowable and even desirable, *grande cuisine* aims at a mellow harmony and subtlety and an appearance of artfulness and order.

France's fertile pasturelands, dairies, vineyards, and farmlands, and a wealth of seacoast on both the Atlantic and Mediterranean, placed at the disposal of its chefs unsurpassed raw materials. Sophisticated cookery, however, arrived only with Catherine de Médicis in 1503. She brought from Italy a taste for delicacies such as truffles, sweetbreads, and artichokes and, more importantly, for refined dishes such as aspics, quenelles, and custards; in these dishes there are no heavy sauces or spicings to disguise a lack of skill in preparation. Along with this refinement came great advancements in table etiquette and appointments.

The history of French cuisine henceforth is the development of this aesthetic: to procure the finest ingredients, to bring out all the nuances of flavour in subtle combination, and to serve the dishes with meticulous attention to symmetry and colour.

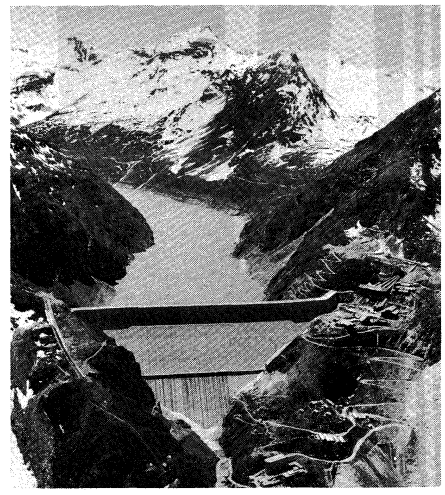
The greatest of French chefs—François Pierre de la Varenne in the 17th century, Marie-Antoine Carême in the late 18th, and Auguste Escoffier in the 19th—advanced the systematization of French cuisine by their writings and through the legions of chefs they trained. In developing new dishes they accumulated a body of knowledge about the nature of raw materials.

Through such experimentation, the master techniques for the preparation of stocks and sauces developed. To each of these were added variations and subdivisions of variations to the extent that, for example, an espagnole (brown) sauce could be endlessly varied by the addition of suitable herbs, vegetables, and flavourings. The properties of meats, fishes, eggs, butter, flour, sugar, and other staples were thoroughly explored; results could be anticipated by duplicating controlled conditions of heat, moisture, and proportion. Methods of braising, roasting, sautéing, and so on were formalized and adjusted for the specific requirements of various meats, fishes, and vegetables. By a mutual understanding of technique, chefs could communicate recipes in a kind of shorthand and build on each other's experience.

The *grande cuisine* is often associated with an overblown and overformal court cuisine and with a Victorian opulence devoted to excess. While there is some truth in this picture, modern French cuisine has been much lightened and simplified.

Grande Dixence Dam, gravity dam on the Dixence River, Switzerland, completed in 1962. It is 935 feet (285 m) high and 2,280 feet (695 m) wide at the crest, has a volume of 7,848,000 cubic yards (6,000,000 cubic m), and impounds a reservoir of 325,000 acre-feet (401,000,000 cubic m).

Grande Dixence was the tallest dam in the world until completion of the Nurek Dam in the Soviet Union in 1980. The dam was built



Grande Dixence Dam

By courtesy of the Grande Dixence S.A.; photograph, Henri Germond

in annual stages, a procedure necessary because the alpine working season is quite short.

Grande dizionario della lingua italiana (Italian: "Great Dictionary of the Italian Language"), Italian dictionary, a scholarly work being produced at Turin, intended to replace the *Dizionario della lingua italiana* (1861–79), the standard Italian dictionary. Volumes 1–10 appeared between 1961 and 1978. A supplement indexing usage citations to both early and modern sources was published in 1968, and an index for the first eight volumes was published in 1973. Definitions, which include all possible meanings, are given in chronological order of their usage. The completeness of the entries, which represent the joint efforts of many scholars, is exemplified by the preposition *a,* to which 26 meanings covering six pages are assigned, or by the word *amore,* for which 19 meanings and approximately 500 illustrative quotations are given.

Grande Enciclopédia Portuguesa e Brasileira (Portuguese: "Great Portuguese and Brazilian Encyclopaedia"), 37-volume Portuguese dictionary-encyclopaedia published in Lisbon and Rio de Janeiro (1935–58), with a 4-volume appendix (1958–60), which includes a general index for the entire set. A second part, covering Brazilian subjects, was begun in 1964 and was projected for four volumes, including biographies of living persons.

The main set treats Portuguese words, including Brazilian usages, technical terms, and modern slang; biographies, which include living persons; and encyclopaedic articles covering all aspects of Portuguese life, in Portugal and Portuguese overseas territories and including history and culture, national institutions, and flora and fauna. There are more than 15,000 illustrations, both colour and black-and-white. Biographies in both parts provide especially useful references for figures often omitted from northern European and North American sources.

Grande Encyclopédie, La (French: "The Great Encyclopaedia"), French general encyclopaedia, lavishly illustrated in 21 volumes and published in Paris (1971–78). The work has a French slant and an emphasis on 20th-century achievements in the fields of technology and technological advances, political and social economy, and physical and social sciences. A completely new encyclopaedia, it is intended both to supplement and to replace the 31-volume *La Grande Encyclopédie, inventaire raisonné des sciences, des lettres et des arts, par une societé de savants et de gens de lettres* (1886–1902; "The Great Encyclopaedia, a Rational Inventory of the Sciences, Letters, and Arts, for a Society of Scholarly and Lettered Persons"), which was considered the most important 19th-century encyclopaedia and which is still valuable for research on continental Europe and Renaissance subjects. This original *La Grande Encyclopédie* had authoritative signed articles, excellent bibliographies, and many entries on minor subjects.

The approximately 8,000 entries in the new set are signed and are enhanced by updated bibliographies, illustrations mostly in colour, and charts and tables. *La Grande Encyclopédie* is known for its combining of brief entries with its lengthy, scholarly articles, which include valuable bibliographies and such supplementary material as portraits, diagrams, and lists and examples of achievements. An index completes the set.

Grande Mademoiselle, la: *see* Montpensier, Anne-Marie-Louise d'Orléans, duchesse de.

Grande Prairie, city, western Alberta, Canada. It lies along the Bear River, near the British Columbia border, 286 miles (460 km) northwest of Edmonton. Named by a missionary and settled by farmers in about 1910, it grew after the arrival of the Northern Alberta Railway (1916). Grande Prairie's economy is based on agriculture and forest products, augmented by tourism. Grand Prairie Regional College was established in 1966. In the vicinity are Saskatoon Island Provincial Park and Kleskun Hill, a site where dinosaur fossils have been found. Inc. village, 1914; town, 1918; city, 1958. Pop. (1986) 26,471.

Grande River, La, French LA GRANDE RIVIÈRE, formerly FORT GEORGE RIVER, river in Nouveau-Québec (New Quebec) region, north-central Quebec province, Canada. Rising from Nichicun Lake in the Otish Mountains of central Quebec, it descends 1,737 feet (529 m) in its westward journey to James Bay, which forms part of Hudson Bay. For most of the river's course of about 550 miles (900 km), its valley is almost uninhabited.

Grande-Terre, island in the Lesser Antilles in the Caribbean Sea, which with its twin to the west, Basse-Terre, constitutes the core of the French overseas *département* of Guadeloupe. Although the two islands are separated only by a narrow inlet of the sea called Rivière Salée ("Salty River"), Grande-Terre belongs geologically to the outer limestone arc of the Lesser Antilles, while Basse-Terre belongs to the inner, mountainous, volcanic arc. Grande-Terre is a low-lying island of 228 square miles (590 square km) without any rivers. Sandy soils and scrub forest vegetation are characteristic of the dry climate. The chief town of the island and the economic centre of the *département* is Pointe-à-Pitre on the southwestern coast. The majority of the population are black and mulatto, with some Europeans and Asian Indians. Pop. (1982) 162,500.

grandee, Spanish GRANDE, a title of honour borne by the highest class of the Spanish nobility. The title appears first to have been assumed during the late Middle Ages by certain of the *ricos hombres,* or powerful magnates of the realm, who had by then acquired vast influence and considerable privileges, including one—that of wearing a hat in the king's presence—which later became characteristic of the dignity of grandee. The title was given a formal character in 1520 and, under Charles I (1516–56; Holy Roman emperor as Charles V), the number of grandees was limited to 25. This figure was later increased; and by the early 17th century the grandees of Spain had been divided into three classes: (1) those who spoke to the king and received his reply with their heads covered; (2) those who addressed him uncovered but put on their hats to hear his answer; and (3) those who awaited the

permission of the king before covering themselves.

All grandees were addressed by the king as "my cousin" (*mi primo*), whereas ordinary nobles were only qualified as "my kinsman" (*mi pariente*). The title of grandee, abolished under Joseph Bonaparte, was revived in 1834, when, by the *Estatuto real,* grandees were given precedence in the chamber of peers. Later the designation became purely titular and implied neither privilege nor power.

grandfather chair: *see* wing chair.

grandfather clause, statutory or constitutional device enacted by seven Southern states between 1895 and 1910 to deny suffrage to American blacks; it provided that those who had enjoyed the right to vote prior to 1866 or 1867, or their lineal descendants, would be exempt from educational, property, or tax requirements for voting. Because the former slaves had not been granted the franchise until the adoption of the Fifteenth Amendment in 1870, these clauses worked effectively to exclude blacks from the vote but assured the franchise to many impoverished and illiterate whites. In 1915 the Supreme Court declared the grandfather clause unconstitutional because it violated equal voting rights guaranteed by the Fifteenth Amendment.

grandfather clock: *see* longcase clock.

Grandgent, Charles Hall (b. Nov. 14, 1862, Dorchester, Mass., U.S.—d. Sept. 11, 1939, Cambridge, Mass.), American linguist concerned with Romance languages and a principal authority on Vulgar Latin. He was also noted for his Dante scholarship.

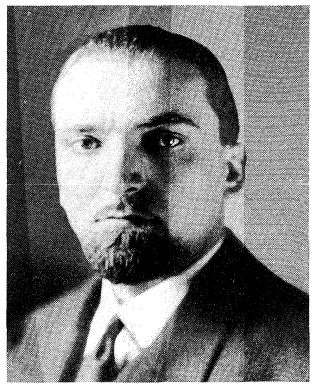
Grandgent was a professor at Harvard University (1896–1932), lecturing on Dante as well as on Romance linguistics and phonetics. In addition to French and Italian grammars and a work on Old Provençal, he wrote an important *Introduction to Vulgar Latin* (1907) and *From Latin to Italian: An Historical Outline of the Phonology and Morphology of the Italian Language* (1927). In the area of Dante scholarship Grandgent produced an edition of Dante's *Divina Commedia* (1909) and a number of other works, including *The Ladies of Dante's Lyrics* (1917) and *Discourses on Dante* (1924).

Grandi, Alessandro (d. 1630, Bergamo, Rep. of Venice [now in Italy]), Italian composer noted for his solo songs; he was the first to use the word cantata in the modern sense.

Grandi was musical director to a religious fraternity in Ferrara in 1597 and held other positions there until 1617, when he became a singer at St. Mark's in Venice. In 1620 he became Claudio Monteverdi's assistant there. During this period he produced several remarkably fine books of songs called *Cantade et arie a voce sola* (published 1620–29). He combined a gift for attractive melody with one for finding music to fit exactly the meaning of the words. His monodic "cantatas" are precursors of the ground-bass songs of Henry Purcell, the voice varying the melody over a repeated bass. He also wrote religious songs in the same style, and these had some influence on Heinrich Schütz. In 1627 he went to Bergamo to become music director at the basilica of Santa Maria Maggiore. He died with his family during a plague epidemic.

Grandi, Dino, CONTE (count) DI MORDANO (b. June 4, 1895, Mordano, Italy—d. May 21, 1988, Bologna), high-ranking official of Italy's Fascist regime who contributed to the downfall of the dictator Benito Mussolini.

Educated as a lawyer, Grandi fought in World War I (1914–18), after which he joined the Fascist *squadristi* (armed squads that terrorized the countryside). At the national congress



Dino Grandi
B. Pellegrini

of Fascists (Nov. 7, 1921), Grandi made an unsuccessful bid for leadership, losing out to Mussolini, who proposed that the Fascists become a political party.

Grandi participated in the March on Rome that installed Mussolini as head of the government (October 1922). He was appointed under secretary of interior in 1924, and in September 1929 he became head of the ministry of foreign affairs. He was named ambassador to Great Britain (July 1932) and concluded an Anglo-Italian agreement (1938) before being recalled to Italy to become minister of justice and president of the Chamber of Fasces and Corporations.

He was opposed to participation in World War II. Grandi was replaced in the Cabinet in February 1943 but remained chairman of the Grand Council, where he presented the resolution that deposed Mussolini in July 1943. Soon afterward, Grandi fled to Lisbon and in 1944 was condemned in absentia to death by a Fascist tribunal in Verona. He later moved to Brazil and eventually returned to Italy to live.

Grandjean, Philippe (b. 1666, Mâcon, Fr.—d. May 6, 1714, Paris), French type engraver particularly noted for his famous series of roman and italic types known as Romain du Roi. The design was commissioned in 1692 for the Imprimerie Royale (royal printing house) of King Louis XIV and was carried out by a committee of mathematicians, philosophers, and others, who produced carefully worked-out drawings. The type itself was cut by Grandjean; he achieved a modern look by using thin flat serifs and virtually eliminating the brackets joining them to the main strokes.

Reserved for use by the Imprimerie Royale, Romain du Roi made its first appearance in the magnificent *Médailles sur les principaux énvenémens du règne de Louis-le-Grand* (1702). The success of the type soon prompted many other typefounders to use modifications of it. Work on the type was continued by Grandjean's pupil Jean Alexandre and completed by Louis Luce in 1745.

Grandma Moses: *see* Moses, Grandma.

Grandville, byname of JEAN-IGNACE-ISIDORE GÉRARD (b. Sept. 13, 1803, Nancy, Fr.—d. March 17, 1847, Paris), French caricaturist who is admired as a fantasist and proto-Surrealist. His big-headed people, seen as if in distorting mirrors, and his animal analogies (individuals with the bodies of men and the faces of animals) have been considered among the sources for Lewis Carroll's *Alice in Wonderland.*

Grandville received his first instruction in drawing from his father, a painter of miniatures. At the age of 21 he went to Paris, where a collection of his lithographs entitled "Les Tribulations de la petite propriété" ("The Trials of Owning a Small Estate") was soon published. His reputation was established with "Les Métamorphoses du jour" (1828; "Present-day Metamorphoses"), a series of 70 scenes in which human–animal figures played the human comedy. Grandville contributed drawings to many periodicals, including *La Caricature* and *Le Charivari.* Both his political caricatures and his illustrations for works of literature were widely popular.

Granet, François Marius (b. Dec. 17, 1775, Aix-en-Provence, Fr.—d. Nov. 21, 1849, Aix-en-Provence), French painter and watercolourist. With a number of other artists—Jean-Auguste-Dominque Ingres, Antoine-Jean Gros, Anne-Louis Girodet-Trioson—he lived and worked in the former convent of the Capuchins in the Boulevard des Capucines in Paris. There he found the subjects most characteristic of his work—cloisters, cells, and large, quiet sunlit rooms, with mild historical compositions in the same tranquil settings.

In 1802 Granet went to Rome, where he stayed for 17 years. On his return to Paris in 1819 he exhibited in the Salon his "Choeur de l'Église des Capucins," which was so successful that 16 replicas were commissioned. His paintings and watercolours influenced the evolution of Camille Corot's style. In 1826 he was made conservator of the Louvre, and in 1830 Louis Philippe made him curator of the pictures at Versailles. He left a large bequest to the Granet Museum in his hometown.

Grange, Red, byname of HAROLD GRANGE (b. June 13, 1903, Forksville, Pa., U.S.), collegiate and professional American football player, a great running back and highly publicized player in American football history.

In 20 varsity games for the University of Illinois, Grange scored 31 touchdowns and gained 3,637 yards. On Oct. 19, 1924, as a junior, he scored five touchdowns against the University of Michigan, four in the first 12 minutes of play. He became known as the "Galloping Ghost" and the "Wheaton Iceman" (while a high school student at Wheaton, Ill., he worked part-time for an ice company), and by his football-uniform number, 77.

His early play with the Chicago Bears (1925) greatly stimulated public interest in professional football. In his later years with the Bears he was noted as a defensive back. He retired after the 1934 season and subsequently became a radio and television sports commentator.

Grangemouth, seaport and industrial town on the south shore of the Firth of Forth, Falkirk district, Central region, Scotland. After 1945 Grangemouth expanded rapidly as a centre of the petrochemical industry and an oil-importing port, ranking as one of Scotland's most important ports in terms of value of trade. Grangemouth was founded in 1777 as the eastern terminus and transshipment point of the Forth–Clyde Canal (closed in 1963). The port developed as Stirlingshire's chief port and the main east-coast outlet for Glasgow. Grain and timber were the main imports and coal the chief export. By 1914 Grangemouth had begun to import oil, and within a decade a refinery had also been established to treat the imported crude oil. The importing and refining of petroleum and the associated petrochemical industry are together responsible for Grangemouth's subsequent growth. Crude oil is both imported and delivered by overland pipeline from Finnart on the deep waters of Loch Long on Scotland's west coast. Later developments include the construction of an overland pipeline delivering North Sea oil from the landfall terminal at Cruden Bay to the Grangemouth refinery. The by-products from the refining of crude-oil supply plastics and petrochemical industries.

In addition to the expanding industrial complex, Grangemouth's port facilities have been constantly updated and enlarged. Already Scotland's principal oil port, Grangemouth also became its first port with container ser-

vices to both northern Europe and the United States. Apart from oil, main imports include timber, cement, iron ore, wood pulp, and rubber. Exports consist mainly of iron and steel, whisky, coal, and agricultural implements and machines. Pop. (1981) 21,599.

Granger movement, coalition of U.S. farmers, particularly in the Middle West, that fought monopolistic grain transport practices during the decade following the American Civil War.

The Granger movement began with a single individual, Oliver Hudson Kelley. Kelley was an employee of the Department of Agriculture in 1866 when he made a tour of the South. Shocked by the ignorance there of sound agricultural practices, Kelley in 1867 began an organization—the Patrons of Husbandry—he hoped would bring farmers together for educational discussions and social purposes.

The organization involved secret ritual and was divided into local units called "Granges." At first only Kelley's home state of Minnesota seemed responsive to the Granger movement, but by 1870 nine states had Granges. By the mid-1870s nearly every state had at least one Grange, and national membership reached close to 800,000. What drew most farmers to the Granger movement was the need for unified action against the monopolistic railroads and grain elevators (often owned by the railroads) that charged exorbitant rates for handling and transporting farmers' crops and other agricultural products. The movement picked up adherents as it became increasingly political after 1870.

In 1871 Illinois farmers were able to get their state legislature to pass a bill fixing maximum rates that railroads and grain-storage facilities could charge. Minnesota, Wisconsin, and Iowa later passed similar regulatory legislation. These laws were challenged in court, and what became known as the "Granger cases" reached the Supreme Court in 1877. The most significant of the Granger cases was *Munn* v. *Illinois* (*q.v.*), in which a Chicago grain-storage facility challenged the constitutionality of the 1871 Illinois law setting maximum rates. The court, with Chief Justice Morrison Remick Waite writing for the majority, upheld the state legislation on the grounds that a private enterprise that affects the public interest is subject to governmental regulation.

Meanwhile, independent farmers' political parties began appearing all over the country, outgrowths of the Granger movement. Ignatius Donnelly was one of the principal organizers, and his weekly newspaper *Anti-Monopolist* was highly influential. At their Grange meetings farmers were urged to vote only for candidates who would promote agricultural interests. If the two major parties would not check the monopolistic practices of railroads and grain elevators, the Grangers turned to their own parties for action.

With the rise of the Greenback Party and later organizations for the expression of agricultural protest, however, the Granger movement began to subside late in the 1870s. Ill-advised farmer-owned cooperatives for the manufacture of agricultural equipment sapped much of the group's strength and financial resources. By 1880 membership had dropped to slightly more than 100,000. The Granger movement rebounded in the 20th century, however, especially in the eastern part of the country. The National Grange, as it is called, remains a fraternal organization of farmers and takes an active stance on national legislation affecting the agricultural sector.

Granicus, Battle of the (early summer of 334 BC), first victory won by Alexander the Great of Macedon in his invasion of the Persian Empire. The Persians, numbering perhaps 40,000, occupied the far bank of the Granicus River (modern Kocabas, flowing into the Sea of Marmara). Alexander's shock troops forded the stream and clambered up the bank under a shower of javelins. Alexander followed and charged the generals, who were concentrated in the left centre of the Persian line. He killed two relatives of the Persian king, Darius, and was himself saved from death by his cavalry commander, Cleitus (the Black). The Persian effort collapsed. According to Alexander's biographer, Arrian (2nd century AD), the struggle cost the Macedonians only 115 men.

Granit, Ragnar Arthur (b. Oct. 30, 1900, Helsinki), Finnish-born Swedish physiologist who was a corecipient (with George Wald and Haldan Hartline) of the 1967 Nobel Prize in Physiology or Medicine for his analysis of the internal electrical changes that take place when the eye is exposed to light.

Granit received his M.D. from the University of Helsinki in 1927, after which he conducted research at the University of Pennsylvania and at the laboratory of Sir Charles Scott Sherrington at Oxford, Eng. He was appointed professor of physiology at the University of Helsinki in 1937. A naturalized Swede, Granit joined the medical school of the Caroline Institute, Stockholm, in 1940; he was named chairman of the institute's department of neurophysiology in 1946. A year earlier he had also become the director of the Nobel Institute for Neurophysiology in Stockholm. In the 20 years from 1956 to 1976 Granit also served as a visiting professor or researcher at numerous institutions.

From studies of the action potentials in single fibres of the optic nerve, Granit formed his "dominator-modulator" theory of colour vision. In this theory he proposed that in addition to the three kinds of photosensitive cones—the colour receptors in the retina—which respond to different portions of the light spectrum, some optic nerve fibres (dominators) are sensitive to the whole spectrum while others (modulators) respond to a narrow band of light wavelengths and are thus colour-specific. Granit also proved that light could inhibit as well as stimulate impulses along the optic nerve. His book *Sensory Mechanisms of the Retina* (1947) is a classic work in the field of retinal electrophysiology.

Granit then turned his attention to the study of the control of movement, specifically the role of muscle sense-organs called muscle spindles and tendon organs. He helped to determine the neural pathways and processes by which these internal receptors regulate and coordinate muscle action.

granite, coarse- or medium-grained intrusive igneous rock that is rich in quartz and feldspar; it is the most common plutonic rock of the Earth's crust, forming by the cooling of magma (silicate melt) at depth.

Because of its use as paving block and as a building stone, the quarrying of granite was, at one time, a major industrial activity. Except for tombstones, however, for which there is a continuing demand, the present production of granite is geared to the fluctuating market for curbing in highway construction and veneer used in the facing of large industrial and commercial buildings.

Granite may occur in dikes or sills (tabular bodies injected in fissures and inserted between other rocks), but more characteristically it forms irregular masses of extremely variable size, ranging from less than eight kilometres (five miles) in maximum dimension to larger masses (batholiths) that are often hundreds or thousands of square kilometres in area.

The principal constituent of granite is feldspar. Both plagioclase feldspar and alkali feldspar are usually abundant in it, and their relative abundance has provided the basis for granite classifications. In most granite, the ratio of the dominant to the subdominant feldspar is less than two. This includes most granites from the eastern, central, and southwestern United States, southwestern England, the Fennoscandian (Baltic Shield) area, western and central France, Spain, and many other areas. Granites in which plagioclase greatly exceeds alkali feldspar are common in large regions of the western United States and are thought to be characteristic of the great series of batholiths stretching from Alaska and British Columbia southward through Idaho and California into Mexico. Granites with a great excess of alkali feldspar over plagioclase are known from New England; they occur in smaller bodies at numerous sites in British Tertiary rocks and in the Oslo region of Norway, but their most extensive development is in northern Nigeria.

Rocks containing less than 20 percent quartz are almost never named granite, and rocks containing more than 20 percent (by volume) of dark, or ferromagnesian, minerals are also seldom called granite. The minor essential minerals of granite may include muscovite, biotite, amphibole, or pyroxene. Biotite may occur in granite of any type and is usually present, though sometimes in very small amounts. The sodic-amphiboles and pyroxenes (riebeckite, arfvedsonite, aegirine) are characteristic of the alkali granites. If neither feldspar is in great excess, neither amphibole nor pyroxene is likely to be an essential constituent; the dark minerals will then ordinarily be either biotite or muscovite, or both.

Granite City, city, Madison County, southwestern Illinois, U.S., situated on the Mississippi River, within the St. Louis, Mo., metropolitan area. It was founded with the establishment (1891) of a graniteware (enamelled ironware) factory by St. Louis manufacturers Frederick G. and William F. Niedringhaus. Though no longer manufactured there, the product gave the city its name. Steel founding began in Granite City in 1893, and manufactures there now include a variety of steel products, railroad equipment, starch, chemicals, and food products. The city is a major shipping point and has a U.S. Army supply depot. Inc. 1896. Pop. (1980) 36,815.

granite moss, also called ROCK MOSS, any of the plants of the order Andreaeales, comprising a single family, Andreaeaceae, which includes the genera *Andreaea*, with about 120 species, and *Neuroloma*, with one species. The reddish-brown or blackish plants are about two centimetres (⅘ inch) high and grow in cold climates on nonlimy rocks such as granite or slate outcroppings.

The phyllids (leaves) of *Andreaea*, borne in three rows, are brittle and densely matted. The spores are shed through four moisture-sensitive slits in the capsule, or spore case; for this reason the mosses are sometimes known as slit mosses. The straplike or platelike protonema (the structure that produces the sexual plant by budding) provides firm attachment to the rock substrate and may become dormant in unfavourable conditions. The seta (capsule stalk) is greatly reduced in size, and the capsule is raised by lengthening of the plant stem.

Granite Peak, highest point (12,799 ft [3,901 m]) in Montana, U.S., in Beartooth Range, northeast of Yellowstone National Park. The peak is in the Absaroka Beartooth Wilderness—an area of high passes, lakes, and early mining camps—known for its hunting, fishing, and winter sports. The mountain range has white limestone cliffs that reminded 19th-century explorers of bears' teeth.

Granite Railway, first chartered railroad in the United States (March 4, 1826). It was designed and built by Gridley Bryant, an engineer, and began operations on Oct. 7, 1826, running three miles from Quincy, Mass., to the Neponset River. The wooden rails were plated with iron and were laid 5 feet (1.5 me-

tres) apart. Horse-drawn wagons with wheels 6 feet (2 m) in diameter hauled blocks of granite along these rails to the river, from where they were taken by barge to Charlestown in Boston, Mass., for use in the construction of the Bunker Hill Monument. In winter the cars were equipped with a kind of snowplow. The Granite Railway later became part of the New York, New Haven, and Hartford Railroad.

granitization, formation of granite or closely related rocks by metamorphic processes, as opposed to igneous processes in which such rocks form from a melt, or magma, of granitic composition. In granitization, sediments are transformed in the solid state or in a partially molten state. The solid-state process requires the addition and removal of chemical components by solid-state diffusion, vapour transport, or the movement of certain fluids such as aqueous solutions.

Solid-state granitization may occur on a small, localized scale, as in the formation of migmatite in which igneous rocks of granitic composition are intermixed with high-grade metamorphic rocks. Where more massive granites are formed, partial melting usually has occurred. The most convincing evidence for such large-scale granitization is the common sequence of relations where high-grade metamorphic rocks merge into migmatite gneiss and, in turn, into foliated granites and finally into massive granites (as in the vast rock complexes in fold-mountain zones). In recent years geochemical criteria have been developed to help sort out the various types of granites, and both granitization and crystal–liquid differentiation from magmas are invoked to explain differences between granites from the same geological region.

Granja De San Ildefonso, La, Spanish royal glass factory established in 1728 near the summer palace of King Philip V in San Ildefonso. The glassworkers were initially foreigners; the main stylistic influence was, as in earlier Spanish glass, that of Venice. Glass from La Granja carried on many of the classic Venetian techniques such as latticinio (threads of opaque glass embedded in clear glass). What largely distinguishes it from its Venetian counterparts, apart from less consummate technique, is the prevalence of such specifically Spanish vessel forms as the *porrón,* a spouted wine-drinking vessel; the *cántara,* a spouted water vessel; and the *almorrata,* a many-spouted rosewater sprinkler. The La Granja factory also made objects more generally in European use, including glass epergnes, centrepieces with multicavities, and ornamental glass baskets, sometimes embellished with opaque blue, white, or pink glass. Some of the clear glass had a grayish tinge. Wheel-engraved work also was done at La Granja.

Granma, province, southeastern Cuba. It is bordered by the provinces of Las Tunas on the northwest, Holguín on the northeast, Santiago de Cuba on the east and on the south and west by the Gulf of Guacanayabo. It was part of former Oriente province until 1976 and now has an area of 3,229 square miles (8,362 square km). The Cauto River and its tributaries, including the Salado River, drain the fertile plains of the province, creating alluvial mangrove swamps along the lowland coast of the Gulf of Guacanayabo. Farther south, Cape Cruz is the westernmost point of the Sierra Maestra. Rice grown in Granma constitutes about one-third of Cuba's total production and is cultivated around Bayamo (*q.v.*), the provincial capital, and the port city of Manzanillo. Cattle, sugarcane, and tobacco, together with coffee and cotton, are the other important agricultural products. Manganese and copper are mined in the region. The province produces shoes, chocolate, cigars, canned goods, textiles, lumber, dairy products, and sugar, and Manzanillo has a foundry. Bayamo lies on the central highway and major railroad, with connections to Holguín, Camagüey, and Santiago de Cuba. Pop. (1985 est.) 758,379.

Granma, daily newspaper published in Havana, the official organ of the Central Committee of the Communist Party of Cuba. The paper takes its name from the yacht that carried Fidel Castro and others supporting his revolution from Mexico to Cuba in 1956. *Granma* was established in 1965 by the merger of what then were the two major, and rival, newspapers, *Hoy* (Spanish: "Today"), the organ of the Communist Party of Cuba, and the daily newspaper of Castro's 26th of July movement, *Revolución.* In addition to daily editions in Spanish, *Granma* publishes weekly editions in French and in English.

Granmont, Louis, Granmont also spelled GRAMMONT (b. *c.* 1650, Paris—d. 1686?, Caribbean Sea?), one of the most celebrated of French buccaneers, a scourge of the Spanish settlements bounding the Caribbean.

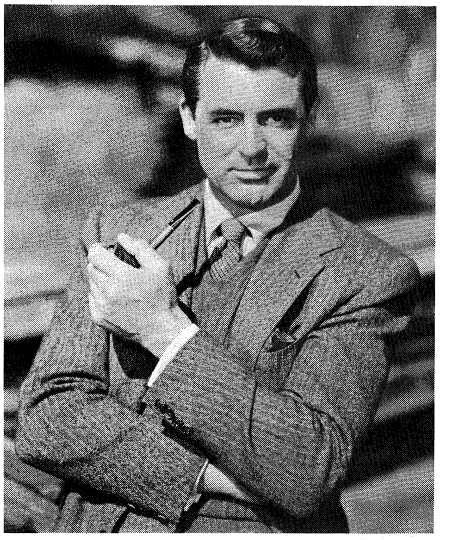
Granmont first distinguished himself in service in the French royal marines, but, having illegally gambled away a captured prize cargo in Hispaniola (Haiti), he dared not return to France and took to buccaneering. His first grand exploit was at the head of 700 men on Lake Maracaibo, Venezuela, seizing ships and plundering surrounding settlements. In June 1680 he and a small party of men launched a night attack at La Guaira, the seaport of Caracas, and carried off the local governor and other prisoners. In 1683 he took part in the successful French and English attack on Veracruz, Mex. The following year he led an attack on Cartagena. In 1685, with other captains and a force of about 11,000, he seized, burned, and plundered Campeche on the Yucatán Peninsula. In 1686, after being appointed king's lieutenant by Louis XIV, Granmont sailed from Hispaniola with a crew of 180 and was never heard of again.

granodiorite, medium- to coarse-grained rock that is among the most abundant intrusive igneous rocks. It contains quartz and is distinguished from granite by its having more plagioclase feldspar than orthoclase feldspar; its other mineral constituents include hornblende, biotite, and augite. The plagioclase (andesine) usually forms twinned crystals, sometimes wholly encased by orthoclase. The mode of formation and occurrence, physical appearance, and mineralic composition and texture of granodiorite are much like those of granite (*q.v.*); granodiorite is darker in colour, however, because of its greater plagioclase content.

Granollers, city, Barcelona province, in the autonomous community (region) of Catalonia, northeastern Spain. The capital of the fertile Vallés region, Granollers is a marketing and manufacturing centre that produces chemicals and textiles. It has many fine medieval houses and the 12th-century Gothic church of San Esteban. Called Granullaria (from the Latin word for grain) by the Romans because of its agricultural importance, Granollers became a self-governing commercial city in medieval times and played a major role in the 15th-century Catalan revolt against John II of Aragon. It suffered heavy bombing damage in 1938 during the Spanish Civil War. Pop. (1981) 45,300.

granophyre, fine-grained igneous rock that is characterized by a porphyritic texture, having large crystals (phenocrysts) that rest in a non-glassy, finely crystalline matrix (groundmass). Granophyre is similar to granite, except for its fine texture and smaller grain size; those granophyres that have quartz and alkali feldspar phenocrysts in a groundmass of quartz, alkali feldspar, and mafic (dark-coloured) minerals resemble rhyolite, while others consist of micropegmatite (*q.v.*).

Grant, Cary, original name ARCHIBALD ALEXANDER LEACH (b. Jan. 18, 1904, Bristol, Gloucestershire, Eng.—d. Nov. 29, 1986, Davenport, Iowa, U.S.), British-born American motion-picture actor known for his witty, sophisticated screen persona.



Cary Grant, 1957
The Museum of Modern Art/Film Stills Archive, New York City

He began his show business career with an acrobatic comedy troupe in England. Following a tour of the United States in 1920, he emigrated there and performed in stage musical comedies before making his film debut in *This Is the Night* (1932), by which time he had adopted the euphonious name Cary Grant. Six more films followed that same year, and Grant's distinctive style prompted Mae West to cast him opposite herself in *She Done Him Wrong* (1933), a film that established Grant as a star.

On screen, Grant combined debonair charm and an air of humorous intelligence with resilient good looks and elegant, self-possessed body movements. He also had a distinctive singsong speaking manner.

His comic finesse brought Grant great popular success in the sophisticated slapstick of *Topper* and *The Awful Truth* (both 1937), *Bringing Up Baby* (1938), *Holiday* (1938), *His Girl Friday* (1940), *The Philadelphia Story* (1940), *Monkey Business* (1952), and *Charade* (1963). Four films with director Alfred Hitchcock gave him some of his finest roles: *Suspicion* (1941), *Notorious* (1946), *To Catch a Thief* (1955), and *North by Northwest* (1959). Grant retired from the screen after *Walk, Don't Run* (1966) and became an executive for the Fabergé cosmetics firm. He received a special Oscar from the Motion Picture Academy of Arts and Sciences in 1970.

Grant, Duncan (James Corrowr) (b. Jan. 21, 1885, Rothiemurchus, Inverness, Scot.—d. May 8, 1978, Aldermaston, Berkshire, Eng.), innovative British Postimpressionist painter and designer.

The son of a military officer, Grant spent several years of his youth in India and was educated at St. Paul's School, London (1899–1901). Between 1902 and 1907 he studied at the Westminster School of Art and traveled in Italy and in France, where he studied with Jacques-Émile Blanche (1906) and met Henri Matisse (1909).

As a cousin of Lytton Strachey, Grant was introduced to the Bloomsbury group, the members of which became his lifelong friends. He contributed to the Postimpressionist exhibition of 1912 organized by the influential art

critic Roger Fry; he joined the Camden Town group (*q.v.*) in 1911 and participated in Fry's Omega Workshops (1913–19).

In 1919 Grant joined the London Group, and his painting changed from abstraction to the careful translation of nature in still lifes and landscapes. He had his first one-man show in London in 1920 and in 1922 began his collaboration with Vanessa Bell in interior design. He represented Great Britain at the Venice Biennale in 1926, 1932, and 1940.

After World War II Grant's fame subsided, but a revival of interest in his work began with a retrospective exhibition in 1959 and a one-man show in New York City in 1975. Among his best known works are portraits of his Bloomsbury associates (*e.g.,* Virginia Woolf, 1911); he and Vanessa Bell, with whom he lived for a number of years, produced an extensive and remarkable series of portraits of one another.

Grant, James Augustus (b. April 11, 1827, Nairn, Nairn, Scot.—d. Feb. 11, 1892, Nairn), Scottish soldier and explorer who accompanied John Hanning Speke in the search for and discovery of the source of the Nile. Commissioned in the British Army in 1846, Grant saw action in India in the Sikh Wars and the Indian Mutiny of 1857. When Speke started his second African expedition in 1860, he asked Grant, his friend and comrade in India, to join him. A loyal lieutenant, Grant for long intervals during the expedition was given independent command of part of the caravan. After great hardship, they found the outlet of Lake Victoria from which the Nile issued (July 1862). For his services, Grant was awarded a gold medal by the Royal Geographical Society. During the 2½-year journey, Grant had kept a journal describing events of geographical significance and the customs of native peoples; it was published under the title *A Walk Across Africa* (1864). In 1868 Grant served in the intelligence department under Lord Napier during the Ethiopian campaign, retiring from the service that same year with the rank of lieutenant colonel.

Grant, Richard: *see* Richard le Grant.

Grant, Ulysses S., original name HIRAM ULYSSES GRANT (b. April 27, 1822, Point Pleasant, Ohio, U.S.—d. July 23, 1885, Mount McGregor, N.Y.), U.S. general, commander of the Federal Army during the late years (1864–65) of the U.S. Civil War and 18th president of the United States (1869–77).

Ulysses S. Grant

By courtesy of The Library of Congress, Washington, D.C.

Early life. Grant was the son of Jesse Root Grant, a tanner, and Hannah Simpson Grant. Detesting the work around his father's tannery, Ulysses performed his share of chores on farmland owned by his father, developing considerable skill in handling horses.

Jesse secured for Ulysses an appointment to the United States Military Academy at West Point, N.Y., in 1839. Ulysses had no interest in military life but accepted the appointment, realizing that the alternative was no further education. Ulysses decided to reverse his original name and enroll as Ulysses Hiram; his appointment to West Point was erroneously made in the name Ulysses S. Grant, the name he eventually accepted, maintaining that the middle initial did not stand for anything.

At West Point, Grant ranked 21st in a class of 39 but distinguished himself in horsemanship and showed considerable ability in mathematics. Upon graduation in 1843, he was assigned as a brevet second lieutenant to the 4th U.S. Infantry, stationed near St. Louis, Mo. There he fell in love with Julia Boggs Dent, whom he married in 1848. They had four children.

During the Mexican War (1846–48) Grant showed gallantry in campaigns under Gen. Zachary Taylor, then was transferred to Gen. Winfield Scott's army, where he first served as regimental quartermaster and commissary, which gave him invaluable knowledge of army supply but galled the young officer who wanted action, and later distinguished himself in battle, earning brevet commissions as first lieutenant and captain, though his permanent rank was first lieutenant.

On July 5, 1852, when the 4th Infantry sailed from New York for the Pacific coast, Grant left his family behind, unwilling to endanger them on a dangerous crossing of the Isthmus of Panama. Assigned to Ft. Vancouver, Oregon (later Washington) Territory, he entered unsuccessful business ventures to supplement his army pay, but he could not reunite his family. A promotion to captain in August 1853 brought an assignment to Ft. Humboldt, California, a dreary post with an unpleasant commanding officer. On April 11, 1854, Grant resigned from the army. Allegations that he found consolation in drink during the lonely years on the Pacific coast and in later life were never proved, yet they affected his reputation nonetheless. There were many reasons for his resignation, and it was submitted by his own choice.

Grant settled on the Dent estate of White Haven, in Missouri, and began to farm 80 acres (30 hectares) given to Julia by her father. Grant's farming venture and a real estate partnership in St. Louis in 1859 were both unsuccessful. In 1860 Grant took a post in a leather goods business, owned by his father and operated by his brothers, in Galena, Ill.

The Civil War. At the outbreak of the Civil War, Grant helped recruit, equip, and drill troops in Galena, then accompanied them to Springfield, where Gov. Richard Yates appointed him an aide and assigned him to the state adjutant general's office. Yates appointed him colonel of an unruly regiment (later named the 21st Illinois Volunteers) in June 1861. Before he had even engaged the enemy, Grant was appointed brigadier general through the influence of Elihu B. Washburne, U.S. congressman from Galena. He soon gained command of the District of Southeast Missouri, headquartered at Cairo, Ill.

In January 1862, dissatisfied with the use of his force for defensive and diversionary purposes, Grant received permission from Gen. Henry Wager Halleck to begin an offensive campaign. On February 16 he won the first major Union victory of the war, when Ft. Donelson, on the Cumberland River in Tennessee, surrendered with about 15,000 troops.

Now a major general, Grant drove off an unexpected Confederate attack on April 6–7 at Shiloh Church, near Pittsburg Landing, Tenn., but outcry over heavy Union losses (1,754 killed) hurt Grant's reputation, and Halleck took personal command of the army. When Halleck was called to Washington as general in chief in July, Grant regained command. Before the end of the year, Grant began his advance toward Vicksburg, the last major Confederate stronghold on the Mississippi River. Grant displayed the qualities of aggressiveness, resilience, independence, and determination that led to final victory on July 4, 1863. When Port Hudson, La., the last Confederate post on the Mississippi, fell a few days later, the Confederacy was cut in half.

Command over Union armies. Grant was appointed lieutenant general in March 1864 and was given command over all the armies of the United States. His basic plan for the 1864 campaign—to immobilize Gen. Robert E. Lee near the Confederate capital at Richmond, Va., while Gen. William Tecumseh Sherman led the western Union army through Georgia—was successful. By mid-June Lee was pinned down at Petersburg, near Richmond, while Sherman's army cut through Georgia, and cavalry forces under Gen. Philip Sheridan destroyed railroads and supplies in Virginia. On April 2, 1865, Lee was forced to abandon his Petersburg line, and the inevitable surrender followed on April 9 at Appomattox Court House.

That Grant's army vastly outnumbered Lee's at the close of the conflict should not obscure Grant's achievements; the Union had had numerical superiority in Virginia throughout the war, yet Grant was the first to make these numbers count. Grant had rebounded from initial defeat at Shiloh; his success was due in large measure to administrative ability, receptiveness to innovation, versatility, and capacity for growth.

In late 1865 Grant toured the South at Pres. Andrew Johnson's request, was greeted with surprising friendliness, and submitted a report recommending a lenient Reconstruction policy. In 1866 Grant was appointed to the newly established rank of general of the armies of the United States. In 1867 Johnson removed Secretary of War Edwin M. Stanton in order to test the constitutionality of the Tenure of Office Act, which required the assent of Congress to removals from office, and in August he appointed Grant secretary of war ad interim. When Congress insisted upon Stanton's reinstatement, Grant resigned his secretaryship (January 1868), thus infuriating Johnson, who believed that Grant had promised to remain in office to provoke a court decision. Johnson's angry charges brought an open break and strengthened Grant's Republican ties, leading to his nomination for president in 1868. The last line of his letter of acceptance, "Let us have peace," became the Republican campaign slogan. Grant was elected with a small popular margin over his Democratic opponent, Horatio Seymour, former governor of New York.

Grant's presidency. Grant entered the White House on March 4, 1869, politically inexperienced and, at age 46, the youngest man yet elected president. His appointments to office were uneven in quality but sometimes refreshing, as when he appointed a Seneca Indian, Ely S. Parker, his former staff officer, as commissioner of Indian affairs.

On March 18 Grant signed his first law, pledging to redeem in gold the greenback currency issued during the Civil War, thus placing himself with the financial conservatives of the day. During his first term he backed the recommendations of the first Civil Service Commission, but he abandoned the effort in view of congressional intransigence. He was more persistent but equally unsuccessful when the Senate rejected a treaty of annexation with Santo Domingo. His negotiation of the Treaty of Washington provided for the settlement

by international tribunal of American claims against England arising from the wartime activities of the British-built Confederate raider *Alabama.*

Grant won reelection easily in 1872, with a large margin over Horace Greeley. During the campaign, newspapers discovered that prominent Republican politicians were involved in the Crédit Mobilier of America, a shady corporation designed to siphon profits of the Union Pacific Railroad. More scandal followed in 1875, when Secretary of the Treasury Benjamin Helm Bristow exposed the operation of a whiskey ring that had the aid of high government officials in defrauding the government of tax revenues. When the evidence touched the president's private secretary, Orville E. Babcock, Grant regretted his earlier statement, "Let no guilty man escape." Grant blundered in accepting the resignation of Secretary of War William W. Belknap, who was impeached on charges of accepting bribes; Belknap escaped conviction since he was no longer a government official. Discouraged and sickened, Grant closed his second term by assuring Congress that "Failures have been errors of judgment, not of intent."

Scandals have become the best remembered feature of the Grant administration, obscuring more positive aspects. Grant supported amnesty for Confederate leaders and protection for black civil rights. His veto of a bill to increase the amount of legal tender currency (1874) diminished the currency crisis during the next quarter century. He dealt gracefully with the controversy caused when both Republican Rutherford B. Hayes and Democrat Samuel Jones Tilden claimed election to the presidency in 1876.

Later life. In 1879 Grant found a faction of the Republican Party anxious to nominate him for a third term. Although he did nothing to encourage support, he received more than 300 votes in each of the 36 ballots of the 1880 convention, which finally nominated James A. Garfield. In 1881 Grant bought a house in New York City and began to take an interest in the investment firm of Grant and Ward, in which his son Ulysses, Jr., was a partner. Grant put his capital at the disposal of the firm and encouraged others to follow. In 1884 the firm collapsed, swindled by Ferdinand Ward. This impoverished the entire Grant family and clouded Grant's reputation.

In 1884 Grant began to write reminiscences of his campaigns for the *Century Magazine* and found this so congenial that he began to prepare his memoirs. Despite excruciating throat pain later diagnosed as cancer, he signed a contract with his friend Mark Twain to publish the memoirs and resolved grimly to complete them before he died. In June 1885 the Grant family moved to a cottage at Mount McGregor in the Adirondacks, and a month later Grant died there. He was buried in Riverside Park, New York City, where an elaborate tomb was dedicated in 1897.

Grant completed his memoirs shortly before his death. Written with modesty and restraint, exhibiting equanimity, candour, and a surprisingly good sense of humour, they retain high rank among military autobiographies.

(J.Y.S.)

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Grantha alphabet, writing system of southern India developed in the 5th century AD and still in use. The earliest inscriptions in Grantha, dating from the 5th–6th century AD, are on copper plates from the kingdom of the Pallavas (near modern Madras). The form of the alphabet used in these inscriptions, classified as Early Grantha, is seen primarily on copper plates and stone monuments. Middle Grantha, the form of the script used from the mid-7th to the end of the 8th century, is also known from inscriptions on copper and stone. The script used from the 9th to the 14th century is called Transitional Grantha; from about 1300 on, the modern script has been in use. Currently two varieties are used: Brahmanic, or "square," and Jain, or "round." The Tulu-Malayalam script is a variety of Grantha dating from the 8th or 9th century AD. The modern Tamil script may also be derived from Grantha, but this is not certain.

Originally used for writing Sanskrit only, Grantha in its later varieties is also used to write a number of the Dravidian languages indigenous to southern India. The script has 35 letters, five of them vowels, and is written from left to right.

Grantham, town, South Kesteven district, county of Lincolnshire, England, on the River Witham. The town is an important junction on the railway line from London to Scotland. Its chief industry is mechanical engineering, notably the production of diesel engines and road rollers.

Of Saxon origin, Grantham is mentioned in Domesday Book (1086), and its royal charter of incorporation was granted in 1463. In the Middle Ages, Grantham grew prosperous from the wool trade. St. Wulfram's Church is one of England's finest medieval churches. The fine 18th-century George Hotel was made famous by Charles Dickens in *Nicholas Nickleby* (1839). Pop. (1981) 31,095.

Grantland, Henry: *see* Rice, Grantland.

Consult the INDEX *first*

Grants, city, Cibola county, west-central New Mexico, U.S., on the San Jose River. The site was first settled in 1881 when the Grant brothers, contractors building the Atchison, Topeka and Santa Fe Railway, established a construction camp at what became known as Grants Station. Originally a livestock shipping point, it was later supported by lumbering and vegetable farming. Uranium ore was discovered in the nearby Ambrosia Lake district in 1950, and mining, milling, and processing of the ore is now the major industry.

The area contains considerable uranium reserves. Ancient Indian pottery has been found beneath local lava beds that flowed centuries ago from Mount Taylor to the northeast. Parts of the Cibola National Forest and the Acoma Indian Reservation are tourist atractions. A branch of New Mexico State University is in the city. Inc. 1941. Pop. (1986 est.) 8,520.

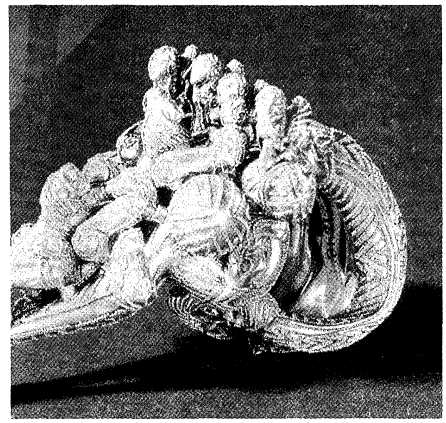
Grants Pass, city, seat (1885) of Josephine county, southwestern Oregon, U.S., on the Rogue River, in the Klamath Mountains, 25 miles (40 km) northwest of Medford. A stage stop on the Sacramento–Portland overland route, it was named for President Ulysses S. Grant and developed after the Oregon and California (later Southern Pacific) Railroad established a station there in 1883.

A trading point for mining, forest, and agricultural products, Grants Pass serves as a tourist base for the Rogue River recreational area and is headquarters for Siskiyou National Forest. Rogue Community College opened there in 1971. The Oregon Caves National Monument is 50 miles (80 km) south. Inc. 1887. Pop. (1988 est.) 17,457.

Grant's Tomb (New York City): *see* General Grant National Memorial.

granulation, in jewelry, type of decoration in which minute grains or tiny balls of gold are applied to a surface in geometric or linear patterns or massed to fill in parts of a decoration. First used as early as the 3rd millennium BC, it was known in western Asia and Egypt. The technique as practiced by the ancient Greeks, especially immediately following the Mycenaean Age, achieved an amazing fineness and could produce a texture of great richness.

By the 5th century BC, granulation had been largely replaced by filigree in Greek work. The art of granulation probably reached its



Detail of a gold Etruscan fibula with granulated decoration, 7th century BC; in the British Museum

By courtesy of the trustees of the British Museum

peak with the Etruscans between the 7th and 6th centuries BC, in the elaborately granulated and embossed earrings, pronged shoulder clasps (for cloaks) modeled with gold-granulated sphinxes and lions, and beads found in Etruscan tombs. Granulation was spread widely in southern Asia, particularly in India and Persia, through contact with the Roman Empire.

granulite facies, one of the major divisions of the mineral facies classification of metamorphic rocks, the rocks of which formed under the most intense temperature-pressure conditions usually found in regional metamorphism. At the upper limit of the facies, migmatite formation or granitization processes may occur. Temperatures of 500°–650° C (950°–1,200° F) and pressures of several kilobars (one kilobar equals about 15,000 pounds per square inch) may be reached. Under conditions of less intense metamorphism, rocks of the amphibolite facies (*q.v.*) are formed.

The minerals found in the rocks of the granulite facies include hornblende, pyroxene, biotite, garnet, calcium plagioclase, and quartz or olivine. As in all metamorphic rocks, the composition of the parent rock exerts a strong control on the particular mineralogy that is observed. A characteristic of this facies is the low content of water, which has been forced out of the rock by the high pressure.

granuloma inguinale, mildly contagious venereal disease occurring predominantly in tropical areas and more frequently affecting dark-skinned people, characterized by deep, purulent ulcers on or near the genital organs. Encapsulated bacilli called Donovan bodies (*Donovania granulomatis,* or *Calymmatobacterium granulomatis,* family Brucellaceae) occur in smears from the lesions or in biopsy material and are thought to be the cause of the disease. Granuloma inguinale has been treated with streptomycin or with broad-spectrum antibiotics, usually with success.

granulomatous thyroiditis, also called SUBACUTE, GIANT-CELL, PSEUDOTUBERCULOUS, or DE QUERVAIN'S THYROIDITIS, inflammatory disease of the thyroid gland, of unknown but presumably viral origin. It may persist from several weeks to a few months but subsides spontaneously.

The disease most frequently occurs in women between the ages of 30 and 50. The thyroid gland may become enlarged, and some patients complain of tenderness in the front of the throat and difficulty in swallowing. Other symptoms include those of hyperthyroidism (*e.g.*, accelerated heart rate, sweating, tremor), which are transient, and pain, fatigue, muscle aches, and fever. Symptoms are not consistently present, however, and about 25 percent of those affected experience neither pain nor fever. Most patients with the disease require only mild pain relievers for alleviation of symptoms, although more severe cases may call for stronger drugs, including steroids.

Granvelle, Antoine Perrenot de (b. Aug. 20, 1517, Besançon, Fr.—d. Sept. 21, 1586, Madrid), minister of King Philip II of Spain; he played a major role in the early stages of the Netherlands' revolt against Philip's rule.

Granville, educated at Padua and at Louvain, was ordained priest and, in 1540, consecrated bishop of Arras. Pope Pius IV made him archbishop of Malines (1560) and cardinal (1561). In 1560 Philip II appointed Granvelle chief counselor to Margaret of Austria, regent in the Netherlands. His monarchism led him to clash with the Dutch leaders, Prince William the Silent and the counts of Egmont and Hoorn, all of whom opposed Philip's policy of converting the Netherlands into a Spanish dependency, and the Dutch leaders eventually effected Philip's removal of Granvelle (1564). Later Philip concluded that the Netherlands revolution never would have developed had he supported Granvelle.

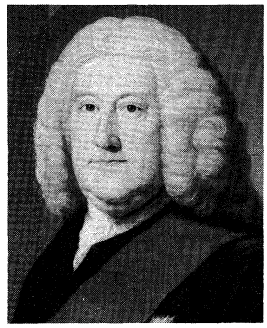
From 1565 to 1579 Granvelle served in Italy as viceroy of Naples (1571–75) and as president of the Council for Italy (1575–79). In 1579 Philip appointed him secretary of state (Spain), in which capacity he campaigned against William and the Dutch Protestants and negotiated the union of the Portuguese and Spanish crowns.

Granville, seaside resort and harbour town, Manche *département,* Basse-Normandie region, western France. It is located south of Cherbourg and west of Paris. The old walled upper town stands on a promontory jutting out above the harbour and the lower town, which has a bathing beach and promenades. Granville is a centre for yachtsmen and tourists and has a boat service to the Channel Islands of Great Britain. Food processing is the only important industry. Pop. (1982) 12,326.

Granville, EARLS OF, titled English nobility of two creations, in the families Carteret and Leveson-Gower, grouped below chronologically and indicated by the symbol •.

• Granville, John Carteret, 1st Earl, VISCOUNT CARTERET, BARON CARTERET OF HAWNES (b. April 22, 1690—d. Jan. 2, 1763, Bath, Somerset, Eng.), English statesman, a vigorous opponent of Robert Walpole (who was chief minister from 1721 to 1742). A leading minister from 1742 to 1744, Carteret directed England's involvement against France in the War of the Austrian Succession (1740–48).

The son of George, 1st Baron Carteret, and Lady Grace Granville (created Countess Granville in 1715), he succeeded his father as Lord Carteret in 1695 at the age of five and entered the House of Lords in 1711. He was appointed secretary of state in 1722, but because he voiced opposition to Walpole, he was sent away from London in 1724 to serve as lord lieutenant of Ireland. Upon his return in 1730 he became one of Walpole's most elo-



1st Earl Granville, detail of an oil painting from the studio of William Hoare, 1750–52; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

quent and prominent critics in the House of Lords, attacking in particular Walpole's policy of accommodation with Spain.

At the same time Carteret retained the confidence of King George II, who appreciated Carteret's pro-Hanoverian policy and appointed him secretary of state after Walpole's fall in 1742. By vigorously pursuing the unpopular War of the Austrian Succession in support of the Austrian princess Maria Theresa, Carteret left himself open to the charge that he was sacrificing the interests of Great Britain to those of the king's Hanoverian possessions. Working behind the scenes, Walpole forced the reluctant king to dismiss Carteret in 1744. Carteret inherited the earldom from his mother shortly before his fall; he remained in the government but had little further influence on policy. He was succeeded by his only surviving son, Robert, who died without issue in 1776, when the earldom became extinct.

• Granville, Granville George Leveson-Gower, 2nd Earl, VISCOUNT GRANVILLE OF STONE PARK, BARON LEVESON OF STONE (b. May 11, 1815, London—d. March 31, 1891, London), British foreign secretary

2nd Earl Granville, detail of a pencil drawing by F. Sargent; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

in William E. Gladstone's first and second administrations, succeeding him as leader of the Liberal Party.

Educated at Eton and Christ Church, Oxford, he was elected a Whig member of Parliament in 1836. Holding minor offices under Lord John Russell from 1846 (the year that he succeeded to his father's earldom), Granville succeeded Lord Palmerston (December 1851) as foreign secretary for the remaining three months of the government's life. President of the Privy Council (1852–54) and chancellor of the duchy of Lancaster (1854–55) in Lord Aberdeen's coalition government, he also became leader of the Liberal peers in the House of Lords, a post he retained, save for an interval during 1865–68, until his death. Unable to form a government in 1859, Granville resumed the presidency of the council under Palmerston and under Russell from 1859 to 1866, a post that brought him into favour with Queen Victoria.

His most important political services were rendered as an intermediary between Queen Victoria and Gladstone, his closest political friend from 1868. As colonial secretary (1868–70) and then as foreign secretary (1870–74 and 1880–85), Granville was an ideal negotiator of Gladstone's foreign policies. He handled the difficult negotiations of the London Conference (1871), after Russia had denounced the Treaty of Paris of 1856, and he settled the *Alabama* claims, a dispute centred on the English-built cruiser *Alabama,* used by the Confederacy as a commerce destroyer during the American Civil War. He became the official leader of the Liberal Party upon Gladstone's first retirement (1874), but he gave way at once to Gladstone when the latter formed his second government (in 1880). During Granville's last period at the Foreign Office, his powers were clearly failing. He was one of the few Whigs who stood by Gladstone in the Irish Home Rule crisis of 1886.

Granville-Barker, Harley (b. Nov. 25, 1877, London—d. Aug. 31, 1946, Paris), English dramatist, producer, and critic whose naturalistic stagings in an era of theatrical artificiality profoundly influenced the 20th-century theatre.

Granville-Barker began his stage training at 13 years of age and first appeared on the London stage two years later. He preferred work with William Poel's Elizabethan Stage Society and Ben Greet's Shakespeare repertory company to a West End career, and in 1900 he joined the experimental Stage Society. In 1904 he became manager of the Court Theatre with J.E. Vedrenne and introduced the public to the plays of Henrik Ibsen, Maurice Maeterlinck, John Galsworthy, John Masefield, and Gilbert Murray's translations from Greek. His original productions of the early plays of George Bernard Shaw were especially important. His wife, Lillah McCarthy, played leading roles in many of the plays he produced. Among new plays produced at the Court Theatre were several of his own: *The Voysey Inheritance* (1905), the most famous, showing Shaw's influence; *Prunella* (1906), a charming fantasy written with Laurence Housman; *Waste* (1907); and *The Madras House* (1910).

Also revolutionary was his treatment of Shakespeare. Instead of traditional scenic decor and declamatory elocution, Barker successfully introduced, in the Savoy productions (1912–14) of *The Winter's Tale* and *Twelfth Night,* continuous action on an open stage and rapid, lightly stressed speech. He was active in promoting a national theatre and by 1914 had every prospect of a brilliant career.

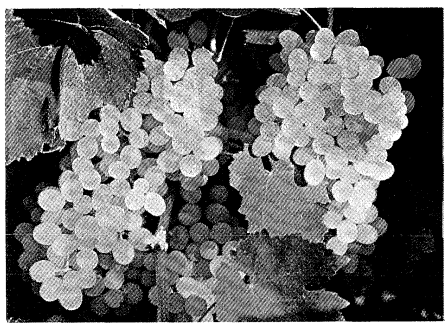
Granville-Barker, detail of an oil painting by J.-E. Blanche, 1930; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

After World War I, however, during which he served with the Red Cross, he found the mood of the postwar theatre alien and contented himself with work behind the scenes, including presidency of the British Drama League. He settled in Paris with his second wife, an American, collaborating with her in translating Spanish plays and writing his five series of *Prefaces to Shakespeare* (1927–48), a contribution to Shakespearean criticism that analyzed the plays from the point of view of a practical playwright with firsthand stage experience.

In 1937 Barker became director of the British Institute of the University of Paris. He fled to Spain in 1940 and then went to the United States, where he worked for British Information Services and lectured at Harvard University. He returned to Paris in 1946.

grape, any member of the grape genus, *Vitis* (family Vitaceae), with about 60 species native to the north temperate zone, including varieties that may be eaten as table fruit, dried to produce raisins, or crushed to make grape juice or wine. *Vitis vinifera,* the species



Grape (*Vitis*)
Grant Heilman—EB Inc.

most commonly used in wine making, was successfully cultivated in the Old World for thousands of years and was eventually brought to California. Fossilized grape leaves, stem pieces and seeds unearthed from Miocene and Tertiary deposits in the Northern Hemisphere indicate the long existence and wide distribution of the vine, as it was known to the ancients. Several species are native to North America, notably *V. Labrusca,* or *V. aestivalis,* the American wild bunch grape; and *V. rotundifolia,* the popular muscadine grape of the southeastern U.S.

The grape is usually a woody vine, climbing by means of tendrils (modified branches) and when untrained often reaching a length of 17 metres (56 feet) or more. In arid regions it may form an almost erect shrub. The leaves are alternate, palmately lobed, and always tooth-edged. Small, greenish flowers, in clusters, precede the fruit, which varies in colour from almost black to green, red, and amber. Botanically, the fruit is a berry, more or less globular, within the juicy pulp of which lie the seeds. In many varieties the fruit develops a whitish powdery coating, or bloom. Grapes contain such minerals as calcium and phosphorus and are a source of vitamin A. All grapes contain sugar (glucose and fructose) in varying quantities depending upon the variety. Those having the most glucose are the most readily fermented.

Grape cultivation, or viticulture, is nearly as old as civilization; details for grape and wine production figured in the hieroglyphics of the 4th (2400 BC), 17th, and 18th dynasties of Egypt. According to the Bible, Noah planted a vineyard. In Homer's time, wine was a regular commodity among the Greeks.

The Phoenicians carried the grape into France about 600 BC; the Romans planted grapes in the Rhine Valley not later than the 2nd century AD. Pliny the Elder described 91 varieties of grapes, distinguished 50 kinds of wines, and described vine-training methods. Coinciding with the westward spread of grape culture, grapes were moved into the Orient by way of India. As new lands were colonized, the grape was taken along, so that it is cultivated on all continents and islands where the climate is favourable.

Vinifera grapes require long, dry, warm-to-hot summers and cool winters for their best development. Severe winter conditions destroy unprotected vines; spring frosts occurring after the vines start growth will kill the shoots and clusters. Grapes are adapted to a wide range of soils, ranging from blow sands to clay loams, from shallow to very deep soils, from highly calcareous to noncalcareous soils, and from very low to high fertility.

Commercial grape varieties are propagated with cuttings, segments or canes, or grafts. Cuttings are usually grown for one year in a nursery to develop roots. The grafts consist of a segment of a stem of a fruiting variety placed on a rootstock cutting. The rootstock cuttings are field budded to the desired fruiting variety in late summer after being planted in the vineyard. The point of union of grafted or budded vines must be situated well above the ground level in order to prevent the production of scion roots.

Training is necessary to develop a vine of desirable form. It is accomplished by pruning the young vine and then tying both it and its growth to a support. Pruning is the most important single vineyard operation. With wine and raisin varieties, it is usually the sole means of regulating the crop, largely determining not only the quality of the fruit but also the quality of the wood for the next year. At the annual pruning, 90 to 95 percent or more of the year's growth is removed, leaving the spurs or fruit canes or both.

The grape is subject to several parasites, including *Phylloxera,* a vine louse native to eastern America, brought into Europe on American vines in the late 1800s, causing widespread vineyard damage, finally halted by grafting the European varieties to American rootstock more resistant to this parasite.

Grapes are harvested upon reaching the stage best suited for the intended use. Wine grapes are harvested when sugar content reaches its highest point, and the skins are covered with a waxy coating, trapping the yeasts that will later help produce fermentation. Delays in harvesting may cause unpleasant aroma in the wine produced or allow bacteria to attack the grape sugar.

The mature fruit of all varieties, about 8,000 altogether, will ferment into a kind of wine when crushed, and most grapes can be dried or eaten fresh. But only a limited number of varieties produce standard or higher quality wines, three varieties account for most of the raisins of commerce, only 15 to 20 varieties are grown extensively as table grapes, a single variety yields the bulk of sweet juice produced in the U.S., and only a few varieties are used for canning.

Acreage devoted to cultivation of grapes averaged more than 3,500,000 acres (1,400,000 hectares) in the 1970s in France, Italy, and Spain; more than 2,600,000 ac in Turkey and the U.S.S.R.; and more than 650,000 ac in Algeria, Argentina, Greece, Hungary, Portugal, Romania, Yugoslavia, and the U.S. Other principal grape-producing countries with more than 280,000 acres of vines include Australia, Bulgaria, Chile, Germany, Syria, and South Africa.

See also raisin.

grape-hyacinth, any plant of the genus *Muscari* of the family Liliaceae, consisting of about 50 species of small bulbous perennials native to the Mediterranean region. Most species of the genus have dense clusters of blue, white, or pink urn-shaped flowers that are borne at

Common grape-hyacinth (*Muscari botryoides*)
Ingmar Holmasen

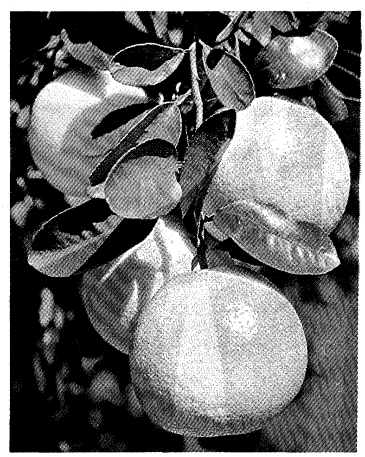
the tip of a leafless flower stalk. The leaves are long and narrow, and the fruit is a capsule.

Some species have a musky odour. Grape-hyacinths often are planted as spring-flowering garden ornamentals.

grape phylloxera (*Phylloxera vitifoliae*), a small greenish-yellow insect (order Homoptera), highly destructive to grape plants in Europe and the western United States. Their sucking of fluid from grapevines results in formation of small galls on leaves and nodules on roots, which result in eventual rotting of the plant. The complex phylloxeran life cycle includes wingless stages that reproduce parthenogenetically. A winged stage produces sexual forms that mate; females lay eggs that survive the winter.

Grape phylloxera was introduced into Europe from the eastern United States in the mid-19th century and within 25 years had almost destroyed the grape and wine industries in France, Italy, and Germany. Vines were saved by the grafting of European plants to resistant rootstalks of vines native to the eastern United States that were immune to grape phylloxera. Hybrids and fumigants have also been used to combat this pest.

grapefruit, also called POMELO (*Citrus paradisi*), citrus tree of the Rutaceae family and its edible fruit. The grapefruit tree grows to be as large and vigorous as an orange tree; a mature tree may be from 4.5 to 6 metres (15 to 20 feet) high. The foliage is very dense, with leaves dark and shiny green and nearly glabrous. Flowers are large, white, borne singly



Grapefruit (*Citrus paradisi*)
Grant Heilman—EB Inc.

or in clusters in the axils of the leaves; petals are similar to those of sweet orange but usually larger. Lemon-yellow when ripe, the fruit ranges from 100 to 150 millimetres (4 to 6 inches) in diameter and averages twice as large as a medium-sized orange, with size depending upon the variety and upon cultural conditions. Its pulp is usually light yellowish, tender, and usually very full of juice, with a distinctive, mildly acid flavour. Several varieties have pink or red pulp. As a source of vitamin C, the grapefruit is exceeded among common fruits only by the orange and lemon.

The grapefruit probably originated in Jamaica as a hybrid of *C. grandis*. It became well established as a fruit for home consumption in the islands of the West Indies before its culture spread to the mainland.

Grapefruit trees produce the best quality fruit on sandy, relatively fertile soils. Supplementary fertilization is necessary in practically all U.S. producing areas. The trees come into bearing early and may be expected to produce commercially profitable crops by the fourth to sixth year after being planted in the orchard. Mature trees may produce remarkably large crops—585 to 675 kilograms (1,290 to 1,490 pounds) of fruit per tree. In the 1980s 60 percent of world production was in the U.S., mainly in Florida, Texas, Arizona, and California. Grapefruit has become popular as breakfast fruit in various parts of the world, and production has expanded to other citrus-growing countries, notably Israel, Cyprus, South Africa, and Brazil. More than half the U.S. crop is canned or frozen.

grapeshot, cannon charge consisting of small round balls or pellets, usually of iron, and used primarily as an antipersonnel weapon. Typically, the small iron pellets were held in clusters of three by iron rings and combined in three tiers by cast-iron plates and a central connecting rod. This assembly, which reminded gunners of a cluster of grapes (hence the name), broke up when the gun was fired, spread out in flight like a shotgun charge, and sprayed the target area. Grapeshot was widely used in wars of the 18th century, including the American Revolution.

graph, pictorial representation of statistical data or of a functional relationship between variables. Graphs have the advantage of showing general tendencies in the quantitative behaviour of data, and therefore serve a predictive function. As mere approximations, however, they can be inaccurate and sometimes misleading.

Most graphs employ two axes, in which the horizontal axis represents a group of independent variables, and the vertical axis represents a group of dependent variables. The most common graph is a broken-line graph, where the independent variable is usually a factor of time. Data points are plotted on such a grid and then connected with line segments to give an approximate curve of, for example, seasonal fluctuations in sales trends. Data points need not be connected in a broken line, however. Instead they may be simply clustered around a median line or curve, as is often the case in experimental physics or chemistry.

If the independent variable is not expressly temporal, a bar graph may be used to show discrete numerical quantities in relation to each other. To illustrate the relative populations of various nations, for example, a series of parallel columns, or bars, may be used. The length of each bar would be proportional to the size of the population of the respective country it represents. Thus, a demographer could see at a glance that China's population is about 50 percent larger than its closest rival, India.

This same information may be expressed in a part-to-whole relationship by using a circular graph, in which a circle is divided into sections, and where the size, or angle, of each sector is directly proportional to the percentage of the whole it represents. Such a graph would show the same relative population sizes as the bar graph, but it would also illustrate that approximately one-fourth of the world's population resides in China. This type of graph, also known as a pie chart, is most commonly used to show the breakdown of items in a budget.

In analytic geometry, graphs are used to map out functions of two variables on a Cartesian coordinate system, which is composed of a horizontal *x*-axis, or abscissa, and a vertical *y*-axis, or ordinate. Each axis is a real number line, and their intersection at the zero point of each is called the origin. A graph in this sense is the locus of all points (x,y) that satisfy a particular function.

The easiest functions to graph are linear, or first-degree, equations, the simplest of which is $y = x$. The graph of this equation is a straight line that traverses the lower left and upper right quadrants of the graph, passing through the origin at a 45-degree angle. Such regularly-shaped curves as parabolas, hyperbolas, circles, and ellipses are graphs of second-degree equations. These and other nonlinear, exponential functions are sometimes graphed on a logarithmic grid, where a point on an axis is not the variable itself but the logarithm of that variable. Thus, a parabola with Cartesian coordinates may become a straight line with logarithmic coordinates.

In certain cases, polar coordinates (*q.v.*) provide a more appropriate graphic system, whereby a series of concentric circles with straight lines through their common centre, or origin, serves to locate points on a circular plane. Both Cartesian and polar coordinates may be expanded to represent three dimensions by introducing a third variable into the respective algebraic or trigonometric functions. The inclusion of three axes results in an isometric graph for solid bodies in the former case and a graph with spherical coordinates for curved surfaces in the latter.

graph theory, the mathematical theory of networks.

A brief treatment of graph theory follows. For full treatment, *see* MACROPAEDIA: Combinatorics and Combinatorial Geometry.

A graph—in the sense used in graph theory—consists of nodes (also called points, or vertices) and of edges (lines) connecting certain pairs of nodes. The exact geometrical pattern is not specified. In a directed graph (digraph) all edges are given a direction. A road or electrical network, a hydrocarbon molecule, the vertices and edges of a polyhedron, a chain of command, and the family trees of a population may be pictured as graphs or digraphs. Two graphs are associated with a political map. One is the graph of boundaries. The other is obtained by placing a node inside each region and connecting each pair of nodes separated by a boundary.

In 1735 the Swiss mathematician Leonhard Euler published an analysis of the Königsberg bridge problem, an old puzzle concerning the possibility of crossing—in a tour that includes no bridge twice—every one of seven bridges that span a forked river that flows past an island. Euler's proof that no such path exists and his generalization of the problem to all possible networks are now recognized as the origin of both graph theory and topology.

A colouring of a graph means a colouring of the nodes so that connected nodes have different colours. A scheduling problem can sometimes be formulated as a graph-colouring problem. For example, if students and teachers have been assigned to classes and it is necessary to find time slots for them, the classes may be represented as nodes and two nodes are connected if they have a common teacher or student. A colouring will give a conflict-free schedule; the colours represent the time slots.

Graphische Sammlung Albertina, English ALBERTINA GRAPHICS COLLECTION, compilation of graphic arts in the Hofburg in Vienna. It is important for its comprehensive body of prints, drawings, sketchbooks, miniatures, and posters assembled in the 18th century by Albert Kasimer, duke of Saxe-Teschen, and cataloged by Adam von Bartsch.

The extraordinary quantity and quality of prints in this collection induced Bartsch to go one step further and establish *oeuvre* catalogs (inventories of works produced by an artist) of the masters of printmaking. The collection was administered and enlarged by Albert's successors until 1918, when it was taken over by the government of the Austrian republic.

graphite, also called PLUMBAGO, or BLACK LEAD, mineral consisting of carbon. Graphite has a layered structure that consists of rings of six carbon atoms arranged in widely spaced horizontal sheets. For detailed physical properties, *see* native element (table).

It is formed by metamorphosis of sediments containing carbonaceous material, by reaction of carbon compounds with hydrothermal solutions or magmatic fluids, or possibly by crystallization of magmatic carbon. It occurs as isolated scales, large masses, or veins in older crystalline rocks, gneiss, schist, quartzite, and marble and also in granites, pegmatites, and carbonaceous clay slates. Small isometric crystals of graphitic carbon (possibly pseudomorphs after diamond) found in meteoritic iron are called cliftonite.

Graphite, named in allusion to its use in writing, is used in lubricants, crucibles, foundry facings, polishes, arc lamps, batteries, brushes for electric motors, and pencils. It is mined extensively in Sri Lanka; Madagascar; North Korea; Sonora, Mex.; Ontario; western Siberia; and New York.

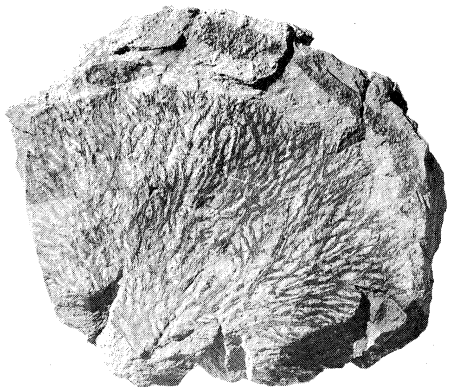
Graphite was first synthesized accidentally by Edward G. Acheson while he was performing high-temperature experiments on carborundum. He found that at about 4,150° C (7,500° F) the silicon in the carborundum vaporized, leaving the carbon behind in graphitic form. Acheson was granted a patent for graphite manufacture in 1896, and commercial production started in 1897. Since 1918, petroleum coke, small and imperfect graphite crystals surrounded by organic compounds, has been the major raw material in the production of 99 to 99.5 percent pure graphite.

graphology, inference of character from a person's handwriting. The theory underlying graphology is that handwriting is an expression of personality; hence a systematic analysis of the way words and letters are formed can reveal traits of personality. Graphologists note such elements as the size of individual letters and the degree and regularity of slanting, ornamentation, angularity, and curvature. Other basic considerations are the general appearance and impression of the writing, the pressure of upward and downward strokes, the smoothness of the writing, and the trimness of strokes.

Whereas intuitive graphologists are chiefly concerned with a total impression, analytic graphologists concentrate on specifics—for example, interpreting a large handwriting as a sign of ambition and a small one as a sign of pedantry. Graphologists have cautioned that the validity of handwriting analysis can be subverted by such considerations as myopia and the loss of motor control.

graptolite, any member of an extinct group of small, aquatic colonial animals that first appeared during the Cambrian Period (about 500,000,000 to 570,000,000 years ago) and persisted into the Mississippian Period (about 325,000,000 to 345,000,000 years ago). Grap-

tolites were floating animals that have been most frequently preserved as carbonaceous impressions on black shales, but their fossils have been found in a relatively uncompressed state in limestones. They possessed a chitinous (fingernail-like) outer covering and lacked mineralized hard parts. When found as impressions, the specimens are flattened, and much detail is lost.



Graptolites, *Inocaulis anastomatica*, collected from the Rochester Shale, Lockport, N.Y.
By courtesy of the Buffalo Museum of Science, Buffalo, N.Y.

The graptolite animal was bilaterally symmetrical and tentacled. It has been suggested that graptolites are related to the hemichordates, a primitive group of invertebrates. Graptolites have proved to be very useful for the stratigraphic correlation of widely separated rock units and for the finer division of Lower Paleozoic rock units (Cambrian to Devonian); examples include the genera Climacograptus, Clonograptus, Didymograptus, Diplograptus, Monograptus, Phyllograptus, and Tetragraptus (*qq.v.*). Graptolites show a gradual development through time, and evolutionary relationships between different graptolite groups have been discovered and analyzed.

Grasmere, locality, South Lakeland district, county of Cumbria, England, surrounded by craggy mountains. The village lies near the head of Lake Grasmere on the main north–south road that traverses the Lake District National Park. William Wordsworth settled there at Dove Cottage in 1799 with his sister, Dorothy. He later married, and all three remained in the district for the rest of their lives. The cottage and the adjacent Wordsworth Museum are open to the public. In the churchyard are the graves of the Wordsworth family. Championships in the local style of wrestling are a feature of the annual sports held in August. Pop. (latest census) 1,029.

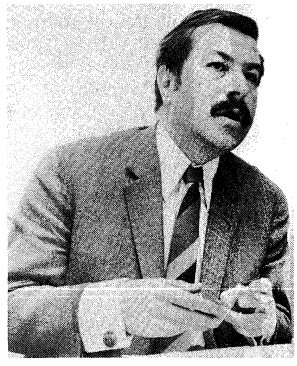
grass, any of many low, green, nonwoody plants belonging to the grass family (Poaceae or Gramineae), sedge family (Cyperaceae), and rush family (Juncaceae). There are many grasslike members of other flowering plant families; but only the approximately 6,000 to 10,000 species in the family Poaceae, which constitutes the order Poales, are true grasses.

They are economically the most important of all flowering plants because of their nutritious grains and soil-forming function, and they also have the most widespread distribution and the largest number of individuals. Grasses provide forage for grazing animals, shelter for wildlife, construction materials, furniture, utensils, and food for man. Some species are grown as garden ornamentals, cultivated as turf for lawns and recreational areas, or used as cover plants for erosion control. Most grasses have round stems that are hollow between the joints, bladelike leaves, and extensively branching fibrous root systems. *See also* Poaceae.

Grass, Günter (Wilhelm) (b. Oct. 16, 1927, Danzig), German poet, novelist, playwright, sculptor, and printmaker who, with his extraordinary first novel *Die Blechtrommel* (1959; *The Tin Drum,* 1962), became the literary spokesman for the German generation that grew up in the Nazi era and survived the war.

In his native Danzig, Grass passed through the Hitler Youth movement, was drafted at 16, wounded in battle, and became a prisoner of war. Later, as an art student in Düsseldorf, he supported himself variously as a dealer in the black market, a tombstone cutter, and a drummer in a jazz band. Encouraged by the writers' association Gruppe 47, he produced poems and plays, at first with small success. In 1956 he went to Paris and wrote *Die Blechtrommel* (filmed 1979). This exuberant, picaresque novel, written in a variety of styles, imaginatively distorts and exaggerates his personal experiences—the Polish-German dualism of Danzig, the creeping Nazification of average families, the attrition of the war years, the coming of the Russians, and the complacent atmosphere of West Germany's postwar "economic miracle." Underlying the anarchic fantasy is the moral earnestness that has earned Grass the role of "conscience of his generation." It was followed by the novella *Katz und Maus* (1961; *Cat and Mouse,* 1963) and an epic novel, *Hundejahre* (1963; *Dog Years,* 1965), which together form a trilogy set in Danzig.

His other novels—always politically topical—include *Der Butt* (1977; *The Flounder,* 1978), a ribald fable of the war between the sexes from the Stone Age to the present; *Das Treffen in Telgte* (1979; *The Meeting at Telgte,* 1981), a hypothetical "Gruppe 1647" meeting of authors at the close of the Thirty Years' War; and *Kopfgeburten: oder die Deutschen sterben aus* (1980; *Headbirths, or, the Germans Are Dying Out,* 1982), which describes a young couple's agonizing over whether or not to have a child in the face of a population explosion and the threat of nuclear war.

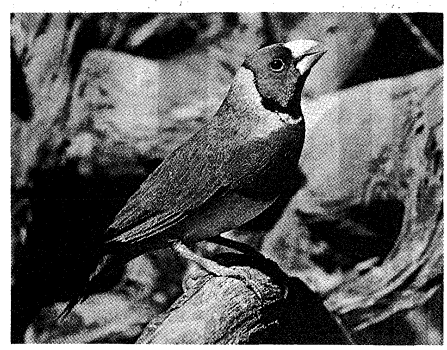


Grass
Authenticated News International

A committed artist, Grass participated actively in Social Democratic Party politics in West Berlin and fought energetically for the social and literary causes he believed in, often writing political tracts. His dramatic works show the influence of the Absurdist playwrights Eugène Ionesco and Samuel Beckett, and of the Epic Theatre of Bertolt Brecht.

grass finch, any of several small finchlike birds of Australasia that constitute the tribe Erythrurini of the songbird family Estrildidae. Their tails are long and pointed, their bills stoutly conical. Grass finches live chiefly in hot open country near rivers.

Several grass finches are well-known cage birds. One of the most colourful is the Gouldian finch (*Chloebia,* formerly *Poephila, gouldiae*) whose plumage is purple, gold, green, blue, and black; its face may be red, orange, or black. The star finch (*Neochmia ruficauda*) is



Gouldian finch (*Chloebia gouldiae*)
H. Rivarola—Photo Researchers

greenish-brown above and yellow below, with white-dotted red head, greenish-gray breast, and white-barred red tail. The painted finch (*Emblema,* formerly *Zonaeginthus, pictus*) is red and brown, with white-spotted black underparts.

grass-green algae: *see* green algae.

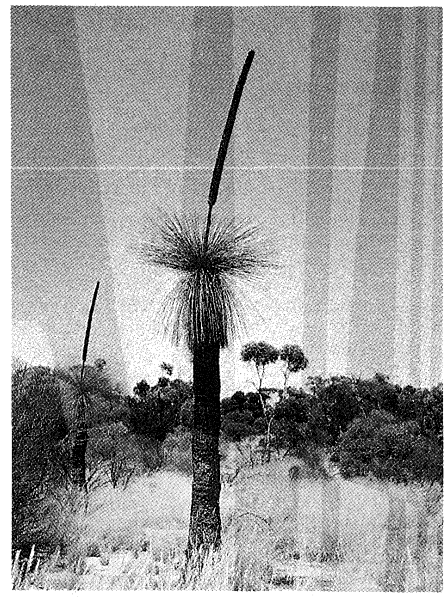
grass of Parnassus (*Parnassia*), any of about 15 species of low perennial herbs, in the family Parnassiaceae, distributed throughout the Northern Hemisphere. The plants grow in tufts and bear white, greenish white, or yellow flowers. Five sterile stamens bearing nectar glands alternate with five fertile stamens in each flower. Grass of Parnassus is occasionally planted in damp, shady places near bodies of water.

grass owl, any of certain grassland owl species, belonging to the family Tytonidae, which also includes the barn owls. *See* barn owl.

grass spider: *see* funnel weaver.

grass tree, any plant of the genus *Xanthorrhoea* of the family Xanthorrhoeaceae, with about 17 species native to eastern Australia. They have thick, woody, often palmlike stems about 5 metres (16 feet) tall that end in a tuft of rigid, grasslike leaves from which flower spikes resembling those of the bulrush extend 3 m or more.

The trees are also known as grass gums because of the red or yellow gumlike resins that



Grass tree (*Xanthorrhoea thorntoni*)
V. Serventy—Bruce Coleman Inc.

exude from the bases of old leaves. The resins are used for varnish. In some areas grass trees are known as yaccas (or yuccas) and as blackboys, especially *X. hastilis.* In western Aus-

tralia a monotypic species, *Kingia australis*, is known as grass tree.

Grasse, town, southeastern France, Alpes-Maritimes *département,* Provence-Alpes-Côte-d'Azur region, northwest of Cannes, west-southwest of Nice. Situated at an altitude of 1,100–1,250 feet (330–380 m) on a slope in a natural amphitheatre in the lower Alps, it is a winter resort and is also the centre of the French perfume industry. Roses, jasmine, and other flowers, as well as bitter orange blossom, from which the perfumes are distilled, are cultivated in the vicinity. The town is also known for its candied fruit.

In the 12th century Grasse was a miniature republic, but in 1227 it was taken by Raymond Bérenger, count of Provence, and from 1244 until 1790 was an episcopal see. Its Musée Fragonard, named after the 18th-century French court painter, who was born there, contains three paintings and several drawings by the master. Queen Victoria of Great Britain (reigned 1837–1901) passed several winters at Grasse. Pop. (1982) 24,257.

Grasse, François-Joseph-Paul, comte de (count of), MARQUIS DE GRASSE-TILLY (b. Sept. 13, 1722, Le Bar, Fr.—d. Jan. 11, 1788, Paris), French naval commander who engaged British forces during the U.S. War of Independence (1775–83).

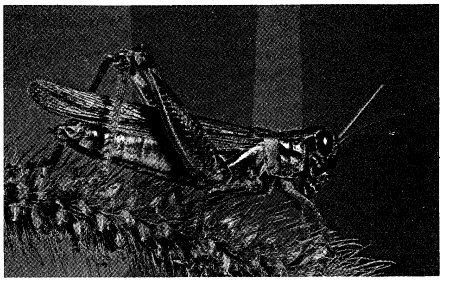
De Grasse took service in 1734 on the galleys of the Knights of Malta, and in 1740 he entered the French service. Shortly after France and the United States joined forces in the Revolutionary War, he was dispatched to America as commander of a squadron. In 1779–80 he fought the English off the West Indies. In 1781 he was promoted to the rank of admiral and was successful in defeating Admiral Samuel Hood and in taking Tobago. When the American commander George Washington and the French general the Count de Rochambeau determined to march to Virginia to join forces with the Marquis de Lafayette's army against the British commander Lord Cornwallis, Washington requested the cooperation of de Grasse's fleet. De Grasse therefore sailed from the West Indies to the Chesapeake River, where he was joined by a fleet under Count de Barras. A British force under Admiral Thomas Graves attempted to prevent this juncture by engaging de Grasse's fleet when it arrived at the Chesapeake Bay but was unsuccessful. French naval supremacy in the waters off Yorktown was instrumental in the success of the siege of that city.

After Cornwallis' surrender, de Grasse returned to the West Indies, where he captured the island of St. Kitts in January 1782. In April, however, he was defeated by Admiral George Rodney and taken prisoner. On his return to France, he published a *Mémoire justificatif* and was acquitted by a court-martial in 1784.

grasshopper, any leaping insect of the orthopteran families Acrididae and Tettigoniidae. Though found in a variety of habitats, the grasshopper occurs in greatest numbers in lowland tropical forests, semiarid regions, and grasslands. It ranges in colour from green to olive or brown and may have yellow or red markings. The grasshopper senses touch through organs located in various parts of its body—through antennae and palps on the head, through cerci on the abdomen, and through receptors on the legs. Organs for taste are located in the mouth; those for smell on the antennae. The grasshopper hears by means of a tympanal organ found either at the base of the abdomen or at the base of each front tibia. Its sense of vision is in the compound eyes; light is perceived in the simple eyes (or ocelli). Although most grasshoppers are herbivorous, only a few species are important economically as crop pests.

The femur region of the upper hindlegs is greatly enlarged and well adapted for leaping. The male can produce a buzzing sound either by rubbing its front wings together or by rubbing toothlike ridges on the hind femurs against a raised vein on each closed front wing.

Some grasshoppers are adapted to specialized habitats: the South American *Marellia remipes* spends most of its life on floating vegetation, actively swimming and laying eggs on underwater aquatic plants. Grasshoppers generally are large; some exceed 11 cm (4 inches) in length (*e.g., Tropidacris latriellei* of South America).



Short-horned grasshopper (Acrididae)
Earl L. Kubis—Root Resources

In certain parts of the world grasshoppers are eaten as food—dried, jellied, roasted and dipped in honey, or ground into a meal. Grasshoppers are controlled in nature by predators such as birds, frogs, and snakes; man uses insecticides and poisonous baits.

The short-horned grasshopper (*q.v.;* family Acrididae, formerly Locustidae) includes the inoffensive, nonmigratory species and the often-destructive, swarming, migratory species known as locust (*q.v.*). The long-horned grasshopper (family Tettigoniidae) is represented by the katydid, the meadow grasshopper, the cone-headed grasshopper, and the shield-backed grasshopper.

Other orthopteran families are also known as grasshoppers. The pygmy grasshopper (family Tetrigidae) is sometimes called the grouse, or pygmy, locust. The leaf-rolling grasshopper (family Gryllacrididae) is usually wingless and lacks hearing organs.

grasshopper mouse (genus *Onychomys*), either of two species of insect-eating mice, family Cricetidae (order Rodentia), found in dry, open country of western North America. The two species are the northern grasshopper mouse (*O. leucogaster*) and the southern grasshopper mouse, or scorpion mouse (*O. torridus*). They are stout-bodied rodents with gray or reddish brown fur and white underparts, and they are 9 to 13 cm (3.5 to 5 inches) long without the white-tipped, 3- to 6-cm tail.

Grasshopper mice live in the burrows of prairie dogs and other ground dwellers and emerge at night to hunt for insects and small rodents. They are beneficial in helping to control insect populations.

grassland, area with the dominant vegetation being grasses and grasslike plants, often with scattered trees or shrubs.

A brief treatment of grasslands follows. For full treatment, *see* MACROPAEDIA: Biosphere.

Grasslands were, until extensive agriculture, the largest single biome type in the world. Climatic conditions vary from semiarid to subhumid habitats, marked by periodic precipitation and a topography that ranges from level ground to gently undulating slopes. The environments are too dry to support forest growth but not arid enough to prevent the development of nonwoody, long-lived plant species such as grasses, sedges, herbs, and small shrubs. This kind of environment once dominated nearly half of the Earth's total surface.

Grasslands can develop in succession from bare, dry land or from watery areas. As a dry landmass gradually becomes overgrown with an insulating plant cover over the surface, the first lichens and mosses, and then herbaceous species, appear. Watery environments are first dominated by submerged plant species, and then floating reeds as the water level recedes with a rising substrate. The receding water forces the plant cover to become more dependent on climatic conditions such as soil, temperature, and precipitation levels.

The periodic precipitation of grasslands varies seasonally and annually. Temperate grasslands average between 250 and 750 mm (10 and 30 inches) of rain each year, while tropical and subtropical grasslands have an annual precipitation rate of between 635 and 1,500 mm. The amount of rainfall determines the nature and extent of grassland inhabitants and soil formations. Periods of drought are common and often prolonged, having an adverse effect on species development, particularly in the warmer climates.

Soil conditions in grasslands create an abundance of organic matter at all depths. The rate of precipitation in temperate grasslands allows plants to release nutrients slowly into the ground over long periods of time, so that annual crops are produced. Soil colours range from black near the forest margin to chestnut and brown. Tropical soils are reddish and yellowish in colour, owing to a low organic content, as leaching is more severe in humid climates than in temperate ones. Tropical soils are therefore more subject to nutrition depletion than temperate soils. The high temperatures and dense rainfalls cause organic matter in the tropics to decompose rapidly, and only low levels of humus can accumulate.

Water regimes in grassland areas influence both soil texture and structure. Vegetative cover is modified according to whether the type of soil is sandy or peaty; thus, sandy soil permits water to percolate through the layers, causing a low rate of water runoff and evaporation. Sandy soils thus permit a large quantity of grassy roots because their moisture content is so great.

The length of the growing season in grasslands is a function of both precipitation and temperature variation. Growing seasons in hot climates vary between 120 and 190 days each year. In more temperate climates, the growing season commences when the average temperature reaches about 5° to 10° C (40° to 50° F) and extends from 100 to more than 165 days.

Wind and fire play important roles in controlling organic development in grassland regions. Wind speeds tend to be high because of the low vegetative cover, and lightning-induced fires sweep across open plains up to the forest boundaries. Fire is not as destructive as it might be in other environments, because the low shrubs and herbs of grasslands tend to develop new growth stems close to the ground, as opposed to forest growths, which occur high along the vulnerable leafy stems of trees.

The dominant plant forms—grasses and sedges—are particularly well adapted to compete with herbaceous species (also called forbs) because the grasses can provide a dense plant cover that prevents the less-hardy forbs from taking root and maturing. Grasses are categorized according to the size of their growth and their formation in the soil. High and tall grasses occur in tropical areas; midgrasses with flowering stems are found in temperate regions; and short grasses are found in arid lowlands. Turf grasses spread along the ground by budding on lateral stems below the surface of the soil, and bunch grasses develop horizontally.

Many of the animal species found in the

grasslands are small and inconspicuous, and many others live underground. Small predators include rodents, lizards, frogs, snakes, and large insects such as grasshoppers, termites, and locusts. Reptiles are often predators of insects, while snakes eat the rodents and other small vertebrates. Rodents are credited with causing widespread destruction of the grassy ranges because they modify the speciation of plant cover and expose the soil surface to erosion. The predators of rodents and snakes are usually birds such as owls, hawks, and eagles.

Small soil animals, *e.g.*, springworms and roundworms, are also important to the ecology of the grasslands. Microorganisms found in the soil are mainly microflora, which dwell among the root systems of grasses and herbs. They are eaten by the soil animals, who also aid in providing waste materials and decomposing matter for soil nutrition. The grasses and herbs fed by the resulting humus are in turn eaten by grazing larger animals such as giraffes, gazelles, zebras, kangaroos, buffaloes, and elephants. A large proportion of these animals often segregate into herds or colonies for protection against both the elements and carnivorous animals, *i.e.*, leopards, lions, and foxes. Predatory birds are found in the grasslands, but herbivorous birds such as larks and grouse are also common.

The grassland ecosystem is stratified so that the uppermost layer consists of the tallest grasses and forbs. A lower layer is made up of short grasses and herbs, and along the ground surface lie the mosses and lichens, or algae on watery surfaces. The appearance of the grasslands changes seasonally, so that it is drab and lifeless in winter, a grayish colour in early spring as the old flora is replaced by green shoots, and in summer and early autumn the landscape takes on a bluish or whitish colour, when the dominant grasses and legumes blossom. Late autumn brings yellowish flowers into foliage, which fade as the temperature cools.

About one-half of the energy received from sunlight is absorbed by the flora and stored underground, where approximately 85 percent of the total biomass of the grasslands is found. The rate of organic decomposition due to the activity of microorganisms on dead plant matter is such that the turnover of the biomass occurs about every two years on the surface and every four years underground.

Grassmann, Hermann Günther (b. April 15, 1809, Stettin, Prussia—d. Sept. 26, 1877, Stettin, Ger.), German mathematician chiefly remembered for his development of a general calculus of vectors in *Die lineale Ausdehnungslehre, ein neuer Zweig der Mathematik* (1844; "The Theory of Linear Extension, a New Branch of Mathematics").

Grassmann taught at the Gymnasium in Stettin from 1831 until his death, except for two years (1834–36) of teaching at an industrial school in Berlin. He pursued wide interests, writing on electricity, colour, acoustics, linguistics, botany, and folklore.

In *Ausdehnungslehre* Grassmann developed Gottfried Leibniz' idea of an algebra in which symbols representing geometric entities (such as points, lines, and planes) are manipulated according to certain rules. In suitable circumstances this calculus proves far more powerful than earlier methods of coordinate geometry. Grassmann also initiated the representation of subspaces of a given space (*e.g.*, the lines in three-dimensional space) by coordinates; this leads to a point mapping of an algebraic manifold, called the Grassmannian. Somewhat similar ideas were propounded independently and contemporaneously by Sir William R. Hamilton of Great Britain in his quaternion theory; indeed, Grassmann, Hamilton, and the British mathematician George Boole were the pioneers in the field of modern algebra. Although Grassmann's methods were only slowly adopted, partly because of his obscure writing, they eventually inspired the continental school of vector analysis. Through the work of Élie Cartan of France, his methods have since shown their utility in the study of differential forms, with its important applications to analysis and geometry.

Grassmann was an accomplished linguist, specializing in Sanskrit literature, and at the age of 53, disappointed with the lack of interest in his mathematical work, he turned all his efforts to Sanskrit studies. His Sanskrit dictionary on the Ṛgveda is still widely used.

grateful dead, in folktales of many cultures, the spirit of a deceased person who bestows benefits on the one responsible for his burial. In the prototypical story, the protagonist is a traveller who encounters the corpse of a debtor, to whom the honour of proper burial has been denied. After the traveller satisfies the debt, or, in some versions, pays for the burial, he goes on his way. In another version of the story, burial is prescribed for religious reasons but prohibited by civil authorities. It is this version that forms the theme of the apocryphal Book of Tobit in the Old Testament (*see* Tobit).

The hero is soon joined by another traveller (sometimes in the form of an animal, or, in the story of Tobit, an angel), who helps him in a dramatic way. In some stories the companion saves the hero's life; in others he helps him gain a prize. In many versions, the companion offers to aid the hero, but only on condition that they divide the prize. Then, as the hero is about to comply, the companion reveals himself as the grateful spirit of the deceased whom the hero helped to bury.

Gratia (goddess): *see* Grace.

Gratian, Latin in full FLAVIUS GRATIANUS AUGUSTUS (b. 359, Sirmium, Pannonia—d. Aug. 25, 383, Lugdunum, Lugdunensis), Roman emperor from 367 to 383. During part of his reign he shared this office with his father, Valentinian I (ruled 364–375), and his uncle Valens (ruled 364–378). By proclaiming the eight-year-old Gratian as augustus, his father sought to assure a peaceful succession to imperial power. The boy's education was entrusted to the poet Ausonius. Upon the death of Valentinian (Nov. 17, 375), Gratian was appointed sole ruler of the West. Shortly thereafter he recognized as a colleague his four-year-old half brother, Valentinian, who had been proclaimed Emperor Valentinian II by the troops at Aquincum (near Budapest). Under Ausonius' influence Gratian sought to make his rule mild and popular. He spent most of his reign in Gaul repelling the tribes that were invading from across the Rhine. In 378 he arrived too late to take part in the disastrous battle with the Goths at Adrianople. As a replacement for Valens, who was killed in that conflict, Gratian appointed Theodosius emperor of the East (379).

In 383, upon hearing that Magnus Maximus had been proclaimed emperor in Britain, Gratian rushed into Gaul to intercept the usurper. When Gratian's troops deserted him, he sought to escape beyond the Alps but was treacherously murdered in Lugdunum by Andragathius.

In the latter part of his reign Gratian was greatly influenced by St. Ambrose. Out of deference to the Christian Church, he omitted the words *pontifex maximus* ("supreme priest") from his title—the first Roman ruler to do so—and ordered the removal of the pagan statue of Victory from the Senate in Rome. An embassy of the senators, led by Q. Aurelius Symmachus, failed to persuade him to rescind his instructions on this matter.

Gratian, Latin GRATIANUS (b. late 11th century, Carraria-Ficulle?, Tuscany—d. before 1159, Bologna?), Italian monk, father of the study of canon law whose writing and teaching initiated it as a new branch of learning, a discipline distinct from theology.

Little is known of his life. A Camaldolese monk, he became lecturer (*magister*) at the monastery of SS. Felix and Nabor, Bologna, where he completed (*c.* 1140) the *Concordia discordantium canonum* (generally known as the *Decretum Gratiani*), a collection of nearly 4,000 texts on all fields of church discipline, presented in the framework of a treatise designed to harmonize all the contradictions and inconsistencies existing in the rules accumulated from diverse sources. His materials were drawn from existing conciliar canons up to and including the Lateran Council (1139).

While not the first systematic compilation of canon law, the *Decretum* proved to be the right book at the right time, because of its completeness and because of its superior method of combining juristic and scholastic approaches. For the juristic, Gratian was indebted to the Bolognese doctors of civil law; in the scholastic, he was influenced by contemporary French theological trends. The *Decretum* was also a treatise of Gratian's teaching, and it became the text of canon law as taught in all the universities. Although later papal legislation made much of its content obsolete, it remained the first part of the traditional corpus of canon law of the Roman Catholic Church until the codification of 1917.

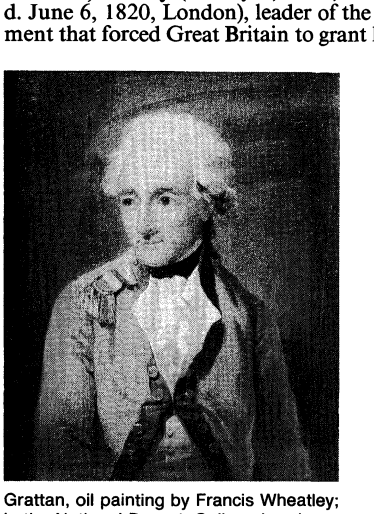
Gratiano (commedia dell'arte): *see* Dottore.

Gratian's Decretum, Latin DECRETUM GRATIANI, or CONCORDIA DISCORDANTIUM CANONUM, collection of nearly 3,800 texts touching on all areas of church discipline and regulation compiled by the Benedictine monk Gratian about 1140. It soon became the basic text on which the masters of canon law lectured and commented in the universities.

The work is not just a collection of texts but also a treatise attempting to resolve the apparent contradictions and discordances in the rules accumulated from different sources. When necessary, Gratian had recourse to the Roman law and made extensive use of the works of the Church Fathers and of ecclesiastical writers.

For centuries the *Decretum* was the text on which the teaching of canon law in the schools was based; it was glossed and commented on by the most illustrious canonists; it became the first part of the *Corpus Juris Canonici,* the great body of canon law, and served as an important source for the official codification of canon law in 1917.

Grattan, Henry (b. July 3, 1746, Dublin—d. June 6, 1820, London), leader of the movement that forced Great Britain to grant legisla-



Grattan, oil painting by Francis Wheatley; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

tive independence to Ireland in 1782. Later he headed opposition to the union (1800) of England and Ireland.

A member of the ruling Anglo-Irish Protestant class, Grattan became a barrister and in the early 1770s joined Henry Flood's campaign for national independence. He entered the Irish Parliament in December 1775, soon after Flood had forfeited the movement's leadership by accepting government office. Grattan's brilliant oratory soon made him the leading spokesman of the nationalist agitation. His movement gained momentum as more and more Irishmen came to sympathize with the North American colonists in their war for independence from Great Britain. By 1779 he was powerful enough to force the British government to remove most of its restraints on Irish trade, and in April 1780 he formally demanded the repeal of Poynings' Law, which had made all legislation passed by the Irish Parliament subject to approval by the English Parliament. Two years later the British—again in response to Grattan's demands and to pressure from the Irish Volunteers, a militia organized to defend Ireland against possible French invasion—relinquished their right to legislate for Ireland and freed the Irish Parliament from subservience to the English Privy Council. Despite these successes, Grattan soon faced rivalry from Flood, who bitterly criticized Grattan for failing to demand that the English Parliament completely renounce all claims to control of Irish legislation. Flood succeeded in undermining Grattan's popularity, but by 1784 Flood himself had lost much of his following.

From 1782 to 1797 Grattan made limited progress in his struggle to reform the composition of the Irish Parliament and to win voting rights for Ireland's Roman Catholics. The outbreak of the French Revolution (1789) bolstered his cause by infusing democratic ideas into Ireland, but the subsequent growth of a radical Irish movement for Catholic emancipation provoked repressive measures by England. Grattan was caught between the two sides. Ill and discouraged, he retired from Parliament in May 1797 and was in England when the Irish radicals staged an unsuccessful rebellion (1798). He returned to Parliament for five months in 1800 and waged a vigorous but fruitless campaign against Prime Minister William Pitt's plans for the legislative union of the Irish and English parliaments. In 1805 Grattan was elected to the English House of Commons, where for the last 15 years of his life he fought for Catholic emancipation.

Graubünden (German), French GRISONS, Italian GRIGIONI, Romansh GRISHUN, largest and most easterly canton of Switzerland; it has an area of 2,744 sq mi (7,106 sq km), of which two-thirds is classed as productive (forests covering one-fifth of the total). The entire canton is mountainous, containing peaks and glaciers of the Tödi (11,857 ft [3,614 m]), Bernina (13,284 ft), Adula, Albula, Silvretta, and Rhätikon ranges in the Central Alps. These ranges are penetrated by a system of level valleys, of which the inner ones are the highest in central Europe. The principal valleys, running southwest to northeast, are those of the Upper Rhine.

The valleys were originally settled by the Raeti (Rhaeti), a people probably Celtic in origin. Most of the modern canton formed the southern part of Raetia, a province set up by the Romans in 15 BC. Designated a county by the emperor Charlemagne *c.* AD 806, the region was largely ruled from the episcopal see of Chur (Coire), the bishop of which had become a prince of the Holy Roman Empire in 1170.

The Gotteshausbund ("League of the House of God"), founded in 1367 to stem the bishop's rising power, was followed in 1395 by the Oberbund, or Grauerbund ("Gray League") of the Upper Rhine Valley. The use of the word gray (German *grau,* French *gris,* Romansh *grisch*) in this context derived from the homespun gray cloth worn by the men and gave rise to the name of the Grisons, or Graubünden ("Gray Leagues"), for the whole canton. A third Raetian league, called the Zehngerichtenbund ("League of the Ten Jurisdictions," or "Courts"), was founded in 1436 by the inhabitants of 10 bailiwicks of the former countship of Toggenburg, whose dynasty had become extinct. In 1450 the Zehngerichtenbund allied with the Gotteshausbund and in 1471 with the Oberbund.

The passing of the Toggenburg possessions to the elder Habsburgs in 1496 led the Oberbund and Gotteshausbund to ally with the Swiss Confederation. The Swiss victories at Calven Gorge and Dornach in the ensuing war compelled the Habsburgs to recognize the practical independence of the Swiss and their allies. In 1526 the last traces of the temporal jurisdiction of the bishops of Chur were abolished. After a brief inclusion in the Helvetic Republic, the Graubünden, or Grisons, entered the Swiss Confederation in 1803. The cantonal constitution dates from 1892.

Forests and mountain pasturage in summer (especially for sheep and goats) provide the principal occupations. Wine is produced below Chur (*q.v.*), the capital, and corn (maize) and chestnuts are grown in the Mesolcina and Poschiavo valleys. Tourism is important in the canton's valleys, spas, and resorts, notably at Davos, Sankt Moritz, Pontresina, and Arosa. There are some light industries around Chur. About one-half of the population, mainly around Chur, speaks German; about one-sixth, in the southern valleys, speaks Italian; and about one-third, in the Bündner Oberland and the Vorder-rhein and Engadin valleys, speaks Romansh and Ladin, survivals of an ancient Romance language. The population is almost evenly divided between Protestant and Roman Catholic. Pop. (1985 est.) 168,800.

Graudenz (Poland): *see* Grudziądz.

Graun, Karl Heinrich (b. May 7, 1704, Wahrenbrück, Saxony—d. Aug. 8, 1759, Berlin), German composer of operas and sacred music, known especially for his Passion oratorio *Der Tod Jesu.*

Graun was a chorister in Dresden, where as a youth he composed several cantatas for church services and worked under the Neapolitan-opera composer Antonio Lotti. In 1725 he made his debut in opera as a tenor at Brunswick. But he was dissatisfied with the arias given him and rewrote them; he then began composing entire operas. At Brunswick he also composed six operas and two Passions.

He became music director to Frederick the Great (then crown prince) in 1735 and in 1740 recruited singers for Frederick's Italian opera company. While in royal service, Graun composed about 30 operas to Italian words, two of them, *Montezuma* and *Merope,* to librettos by Frederick. For about 150 years his *Der Tod Jesu* (1755), like Handel's *Messiah* in England, was performed annually in Germany during Holy Week. His *Te Deum* (1757) was written to celebrate the Prussian victory at Prague. Graun's compositions also include harpsichord concerti, trio sonatas, and other chamber works.

Graun, engraving by Riedel after a portrait by A. Möller

By courtesy of the Royal College of Music, London

As a composer, Graun was a leading exponent of the preclassical Berlin school, which also included C.P.E. Bach, Graun's elder brother, Johann Gottlieb (1703–71), and Frederick the Great himself. His music shows a combination of old and new melodic and formal concepts. His operas are highly Italianized in the predominant Neapolitan style.

Graunt, John (b. April 24, 1620, London—d. April 18, 1674, London), English statistician, generally considered to be the founder of the science of demography, the statistical study of human populations. His analysis of the vital statistics of the London populace influenced the pioneer demographic work of his friend Sir William Petty and, even more importantly, that of Edmond Halley, the astronomer royal.

A prosperous haberdasher until his business was destroyed in the London fire of 1666, Graunt held municipal offices and a militia command. While still active as a merchant, he began to study the death records that had been kept by the London parishes since 1532. Noticing that certain phenomena of death statistics appeared regularly, he was inspired to write *Natural and Political Observations . . . Made upon the Bills of Mortality* (1662). He produced four editions of this work; the third (1665) was published by the Royal Society, of which Graunt was a charter member.

Graunt classified death rates according to the causes of death, among which he included overpopulation: he observed that the urban death rate exceeded the rural. He also found that although the male birth rate was higher than the female, it was offset by a greater mortality rate for males, so that the population was divided almost evenly between the sexes. Perhaps his most important innovation was the life table, which presented mortality in terms of survivorship. Using only two rates of survivorship (to ages 6 and 76), derived from actual observations, he predicted the percentage of persons that will live to each successive age and their life expectancy year by year. Petty was able to extrapolate from mortality rates an estimate of community economic loss caused by deaths.

Graupner, Christoph (b. Jan. 13, 1683, Kirchberg, Saxony—d. May 10, 1760, Darmstadt, Hesse-Darmstadt), one of the principal German composers of the period of Bach and Telemann.

Graupner studied at the Thomasschule in Leipzig. In 1706, because of a threat of Swedish invasion, he sought refuge at Hamburg, where he was harpsichordist at the opera under R. Keiser. About 1710 he entered the service of the Landgrave of Hesse-Darmstadt, becoming chapelmaster in 1712. In 1722 he was offered the cantorship of St. Thomas in Leipzig, but he declined the post and it passed to J.S. Bach.

The most significant genres in which Graupner worked were the chorale cantata, the trio sonata, and the concerto. He composed about 1,300 cantatas. In style they approach the gallant, or Rococo, style, that was emerging at that time. His trio sonatas and concerti represent a German assimilation of these Italian forms. Characteristically, the trio sonatas are written in fugal style. Graupner also wrote several operas, many overtures and symphonies, and harpsichord partitas and sonatas.

gravel, aggregate of more or less rounded rock fragments coarser than sand (*i.e.,* more than 2 millimetres [0.08 inch] in diameter). Gravel beds in some places contain accumulations of heavy metallic ore minerals, such as cassiterite (a major source of tin), or native metals, such as gold, in nuggets or flakes. Gravels are widely used building materials.

Fragments in gravel range in size from pebbles (4–64 millimetres [0.16–2.56 inches] in diameter), through cobbles (64–256 millimetres [2.56–10.24 inches]), to boulders (larger than 256 millimetres). The rounding of gravel results from abrasion in the course of transport by streams or from milling by the sea. Gravel deposits accumulate in parts of stream channels or on beaches where the water moves too rapidly to permit sand to remain. Because of changing conditions, gravel formations generally are more limited and more variable in coarseness, thickness, and configuration than sand or clay deposits. Persistent accumulation of gravel or pebble beds may take place along an inner zone of breaking waves, on a beach that is otherwise sandy. Cobble and pebble beaches (shingle beaches) often originate from the points of rocky cliffs.

In many regions marine gravels similar to those of the seashore exist tens or hundreds of metres above tide level; such gravel terraces (or raised beaches) may extend great distances and indicate that the sea at one time stood relatively higher. River gravels occur mostly in the middle and upper parts of streams where the currents are swiftest. Ancient gravel terraces found at levels much above those of the present rivers mark former streams or are evidence of uplift of the land or lowering of the sea.

The prolonged weathering and extended transport of gravel by long rivers results in more complete rounding and sorting of the rock fragments by size and physical and chemical durability. Cemented gravels are called conglomerates.

Gravelet, Jean-François: *see* Blondin.

Gravelines, Flemish GRAVELINGHE, seaport town of northern France, in the *département* of Nord and the *arrondissement* of Dunkirk. It is situated midway between Dunkirk and Calais, near the mouth of the Aa River. The canalization of the Aa by the Count of Flanders in about the mid-12th century led to the foundation of Gravelines (*gravelinghe,* meaning "count's canal"). It became the site of an important citadel, which was fortified by a double circuit of ramparts and by a tidal moat. There Lamoraal, count of Egmond, who was fighting for Spain, defeated the French in 1558, and the English scattered the Spanish Armada in 1588 offshore from it. The French took Gravelines in 1644, the Austrians in 1652, and the French finally in 1658 by the Treaty of the Pyrenees. Since then it has barely survived as a fishing village and coastal port because of the nearness of Calais and Dunkirk and the silting up of the Aa's channel to the sea. Pop. (1982) 11,077.

graver (printmaking): *see* burin.

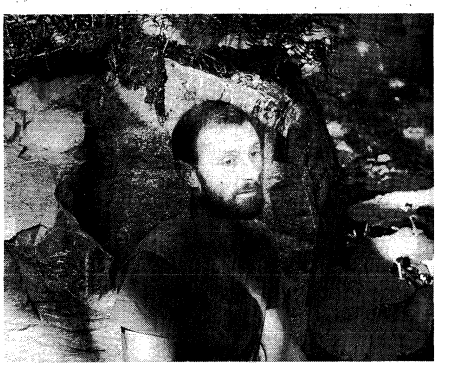
Graves, Michael (b. July 9, 1934, Indianapolis, Ind., U.S.), American architect and designer, one of the principal figures in the Postmodernist movement.

Graves trained to be an architect at the University of Cincinnati and at Harvard University, earning a master's degree in 1959 at the latter school. He then studied in Rome from 1960 to 1962 and upon his return took a teaching position at Princeton University, becoming a full professor there in 1972.

Graves began his career in the 1960s as a creator of private houses in the abstract and austere style of orthodox Modernism, his compositions being influenced by the work of Le Corbusier. In the late 1970s, however, Graves began to reject the bare and denuded Modernist idiom as too cool and abstract, and he began seeking a richer architectural vocabulary that would be more accessible to the public. He soon drew remarkable attention with his designs for several large public buildings in the early 1980s. The Portland Building in Portland, Ore. (1980), and the Humana Building, Louisville, Ky. (1982), were notable for their hulking masses and for Graves's highly personal, Cubist interpretations of such classical elements as colonnades and loggias in them. Though somewhat awkward, these and other of Graves's later buildings were acclaimed for their powerful and energetic presence. By the mid-1980s Graves had emerged as arguably the most original and popular figure working in the Postmodernist idiom.

Graves, Morris (Cole) (b. Aug. 28, 1910, Fox Valley, Ore., U.S.), American painter best known for introspective works expressing a mystical approach to nature. His style was greatly influenced by the three trips he made to the Far East in 1928–30, and, like Mark Tobey, another painter of the Northwest school, Graves had a deep interest in Oriental art and religion, especially Zen Buddhism.

In 1936 his first one-man show was presented at the Seattle (Washington) Art Museum. About 1937 he turned from oils to



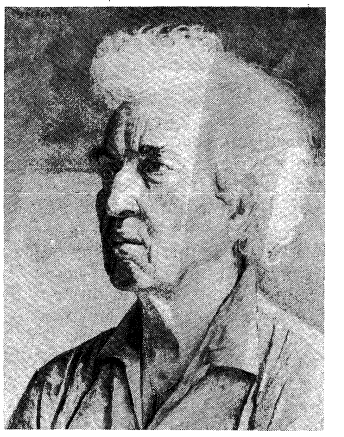
Morris Graves, 1950
Imogen Cunningham

tempera or gouache, which he applied to Chinese paper. Some of his best known works followed, including "Blind Bird" (1940; Museum of Modern Art, New York City) and "Little Known Bird of the Inner Eye" (1941; Museum of Modern Art). He frequently used a calligraphic style in which delicate white lines appear against a dark background.

A study Graves made of the Oriental art in the Honolulu Academy of Art in 1947 resulted in his series of paintings of Chinese bronzes. In 1954–56 he painted the birds and animals of Ireland. Shortly thereafter Graves left the United States to make his home outside Dublin, to escape, as he explained, "the onrush and outrage of machine noise." Before he left he painted "Spring with Machine-Age Noises—No.3" (1957), a visual cacophony sweeping over a stretch of grass.

Graves, Robert (von Ranke) (b. July 24/26, 1895, London—d. Dec. 7, 1985, Deyá, Majorca, Spain), English poet, novelist, critic, and classical scholar who carried on many of the formal traditions of English verse in a period of experimentation. His more than 120 books also include a notable historical novel, *I, Claudius* (1934); an autobiographical classic of World War I, *Good-Bye to All That* (1929; rev. ed. 1957); and erudite, controversial studies in mythology.

As a student at Charterhouse School, London, young Graves began to write poetry; he continued this while serving as a British officer at the western front during World War I, writing three books of verse during 1916–17.



Robert Graves, oil painting by J. Aldridge, 1968; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

The horror of trench warfare was a crucial experience in his life: he was severely wounded in 1916 and remained deeply troubled by his war experiences for at least a decade. Graves's mental conflicts during the 1920s were exacerbated by an increasingly unhappy marriage that ended in divorce. A new acceptance of his own nature, in which sexual love and dread seemed to exist in close proximity, appeared in his verse after he met Laura Riding, an American poet, who accompanied him to the island of Majorca, Spain, in 1929 and with whom he was associated for 13 years.

The success of Graves's *Good-Bye to All That,* war memoirs notable for their unadorned grimness, enabled him to make his permanent home on Majorca, an island whose simplicity had not yet been altered by tourism. Graves's novel *I, Claudius* is an engaging first-person narrative purportedly written by the Roman emperor Claudius as he chronicles the personalities and machinations of the Julio-Claudian line during the reigns of Augustus, Tiberius, and Caligula. This work was followed by other historical novels dealing with ancient Mediterranean civilizations and including *Claudius the God* (1934), which extends Claudius' narrative to his own reign as emperor; *Count Belisarius* (1938), a sympathetic study of the great and martyred general of the Byzantine Empire; and *The Golden Fleece* (1944; U.S. title *Hercules, My Shipmate*). Graves's researches for *The Golden Fleece* led him into a wide-ranging study of myths and to what was his most controversial scholarly work, *The White Goddess; A Historical Grammar of Poetic Myth* (1948). In it the author argues the existence of an all-important religion, rooted in the remote past but continuing into the Christian Era, based on the worship of a goddess.

Graves began before 1914 as a typical Georgian poet, but his war experiences and the difficulties of his personal life gave his later poetry a much deeper and more painful note. He remained a traditionalist rather than a modernist, however, in his emphasis on meter and clear meaning in his verse. Graves's sad love poems are regarded as the finest produced in the English language during the 20th century, along with those of W.B. Yeats.

Graves was elected professor of poetry at the University of Oxford in 1961 and served there until 1966. His *Collected Poems* appeared in 1948, with revisions in 1955, 1959, 1961, and 1975. His controversial translation of *The Rubáiyát of Omar Khayyàm,* with Omar Ali-Shah, appeared in 1967. His own later views on poetry can be found in *The Crowning Privilege* (1955) and *Oxford Addresses on Poetry* (1962).

Graves, Robert James (b. 1796, Dublin—d. Mar. 20, 1853, Dublin), Irish physician and

a leader of the Irish, or Dublin, school of diagnosis, which emphasized the clinical observation of patients and which significantly advanced the fields of physical diagnosis and internal medicine.

Graves received his degree from the University of Dublin in 1818. After studying in London and on the Continent, he returned to Dublin in 1821 and set up the Park Street School of Medicine. He also served as a physician at Meath Hospital, introducing reforms in medical training that he had witnessed on his travels. In addition to teaching traditional textbook medicine, Graves assigned to advanced students the responsibility for diagnosis and treatment of ward patients, under the supervision of the faculty. Like other progressive professors of his times, he gave his lectures in English rather than in Latin. Graves was named regius professor of the Institute of Medicine in Trinity College in recognition of his achievements in education. A founder of the *Dublin Journal of Medical Science,* he served as one of the journal's editors until his death.

Graves was one of the first physicians to fully describe exophthalmic goitre, now called Graves' disease. His *Clinical Lectures on the Practice of Medicine,* published in 1848, are responsible for establishing his enduring reputation. Among the innovations introduced in the lectures were the timing of the pulse by watch and the practice of giving food and liquids to patients with fevers instead of withholding nourishment from them. Graves facetiously suggested that his epitaph should read, "He fed fevers."

Graves' disease, also called THYROTOXICOSIS, TOXIC DIFFUSE GOITRE, OF EXOPHTHALMIC GOITRE, endocrine disorder that is the most common type of hyperthyroidism (oversecretion of thyroid hormone). In Graves' disease the excessive secretion of thyroid hormone is usually accompanied by diffuse primary overgrowth of the thyroid gland (which results in goitre) and by exophthalmos (protrusion of the eyeballs), with eyelid retraction and other eye signs. The thyroid gland may be enlarged from twice to several times its normal size. The increased levels of thyroid hormone result in increased cardiac output with tachycardia (rapid heartbeat), palpitations, possible shortness of breath, fibrillation (rapid, irregular contractions of the heart muscle), and heart failure. Nervousness, hyperexcitability, restlessness, insomnia, and emotional instability are not unusual, nor are such symptoms as weight loss, muscular weakness and wasting, and diarrhea. Physical or emotional stress may precipitate a crisis known as "thyroid storm," which may result in vasomotor collapse and, if untreated, in death.

Graves' disease is considered to be an autoimmune disease (*i.e.,* one in which the body reacts defensively to its own tissues or fluids as though they were foreign substances introduced into the body). An antibody with thyroid-stimulating properties has been isolated from the blood serum of many Graves' patients. Graves' disease occurs in women four times as often as in men, has a tendency to affect young to middle-aged adults, and demonstrates a familial pattern.

Treatment of severe cases entails the surgical removal of all or part of the thyroid gland. Sometimes the condition can be controlled by the oral administration of radioactive iodine, iodide, or certain of the enzyme-blocking agents such as thiouracil. Therapeutically administered radioactive iodine is taken up by the cells of the thyroid gland just as is nonradioactive iodine in the course of the synthesis and secretion of thyroid hormone. When present in sufficient dosage, however, radioactive iodine results in the destruction of the thyroid's cells. The dosage can be regulated so that sufficient undamaged tissue remains to maintain normal thyroid function in most cases. Although many of the abnormalities produced by Graves' disease can thus be corrected, some of the eye changes produced by it may be permanent.

Gravesend, locality, Gravesham district, county of Kent, England. It lies on the right bank of the River Thames, downstream from London.

The discovery of the skull of Swanscombe man near Gravesend dates early settlement in the area to the Second Interglacial Period (about 200,000 years ago). Gravesend is mentioned in Domesday Book (1086) as Gravesham, possessing a hithe (port) on the river. The community's rights to ferry passengers to London were increased in the 14th century, and many famous persons passed through Gravesend en route to the capital. Pocahontas, the American Indian "princess," died in Gravesend in 1617 and is buried in St. George's Church.

Gravesend still retains several administrative functions associated with the ancient ferry rights. It is a centre for English customs, for the Port of London Health Authority, and for the Trinity House pilots who guide vessels into the Thames. The town grew considerably in the 19th century as a watering place, and the Royal Terrace Pier and public gardens were opened. Gravesend's present-day industrial significance is still closely tied to the Thames and involves paper mills, cement works, ship repairing, and engineering industries. Pop. (1981) 53,638.

Gravesham, district (borough), county of Kent, England, with an area of 39 square miles (100 square km). Its centre is the town of Gravesend, but it includes a section of the south bank of the River Thames above and below the town, and it runs inland to the crest of the chalk hills (North Downs) that traverse the county from west to east. The district was once agricultural, with areas of orchards and market gardens, but the whole of Thameside has become built-up and industrialized. Residential developments, factories, and chalk quarries have encroached extensively on the farmland. Pop. (1986 est.) 93,800.

graveyard school, genre of 18th-century British poetry that focused on death and bereavement. The graveyard school consisted largely of imitations of Robert Blair's popular long poem of morbid appeal, *The Grave* (1743), and of Edward Young's celebrated blank-verse dramatic rhapsody *Night Thoughts* (1742–45). These poems express the sorrow and pain of bereavement, evoke the horror of death's physical manifestations, and suggest the transitory nature of human life. The meditative, philosophical tendencies of graveyard poetry found their fullest expression in Thomas Gray's "An Elegy Written in a Country Church Yard" (1751). The poem is a dignified, gently melancholy elegy celebrating the graves of humble and unknown villagers and suggesting that the lives of rich and poor alike "lead but to the grave." The works of the graveyard school were significant as early precursors of the Romantic movement.

gravimeter, also called GRAVITY METER, sensitive device for measuring variations in the Earth's gravitational field, useful in prospecting for oil and minerals. In one form, it consists of a weight suspended from a spring; variations in gravity cause variations in the extension of the spring. A number of different mechanical and optical schemes have been developed to measure this deflection, which in general is very small. Gravimeters have been developed that can detect variations in the Earth's gravitational field as small as one part in 10,000,000.

gravimetric analysis, a method of quantitative chemical analysis in which the constituent sought is converted into a substance (of known composition) that can be separated from the sample and weighed. The steps commonly followed in gravimetric analysis are: (1) preparation of a solution containing a known weight of the sample; (2) separation of the desired constituent; (3) weighing the isolated constituent; and (4) computation of the amount of the particular constituent in the sample from the observed weight of the isolated substance.

Of the many methods that may be employed for isolating the desired constituent from a solution of a sample, the most common is precipitation—that is, transformation into a substance not soluble in the solution. A reagent is added that forms an insoluble compound with the desired constituent but will not precipitate other constituents of the sample. The precipitate obtained is separated by filtration, washed free of soluble impurities, dried or ignited to remove water, and weighed. Certain substances can be separated by virtue of their easy convertibility into gaseous compounds, as in the determination of carbonate in a mineral analysis. The sample is treated with an acid, and carbon dioxide is evolved as a gas. The gas is absorbed on a weighed quantity of a solid alkaline reagent, and the amount of carbon dioxide is determined from the gain in weight of the absorbent. Electrodeposition is used in order to separate certain metals that can be plated out by passing an electric current through a solution of their salts. Copper in alloys may be determined by this method as long as the sample is free from other metals that plate out under the same conditions. Errors made in gravimetric analyses usually relate to the purity of the isolated constituent. In general, the compounds that are precipitated are very insoluble, and negligible error results from the incompleteness of precipitation. Obtaining a precipitate that is 100 percent pure and is exactly of the composition represented by a chemical formula is, however, considerably more difficult. All gravimetric methods are subject to some degree of error because of this difficulty.

Gravina in Puglia, walled town, Bari *provincia,* Puglia (Apulia) *regione,* southern Italy. The town's cathedral and the castle of the Orsini family are notable local monuments, and there are numerous cave dwellings in the locality. The town also has museums of local costumes and of archaeology and pottery. Local crops are chiefly cereals; there are limestone quarries in the neighbourhood. A distinctive breed of horses is associated with the Gravina area. Pop. (1987 est.) mun., 38,088.

gravitation, in mechanics, the universal force of attraction that affects all matter. It is the weakest of the four basic physical forces, but on the scale of everyday objects near the Earth or that of astronomical bodies, it is the dominant one. The fall of bodies released from a height to the surface of the Earth and the weight of resting bodies at or near the surface are the most familiar manifestations of gravitation, but the rotation of the Earth about the Sun, the motion of the Sun around the centre of the Milky Way Galaxy, and the geometric structure of the universe itself are equally the results of the force of gravitation.

A brief treatment of gravitation follows. For full treatment, *see* MACROPAEDIA: Gravitation; Earth.

Building on the work of Galileo (Galilei) and Johannes Kepler, Isaac Newton developed the first quantitative theory of gravitation, which he published in his *Principia* in 1687. Newton held that every particle of matter in the universe attracts every other particle with a force that is proportional to the product of their masses and inversely proportional to the

square of the distance between them. Mathematically this is expressed by the classical formula

$$F = \frac{Gm_1m_2}{d^2},$$

where F is the force of attraction, m_1 and m_2 are the masses, d is the distance, and G is a universal gravitational constant whose value depends on the units chosen to express it. Newton was able to show that Kepler's three empirical laws of planetary motion followed from his own three general laws of motion and the above law of gravitation. The power of the law to explain and predict phenomena was triumphantly confirmed when two astronomers, J.C. Adams and U.-J.-J. Le Verrier, working independently, used data on perturbations in the orbit of the planet Uranus to predict the existence and location of an undiscovered planet whose gravitational attraction was held to be responsible for the observed anomalies. The planet subsequently named Neptune was discovered in 1846 almost precisely where it had been predicted to be.

The value of the universal constant of gravitation G has been measured a number of times. The first reliable measurement was made by Henry Cavendish in 1798, using two large lead balls to attract two smaller balls that were attached to a torsion balance. Cavendish's value was 6.754×10^{-11} newton-square metre per square kilogram; the presently accepted value is $6.67259 \times 10^{-11} \text{Nm}^2\ \text{kg}^{-2}$. Some cosmological theories suggest that G may be changing by about one part in 10^{11} per year or that it may vary somewhat in different regions of space. Measurements indicate that G cannot vary by more than four parts in 10^{10} per year. (*See also* Cavendish experiment.)

Newton's conception and quantification of gravitation held firm until the beginning of the 20th century, when the notion of instantaneous action at a distance, which it entailed, was recognized generally as unintelligible, particularly from the viewpoint of relativity. In his general theory of relativity, Einstein developed a wholly new conception of gravitation. Einstein proposed that the four-dimensional space-time continuum is curved by the presence of matter, producing a universe in which bodies travel in geodesics (shortest paths) that are the curved orbits interpreted by Newton as the result of some attractive force. (*See also* space-time.) Einstein also showed that there is no way in principle to distinguish between a body undergoing uniform acceleration and one that is stationary in a gravitational field. The relativistic view of gravitation yielded predictions of several phenomena that violate Newtonian theory and that, to the limits of observational accuracy, have been confirmed; these include the bending of a ray of light passing near a very massive object such as the Sun, the reddening of light emitted by a very massive object, and the slowing of a clock raised above the Earth relative to one remaining on the surface. The new theory was also able to explain a long-known phenomenon, the precession of the orbit of Mercury about the Sun, which had defied Newtonian analysis.

Another prediction of relativistic gravitation theory is the existence of gravity waves propagated by objects moving in a gravitational field. Some experimenters have claimed to have detected such waves, but their results remain so far unconfirmed. Yet another apparent implication of relativistic gravitational fields is the existence of particles, called gravitons, as carriers of the field. They are postulated to be massless, uncharged particles moving at the speed of light; they, too, are as yet undetected.

gravitational radius, also called SCHWARZSCHILD RADIUS, the radius below which the gravitational attraction between the particles of a body must cause it to undergo irreversible gravitational collapse. This phenomenon is thought to be the final fate of the more massive stars (*see* black hole).

The gravitational radius (R_g) of an object of mass M is given by the following formula, in which G is the universal gravitational constant and c is the speed of light: $R_g = 2GM/c^2$.

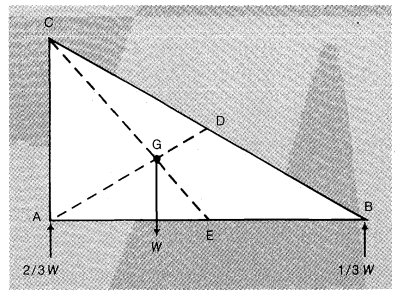
For a mass as small as a human being, the gravitational radius is of the order of 10^{-23} cm, much smaller than the nucleus of an atom; for a typical star such as the Sun, it is about 3 km (2 miles).

The gravitational radius is sometimes called the Schwarzschild radius for the German astronomer and physicist Karl Schwarzschild, who investigated the concept in the early 20th century.

graviton, postulated quantum that is thought to be the carrier of the gravitational field. It is analogous to the well-established photon of the electromagnetic field. Gravitons, like photons, would be massless, electrically uncharged particles traveling at the speed of light and would be emitted only by highly accelerating, extremely massive objects such as stars. Since gravitons would apparently be identical to their antiparticles, the notion of antigravity is questionable.

gravity, gravitational attraction of one mass for another. *See* gravitation.

gravity, centre of, in physics, imaginary point in a body of matter where, for convenience in certain calculations, the total weight of the body may be thought to be concentrated. The concept is sometimes useful in designing static structures (*e.g.,* buildings and bridges) and in predicting the behaviour of a body when it is acted on by external accelerating forces. Although the term centre of gravity is widely used, the same imaginary location in a body may also be called the centre of mass, since weight and mass are proportional. Because the centre of mass does not require a gravitational field, many physicists prefer the term centre of mass to centre of gravity.



Centre of gravity

When a body is in a gravitational field, its centre of mass and centre of gravity share a common location. An exception is a pair of large cosmic bodies that exert gravitational force on each other as each orbits around the other. In binary star systems, for example, the stars' mutual attraction may cause a separation of the centre of mass from the centre of gravity in each of the bodies.

The location of a body's centre of gravity may coincide with the geometrical centre of the body, especially in a symmetrically shaped object composed of homogenous material. An asymmetrical object composed of a variety of materials with different masses, however, is likely to have a centre of gravity located at some distance from its geometrical centre. In some cases, such as hollow bodies or irregularly shaped objects, the centre of gravity (or centre of mass) may occur in space at a point external to the physical material—*e.g.,* in the centre of a tennis ball or between the legs of a chair.

Published tables and handbooks list the centres of gravity for most common geometrical shapes. For a triangular metal plate such as that depicted in the Figure, the calculation would involve a summation of the moments of the weights of all the particles that make up the metal plate about point A. By equating this sum to the plate's weight W, multiplied by the unknown distance from the centre of gravity G to AC, the position of G relative to AC can be determined. The summation of the moments can be obtained easily and precisely by the integral calculus.

The point G can be located by suspending the plate by a cord attached at point A, and then by a cord attached at C. When suspended from A, the line AD is vertical; when suspended from C, the line CE is vertical. The centre of gravity is at the intersection of AD and CE. When an object is suspended from a single point, its centre of gravity lies directly beneath that point.

gravity meter: *see* gravimeter.

gravity wind: *see* katabatic wind.

gravure printing, photomechanical intaglio process in which the image to be printed consists of depressions or recesses on the surface of the printing plate. The process is the reverse of relief printing, in which the image is raised from the surface of the plate. The printer forms the image by cutting into the plate by hand or by using acids or other chemicals to etch the plate along the lines of the desired image. The printer then covers the plate with ink and wipes the ink from the higher surface, leaving the depressions, or intaglio areas, filled with ink. Paper pressed to the plate then absorbs ink from the depressed areas. Varying the depth of the depressions provides tonal gradations in the printed image.

In the photogravure or rotogravure (rotary photogravure) process, a negative image is etched into the surface of a copper printing cylinder in tiny cells and dots of various sizes and various depths. These constitute the type characters and artwork with its tonal gradations. When the printing cylinder rotates on the press, ink is applied to it by roller, spray, or bath, and a flexible metal blade called a doctor blade removes excess ink, leaving the surface clean, with ink left only in the depressions. Paper is fed between the inked printing cylinder and an impression cylinder coated with a resilient blanket, which presses the paper against the printing cylinder. The intaglio areas then transfer ink to the paper.

The gravure process requires careful preparation, but it produces good printing quality and colour, even on less expensive paper. The printing cylinder can be chromium-plated for durability in long runs and even replated if desired. Therefore, gravure is used for long runs of magazines and catalogs and colour supplements for newspapers. The process was originally developed for high-quality picture reproduction. It is also used to make art prints.

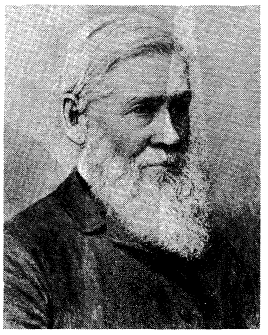
gray: *see under* grey, except as below.

gray, unit of absorbed dose of ionizing radiation, defined in the 1980s by the International Commission on Radiation Units and Measurements. One gray is equal approximately to the absorbed dose delivered when the energy per unit mass imparted to matter by ionizing radiation is 1 joule per kilogram. As a unit of measure, the gray is coherent with the units of measure in the SI system. The gray replaced the rad, which was not coherent with the SI system. One gray equals 100 rads.

Gray, Asa (b. Nov. 18, 1810, Sauquoit, N.Y., U.S.—d. Jan. 30, 1888, Cambridge, Mass.), American botanist whose extensive studies of North American flora did more than the work of any other botanist to unify the taxonomic

knowledge of plants of this region. His most widely used book, *Manual of the Botany of the Northern United States, from New England to Wisconsin and South to Ohio and Pennsylvania Inclusive* (1848), commonly called *Gray's Manual,* has remained, in successive editions, a standard work in this subject.

Gray received his M.D. degree from Fairfield Medical School, Connecticut (1831), where he spent his spare time collecting plant specimens and educating himself in botany. In 1834 he went to the College of Physicians and Surgeons, New York City, as assistant to chemistry professor John Torrey. Gray soon took another position that allowed him to continue his botanical studies and write his first textbook, *Elements of Botany* (1836). During that time, Gray and Torrey remained good friends, and together they worked on a long project, *Flora of North America,* 2 vol. (1838–43). In 1878 an expansion of this work was published as the first volume of *Synoptical Flora of North America,* under Gray's direction.



Asa Gray, engraving

By courtesy of the Smithsonian Institution, Washington, D.C., and the Hunt Institute, Pittsburgh

Gray spent a year (1838–39) in Europe studying the specimens of North American plants kept in herbaria. On his return to the U.S., he made a systematic study of the flora of the Southeast to include as part of his *Flora.* In 1842 he accepted the Fisher professorship of natural history at Harvard University. He donated the thousands of books and plants he had collected at his own expense to Harvard in 1865, on condition that the school house the priceless collection in a building. This cooperative effort resulted in the establishment of the botany department at Harvard.

Gray published many of his scientific reports in the influential *American Journal of Science,* which for some years he also edited. Some of his best writings, often interpretive in character, concern the geographical distribution of plants. His 1856 paper on plant distribution, "Statistics of the Flora of the Northern United States," was written partly in response to a request by Charles Darwin for a list of American alpine plants. Gray was one of the few persons whom Darwin kept fully informed concerning the publication of his *Origin of Species* (1859). Gray was a devout Christian, however, and, although he did accept natural selection as the cause of new species, he did not believe it to be the only cause of variation, which he considered to be caused by some inherent power imparted in the beginning by divine agency. But Gray, an excellent writer of philosophical essays, biographies, and scientific criticism, staunchly supported Darwin and collected his supporting papers into the widely influential *Darwiniana* (1876, reprinted 1963).

Gray, Elisha (b. Aug. 2, 1835, Barnesville, Ohio, U.S.—d. Jan. 21, 1901, Newtonville, Mass.), U.S. inventor and contestant with Alexander Graham Bell in a famous legal battle over the invention of the telephone.

Gray invented a number of telegraphic devices and in 1869 was one of two partners who founded what became Western Electric

Elisha Gray

By courtesy of Oberlin College, Oberlin, Ohio

Company. On Feb. 14, 1876, the day that Bell filed an application for a patent for a telephone, Gray applied for a caveat announcing his intention to file a claim for a patent for the same invention within three months. When Bell first transmitted the sound of a human voice over a wire, he used a liquid transmitter of the microphone type previously developed by Gray and unlike any described in Bell's patent applications to that date, and an electromagnetic metal-diaphragm receiver of the kind built and publicly used by Gray several months earlier. In the legal cases that followed, the claims of Gray and Bell came into direct conflict, and Bell was awarded the patent. In 1880 Gray became professor of dynamic electricity at Oberlin College, Oberlin, Ohio.

Gray, Harold (Lincoln) (b. Jan. 20, 1894, Kankakee, Ill., U.S.—d. May 9, 1968, La Jolla, Calif.), U.S. cartoonist and creator of "Little Orphan Annie," one of the most popular comic strips of all time.

After graduating from Purdue University, Lafayette, Ind., in 1917, Gray joined the staff of the *Chicago Tribune,* to which he returned after brief service in the U.S. Army. After leaving the *Tribune* in 1919, he did commercial art and for a five-year period assisted Sidney Smith with his strip, "The Gumps," carried by the *New York Daily News.* "Little Orphan Annie" was conceived by Gray and Joseph Medill Patterson, editor of the *News.* Gray's choice of a girl as the central character was unusual at that time. He named her "Annie" for a bright Chicago street urchin he had known. As an orphan, Gray's Annie was free to have adventures that enlarged her circular eyes and raised her frizzy hair. Her dog Sandy was her constant companion, and she was frequently rescued by Daddy Warbucks, a bald billionaire who often expressed Gray's conservative political leanings. Annie had courage, determination, and honesty, and Gray kept her at her original age—around 10 or 12. At the time of his death, the strip was carried by 400 papers in the U.S., Canada, and abroad. In 1977 a musical comedy based on the strip and titled *Annie* proved to be very successful.

Gray, Horace (b. March 24, 1828, Boston—d. Sept. 15, 1902, Washington, D.C.), justice of the U.S. Supreme Court, 1881–1902.

Admitted to the bar in 1851, Gray practiced law in Massachusetts and was active in Free-Soil and, later, Republican party affairs. In 1860 he ran unsuccessfully for state attorney general. He served with distinction for many years at the Massachusetts Supreme Court, first as court reporter (1854–61) and later as associate justice (1864–73) and chief justice (1873–81).

In 1881 he was appointed to the U.S. Supreme Court by Pres. Chester A. Arthur. During his 21 years on the bench, Gray was distinguished for his broad knowledge of the court's previous decisions and the deft application of precedent to cases before him. In his most notable opinion, *Juilliard* v. *Greenman* (1884), Gray upheld the right of the federal government to make paper money legal tender for the payment of private debt even in times of peace, a procedure previously considered constitutional only as an emergency war measure.

Gray, Sir James (b. Oct. 14, 1891, London—d. Dec. 14, 1975, Cambridge, Cambridgeshire, Eng.), English zoologist who played a leading part in changing the main objective of 20th-century zoological research from evolutionary comparative anatomy to the functional analysis of living cells and living animals, particularly through his editorship (1925–54) of the *Journal of Experimental Biology.* He was noted for his work on the mechanism of cellular and animal movement.

Gray was educated and spent his career at Cambridge University, where he gradually established one of the major schools of biological research in Britain. In 1948 he received the royal medal of the Royal Society. He was knighted in 1954.

Beginning research as a cytologist, Gray at first particularly concerned himself with the mechanics of various kinds of cellular movements; he is the author of a standard work on experimental cytology (1931). Later he extended this application of mechanical principles to the analysis of animal movement in general and showed the importance of applying engineering principles to biological problems pertaining to movement. His works include *Ciliary Movement* (1928), *Text-book of Experimental Cytology* (1931), *How Animals Move* (1953), and *Animal Locomotion* (1968).

Gray, Robert (b. May 10, 1755, Tiverton, R.I.—d. summer 1806, at sea near eastern U.S. coast), captain of the first U.S. ship to circumnavigate the globe and explorer of the Columbia River.

Gray went to sea at an early age, and after serving in the Continental Navy during the Revolutionary War, he entered the service of a Massachusetts trading company. In command first of the "Lady Washington" and later of the "Columbia," Gray sailed from Boston to the Pacific Northwest on a trading expedition in 1787 and travelled home around the world, reaching Boston again in August 1790. In May 1792, while on a second voyage in the "Columbia," he explored Gray's Harbor (in the present state of Washington) and the Columbia River (which is named for his ship), giving the U.S. a claim to the Oregon Territory. Once again he circumnavigated the globe, and after his return in July 1793, he spent the remainder of his career commanding merchant vessels along the Atlantic coast.

Gray, Thomas (b. Dec. 26, 1716, London—d. July 30, 1771, Cambridge, Cambridgeshire, Eng.), English poet whose "An Elegy Written in a Country Church Yard" is one of the best known of English lyric poems. Although his literary output was slight, he was the dom-

Thomas Gray, detail of an oil painting by John Giles Eccardt; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

inant poetic figure in the mid-18th century and a precursor of the Romantic movement.

Born into a prosperous but unhappy home, Gray was the sole survivor of 12 children of a harsh and violent father and a long-suffering mother, who operated a millinery business to educate him. A delicate, pensive, studious boy, he was sent to Eton in 1725 at the age of eight. There he formed a "Quadruple Alliance" with three other boys who liked poetry and classics and disliked rowdy sports and the Hogarthian manners of the period. They were Horace Walpole, the son of the prime minister; the precocious poet Richard West, who was closest to Gray; and Thomas Ashton. The style of life Gray developed at Eton, devoted to quiet study, the pleasures of the imagination, and a few understanding friends, was to persist for the rest of his years.

In 1734 he entered Peterhouse College, Cambridge, where he began to write Latin verse of considerable merit. He left in 1738 without a degree and set out in 1739 with Walpole on a grand tour of France, Switzerland, and Italy at Sir Robert Walpole's expense. At first all went well, but in 1741 they quarrelled—possibly over Gray's preferences for museums and scenery to Walpole's interest in lighter social pursuits—and Gray returned to England. They were reconciled in 1745 on Walpole's initiative and remained somewhat cooler friends for the rest of their lives.

In 1742 Gray settled at Cambridge. That same year West died, an event that affected him profoundly. Gray had begun to write English poems, among which some of the best were "Ode on the Spring," "Sonnet on the Death of Mr. Richard West," "Hymn to Adversity," and "Ode on a Distant Prospect of Eton College." They revealed his maturity, ease and felicity of expression, wistful melancholy, and the ability to phrase truisms in striking, quotable lines, such as "where ignorance is bliss, 'Tis folly to be wise." The Eton ode was published in 1747 and again in 1748 along with "Ode on the Spring." They attracted no attention.

It was not until "An Elegy Written in a Country Church Yard," a poem long in the making, was published in 1751 that Gray was recognized. Its success was instantaneous and overwhelming. A dignified elegy in classical diction celebrating the graves of humble and unknown villagers was, in itself, a novelty. Its theme that the lives of the rich and poor alike "lead but to the grave" was already familiar, but Gray's treatment—which had the effect of suggesting that it was not only the "rude forefathers of the village" he was mourning but the death of all men and of the poet himself—gave the poem its universal appeal. Gray's newfound celebrity did not make the slightest difference in his habits. He remained at Peterhouse until 1756, when, outraged by a prank played on him by students, he moved to Pembroke College. He wrote two Pindaric odes, "The Progress of Poesy" and "The Bard," published in 1757 by Walpole's Strawberry Hill Press. They were criticized, not without reason, for obscurity, and in disappointment, Gray virtually ceased to write. He buried himself in his studies of Celtic and Scandinavian antiquities and became increasingly retiring and hypochondriacal. In his last years his peace was disrupted by his friendship with a young Swiss nobleman, Charles Victor de Bonstetten, for whom he conceived a romantic devotion, the most profound emotional experience of his life.

Gray died at 55 and was buried in the country churchyard at Stoke Poges, Buckinghamshire, celebrated in his "Elegy."

Gray, Walter de, Gray also spelled GREY (d. May 1, 1255, Fulham, Middlesex, now part of London), English churchman who rose to high ecclesiastical office through service to King John.

He became chancellor of England in 1205 and, after John had made his peace with the church, was elected bishop of Worcester (1214). In 1215 John advanced him as a candidate for the see of York against the wishes of the cathedral chapter, and Pope Innocent III settled the subsequent appeal in favour of Walter. He played a considerable part in restoring law and order to the North after the baronial revolt.

As archbishop of York, Walter drew up provincial constitutions (1250) and encouraged the building of new churches. At York Minster he built the south transept, where he was later buried. He was one of the first English prelates to keep records of his acts; his registers have survived.

Consult the INDEX *first*

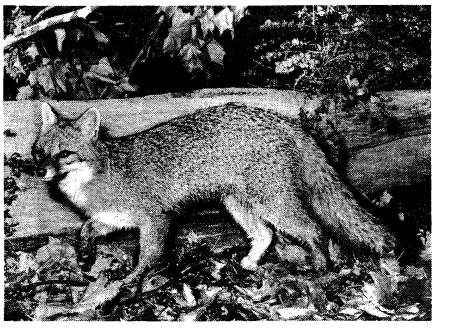
gray birch, also spelled GREY BIRCH, also called OLDFIELD BIRCH, WIRE BIRCH, or POPLAR-LEAVED BIRCH (*Betula populifolia*), slender ornamental tree of the family Betulaceae, found in clusters on moist sites in northeastern North America. Rarely 12 metres (40 feet) tall, it is covered almost to the ground with flexible branches that form a narrow, pyramidal crown. The thin, glossy, dark-green, triangular leaves have long, thin stems and flutter in the wind. In one variety, the leaves are purplish when young.

The red-brown or gray bark of young stems and branches whitens as the tree matures, becoming red orange on the inner surface. The outer bark resembles that of paper birch but is not so white, peels less, and has rough, triangular, black patches below the junctions of branches and trunk.

Gray birch often is injured by ice and snow. Quick growing but short-lived, it seeds prolifically, providing burned or abandoned areas with a ground cover that protects seedlings of more permanent trees. It is also planted as an ornamental in naturalistic landscapes. Gray birch wood is used in turnery and for fuel. *See also* birch.

Gray Eminence, The: *see* Holstein, Friedrich (August) von; Joseph, Father.

gray fox (*Urocyon cinereoargenteus*), grizzled, gray-furred New World fox of the family Canidae, found in forested, rocky, and brush-covered country from Canada to northern South America. Distinguished by the red-



Gray fox (*Urocyon cinereoargenteus*)
John H. Gerard

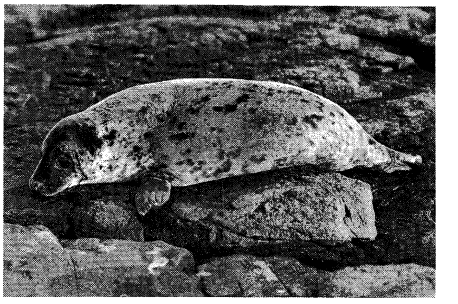
dish colour on its neck, ears, and legs, the gray fox grows to a length of about 50–75 centimetres (20–30 inches), excluding its 30–40-cm tail, and a weight of about 3–6 kilograms (7–13 pounds). It is more retiring and less crafty than the red fox, and unlike other foxes it commonly climbs trees. It is primarily nocturnal and takes a variety of foods, including small birds and mammals, insects, and fruit. Its two to seven dark-furred pups are born in spring, after a gestation of about 63 days.

The gray fox, though it may sometimes raid hen houses, is beneficial in controlling the rodent population; its fur is often sold but is not of great value. A closely related but smaller form, the island gray fox (*U. littoralis*), is found on islands off the coast of southern California. The name gray fox is sometimes also applied to the hoary fox (*see* fox) of Europe.

Gray Ghost, The (racehorse): *see* Native Dancer.

gray mold blight (plant disease): *see* botrytis blight.

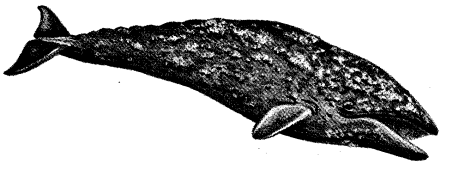
gray seal (*Halichoerus grypus*), northern seal of the family Phocidae, found along the coast of Newfoundland, the British Isles, and in the Baltic region. It is spotted gray and black



Female gray seal (*Halichoerus grypus*)
Eric Hosking—The National Audubon Society Collection/Photo Researchers

and is characterized by a robust appearance and heavy head. The male grows to about 3 metres (10 feet) in length and 300 kilograms (660 pounds) in weight; the female is smaller. Gregarious and rather slow-moving, the gray seal is commonly found near rocks and cliffs. It feeds on fish and breeds in late winter (autumn in Britain), the male gathering a harem of about 10 females. Litters usually contain a single white-coated pup.

gray whale (*Eschrichtius robustus,* sometimes classified as *E. glaucus* or *E. gibbosus*), slender-bodied baleen whale, the only living



California gray whale (*Eschrichtius robustus*)
Painting by Richard Ellis

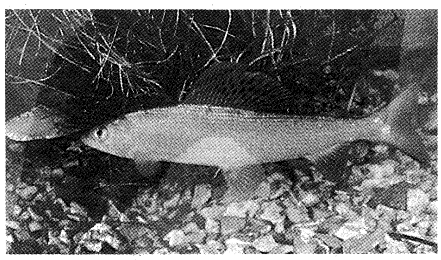
member of the family Eschrichtiidae. The gray whale attains a maximum length of about 15 metres (50 feet). It is gray or black, mottled with white, and has short, yellow baleen, two (rarely more) lengthwise grooves on its throat, and, instead of a dorsal fin, a row of low humps on its back. It is noted for its preference for shore waters rather than the open sea. The gray whale occurs in two distinct populations. One inhabits the Sea of Okhotsk in summer, migrating south in winter to breed off southern Korea. The other summers in the Bering and Chukchi seas and travels south to winter breeding grounds along the coast of Baja California. The gray whale was hunted almost to extinction by 1925 but was placed under complete international protection and since the 1940s has increased in numbers.

grayback, common name for several North American fishes including the alewife (*q.v.*), cisco (*see* whitefish), and Menominee whitefish.

graybird, any of numerous cuckoo-shrikes of the genus *Coracina. See* cuckoo-shrike.

Grayling, city, seat (1879) of Crawford County, north central Michigan, U.S., on the Middle Branch of the Au Sable River, one of the most celebrated trout streams in the Midwest, 52 mi (84 km) east of Traverse City. Named for the once plentiful grayling, the city developed as a resort for summer and winter sports. Nearby are the Hartwick Pines, North Higgins Lake, and South Higgins Lake state parks and the headquarters for the Michigan National Guard. Annual events are the Winter Sports Festival (February), the World's Championship Au Sable River Canoe Marathon (July), and the Au Sable River Longboat Regatta (August). Inc. village, 1903; city, 1935. Pop. (1980) 1,792.

grayling (*Thymallus*), any of several troutlike game fishes, family Salmonidae, found in cold, clear streams of Eurasia and northern North America. Graylings are handsome, silvery-purple fishes, which reach a length of about 40 centimetres (16 inches). They have rather large



Grayling (*Thymallus thymallus*)
S.C. Bisserot—Bruce Coleman Ltd.

scales, large eyes, a small mouth with feeble teeth, and a sail-like, brightly coloured dorsal fin, with 20 to 24 rays. Graylings feed primarily on insects, and they spawn in shallow water during the spring. Pollution of streams in some areas of North America has reduced the numbers of this excellent food fish appreciably.

The grayling is placed by some authorities in a distinct family, Thymallidae.

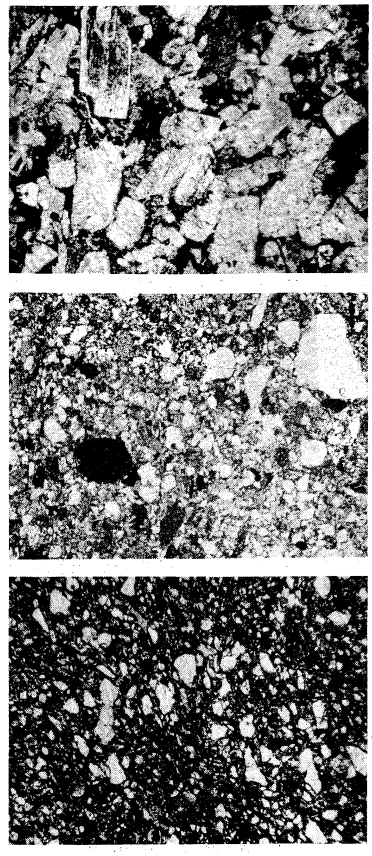
graysby, species of sea bass (*q.v.*).

Grayson, David: *see* Baker, Ray Stannard.

graywacke, also called DIRTY SANDSTONE, a sedimentary rock composed of sand-sized grains (0.063–2 millimetres [0.0025–0.078 inch]) with a fine-grained clay matrix. The sand-sized grains are frequently composed of rock fragments of wide-ranging mineralogies (*e.g.,* those consisting of pyroxenes, amphiboles, feldspars, and quartz). The grains are angular and poorly sorted with many minerals retaining growth forms that resulted from low abrasion. The matrix, which contains appreciable amounts of clay minerals, may comprise up to 50 percent of the volume. Of the clay minerals, chlorite and biotite are more abundant than muscovite and illite; kaolinite is absent. The abundant matrix tends to bind the grains strongly and form a relatively hard rock.

Common structural features of graywackes include repeated graded bedding and such deformational features as folds and deformed bedding, which appear to have formed soon after deposition; cross bedding is absent. Cyclic sequences of deposition are common within graywackes, with basal sandstone followed by laminated sandstone and shale at the top.

The characteristics of graywackes all point to rapid deposition in turbidity currents (density currents resulting from an increase in sediment concentration) in a tectonically active region. Graywacke sequences may be several thousand metres thick, strongly suggesting rapid subsidence in geosynclinal regions. They occur in almost all fold mountain belts except



Photomicrographs of graywackes
(Top) Lower Carboniferous plagioclase graywacke, Tamworth Trough, New South Wales; (centre) Ordovician lithic wacke with 40 percent quartz and many clay fragments, Austin Glen, New York; (bottom) Ordovician quartz-rich graywacke with abundant matrix material, Pittman Formation, Gundaroo, New South Wales (all specimens magnified 20 ×)
By courtesy of K.A.W. Crook, the Australian National University, Canberra

those dominated by limestones, such as the Canadian Rockies.

Graz, city, capital of *Bundesland* Steiermark (federal province of Styria), southeastern Austria. The country's second largest city, it lies on the Mur River between the Styrian Alps and a wide, fertile valley, the Grazerfeld. In the 9th century there was probably a fortress

The 16th-century clock tower at Graz, Austria
Michel Serraillier—Rapho/Photo Researchers

on the Schlossberg, a rocky cone (1,552 ft [473 m]) that dominates the city. The name Graz is derived from *gradec,* a Slavic word meaning "small fortress." It received town rights *c.* 1240 and became the centre of Steiermark during the Middle Ages and the residence of the Leopoldine Habsburgs after 1379. Its fortifications, built in the 15th–16th centuries, successfully withstood numerous sieges by the Hungarians and the Turks. Protestantism was established in Graz *c.* 1530 and flourished until oppressive measures by the Austrian archduke Charles (later the emperor Charles V) restored the authority of Rome. During the Napoleonic Wars, Graz was held by the French in 1797, 1805, and 1809. A trade centre in the 17th and 18th centuries, it developed even more rapidly in the 19th century through the interest of the archduke John and was constituted a city in 1850.

The Schlossberg fortifications were blown up by the French in 1809, and the site was laid out with parks after 1839. The clock tower (1561) and the belfry (1588) survive as prominent landmarks. The most notable buildings are in the old part of the town and include the Renaissance Landhaus (State House); the armoury (1643–45), with a unique historical collection of armour and weapons; the town hall (1888–93); the 11th-century castle with 15th-century additions, now used as government offices; St. Aegidius Cathedral (1438–62), with Baroque decorations and fine stained-glass windows; and the adjacent mausoleum (1614–1714) of Ferdinand II. Other historic buildings include the Mariahilf church (1607–11) and the 17th-century Eggenberg Castle. Among the city's institutions are the Karl-Franzens-Universität Graz (1586), Graz Technical University (1811), and the Steiermärkisches Landesmuseum Joanneum, the Styrian provincial museum, founded in 1811 by the archduke John and containing historical and art collections. The University of Music and Dramatic Art in Graz was founded in 1963. A rail and industrial centre, Graz has ironworks and steelworks, breweries, and railway workshops, and the city manufactures precision and optical instruments, machinery, leather, paper, textiles, and chemicals. There is an active trade in cereals, fruit, and wine from the nearby hills, and tourism is also important. Pop. (1981) 243,405.

Graziani, Rodolfo, MARCHESE (marquess) DI NEGHELLI (b. Aug. 11, 1882, Filettino, Italy—d. Jan. 11, 1955, Rome), Italian field marshal, administrator, and adherent of Benito Mussolini.

After service in Eritrea and Libya before World War I and in Macedonia and Tripolitania subsequently, Graziani became commander in chief of Italian forces in Libya (1930–34), governor of Italian Somaliland (1935–36), viceroy of Ethiopia (1936–37), and honorary governor of Italian East Africa (1938). Again commanding in Libya at the outbreak of World War II, he advanced against Egypt in 1940. Decisively defeated by Sir Archibald (later Earl) Wavell (December 1940–February 1941), he resigned his post. After the Italian armistice of 1943, Graziani entered the government of Mussolini's German-backed Italian republic as defense minister, engaging in anti-partisan warfare. Placed on trial after the war, he was sentenced to 19 years' imprisonment in 1950 but was released the same year, later becoming leader of the Italian neo-Fascist movement.

Grazzini, Anton Francesco, byname IL LASCA (Italian: The Roach) (b. March 22, 1503, Florence—d. Feb. 18, 1584, Florence), Italian poet, playwright, and storyteller who was active in the linguistic and literary controversies of his day.

Apparently educated in vernacular literature, in 1540 he took part in the founding of the Accademia degli Umidi (Academy of the Humid), the first literary society of the time. Grazzini was a contentious individual and became known as Il Lasca ("The Roach," a fish well known to anglers for putting up a good fight, and a member of the genus *Leuciscus*, another name by which he was sometimes identified), and he retained the name even after the establishment of the Crusca Academy, which he was instrumental in founding in 1582.

In his burlesque verses, written in the manner of Francesco Berni, whose works he edited, he strongly opposed humanism and Petrarchism, but he defended pure Tuscan diction in the reform of Italian literary style. His own language is lively, at times approaching dialect, in his seven comedies (written 1540–50) and in *Le cene* ("The Suppers"), a collection of 22 stories in the manner of Giovanni Boccaccio, purporting to be told by a group of young people at a carnival. (D.H. Lawrence translated one, *The Story of Doctor Manente* [1917].) The plays, like the stories and poems, reflect his disenchanted, self-seeking age, and exhibit the lustiness and vicious sting of his writings and the love he reveals for the ruthlessly cruel, whether in deeds of horror or pitiless jests.

Grazzini also collected (1559) the *Canti carnascialeschi* ("Carnival Songs") popular in Florence during the time of Lorenzo the Magnificent.

grease, thick, oily lubricant consisting of inedible lard, the rendered fat of waste animal parts, or a petroleum-derived or synthetic oil containing a thickening agent.

White grease is made from inedible hog fat and has a low content of free fatty acids. Yellow grease is made from darker parts of the hog and may include parts used to make white grease. Brown grease contains beef and mutton fats as well as hog fats. Fleshing grease is the fatty material trimmed from hides and pelts. Bone grease, hide grease, and garbage grease are named according to their origin. In some factories, food offal is used along with animal carcasses, butcher-shop scraps, and garbage from restaurants for recovery of fats.

Greases of mineral or synthetic origin consist of a thickening agent dispersed in a liquid lubricant such as petroleum oil or a synthetic fluid. The thickening agent may be soap, an inorganic gel, or an organic substance. Other additives inhibit oxidation and corrosion, prevent wear, and change viscosity. The fluid component is the more important lubricant for clearances between parts that are relatively large, but for small clearances the molecular soap layers provide the lubrication.

Synthetic grease may consist of synthetic oils containing standard soaps or may be a mixture of synthetic thickeners, or bases, in petroleum oils. Silicones are greases in which both the base and the oil are synthetic. Synthetic greases are made in water-soluble and water-resistant forms and may be used over a wide temperature range. The synthetics can be used in contact with natural or other rubbers because they do not soften these materials.

Special-purpose greases may contain two or more soap bases or special additives to gain a special characteristic.

greasewood, also called BLACK GREASEWOOD (species *Sarcobatus vermiculatus*), North American weedy shrub of the goosefoot family (Chenopodiaceae). Greasewood is a characteristic plant of strongly alkaline and saline soils in the desert plains of western North America. It is a much-branched, somewhat spiny shrub, up to 3 m (about 10 feet) high. The small, fleshy, toothless leaves arise directly from the branch.

The name greasewood has also been applied to *Adenostoma fasciculatum, Salvia apiana,* and other shrubs.

Great Admiralty Island (Papua New Guinea): *see* Manus Island.

Great Alfold, Hungarian NAGY-ALFÖLD, NAGY MAGYAR ALFÖLD, or ALFÖLD, English GREAT HUNGARIAN PLAIN, a flat, fertile lowland, southeastern Hungary, also extending into northern Yugoslavia and western Romania. Its area is 40,000 square miles (100,000 square km), about half in Hungary. In its natural state the Great Alfold is a steppeland broken up with floodplain groves and swamps—a southwestern projection of the Russian steppes. In Hungary flood control, irrigation, and swamp drainage projects have added large areas of cultivable land. Cereals, fodder crops, livestock, vegetables, and fruit are widely raised. The original arid grasslands or steppe (Hungarian *puszta*) are almost extinct but survive in the Hortobágy area east of Budapest.

The plains are not sharply delineated in all directions. On the north and east are foothills of the Carpathian arc, to the south and west the Balkan Mountains. The plains are generally divided into two areas: the region between the Danube River and its tributary, the Tisza, and the region east of the Tisza (the Tiszántúl). The former is mostly windblown sandy soil with loess in places and extends across the now-regulated Danube floodplain to the west and across the Tisza floodplain in the east. The Tisza River, before it was regulated, flooded large parts of the plain. The area east of the Tisza has alluvial deposits, loess, and windblown sand.

In the geomorphological history of the Great Alfold, a range of block-faulted mountains, coincident with the present plain, submerged into an inland sea (known as the Pannonian Sea) in the late Tertiary period. This was followed by uplift on the margins, leaving the Great Alfold area as an inland lake, which dried up or was filled with riverine deposits from the surrounding uplifted highlands. The present drainage pattern derives from the postglacial river pattern.

Great American Desert, a vast, vaguely defined arid and semiarid region of North America that embraces the Great Plains (*q.v.*).

Great Appalachian Valley, also called GREAT VALLEY REGION, longitudinal chain of valley lowlands of the Appalachian mountain system of North America. Extending from Canada on the northeast to Alabama, U.S., on the southwest, it includes the St. Lawrence River valley in Canada, and the Kittatinny, Cumberland, Shenandoah, and Tennessee river valleys in the United States. In its southerly region the Great Appalachian Valley divides the Appalachian Mountains into two subequal portions; in its northern section it lies west of the Appalachian ranges of New England and Canada, separating them from the Adirondack group. The valley contains rich farmland, especially in the Cumberland and Shenandoah valleys.

Great Artesian Basin, also called GREAT AUSTRALIAN BASIN, one of the largest areas of artesian water in the world, underlying about one-fifth of Australia. It includes most of the Darling and Lake Eyre catchments and extends northward to the Gulf of Carpentaria. Most of its 676,250 square miles (1,750,000 square km) underlies Queensland, with smaller segments extending under New South Wales, South Australia, and Northern Territory. Its floor varies considerably in depth, with deepest bores reaching 7,000 feet (2,100 m). The daily free discharge of water, from more than 18,000 boreholes, averages 350,000,000 gallons (1,300,000,000 litres), much of which is lost through evaporation and seepage. Distribution for irrigation, stock, and domestic use is by open earth channels and plastic tubing.

Great Atlantic & Pacific Tea Company, Inc. (A&P), American corporation operating one of the largest chains of supermarkets in the United States, mostly under the A&P name. Headquarters are in Montvale, N.J.

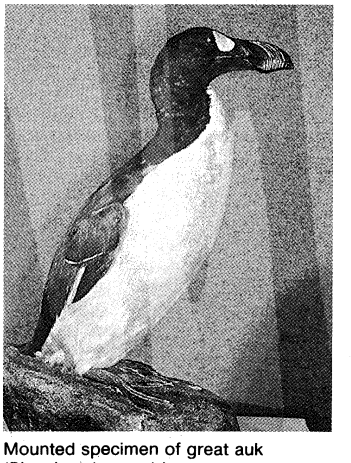
The company's history traces to 1859, when George F. Gilman and George Huntington Hartford founded the Great American Tea Co. in New York City to trade in tea bought from the cargoes of the clipper ships. It became largely a mail-order operation, but in 1869 the first retail stores, under the name Great Atlantic & Pacific Tea Company, were incorporated. By 1881 the company's stores extended as far west as St. Paul, Minn., and as far south as Richmond and Norfolk, Va. Soon coffee, spices, and extracts were added to the sales. By 1900, 200 stores were selling a variety of grocery items. Twenty-five years later there were 14,000 "economy stores," and A&P was the American food industry's largest grocery chain. In 1936 the first of A&P's supermarkets was opened; and these, fewer in number, eventually supplanted the former smaller stores. A&P further contracted over the years, giving up its Midwestern outlets in the 1970s and limiting its operations to the Eastern Seaboard. In 1986, however, it purchased Shopwell, Inc., bringing under its aegis the Dominion Stores in Canada, the Pantry Pride stores in Virginia, and the Kohl's Food Stores in Milwaukee, Wis. Besides the A&P name, various A&P stores are operated under such names as Super Fresh and Futurestore.

A&P, once also owner of manufacturing plants producing an array of food and household items (primarily under Ann Page and A&P labels), withdrew from most manufacturing in the 1970s and '80s and now produces only a few dairy and bakery goods, as well as coffee (8 O'Clock brand).

In 1969, at the death of its eccentric and domineering president, Ralph Burger, A&P was the largest food chain in the United States, with more than twice the sales of its nearest competitor, Safeway. In 1973, however, Safeway's sales surpassed A&P's, and in 1978 A&P fell to third place behind Kroger; in the 1980s its ranking fell still further. Beginning in 1979, after stock prices fell dramatically, the German supermarket giant Tengelmann bought a controlling percentage of the outstanding shares.

Great Atlas (mountains, Morocco): *see* Haut Atlas.

great auk, also called GAREFOWL (species *Pinguinus impennis*), flightless seabird extinct since 1844. Great auks belonged to the family Alcidae (order Charadriiformes). They bred in colonies on rocky islands off North Atlantic



Mounted specimen of great auk (*Pinguinus impennis*)
John Warham

coasts (St. Kilda, the Faeroe Islands, Iceland, and Funk Island off Newfoundland); subfossil remains have been found as far south as Florida, Spain, and Italy.

The body of the great auk was about 75 cm (30 inches) long; the wings, used in swimming under water, were less than 15 cm (6 inches) long. The large black bill bore eight or more transverse grooves. The bird stood erect on land. It had a black back and head, a white front, and a large white spot between the bill and eye.

Utterly defenseless, great auks were slaughtered by rapacious hunters for food and bait, particularly during the early 1800s. About 80 great auks and a like number of their eggs are preserved in museums. The nearest living relatives are the razor-billed auks, about 40 cm (16 inches) long.

Great Australian Basin (Australia): *see* Great Artesian Basin.

Great Australian Bight, wide embayment of the Indian Ocean, indenting Australia's southern coast. By definition of the International Hydrographic Bureau it extends eastward from West Cape, Western Australia, to South West Cape, Tasmania. The more generally accepted boundaries are from Cape Pasley, Western Australia, to Cape Carnot, South Australia—a distance of 720 miles (1,160 km).

The head of the bight abuts on the arid Nullarbor Plain and is bounded by a remarkably even and continuous line of cliffs, 200–400 feet (60–120 m) high. Between Eucla and Israelite Bay on the bight's shores are the Nuytsland Reserve and the Cape Arid National Park. West of Eucla, near the Western Australia–South Australia boundary, the old cliff line is bordered by a sandy coastal plain. Lying full in the track of the winter westerly winds, the bight has a reputation for storms and rough seas. It includes the offshore Archipelago of the Recherche, Nuyts Archipelago, and the Investigator and Whidbey islands.

First visited in 1627 by the Dutch navigator Pieter Nuyts, the barren coast was surveyed by Matthew Flinders, an Englishman, in 1802.

Great Awakening, religious revival in the British American colonies mainly between about 1720 and the 1740s. It was a part of the religious ferment that swept western Europe in the latter part of the 17th century and early 18th century, referred to as Pietism and Quietism in continental Europe among Protestants and Roman Catholics and as Evangelicalism in England under the leadership of John Wesley (1703–91).

A number of conditions in the colonies often cited as preparing the way for the revival include attempts to renew the covenant between God and his people over and against an arid rationalism in New England, a formalism in liturgical practices, as among the Dutch Reformed in the Middle Colonies, and neglect of pastoral supervision in the South. The revival took place primarily among the Dutch Reformed, Congregationalists, Presbyterians, Baptists, and some Anglicans, most all of whom were Calvinists. The Great Awakening may be seen, therefore, as a development toward an evangelical Calvinism.

The revival preachers emphasized the "terrors of the law" to sinners, the unmerited grace of God, and the "new birth" in Jesus Christ. One of the great figures of the movement was George Whitefield, an Anglican priest who was influenced by John Wesley but was himself a Calvinist. Visiting America in 1739–40, he preached up and down the colonies to vast crowds in open fields, because no church building would hold them. Although he gained many converts, he was attacked, as were other revival clergy, for criticizing the religious experience of others, for stimulating emotional excesses and dangerous religious delusions, and for breaking into and preaching in settled parishes without proper invitation by ecclesiastical authorities.

Jonathan Edwards was the great academician and apologist of the Great Awakening. A Congregational pastor at Northampton, Conn., he preached justification by faith alone with remarkable effectiveness. He also attempted to redefine the psychology of religious experience and to help those involved in the revival to discern what were true and false works of the Spirit of God. His chief opponent was Charles Chauncy, a liberal pastor of the First Church in Boston, who wrote and preached against the revival, which he considered an outbreak of extravagant emotion.

The Great Awakening stemmed the tide of Enlightenment rationalism among a great many people in the colonies. One of its results was division within denominations, for some members supported the revival and others rejected it. The revival stimulated missions to the Indians and the growth of several educational institutions, including Princeton, Dartmouth, Brown, and Rutgers. The increase of dissent from the established churches during this period led to a broader toleration, and the democratization of the religious experience was an impulse that fed the fervour that resulted in the American Revolution.

Edwards maintained that the Spirit of God withdrew from Northampton in the 1740s, and some supporters found that the revival came to an end in that decade.

A revival known as the Second Great Awakening began in New England in the 1790s. Generally less emotional than the Great Awakening, the Second Awakening led to the founding of colleges and seminaries and to the organization of mission societies. Kentucky was also influenced by a revival during this period. The custom of camp-meeting revivals developed out of the Kentucky revival and was an influence on the American frontier during the 19th century.

Great Badminton (England): *see* Badminton.

Great Bahama Bank, large shoal off The Bahamas, separated from Little Bahama Bank (north) by Northwest Providence Channel. Its shallow waters extend southeast from Miami, across the Straits of Florida, in a broad curve about 330 miles (530 km) long, between Cuba and Andros Island. The edge of the bank drops off precipitously into great depths. The marine life is abundant and varied, making it a prized fishing area.

Great Bahama Canyon, submarine canyon in the Atlantic Ocean off the Bahamas, and one of the greatest yet discovered. It is located to the northeast of the Great Bahama Bank between Great Abaco and Eleuthera islands. Two main branches, the Tongue of the Ocean and Northwest Providence, merge to form the canyon itself. The vertical rock walls of the Great Bahama Canyon rise 14,060 feet (4,285 m) from the canyon floor to the surrounding seabed. The Great Bahama Canyon has been traced for more than 140 miles (225 km) in length but could extend as far as the base of the steep part of the North American continental slope. It has a width of 23 miles (37 km) at its deepest point and an average floor slope of about 300 feet per mile (60 m per km).

Great Barrier Island, island marking the northeastern corner of Hauraki Gulf, eastern North Island, New Zealand. Separated from the Coromandel Peninsula (south) by Colville Channel, it is the largest island off North Island, with a total land area of 110 square miles (285 square km). Its mountainous surface rises to volcanic Mount Hobson (Hirakimata), 2,038 feet (621 m).

Known to the Maoris as Aotea, the island was named by Captain James Cook (1769). Earlier mining has been replaced by sheep and dairy farming. Accessible by launch from Auckland (55 miles [88 km] southwest) to Tryphena, on the south coast, and Port Fitzroy, on the west, Great Barrier is a summer resort. Pop. (1986) 858.

Great Barrier Reef, largest structure ever built up by living creatures, extending for more than 1,250 miles (2,000 km) off the northeastern coast of Australia, at an offshore distance ranging from 10 to 100 miles (16 to 160 km), and with an area of 80,000 square miles (207,000 square km).

The reef actually consists of some thousands of individual reefs, shoals, and islets. Many are dry or barely awash at low tide; some have islands of coral sand, or cays; others fringe high islands or the mainland coast. In spite of this variety, the reefs share a common origin: each has been formed, over millions of years, from the skeletons and skeletal waste of a mass of living marine organisms. The "bricks" in the reef framework are formed by the calcareous remains of the tiny creatures known as coral polyps and hydrocorals, while the "cement" that binds these remains together is formed in large part by the remains of coralline algae and polyzoans. The interstices of this framework have been filled in by vast quantities of skeletal waste produced by the pounding of the waves and the depredations of other boring organisms.

European exploration of the reef began in 1770, when the British explorer Captain James Cook ran his ship aground upon it. The work of charting channels and passages through the maze of reefs, begun by Cook, continued during the 19th century. The Great Barrier Reef Expedition of 1928–29 contributed important knowledge about coral physiology and the ecology of coral reefs. A modern laboratory on Heron Island continues scientific investigations.

The reef has risen on the shallow shelf fringing the Australian continent, in warm waters that have enabled the corals to flourish (they cannot exist where average temperatures fall below 70° F [21° C]). Borings have established that reefs were growing on the continental shelf as early as the Miocene epoch (23.7 to 5.3 million years ago). Subsidence of the continental shelf has proceeded, with some reversals, since the early Miocene.

The water environment of the Great Barrier Reef is formed by the surface water layer of the southwestern Pacific Ocean. The reef waters show little seasonal variations: surface-water temperature is high, ranging from 70° to 100° F (21° to 38° C). Average salinity is about 35 parts per 1,000, and the oxygen content is high, with a 90 percent saturation most of the time. The waters are generally crystal-clear, with submarine features clearly visible at depths of 100 feet (30 m).

In addition to at least 350 species of coral, forms of life include anemones, worms, gastropods, lobsters, crayfish, prawns, crabs, and a great variety of fishes and birds. The most notorious reef animal is the crown-of-thorns starfish (*Acanthaster planci*), which has reduced the colour and attraction of many of the central reefs by eating much of the living coral. Encrusting red algae *Lithothamnion* and *Porolithon* form the fortifying purplish red algal rim that is one of the Great Barrier Reef's most characteristic features, while the green alga *Halimeda* flourishes almost everywhere. Above the surface, the plant life of the cays is very restricted, consisting only of some 30 to 40 species. Some varieties of mangrove occur in the northern cays.

In addition to its scientific interest, the reef has become increasingly important as a tourist attraction. Growing concern over the preservation of its natural heritage has led to increased

controls on such potentially threatening activities as drilling for petroleum resources.

Great Barrington, town (township), Berkshire county, southwestern Massachusetts, U.S. It lies along the Housatonic River, in the Berkshire Hills, 19 miles (31 km) south of Pittsfield. The site was settled in 1726 and set off from Sheffield and incorporated in 1761. It was probably named for the 2nd Viscount Barrington, a nephew of the Massachusetts Bay Colony's governor, Samuel Shute. In August 1744 the townspeople openly opposed the British by barring court sessions. The colonial home of the poet William Cullen Bryant (who was town clerk in 1815–25) and the Colonel Ashley (1735) and Henderson (1739) houses are preserved in Great Barrington, and W.E.B. Dubois (1868–1963), the black sociologist and author, was born in the town. Simon's Rock Early College was founded there in 1964. The town is a service centre for nearby resort areas including Butternut Basin, Otis Ridge, and Catamount (winter sports) and Beartown State Forest. Pop. (1984 est.) 7,314.

Great Basin, distinctive natural feature of western North America, equally divided into rugged, north–south-trending mountain blocks and broad intervening valleys. It covers an arid expanse of about 190,000 square miles (492,000 square km) and is bordered by the Sierra Nevada Range on the west, the Wasatch Mountains on the east, the Columbia Plateau on the north, and the Mojave Desert on the south. Most of the U.S. state of Nevada, the western half of Utah, and portions of other nearby states lie within its boundaries. The terms Great Basin and Great Basin Desert are sometimes used interchangeably. The Great Basin is the largest subdivision of the Basin and Range Province, a physiographic feature extending southward to include southern Arizona, southeastern and central New Mexico, the western tip of Texas, and northwestern Mexico.

The mountain ranges of the Great Basin have been likened, in an old survey report, to a group of caterpillars, all crawling irregularly northward. The ranges are from 60 to 120 miles (95 to 190 km) long and 3 to 15 miles (5 to 24 km) wide. The valleys are usually somewhat wider than the ranges and are mostly deserts, with floors 1,000 to 6,000 feet (300 to 1,800 m) above sea level. The ranges have peaks commonly reaching 9,000 feet (2,750 m) or more above sea level, and where this occurs they catch a moderate amount of precipitation and support conifer stands. The western face of the Sierra Nevada Range otherwise blocks Pacific rain-bearing winds from reaching the Great Basin; a "rain shadow" is thus formed over the entire region, which has an annual rainfall of 10 inches (254 mm) or less and supports little more than a sparse desert or semidesert vegetation.

The Great Basin is particularly noted for its internal drainage system, in which rain falling on the surface leads eventually to closed valleys and does not reach the sea. The Humboldt River of northern Nevada, for example, rises in ranges in the northeast of the state, drains a number of small valleys on its way westward, and ends in a closed basin called Humboldt Sink. The Great Salt Lake lies in the final and lowest catchment basin of western Utah and gathers much of the drainage of the region that has not evaporated or seeped underground en route.

The arid Great Basin for a long time thwarted cross-country travel to California, and hence impeded significantly the development of the western United States. Jedediah Smith (1798–1831), a great explorer of the West, made the first journey across the basin in 1824 but did not document his travels. He was followed by John C. Frémont, who surveyed an eastern swath of the Great Basin in 1846 but did not cross it. The California Gold Rush brought thousands westward in 1848 and 1849, many of them reaching Salt Lake City and then attempting alternate routes across the Great Basin. A survey made in 1867–78 produced the first federally sponsored scientific account of the climate, travel conditions, and resources of the Utah–Nevada region.

The ranges and valleys of the Great Basin may be characterized as huge blocks of the Earth's crust that have been uplifted, dropped, and tilted. Enormous cracks, or faults, bound the blocks, and the uplifted parts have been eroded over geologic time, with the debris accumulating over the depressed parts. There are about 30 major fault-bounded blocks, generally 15–30 miles (24–48 km) across, between the Wasatch range and the Sierra Nevada.

In many places volcanic rocks have been cut and displaced by the block faults, and, because the volcanic rocks are about 30,000,000 years old, the faulting is obviously younger than that. Furthermore, many of the faults exhibit fresh surfaces, indicating recent movement, while there are historical records of earthquakes and constant contemporary microearthquakes, indicating that faulting has continued to the present day.

Minerals have proved to be the greatest resource of the Great Basin. Much of the nation's gold, magnesite, barite, and mercury are produced in Nevada, which is also among the leading producers of lithium, silver, diatomite, and gemstones. Utah is the leading producer of beryllium ore and is among the leading producers of gold, silver, lead, uranium, and molybdenum.

Most of the population in Utah is located along the west base of the Wasatch Mountains focusing on Salt Lake City, with sustaining water supplies coming from streams in the mountains and also from wells tapping the great underground water reservoir trapped beneath the adjacent valley. Similarly, on the other side of the Great Basin, a good part of the population of western Nevada, centring on Reno, is found along the east front of the Sierra Nevada, which supplies most of the water for that area.

Great Basin National Park, scenic region in eastern Nevada, U.S., that was made into a national park in 1986. The area was previously part of the Humboldt National Forest. The park has an area of 76,800 acres (31,100 hectares) and consists mainly of the southern part of the Snake Mountains, a north–south-trending chain of peaks that rise abruptly from the surrounding desert floor to reach a height of 13,063 feet (3,982 m) at Wheeler Peak. The mountains receive sufficient rainfall to support forest cover, and near Wheeler Peak's summit is the southernmost permanent ice field in the United States. A principal attraction of the park is the Lehman Caves (*q.v.*), a group of impressive limestone caverns.

Great Bear, The (constellation): *see* Ursa Major.

Great Bear Lake, lake, in northern Fort Smith region and southeastern Inuvik region, Northwest Territories, Canada, lying astride the Arctic Circle. It was discovered before 1800 by North West Company traders and later named for the bears that inhabited its shores. Irregular in shape and containing many small islands, Great Bear Lake is roughly 200 miles (320 km) long and 25–110 miles (40–175 km) wide and has a maximum depth of 1,356 feet (413 m); its area of 12,028 square miles (31,153 square km) makes it the largest lake entirely within Canada and the fourth largest in North America. Its cold, clear waters abound with fish, notably the speckled trout. The localities of Echo and Sawmill bays on the eastern shore and the trading post of Fort Franklin on the west are the lake's main settlements. The 70-mile- (113-kilometre-) long Great Bear River, which drains the lake westward through marshes into the Mackenzie River, forms an important transportation link during its four ice-free months.

Great Belt, Danish STORE BÆLT, strait between the Danish islands of Fyn and Langeland (west) and Sjælland and Lolland (east). It is about 40 miles (64 km) long and connects the Baltic Sea with the Kattegat (an arm of the North Sea between Jutland [Denmark] and Sweden).

Great Bend, city, seat of Barton county, central Kansas, U.S., on the Arkansas River. Lying in the alleged locality of the mythical city of Quivira sought by Francisco Coronado in the 16th century, the site was visited by Captain Zebulon Pike in 1806 and became a stopping point on the Santa Fe Trail (1821). East of the city are the ruins of Fort Zarah (1864), from which soldiers escorted wagon trains through the dangerous stretch beyond. The community, founded in 1871, was named for the great bend in the course of the Arkansas River there. Reached by the Santa Fe Railroad in 1872, it became a shipping point for wheat, livestock, and other agricultural products. The discovery of oil in the 1930s boosted the city's growth. Wheat processing and oil refining are the chief industries. Great Bend is the site of the Central Kansas Medical Center and Barton County Community College (1965). Inc. 1872. Pop. (1987 est.) 17,500.

great blue shark: *see* blue shark.

Great Britain, also called BRITAIN, island lying off the western coast of Europe and consisting of England, Scotland, and Wales (*qq.v.*). The term is often used as a synonym for United Kingdom (*q.v.*), which also includes Northern Ireland (*q.v.*) and a number of offshore islands.

Great Britain, first Atlantic liner built of iron and having screw propulsion. It was the world's largest ship at the time of its launching (1843) and was 322 feet (98 m) long with a tonnage of 3,270. Designed by Isambard Kingdom Brunel originally as a paddle steamer and built at Bristol, it was equipped with screw machinery that was supplemented by sails on six (later five) masts. In 1884 it was damaged when rounding Cape Horn and was sold as a hulk at Port Stanley, Falkland Islands, where it was scuttled in 1937. It was later raised, restored, and put on display at Bristol, Eng.

Great Burial period (Japan): *see* Tumulus period.

Great Caucasus, also called GREATER CAUCASUS, Russian BOLSHOY KAVKAZ, major range of the Caucasus (*q.v.*) Mountains, extending about 750 miles (1,200 km) from the Taman Peninsula on the Black Sea to the Apsheron Peninsula on the Caspian Sea.

Great Chain of Being, also called CHAIN OF BEING, conception of the nature of the universe that had a pervasive influence on Western thought, particularly through the ancient Greek Neoplatonists and derivative philosophies during the European Renaissance and the 17th and early 18th centuries. The term denotes three general features of the universe: plenitude, continuity, and gradation. The principle of plenitude states that the universe is "full," exhibiting the maximal diversity of kinds of existences; everything possible (*i.e.*, not self-contradictory) is actual. The principle of continuity asserts that the universe is composed of an infinite series of forms, each of which shares with its neighbour at least one attribute. According to the principle of linear gradation, this series ranges in hierarchical order from the barest type of existence to the *ens perfectissimum,* or God.

The idea of the chain of being was first systematized by the Neoplatonist Plotinus, though the component concepts were derived from Plato and Aristotle. Plato's "idea of the good" in the *Republic,* eternal, immutable, ineffable, perfect, the universal object of desire, is fused with the demiurge of the *Timaeus,* who constructed the world of becoming because "he was good, and in one that is good no envy of anything else ever arises." Aristotle introduced a definition of the continuum and pointed out various graded scales of existence. Thus, in the words of Plotinus, in his *Enneads,* "The one is perfect because it seeks for nothing, and possesses nothing, and has need of nothing; and being perfect, it overflows, and thus its superabundance produces an Other." This generation of the many from the one must continue until all possible varieties of being in the descending series are realized.

The scale of being served Plotinus and many later writers as an explanation of the existence of evil in the sense of lack of some good. It also offered an argument for optimism; since all beings other than the *ens perfectissimum* are to some degree imperfect or evil, and since the goodness of the universe as a whole consists in its fullness, the best possible world will be one that contains the greatest possible variety of beings and so all possible evils. The notion died out in the 19th century but was given renewed currency in the 20th by Arthur O. Lovejoy (*The Great Chain of Being: A Study of the History of an Idea,* 1936).

Great Charter: *see* Magna Carta.

great circle route, the shortest course between two points on the surface of a sphere. It lies in a plane that intersects the sphere's centre and was known by mathematicians before the time of Columbus. But not until the 18th century, with improved knowledge of longitude and the prevailing and seasonal winds, did great circle sailing become widespread. The development of steamships in the 19th century allowed complete independence of the winds, removing the major uncertainty for sailors trying to follow a geometrically prescribed route.

Great circle routes, which require constantly changing headings, are most useful beyond the equatorial regions and for distances greater than several hundred miles. Long-distance air traffic uses great circle routes routinely, with great savings in time, fuel, and money.

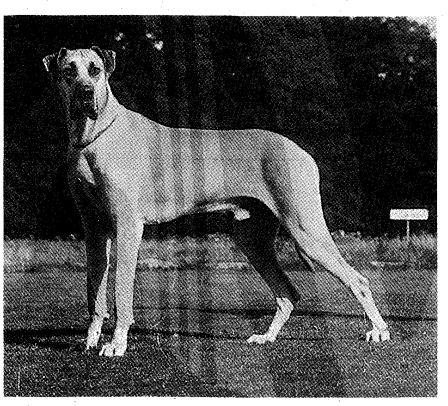
Great circle routes are usually plotted on charts based on the gnomonic projection, on which great circles appear as straight lines.

Great Commoner, the: *see* Pitt, William.

Great Condé, the: *see* Condé, Louis II de Bourbon, 4e prince de.

Great Conti, the: *see* Conti, François-Louis de Bourbon, prince de.

Great Dane, breed of working dog developed at least 400 years ago in Germany, where it was used for boar hunting. The Great Dane is typically a swift, alert dog noted for courage, friendliness, and dependability. It has a massive, square-jawed head, and body lines that give it an elegant appearance. Its short coat is black, golden brown, brindle, blue-gray, or white with black patches. The tallest of the working breeds, the Great Dane stands 28 to 32 inches (71 to 81 centimetres) and weighs 120 to 150 pounds (54 to 68 kilograms). Its name was derived from one of its French names, Grand Danois (Big Danish), although and there is no known reason to associate Denmark with the history or origin of the breed.



Great Dane

Sally Anne Thompson—EB Inc.

Great Depression, economic slump in North America, Europe, and other industrialized areas of the world that began in 1929 and lasted until about 1939. It followed the U.S. economic boom of the 1920s, which ended in the stock market crash of October 1929. A long decline in economic activity ensued, until in 1932 one out of every four U.S. workers was unemployed. The Depression at once affected the European economy, rendering jobless millions of workers in Germany, Great Britain, and other industrial countries. By 1932 the total value of world trade had fallen by more than half as country after country abandoned the gold standard and took measures against the importation of foreign goods. The Depression had important consequences in the political sphere, strengthening extremist forces and lowering the prestige of liberal democracy. In the countries that did not succumb to totalitarianism in the 1930s, mass unemployment and economic stagnation persisted until the outbreak of World War II in 1939, which, with its demand for men and munitions and its spur to technological advance, opened a new economic era.

Great Dionysia, also called CITY DIONYSIA, ancient dramatic festival in which tragedy, comedy, and satyric drama originated; it was held in Athens in March in honour of Dionysus, the god of wine. Tragedy of some form, probably chiefly the chanting of choral lyrics, was introduced by the tyrant Peisistratus when he refounded the festival (534/531 BC), but the earliest tragedy that survives, Aeschylus' *Persai,* dates from 472.

The festivals were attended by all Athenian citizens and visitors from throughout Greece. In the tragic competition, each of three tragic poets wrote, produced, and probably acted in three tragedies on a single theme. He also presented a satyr play, which treated some heroic subject in burlesque fashion. Judges, chosen by lot, awarded a prize to the best poet. In comedy, introduced in 486, five poets competed for the prize, each with one play. The satyr play was always the work of a tragic poet, and the same poet never wrote both tragedies and comedies. In 440 comedy was also introduced into the Lenaea, the minor festival of Dionysus held in January, and tragedy was added 10 years later.

Great Dismal Swamp (U.S.): *see* Dismal Swamp.

Great Dissenter, the (jurist): *see* Holmes, Oliver Wendell, Jr.

Great Dividing Range, also called GREAT DIVIDE, EASTERN HIGHLANDS, or EASTERN CORDILLERA, main watershed of eastern Australia; it comprises a series of plateaus and mountain ranges roughly paralleling the coasts of Queensland, New South Wales, and Victoria for 2,300 mi (3,700 km). Geologically and topographically complex, the range begins in the north at the base of Cape York Peninsula, Queensland. Within that state their average elevation is 2,000–3,000 ft (600–900 m), but they rise as high as 5,000 ft in the Bellenden Ker and McPherson ranges and the Lamington Plateau. Farther south the highlands average 3,000 ft; a segment known as the Australian Alps (*q.v.*), near the New South Wales–Victoria border, contains Australia's loftiest peak, Mt. Kosciusko (7,310 ft). They finally bend westward in Victoria to terminate in the Grampians, while a southern spur emerges from the Bass Strait to form the central uplands of insular Tasmania.

The headwaters of many of Australia's major rivers are in the Great Dividing Range; the Snowy River flows down the steep eastern slope, while the Darling, Lachlan, Murrumbidgee, and Goulburn rivers drain the gentle western slope to form the Murray River. The divide between the slopes is often indeterminate and in places is bifurcated by small interior drainage basins, such as Lake George.

The range was traversed in 1813 by Gregory Blaxland, William Charles Wentworth, and William Lawson. This initial reconnaissance marked the beginning of European migration, previously inhibited by the highlands, from the east coast into the Australian interior, or "outback." The region is now important for agriculture (grazing, mixed farming, fruit growing), lumbering, and mining. The rivers supply large irrigation and hydroelectric schemes, while national parks and ski areas attract tourists.

Great Drought, climatic interval of the Holocene Epoch (the Holocene began about 10,000 years ago and continues to the present). The Great Drought, dated by tree-ring studies, affected much of what is now the western U.S. from present Oregon to southern California to eastern Texas and had a profound influence upon the plants, animals, and American Indian cultures of the time.

The period of drought began about 1276 and continued to about 1299. Many urbanized centres of Indian culture in the Southwest were abandoned, never to be reoccupied. Major movements of people out of the drought-stricken areas occurred; much movement of other people in areas not so affected resulted from the intense competition for limited resources. The stability of many areas was upset as man competed with man.

The Great Drought was but one of several major periods of drought that affected the same region in the relatively recent past. Other periods of drought that have been identified are the Fairbank Drought of 500 BC, and the Whitewater Drought of AD 300. These dates are compatible with the dates of the major upheavals in human populations of the New World, evident all the way to Central America.

Great Dunmow, also called DUNMOW, parish, Uttlesford district, county of Essex, England, on the River Chelmer. Together with the neighbouring parish of Little Dunmow, it has been known historically simply as Dunmow.

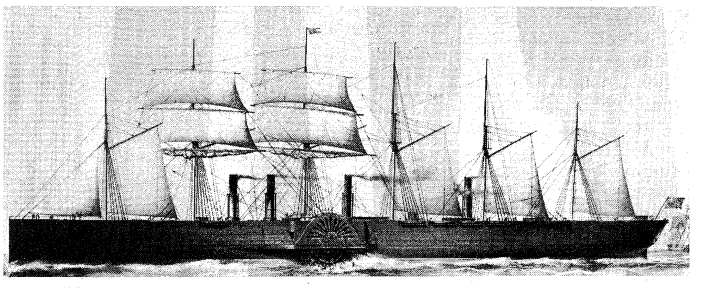
In 1570 Flemish refugees introduced the manufacture of bays and says, types of woollen cloth, but the industry was killed by the Industrial Revolution. Lionel Lukin (1742–1834), inventor of the lifeboat, carried out his experiments on Doctor's Pond in Dunmow.

The ceremony of the "Dunmow Flitch" originated there when Fitzwalter, lord of the manor, offered a flitch (side) of bacon to the man who had not repented of his marriage for a year and a day. References to the award appear in such early sources as *Piers Plowman* and the works of Chaucer, but the first record is a document in the British Museum, which refers to the winners of 1445, 1467, and 1510. The ceremony is now carried out in Great Dunmow. Pop. (1971) 4,529.

Great Dyke, narrow series of long, low ridges and hills in Zimbabwe, southern Africa, trend-

ing for about 320 mi (515 km). Consisting of four igneous complexes, they increase in height northward to about 1,500 ft (460 m) above the plateau surface in the Umvukwe Range, west of Harare (formerly Salisbury), the Zimbabwean capital. Minerals found in the Great Dyke include gold, silver, chromium, platinum, and nickel. Mica, asbestos, and tin are also extracted, as are minerals useful in construction.

Great Eastern, steamship considered the prototype of the modern ocean liner. Designed by I.K. Brunel and J. Scott Russell for the Eastern Navigation Company to carry cargo and passengers between England and India, at the time of her launching (1858) she was the largest ship in the world, displacing 18,914 tons and measuring 692 feet or 211 metres. She had a projected speed of 14½ knots (27 kilometres per hour) and alternate methods of propulsion: two paddle engines, two screw engines, and sails rigged on six masts. Before launching, the vessel passed to the Great Ship Company, which put her on a New York trade route. The huge cargo holds never were filled to capacity, and in 1864, after years of deficit operation, the ship was sold to the Great Eastern Steamship Company, which used her as a cable vessel until 1874; it was during this time that she laid the first successful transatlantic telegraph cable. Cable laying was interrupted in 1867, when she made a voyage from Liverpool to New York to attract U.S. visitors to the Paris Exhibition. Jules Verne was on this passage and wrote about the ship in his novel *Une Ville flottante* (1874; *The Floating City*, 1876). She was broken up in 1889.



The "Great Eastern," lithograph by T.G. Dutton
By courtesy of the Science Museum, London

Great Elector, the, German DER GROSSE KURFÜRST: *see* Frederick William *under* Frederick William (Brandenburg).

Great Escarpment, plateau edge of southern Africa separating the region's highland interior plateau from the fairly narrow coastal strip. It lies predominantly within South Africa and Lesotho, but extends northeastward into eastern Zimbabwe (where it separates much of that country from Mozambique) and northwestward into South West Africa/Namibia and Angola (where it separates the central plateaus of those countries from their arid coastal plains). The Great Escarpment has generally been formed by the headwater erosion of rivers of the coastal plain. The escarpment is sharply defined or rather indistinct depending on whether the plateau edge rocks are hard-overlying-soft or are of undifferentiated hardness. The boldest part of the escarpment is in a section of the Drakensberg along the border of Lesotho and Natal, South Africa, where basalt lavas distinctly overlie soft sandstones.

Great Falls, city, seat (1887) of Cascade County, west central Montana, U.S., on the Missouri River, near the falls (96 ft [29 m] high) for which it was named. In 1805 the explorers Meriwether Lewis and William Clark observed the falls and nearby Giant Springs, one of the world's largest freshwater springs. First settled in 1883, the community was sustained with the arrival in 1887 of the Manitoba Railway. Great Falls has since become the state's second largest city and a financial, distributing, manufacturing, and agricultural centre (based largely on local mineral resources, wheat, and livestock). Copper, zinc, and aluminum are processed, and flour is milled. Malmstrom Air Force Base, nearby, is the site of an intercontinental ballistic missile (ICBM) installation.

Institutions include the College of Great Falls (Roman Catholic; founded 1932), the Montana School for the Deaf and Blind, and a state rehabilitation centre for physically handicapped children. The studio and house of Western artist Charles M. Russell are preserved with exhibits of his works. Great Falls is the headquarters of the Lewis and Clark National Forest and has a considerable tourist trade. It is the site of the annual state fair and rodeo. Inc. 1888. Pop. (1980) city, 56,725; metropolitan area (SMSA), 66,256.

Great Fire of London (Sept. 2–5, 1666), worst fire in London's history; it destroyed a large part of the City of London, including most of the civic buildings, old St. Paul's Cathedral, 87 parish churches, and about 13,000 houses.

On Monday, Sept. 2, 1666, the fire began accidentally in the house of the king's baker in Pudding Lane near London Bridge. A violent east wind encouraged the flames, which raged during the whole of Monday and part of Tuesday. On Wednesday the fire slackened; on Thursday it was extinguished, but on the evening of that day the flames again burst forth at the Temple. Some houses were at once blown up by gunpowder, and thus the fire was finally mastered. Many interesting details of the fire are given in Samuel Pepys's *Diary*. The river swarmed with vessels filled with persons carrying away as many of their goods as they were able to save. Some fled to the hills of Hampstead and Highgate, but Moorfields was the chief resort of the houseless Londoner.

Within a few days of the fire three different plans were presented to the king for the rebuilding of the city, by Christopher Wren, John Evelyn, and Robert Hooke; but none of these plans to regularize the streets was adopted, and in consequence the old lines were in almost every case retained. Nevertheless, Wren's great work was the erection of the cathedral of St. Paul's and the many churches ranged around it as satellites. Hooke's task was the humbler one of arranging as city surveyor for the building of the houses.

Great Fish River, Afrikaans GROOT-VIS, river important in the agricultural economy of the Cape Midlands, Cape Province, South Africa, with a length of 430 mi (692 km) and a drainage area of 11,900 sq mi (30,800 sq km). Its main northern tributary, the Great Brak River, rises in the 7,000-ft (2,100-m)-high mountains 30 mi south of the Orange River and northeast of Middelburg. The Tarka River, coming from the northeast and the Baviaans and Kat rivers farther south are the main eastern tributaries. The direction of the Great Fish River is mainly southward; however, about halfway along its course it turns east and joins with the Koonap River before entering the Indian Ocean 37 mi southeast of Grahamstown.

It was called the Rio de Infante by the Portuguese and the Oub (Fish) by the Hottentots. The Nguni peoples had settled as far south as the Great Fish River by AD 1500. In the early 19th century the lower Great Fish valley formed a battle zone between mostly British settlers moving east from the Cape and tribal settlements to the northeast. Today the river forms the southwestern boundary of the Ciskei region (since 1981, the Republic of Ciskei).

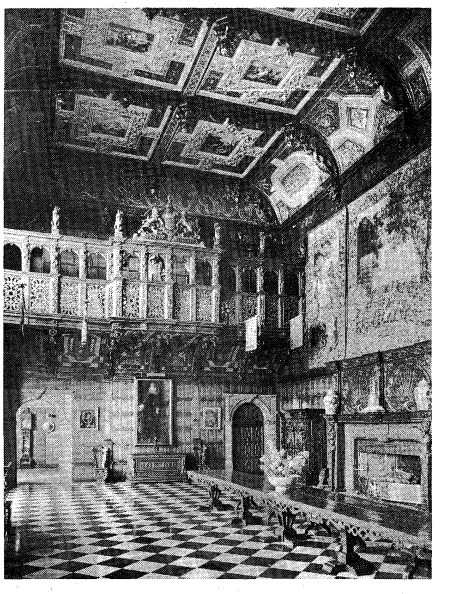
The runoff of the Great Fish River is small and erratic, but there is irrigation development along its course. A vast irrigation scheme begun in 1968 to transfer water from the Orange River basin to the Great Fish River basin had been partially implemented in 1980 with the construction of a 51-mi-long (the world's longest) water tunnel from the Hendrik Verwoerd Dam.

Great Geysir (Iceland): *see* Geysir.

Great Glen of Albin, also called GREAT GLEN (Scotland): *see* Glen More nan Albin.

Great Grimsby, formerly GRIMSBY, district, county of Humberside, England, covering an area of 11 sq mi (28 sq km). Important as a medieval market town near a small harbour 6 mi (10 km) from the North Sea, Grimsby failed to develop as a port until 1800, when the diversion of the small River Freshney into a dock north of the town solved the problem of silting and Grimsby became a fishing port. Railway access in the mid-19th century stimulated further growth beyond the foreshore of docks nearer the channel. Fish landings in the early 1980s exceeded those at Kingston upon Hull. Foodstuffs, timber, and iron and steel are the main imports; chemicals, fertilizer, and steel the major exports of the commercial docks. Grimsby is also an important service centre, providing the main shopping and educational facilities for a large area of South Humberside. Pop. (1982 est.) 92,200.

great hall, main apartment in a medieval manor house, monastery, or college, in which meals were taken. In large manor houses it also served other purposes: justice was administered there, entertainments given, and often



The great hall of Hatfield House, Hertfordshire, England, 1607–11
A.F. Kersting

at night the floor was strewn with rushes so that many of the servants could sleep there.

Great Himalayas, also called HIGHER HIMALAYAS, highest and northernmost section of the Himalayan mountain ranges, extending southeastward across north Pakistan, north India, Nepal, Sikkim (India), and Bhutan and into southern Tibet (China). The range has an average height of more than 20,000 feet (6,100 m).

Great Hungarian Plain (Europe): *see* Great Alfold.

Great Indian Desert: *see* Thar Desert.

Great John L., The (boxer): *see* Sullivan, John L(awrence).

Great Karroo, also spelled GREAT KAROO, Afrikaans GROOT KARROO, also called CENTRAL KARROO, plateau basin in Cape Province, South Africa, lying between the Great Escarpment (north) and the Swartberg (south). It represents the effect of headwater erosion by rivers flowing southwest and southeast from the escarpment. The Great Karroo is divided into a western basin and a much larger eastern basin. The western, which is the headwater basin for the Doring River, is about 140 miles (225 km) north to south and about 50 miles (80 km) wide. The eastern basin contains the headwaters of the Buffels, Dwyka, Gamka, Groot, and Sondags rivers; it is about 300 miles (480 km) long, its width decreasing westward from 80 to 50 miles (130 to 80 km), and is rugged in the north and flat in the south. The low annual rainfall (ranging from 16 inches [400 mm] in the east to 4 inches [100 mm] in the west) and the fauna are typical of arid, semidesert regions. A grazing area, especially for sheep and goats, the basin is fertile where irrigated along the stream courses. Grains and fruit are the chief crops. Principal towns are Graaff-Reinet, Beaufort West, and Aberdeen.

Great Kei River, Afrikaans GROOT-KEI, river, southeastern Cape Province, South Africa, and Transkei. Formed southeast of Queenstown by the junction of the White Kei (Wit Kei) and the Black Kei (Swart Kei) rivers, it flows approximately 140 miles (225 km) southeast to the Indian Ocean. Its longest tributary is the Tsomo (north). The river and its headwaters follow winding courses. The Great Kei marks the southern boundary of the independent republic of Transkei.

Great Lake, largest natural freshwater lake in Australia, lying on Tasmania's Central Plateau at an elevation of 3,398 feet (1,036 m). It has an area of 61 square miles (158 square km), measures 14 miles (22 km) by 7 miles (11 km), and fills a shallow depression averaging 40 feet (12 m) in depth. The lake's original catchment basin of 150 square miles (390 square km) has been expanded to 400 square miles (1,040 square km) by the building of several dams, including the Miena on the Shannon River at its southern outlet. The Great Lake is one of several storage reservoirs in Tasmania harnessed for hydroelectric development. In addition, it provides summer pasture, excellent trout fishing (with a hatchery established in 1864), and other activities for tourists who come from Hobart (65 miles [105 km] southeast) via the Lake Highway.

Great Lakes, chain of lakes in east-central North America comprising Lakes Superior, Michigan, Huron, Erie, and Ontario.

The following article summarizes information about the Great Lakes; for full treatment, *see* MACROPAEDIA: North America.

The Great Lakes form a natural boundary between the United States and Canada and cover an area of 94,560 square miles (245,000 square km), constituting the largest freshwater surface in the world. Their drainage basin of 291,100 square miles (754,000 square km) extends approximately 690 miles (1,110 km) from north to south and about 860 miles (1,400 km) from Lake Superior in the west to Lake Ontario in the east. The lakes drain roughly from west to east, emptying into the Atlantic Ocean. Except for Lakes Michigan and Huron, their elevations drop with each lake, usually causing a progressively increasing rate of flow.

Lake Superior, bordered by the Canadian province of Ontario and the U.S. states of Minnesota, Wisconsin, and upper Michigan, is the northernmost and westernmost lake and can be considered the headwater of the system. It is the second largest lake in the world (after the Caspian Sea) and the largest and deepest of the Great Lakes (mean depth 487 feet [148 m]). It lies at an elevation of 600 feet (183 m) above sea level and discharges into Lake Huron through the St. Marys River at an average rate of 74,200 cubic feet (2,100 cubic m) per sec.

Lake Michigan lies directly south of Lake Superior and is bordered by upper and lower Michigan, Wisconsin, Illinois, and Indiana. The average water level is 579 feet (176 m) above sea level, and its waters flow northward into Lake Huron through the Straits of Mackinac at 56,000 cubic feet (1,590 cubic m) per sec.

Lake Huron, which is bounded by Ontario and Michigan, lies at the same elevation as and is slightly larger than Lake Michigan. The average outflow is 177,500 cubic feet (5,000 cubic m) per sec through the St. Clair River, the shallow basin of Lake St. Clair, and the Detroit River to Lake Erie.

Lake Erie is bordered by Ontario, lower Michigan, Ohio, Pennsylvania, and New York. It is the shallowest of the Great Lakes, with a mean depth of 58 feet (18 m). It lies at an elevation of 570 feet (174 m), and its waters discharge at an average flow of 194,300 cubic feet (5,500 cubic m) per sec. The course of the outflow is along the Niagara River and includes a rapid plunge over Niagara Falls before the waters reach Lake Ontario.

Lake Ontario is the smallest of the system. It lies between Ontario and New York, at an elevation of 245 feet (75 m), and discharges into the St. Lawrence River at a rate of 233,000 cubic feet (6,600 cubic m) per sec. The St. Lawrence flows for about 750 miles (1,200 km) until it empties through the Strait of Gaspé (Détroit de Gaspé) into the Gulf of St. Lawrence and the Atlantic Ocean.

The industry of the lakes region is highly diversified. Large quantities of iron ore, coal, grain, and manufactured goods are moved annually between lake ports or shipped overseas through the St. Lawrence Seaway. Among the more important industrial developments are the large steel mills in Illinois, Indiana, Ohio, and Ontario and the automobile industry centred in the Detroit, Mich., area. The lakes supply water for these and numerous other industries and for about 240 regional municipalities. Commercial fishing was once a major industry on the lakes, but the decline of the more desirable species because of pollution and other factors led to its collapse. Recovery has been slow and partial.

The value of the lakes for a broad spectrum of recreational activities is inestimable. Powerboating and sailing have become major activities. Efforts by U.S. and Canadian agencies to overcome pollution problems have made significant progress in Lakes Michigan and Erie. Experimental planting of anadromous fish species such as coho, chinook, and Atlantic salmon were successful, and a major sport fishery has developed around the salmons, lake trout, and rainbow and other true trout species. Many miles of sandy beaches stretch along the lakeshores. Government lands offer camping, picnicking, and park areas for a thriving tourist industry.

The Great Lakes are the end products of glacial activity of the Pleistocene epoch (1,600,000 to 10,000 years ago). The modern Great Lakes are situated in stream valleys that were repeatedly made larger by glacial activity. The stream valleys were also depressed by the great mass of the glacial ice over the land. Debate exists over the mechanism involved in the formation of the Great Lakes basins, however, and several alternatives have been proposed.

The present Great Lakes are the last stage of a sequence of many lakes dating back to late Pleistocene time. Evidence of these earlier, ancestral Great Lakes consists of various geomorphic features, such as abandoned shorelines, ancient lake sediments now well above the levels of the present lakes, wave-cut cliffs, ancient sandbars, and other features. In addition, abandoned stream channels are known that served as the outlets for the Great Lakes region about 10,000 years ago, when most of the glacial ice had withdrawn. Further changes were those of an adjustive nature. The history of each lake is tied to ice lobes that advanced and retreated across its basin and thus reflects a complexity of varied phases.

Great Leap Forward, the campaign undertaken by the Chinese Communists between 1958 and early 1960 to organize its vast population, especially in large-scale rural communes, to meet China's industrial and agricultural problems. The Chinese hoped to develop labour-intensive methods of industrialization, which would emphasize manpower rather than machines. Thereby, it was hoped, the country could bypass the slow, more typical process of industrialization through the gradual purchase of heavy machinery. The Great Leap Forward approach was epitomized by the development of small backyard steel furnaces in every village, which were to eliminate the necessity of building large new factories.

The promulgation of the Great Leap Forward was the result of the failure of the Soviet model of industrialization in China. The Soviet model, which emphasized the conversion of capital gained from the sale of agricultural products into heavy machinery, was inapplicable in China because, unlike the Soviet Union, it had a very dense population and no large agricultural surplus with which to accumulate capital. After intense debate, it was decided that agriculture and industry could be developed at the same time by changing people's working habits and relying on labour rather than machine-centred industrial processes. An experimental commune was established in the north-central province of Honan early in 1958, and the system soon spread throughout the country.

Under the commune system, agricultural and political decisions were decentralized, and ideological purity rather than expertise was emphasized. The peasants were organized into brigade teams, and communal kitchens were established so that women could be freed for work. The program was implemented with such haste by overzealous cadres that implements were often melted to make steel in the backyard furnaces, and many farm animals were slaughtered by discontented peasants. These errors in implementation were made worse by a series of natural disasters and the withdrawal of Soviet technical personnel.

The resulting breakdown of the Chinese economy caused the government to begin to repeal the Great Leap Forward program by early 1960. Private plots and agricultural implements were returned to the peasants, expertise began to be emphasized again, and the communal system was broken up. The failure of the Great Leap Forward produced a division among the party leaders. One group blamed the failure of the Great Leap Forward

on bureaucratic elements who they felt had been overzealous in implementing its policies. Another faction in the party took the failure of the Great Leap Forward as proof that China must rely more on expertise and material incentives in developing the economy. It was against the latter faction that Mao Tse-tung launched his Cultural Revolution in early 1966.

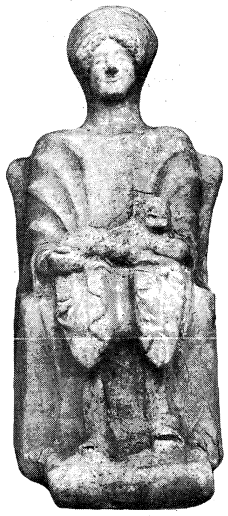
Great Miami River (Ohio, U.S.): *see* Miami River.

Great Michael, naval vessel of the carrack type, built at Leith, in Scotland, and launched in 1511. She was said to have been 240 feet (73 metres) long and 56 feet (17 metres) wide and to have carried 300 sailors, 120 gunners, and 1,000 soldiers; it is likely that all these figures are exaggerated. The "Great Michael" was sold to France in 1514.

Great Mogul diamond, the largest diamond ever found in India. It was discovered as a 787-carat rough stone in the Golconda mines in 1650 and subsequently was cut by the Venetian lapidary Hortentio Borgis. The French jewel trader Jean-Baptiste Tavernier described it in 1665 as a high-crowned rose-cut stone with a flaw at the bottom and a small speck within. Its present location is unknown, and some believe that either the Orlov diamond or the Koh-i-noor may have been cut from this stone after its loss following the assassination of its owner, Nāder Shāh, in 1747.

Great Mosque: *see under* the proper name or under the name of the city in which it is located.

Great Mother of the Gods, also called CYBELE, CYBEBE, or AGDISTIS, ancient Oriental and Greco-Roman deity, known by a variety of local names; the name Cybele or Cybebe predominates in Greek and Roman literature



Cybele, terra-cotta statuette, from Camirus, Rhodes, early 5th century BC; in the British Museum, London

By courtesy of the trustees of the British Museum

from about the 5th century BC onward. Her full official Roman name was Mater Deum Magna Idaea (Great Idaean Mother of the Gods).

Legends agree in locating the rise of the worship of the Great Mother in the general area of Phrygia in Asia Minor, and during classical times her cult centre was at Pessinus, located on the slopes of Mt. Dindymus, or Agdistis (hence her names Dindymene and Agdistis). The existence, however, of many similar non-Phrygian deities indicates that she was merely the Phrygian form of the nature deity of all Asia Minor. From Asia Minor her cult spread first to Greek territory. The Greeks always saw in the Great Mother a resemblance to their own goddess Rhea (*q.v.*) and finally identified the two completely.

During Hannibal's invasion of Italy in 204 BC, the Romans followed a Sibylline prophecy that the enemy could be expelled and conquered if the "Idaean Mother" were brought to Rome, together with her sacred symbol, a small stone reputed to have fallen from the heavens. Her identification by the Romans with the goddesses Maia, Ops, Rhea, Tellus, and Ceres contributed to the establishment of her worship on a firm footing. By the end of the republic it had attained prominence, and under the empire it became one of the most important cults in the Roman world.

In all of her aspects, Roman, Greek, and Oriental, the Great Mother was characterized by essentially the same qualities. Most prominent among them was her universal motherhood. She was the great parent not only of gods but also of human beings and beasts. She was called the Mountain Mother, and special emphasis was placed on her maternity over wild nature; this was manifested by the orgiastic character of her worship. Her mythical attendants, the Corybantes (*q.v.*), were wild, half-demonic beings. Her priests, the *galli* (*q.v.*), castrated themselves on entering her service. The self-mutilation was justified by the myth that her lover, the fertility god Attis (*q.v.*), had emasculated himself under a pine tree, where he bled to death. At Cybele's annual festival (March 15–27), a pine tree was cut and brought to her shrine, where it was honoured as a god and adorned with violets considered to have sprung from the blood of Attis. On March 24, the "Day of Blood," her chief priest, the *archigallus*, drew blood from his arms and offered it to her to the music of cymbals, drums, and flutes, while the lower clergy whirled madly and slashed themselves to bespatter the altar and the sacred pine with their blood. On March 27 the silver statue of the goddess, with the sacred stone set in its head, was borne in procession and bathed in the Almo, a tributary of the Tiber River.

Cybele's ecstatic rites were at home and fully comprehensible in Asia, but they were too frenzied for Europeans farther west. Roman citizens were at first forbidden to take part in the ceremonies—a ban that was not removed until the time of the empire. Though her cult sometimes existed by itself, in its fully developed state the worship of the Great Mother was accompanied by that of Attis.

The Great Mother was especially prominent in the art of the empire. She usually appears with mural crown and veil, seated on a throne or in a chariot, and accompanied by two lions.

Mother goddess figures are found in almost every ancient religion, but these figures, who were usually only goddesses of fertility and reproduction in general, should not be confused with the Great Mother of the Gods, who was regarded as the giver of life to gods, human beings, and beasts alike.

Great Neck, village, in the town (township) of North Hempstead (*q.v.*), Nassau County, New York, U.S., on Great Neck Peninsula and the north shore of Long Island in an area of summer estates. Settled about 1644, it is known as the "Old Village" and was incorporated in 1921. F. Scott Fitzgerald once lived in Great Neck and used it and its "twin," Little Neck, as the setting for his novel *The Great Gatsby.* Nearby are the U.S. Merchant Marine Academy (1943) at Kings Point and the Saddle Rock (early 18th century) gristmill, operated by tidal flow.

Great Neck Estates and Great Neck Plaza are adjacent villages incorporated in 1911 and 1930. Pop. (1980) 9,168.

Great Northern Expedition (1733–42), in Russian history, the continuation of an enterprise initially conceived by the emperor Peter I the Great to map the northern sea route to the East. The expedition mapped a large section of the Arctic coast of Siberia and stimulated Siberian merchants to develop fur trading on islands near Alaska. Sponsored by the admiralty college in St. Petersburg, the planner of the expedition, Capt. Vitus Bering, a Dane serving in the Russian navy, crossed the North Pacific and landed on the coast of Alaska (1741). Captain A.I. Chirikov, commanding another ship in the expedition, reached some islands off the Alaskan coast; Lieut. S.I. Chelyuskin reached the cape named after him, the northernmost point of the Siberian mainland, and the cousins Khariton and Dmitry Laptev charted the Siberian coast from the Taymyr Peninsula to the Kolyma River.

Great Northern Railway Company, U.S. railroad founded by James J. Hill in 1890. It developed out of a struggling Minnesota railroad, the St. Paul and Pacific Railroad, which Hill and three associates purchased in 1878.

Hill was a Minnesota coal and freight merchant who knew the north country well and believed he could build the decaying SP&P into a great railroad. He extended it north to the Canadian border to link up with a Canadian line to Winnipeg, and then westward through the Dakotas and Montana, reaching Great Falls in 1887 and the Pacific coast at Everett, Wash., in 1893. Hill induced thousands of homesteaders, mostly from Scandinavia, to settle along his tracks as he built them westward. In 1890 the system's name was changed to the Great Northern.

To supply cargo for his railroad, Hill developed export markets in the Orient for American cotton, flour, and metals. Eastbound, the road carried lumber from the Pacific Northwest to the midwestern prairies. Together with J.P. Morgan of the Northern Pacific Railway Company (*q.v.*), Hill bought control of the Chicago, Burlington & Quincy Railroad Company (*q.v.*) in 1901. This gave both railroads a link to Chicago, St. Louis, and the cotton-hauling railroads of the South.

In the same year, Hill set up the Northern Securities Company, a holding company to control the three railroads, with himself as president. The U.S. Supreme Court declared it in violation of the Sherman Anti-Trust Act in 1904, and ordered the company dissolved. The Burlington continued under control of the Great Northern and the Northern Pacific, however, and in 1970 the three companies were merged as the Burlington Northern, Inc. (*q.v.*).

Great Northern War (1700–21): *see* Northern War, Second.

Great Oolite Series, division of Middle Jurassic rocks in Great Britain. (The Jurassic Period began about 190,000,000 years ago and lasted about 54,000,000 years.) The series consists of blue-gray clays, both oolitic and non-oolitic limestones, and sandstones. (Oolites are small, rounded particles of calcium carbonate.) The blue-gray clays, collectively known as fuller's earth, are nonplastic, have remarkable absorptive properties, and are economically important for use in removing fats and oils from wool. Except for a few fossilized oysters, the clay is barren of fossils. The sandstone, known as the Stonesfield Slate because of its tendency to split into thin slabs, is very micaceous and calcareous; it contains the remains of plants, insects, turtles, flying reptiles, crocodiles, and dinosaurs as well as the fragmentary remains of primitive Jurassic mammals. The Great Oolite Limestone contains the remains of Jurassic ammonites (fossil mollusks). Together with the overlying Lower Cornbrash Limestone, the Great Oolite Series forms the Bathonian Stage, a division of Jurassic rocks and time.

Great Ouse (England): *see* Ouse, River.

Great Paschal period (calendars): *see* Dionysian period.

Great Plague of London, epidemic of plague that ravaged London from late 1664 to early 1666, killing perhaps more than 75,000 of a total population estimated at 460,000.

The Great Plague was not an isolated event; 40,000 Londoners had died of the plague in 1625; but it was the last and worst of the epidemics. It began in the late autumn of 1664 in London's suburb of St. Giles-in-the-Fields, and the greatest devastation remained in the city's outskirts, at Stepney, Shoreditch, Clerkenwell, Cripplegate, and Westminster, quarters where the poor were densely crowded. The epidemic was severe in the winter and revived and spread again in May 1665. The king and court fled from London in June and did not return until the following February; Parliament kept a short session at Oxford. The total number of deaths from plague in 1665, according to the bills of mortality, was 68,596; but this number is probably an underestimate, since many of the 6,432 deaths attributed to spotted fever were really caused by plague.

In December 1665 the mortality rate fell suddenly and continued down through the winter; in 1666 only 2,000 deaths were recorded. From London the disease spread widely over the country, but from 1667 on there was no epidemic of plague in any part of England, though sporadic cases appeared in bills of mortality up to 1679. This disappearance of plague from London has been attributed to the Great Fire in September 1666, but it also subsided in other cities without such cause. The decline has also been ascribed to quarantine, but effective quarantine was actually not established until 1720. The cessation of plague in England must be regarded as spontaneous. Daniel Defoe's vivid narrative in his *Journal of the Plague Year* (1722) is valuable as a picture of the time.

Great Plains, also called GREAT AMERICAN DESERT, major North American physiographic province, stretching from the Rio Grande at the U.S.–Mexico border in the south to the McKenzie River delta along the Arctic Ocean coastline in the north and from the escarpments terminating the Central Lowlands and the Canadian Shield in the east to the Rocky Mountains in the west. The plains embrace parts of 10 U.S. states and the 3 Prairie Provinces and portions of the Northwest Territories of Canada.

The following article summarizes information about the Great Plains; for full details, *see* MACROPAEDIA: North America.

Varying in east–west width from 300 to 700 mi (500 to 1,100 km), the Great Plains cover an area of about 1,125,000 sq mi (2,900,000 sq km), roughly equivalent to one-third the area of the United States. The Rocky Mountains define the western boundary for their entire 3,000-mi north–south extension. In the United States their eastern boundary is formed by an eastward facing escarpment that runs from Texas to North Dakota, generally somewhat eastward of the 100th meridian. In the Canadian portion the line dividing the Great Plains from the Canadian Shield cuts through Lake Winnipeg in the south before curving northwestward through Lake Athabasca, Great Slave Lake, and Great Bear Lake.

The Great Plains are a vast high plateau of semiarid grassland. Their elevation at the base of the Rockies in the United States is between 5,000 and 6,000 ft above sea level; this decreases gradually to 1,500 ft at their eastern boundary. The elevations of the Canadian portion are lower, and near the Arctic Ocean the surface is only slightly above sea level.

Much of the plains area consists of gently tilted shale, limestone, and sandstone discontinuously mantled by glacial deposits (in the north) and by loess and alluvial deposits. Although the plains are generally pictured as flat to rolling, conspicuous land forms characterize some of their parts; among these are the Black Hills of South Dakota and Wyoming and the Badlands of South Dakota. Over much of the Great Plains' expanse, cold winters and warm summers prevail, with low precipitation and humidity, much wind, and sudden variations of temperature. The prairie regions in both the United States and Canada produce the major proportion of the wheat grown in each country and are also important cattle- and sheep-herding areas. Until recently the cultivation of the Great Plains' vast stretches of arable land was at the mercy of scanty (often less than 15 in. [375 mm] annually) and undependable rainfall. Irrigation in the United States, tapping the region's widespread aquifers, has temporarily freed agriculture from the vagaries of a dry climate. Parts of the plains have considerable reserves of coal and lignite, petroleum, and natural gas.

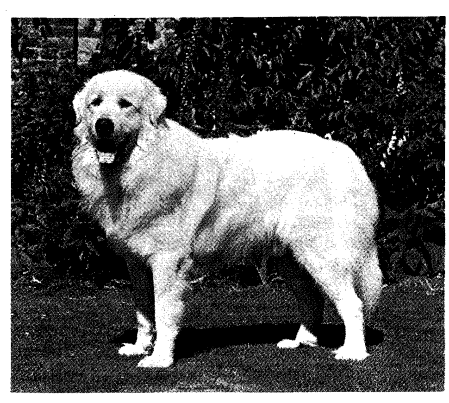
Great Poland Lakeland, Polish POJEZIERZE WIELKOPOLSKIE, lake district, west central Poland, covering more than 20,000 sq mi (55,000 sq km). It crosses the provinces of Zielona Góra, Gorzów, Piła, Poznań, Bydgoszcz, Toruń, and Włocławek. The district is a north- to south-trending valley that lies between the middle Oder and middle Vistula rivers. The area once lay under the Scandinavian ice sheet during its farthest advance to the south. Depressions originally formed in the region's moraines by glacial meltwater during that time have filled with upland water to form lakes, which now extend on both sides of the lower Vistula River.

The lakeland is strewn with rocks deposited by the advance of the ice sheet and is also covered with thick layers of loess (wind-blown soil). In many respects the soils of the lake-dotted area are similar in composition to the soils of the agricultural plains of central Europe. The lakeland is mostly wooded (beech, birch, Polish larch); only the eastern part has a developed agriculture, wheat being the major crop there. The area is thinly populated; what few large settlements there are can be found in the river valleys. Poznań is the main urban centre of the lakeland.

Great Proletarian Cultural Revolution (China): *see* Cultural Revolution.

Great Purge: *see* purge trials.

Great Pyrenees, also called PYRENEAN MOUNTAIN DOG, large working dog, probably of Asian origin, that appeared in Europe between 1800 to 1000 BC. The court favourite of 17th-century France, the Great Pyrenees was originally used in the Pyrenees Mountains to guard flocks of sheep from wolves and bears. It is noted as a guard and watchdog and has been used to pull carts and, during World War I, to carry contraband goods between France and Spain. A massive dog with drooping ears and a characteristic rolling gait, the Great Pyrenees stands 25 to 32 inches (63.5 to 81 centimetres) and weighs 90 to 125 pounds (41 to 57 kilograms). Its thick, long coat is white or white with gray or brown markings.



Great Pyrenees

Sally Anne Thompson—EB Inc.

Great Rebellion: *see* English Civil Wars.

Great Red Spot, atmospheric feature on the planet Jupiter that moves in longitude but remains centred at about latitude 23° S. It is oval-shaped, with a variable east–west dimension that is about twice the north–south one. The north–south extent is approximately 14,000 kilometres (8,700 miles), or about one-fifth of Jupiter's radius, and thus is about equal to the diameter of the Earth. The Great Red Spot was discovered in 1665 by the French astronomer Gian Domenico Cassini with the aid of one of the earliest telescopes, and it has existed at least since that time. Its colour varies from brick red to brownish and may blend indistinguishably into the colouring of the other cloud belts; the colour also tends to change over a period of years.

Dynamically, the Great Red Spot is an anticyclonic circulation system—*i.e.,* a high-pressure centre. Scientific instruments carried by the U.S. Voyager 1 and 2 spacecraft revealed in 1979 that individual patches of cloud rotate around the spot. It takes about six Earth days to complete one circulation, which corresponds to a wind speed on the order of 80 metres per second (180 miles per hour). Many smaller spots on Jupiter appear to be dynamically similar to the Great Red Spot, though their circulation is weaker and their colour is usually white instead of red. The cause of the red coloration is unknown. It seems probable that the strong circulation draws certain trace-chemical constituents from deep within the planet. These could contaminate the cloud particles, which consist primarily of ammonia crystals. Sulfur is relatively abundant and could possibly contribute to the red coloration, as it does on the surface of Jupiter's satellite Io.

The Great Red Spot is not anchored to any solid surface feature, because Jupiter is fluid throughout except for a small core representing about 20 percent of the planet's radius. In effect, the spot and its smaller counterparts are free atmospheric eddies that sustain themselves for long periods of time in the face of dissipative processes. In this respect, they resemble certain special fluid-dynamical configurations (*e.g.,* vortices or solitons) that exhibit long-term stability. The details, however, are not understood for the Great Red Spot.

Great Reformation of the Taika Era (Japan): *see* Taika era reforms.

Great Republic, American clipper ship designed and built by Donald McKay (*q.v.*). At 4,555 tons displacement and 325 feet long, it was for 17 years the largest merchant vessel afloat and also one of the fastest. It was originally towed from its shipyard in East Boston to New York City in preparation for its maiden voyage, but there, at Christmas 1853, a disastrous fire consumed its fourth deck. The ship was then bought by Capt. Nathaniel B. Palmer, repaired, and rigged in a style more conservative than McKay's original plan. Its best day's run was 413 miles.

Great Rift, in astronomy, a complex of dark nebulae that seems to divide the bright clouds of the Milky Way Galaxy lengthwise through about one-third of their extent. From the constellation Cygnus, the rift reaches through Aquila and Sagittarius, where the centre of the Galaxy lies hidden behind it, to Centaurus. The clouds of dark material making up the Great Rift are several thousand light-years from the Earth.

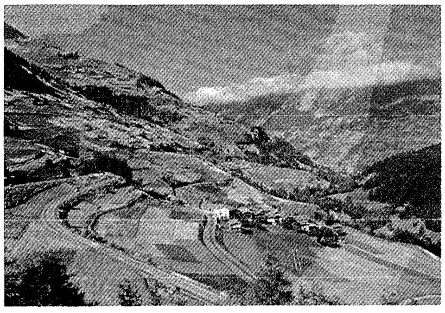
Great Rift Valley (Africa): *see* East African Rift Valley.

Great Rock of Italy (mountains): *see* Gran Sasso d'Italia.

Great Rolls of the Exchequer (English records): *see* Pipe Rolls.

Great Rye Island, Slovak VEĽKÝ ŽITNÝ OSTROV, island, Západoslovenský *kraj* (region), Czechoslovakia. The island lies southeast of Bratislava, between the Little Danube and Váh rivers to the north and the Danube to the south. It is composed of rich alluvial sediments deposited by the Danube in the Little Alföld, which is a plain shared by Hungary and Czechoslovakia. Like Little Schütt Island (Szigetköz) on the Hungarian side of the Danube, Great Rye Island is extensively cultivated in grains, mostly wheat and rye, and is canalized to facilitate this in its eastern end northwest of Komárno.

Great Saint Bernard Pass, Italian COLLE DEL GRAN SAN BERNARDO, French COL DU GRAND-SAINT-BERNARD, one of the highest (8,100 feet [2,469 m]) of the Alpine frontier passes, lying on the Italian-Swiss border east of the Mont Blanc group in the southwestern Pennine Alps. The pass connects Martigny-Ville, Switz. (24 miles [39 km] north-northwest), in the Rhône River valley, with Aosta, Italy (21 miles [34 km] southeast).



Great St. Bernard Pass through the Pennine Alps
Hans Huber

A road through the pass was not mentioned until AD 69, when the military arrangement of the Roman province of Germania rendered its construction desirable. Remains of this road, about 12 feet (3.7 m) in width, are still visible, cut into the rock near the lake that lies at the summit of the pass. The temple of Jupiter Poeninus once stood on the summit. Even though the pass was open for only five months a year and was accessible only by foot, historically it was the most important trans-Alpine route and was used by Napoleon and his 40,000 troops in 1800.

A famous hospice on the pass, founded by St. Bernard in the 11th century, still provides a resting place and rescue services to travelers, though helicopter rescue and a new road have diminished the hospice's role. The old road (1823) has been partly superseded by a 3.5-mile- (5.6-kilometre-) long tunnel (completed 1964) beneath the pass, which allows travel all year long and shortens the travel time between Martigny and Aosta by an hour.

Great Salt Lake, lake in northern Utah, U.S., the largest inland body of salt water in the Western Hemisphere and one of the most saline inland bodies of water in the world. The lake is fed by the Bear, Weber, and Jordan rivers and has no outlet. The lake has fluctuated greatly in size, depending on the rates of evaporation and the flow of the rivers that feed it. Its surface area has varied from about 2,400 square miles (6,200 square km) at its highest levels in 1873 and the mid-1980s to about 950 square miles (2,460 square km) at its low level in 1963. At high level the lake's surface is 4,212 feet (1,284 m) above sea level, and at low level it is 4,191 feet (1,277 m). At times of median water level, the lake is generally less than 15 feet (4.5 m) deep, with a maximum depth of 35 feet.

Like the Dead Sea, the Great Salt Lake exists within an arid environment and has chemical characteristics similar to that of the oceans. It has a much greater salinity than the oceans, however, since natural evaporation exceeds the supply of water from the rivers feeding it.

Surrounded by great stretches of sand, salt land, and marsh, the Great Salt Lake remains eerily isolated from the nearby cities, towns, and other human habitations, though in recent years means have been found to turn its apparent sterility to a profit in both economic and recreational terms. It has become important not only as a source of minerals but also as a beach and water-sports attraction and a wildlife preserve.

Geological and human history. The Great Salt Lake is the largest of the saline-lake remnants of prehistoric freshwater Lake Bonneville, the others being Bear Lake, on the Utah–Idaho border, and Utah Lake, west of Provo, Utah. Originating some 1,000,000 years ago in the Pleistocene epoch, Lake Bonneville covered almost 20,000 square miles of present-day western Utah and also extended into modern Nevada and Idaho. During succeeding glacial periods, large quantities of fresh water entered this intermontane basin and drained out through the Snake River—ultimately into the Columbia River and the Pacific Ocean. During the interglacial and postglacial periods, however, water levels decreased and the outflows were cut off. Water, thus, could escape only through evaporation, and the mineral salts from the inflowing rivers remained trapped in the lake.

The lake appeared on 18th-century maps of the continent through reports of explorer-trappers and Indian tales as a semilegendary body alternately named Timpanogos, or Buenaventura, depending on the source. The first Westerners whose accounts are fully credited were the trappers Étienne Prevost and Jim Bridger, who came upon the lake independently in 1824–25. More detailed investigations were made by Captain John C. Frémont in 1843 and 1845. The Mormons' settlement in 1847 of their "promised land," on the nearby site of Salt Lake City, brought the region more fully into national awareness. The lake was surveyed in 1850, and in 1869 the last spike of America's first transcontinental railroad was driven near the lake's northeastern shore. The study of the Great Basin region by the U.S. Geological Survey in 1890 was an important source of information about the lake, and later studies have been led by that agency.

Surface features and chemistry. The lake's basin is defined by the foothills of the Wasatch Range to the north, east, and south and by the Great Salt Lake Desert, a remnant of the bed of Lake Bonneville, to the west. The part of this desert known as the Bonneville Salt Flats has become an automobile raceway, the site of many trials for world land speed records. The lake's varying shoreline comprises beaches, marshes, and mudflats. The 30-mile- (48-kilometre-) long Lucin Cutoff, an east–west causeway laid down for a rail line in 1959, connects the cities of Ogden and Lucin, splits the lake, and affects the water level. Because the lake's main tributaries enter from the south, the water level of the southern section is several inches higher than that of the northern part. Several small islands, the largest of which are Antelope and Fremont, lie south of the cutoff. The Great Salt Lake's record high levels in the mid-1980s threatened the Lucin Cutoff, highways, and sewage-treatment plants along the shore, and in 1987 pumps were installed that began draining some of the lake's excess waters into the Great Salt Lake Desert to the west. The resulting new body of water was called West Pond.

The Bear, Weber, and Jordan rivers carry more than 1,100,000 tons of salts annually into the lake. The total mineral salt accumulation in the lake basin is 6,000,000,000 tons, mainly sodium chloride, though sulfate, magnesium, and potassium are abundant. Table salt and potash production dates from the 19th century, while magnesium production from brines was begun on a large scale only in 1971.

Natural life. The high salt content makes the lake itself uninhabitable for all but a few minor forms of life. The marshes, mudflats, and islands, however, attract much waterfowl, including pelicans, herons, cormorants, terns, and gulls, while Antelope Island has been made a refuge for the bison.

Consult the INDEX *first*

Great Sand Dunes National Monument, national monument in south-central Colorado, U.S. It is located at the eastern edge of the San Luis Valley and parallels for about 10 miles (16 km) the western base of the Sangre de Cristo Range, 25 miles (40 km) northeast of Alamosa. Established in 1932, the region (area 60 square miles [155 square km]) contains some of the highest piled inland sand dunes in the United States, with ever-changing crests that rise to 700 feet (215 m).

Great Sandy Desert, wasteland, northern Western Australia, extending from Eighty Mile Beach on the Indian Ocean eastward into Northern Territory and from Kimberley Downs southward to the tropic of Capricorn and the Gibson Desert. A vast, arid expanse of salt marshes and sand hills interlaced with *Triodia* (*Spinifex*) grass, it roughly coincides with the sedimentary Canning basin. Canning Stock Route (1,000 miles [1,600 km] long) spans the region in a northeasterly direction from Wiluna via Lake Disappointment to Halls Creek. The first European to cross the desert (east to west) was the traveler Major Peter Egerton Warburton in 1873.

Great Sandy Island (Queensland, Australia): *see* Fraser Island.

Great Sanhedrin, the supreme Jewish legislative and judicial court in Jerusalem under Roman rule. *See* Sanhedrin.

Great Scarcies River, also called KOLENTÉ RIVER, river in western Africa, rising 25 miles (40 km) north of Kindia in the Fouta Djallon highlands of western Guinea. It marks 63 miles (101 km) of the Guinea–Sierra Leone border before entering Sierra Leone to complete its 160-mile (257-kilometre) course to the Atlantic Ocean. Its lower reach (in Sierra Leone) flows through a densely populated mangrove swamp area that has been extensively cleared for rice cultivation by the Temne people. Three towns on the river—Kambia (30 miles [48 km] upstream at the head of navigation), Rokupr (site of the West African Rice Research Station), and Mambolo (site of a government rice mill)—are the chief collecting centres for the swamp rice, which is transported downstream and coastwise to Freetown by launch. The People's Republic of China, in the mid-1970s, financed two bridges to replace the ferries over the Great Scarcies and Little Scarcies rivers at Kambia and Mange. Fishing and the preparation of salt are important activities near the river mouth.

Great Schism (Christianity): *see* Western Schism.

Great Slave Lake, lake, in east-central Fort Smith region, Northwest Territories, Canada, near the Alberta border. It was named for the Slave Indians. The lake was visited in 1771 by the English explorer Samuel Hearne; it was

not completely surveyed, however, until the early 1920s. Fed by several rivers, of which the Slave is most important, and drained by the Mackenzie into the Arctic Ocean, the lake, with an area of 11,031 square miles (28,570 square km), is the fifth largest in North America. It is 300 miles (500 km) long and 30–140 miles (50–225 km) wide and has a shoreline indented by large bays, often with rocky slopes. Its waters are extremely clear and deep (maximum depth more than 2,000 feet [600 m]). The lake contains many islands and supports a fishing industry (trout and whitefish) based at the villages of Hay River and Gros Cap. The lake, linking the Mackenzie and Slave rivers, is an integral part of the Mackenzie River waterway, though ice-free for only four months.

Great Smoky Mountains, byname GREAT SMOKIES, or THE SMOKIES, western segment of the high Appalachian Mountains, U.S., lying between Asheville, western North Carolina, and Knoxville, eastern Tennessee, and blending into the Blue Ridge escarpment to the east. They are sometimes considered a division of the Unaka Mountains. The loftiest portion lies within the Great Smoky Mountains National Park and includes Clingmans Dome (6,643 feet [2,025 m]; the highest point in Tennessee) and Mounts Guyot, Chapman, Collins, LeConte, and Kephart—all more than 6,000 feet (1,830 m). The mountains form a popular resort area that includes the national park, a segment of the Appalachian Trail (for hikers), and the Blue Ridge Parkway (a motor route). A transmountain highway crosses at Newfound Gap (5,046 feet [1,538 m]).

Covered by forests, of which about 40 percent is virgin growth, the Great Smokies support an abundance of rhododendron, mountain laurel, wildflowers, and animal life. Originally the domain of the Cherokee Indians, the mountains embrace the Cherokee Indian Reservation and parts of the Pisgah and Cherokee national forests. They were explored in the mid-19th century by the geologists Thomas L. Clingman (a U.S. senator from North Carolina) and Arnold Guyot and were named for the haze characteristic of the region.

Great Smoky Mountains National Park, national park in eastern Tennessee and western North Carolina, U.S., 20 miles (32 km) wide and extending southwestward for 54 miles (87 km) from the Pigeon River to the Little Tennessee River. The park was established in 1934 to preserve the last remaining sizable area of southern primeval hardwood forest in the United States. It covers 520,269 acres (210,553 hectares) and contains some of the highest peaks in the Appalachian Mountains.

Summits and ridges are crowned with a forest of red spruce and Fraser fir except in open areas (balds), where purple- and pink-blossomed rhododendrons often appear in the early summer. Among the rushing streams on the lower slopes are such trees as hemlock, silver bell, black cherry, buckeye, yellow birch, and tulip tree; the latter sometimes attains a trunk diameter of more than 6 feet (1.8 m). Other vegetation at lower elevations includes flowering dogwood, redbud, and serviceberry; dense stands of mountain laurel, white-blossomed rhododendron, and azaleas form almost impenetrable thickets.

Important species of wildlife in the park include black bears, white-tailed deer, foxes, bobcats, raccoons, ruffed grouse, turkeys, colourful songbirds, and insectivorous birds, which predominate in the spring.

The region's first settlers established themselves in the sheltered coves and valleys of the area, and a number of their picturesque, primitive buildings are preserved in the park. Some families remain and continue to farm there. The park was designated a World Heritage Site in 1983.

Great South Beach (New York, U.S.): *see* Fire Island.

Great Soviet Encyclopedia: *see* Bolshaya Sovetskaya Entsiklopediya.

Great Train Robbery (Aug. 8, 1963), in British history, the armed robbery of £2,600,000 (mostly in used bank notes) from the Glasgow–London Royal Mail Train, near Bridego Bridge north of London. The 15 holdup men, wearing helmets, ski masks, and gloves, were aided by two accomplices—an anonymous insider who provided sensitive train-schedule and cargo information and another person who provided a country hideway, Leatherslade Farm in Buckinghamshire. The ring leader was Bruce Reynolds, a known burglar and armed robber.

The robbers stopped the train by turning off a green track signal and, with batteries, turning on a red signal. The train's fireman went to investigate and was captured, unharmed; the engineer was severely injured by a blow on the head. The robbers took about 120 mail bags by Land Rovers to their farm hideaway, where they divided the loot. Subsequently six thieves were hired to burn down the farmhouse but did such a poor job that the police found everyone's fingerprints. With this and other evidence, 12 of the 15 robbers were caught, convicted, and sent to prison (none serving more than 13 years). One, Ronnie Biggs, escaped from prison in 1965, had plastic surgery done on his face, and fled first to Paris, then to Australia, and finally to Brazil.

Great Trek, Afrikaans GROOT TREK, the emigration of some 12,000 to 14,000 Afrikaners from Cape Colony, in South Africa, between 1835 and the early 1840s, in rebellion against the policies of the British government and in search of fresh pasturelands. The Great Trek is regarded by Afrikaners as a central event of their 19th-century history and the origin of their nationhood. It enabled them to outflank the Xhosa peoples who were blocking their eastward expansion, to penetrate into Natal and the Highveld (which had been opened up by the tribal wars of the previous decade), and to carry white settlement north to the Limpopo River.

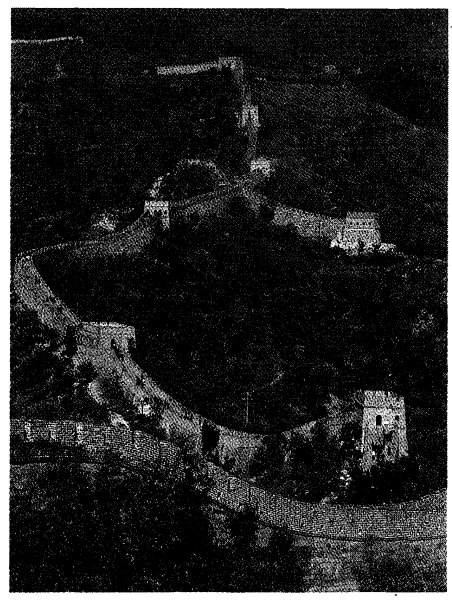
The migrating Afrikaners, called Voortrekkers (Afrikaans: "Early Migrants"), left in a series of parties of kinsfolk and neighbours, with an almost equal number of Coloured dependents, under prominent leaders. Though they all crossed the Orange River in the first instance, they were soon divided as to their ultimate destination, between those who wanted an outlet to the sea in Natal and those who wished to remain on the Highveld. In both areas, after initial setbacks, they were able to defeat powerful African military kingdoms through the skilled use of horses, guns, and defensive laagers, though in later years they were to find the problems of maintaining control over Africans and establishing stable politics more intractable.

In Natal they established a short-lived republic, but, after its annexation by the British in 1843, most rejoined their compatriots across the Drakensberg Mountains, where, apart from a short period, the British government was reluctant to pursue them. In 1852 and 1854 the British granted independence to the trekkers in the Transvaal and Transorangia regions, respectively. In Transvaal several warring little polities were established, and factional strife only ended in the 1860s. In Transorangia the trekkers established the Orange Free State, which, under the double threat posed by the Basuto (Sotho) and the proximity of imperial power, settled down in more unified fashion after the British withdrawal in 1854.

Great Victoria Desert, wasteland, Western and South Australia, between Gibson Desert on the north and Nullarbor Plain on the south and extending eastward from Kalgoorlie almost to the Stuart Range. Much of its eastern end is occupied by the Central and North West Aboriginal reserves. A vast expanse of sand hills, partly fixed by *Triodia* (*Spinifex*) grass and salt marshes, it was penetrated (from east to west) in 1875 by the explorer Ernest Giles, who named it Great Victoria Desert. Crossed by the Laverton–Warburton Mission Track (which links the mission station in the Warburton Range, in Western Australia, with Laverton, 350 miles [560 km] southwest), it is also tracked for the recovery of missiles whose trajectories are guided from the weapons-testing range that is located at Woomera. There are several national parks and reserves in the area, including the Great Victoria Desert Nature Reserve, the Nullarbor National Park, and the Flora and Fauna Conservation Park.

Great Wall of China, Chinese (Wade–Giles) WAN-LI CH'ANG-CH'ENG, or (Pinyin) WANLI CHANGCHENG ("10,000 Li Long Wall"), one of the largest building-construction projects ever carried out, running (with all its branches) about 4,000 miles (6,400 km) east to west from Po Hai, the northwestern arm of the Yellow Sea, to a point deep in central Asia. Parts of the vast fortification date from the 4th century BC. In 214 BC Shih Huang-ti, the first emperor of a united China, connected a number of existing defensive walls into a single system fortified by watchtowers, which served both to guard the rampart and to communicate with the capital, Hsien-yang, near Sian, by signal—smoke by day and fire by night. The principal enemy against whom the Great Wall was built were the Hsiung-nu, the nomadic tribes of the northern steppes.

The Great Wall was originally constructed partly of masonry and partly of earth and was

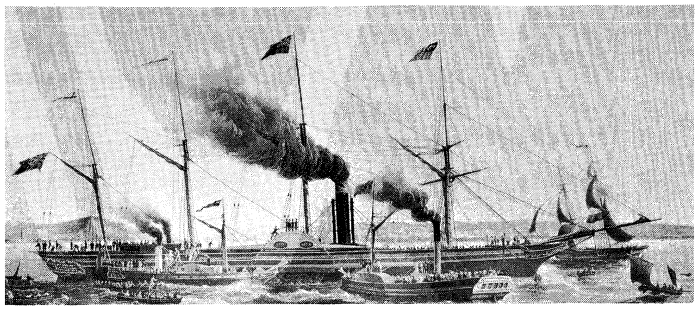


The Great Wall of China on the slopes of the Yen Mountains at Mu-t'ien-yü, Hopeh province
Kurt Scholz—Shostal Assoc.

faced with brick in its eastern portion. It was substantially rebuilt in later times, especially in the 15th and 16th centuries. The basic wall is generally about 30 feet (9 m) high, and the towers are about 40 feet (12 m) high.

Great Western, earliest regular transatlantic steamer. On its maiden voyage, the *Great Western* left Bristol, Eng., on April 8, 1838, and arrived in New York City 15 days later (half the time that sailing ships usually took). Designed by the British engineer Isambard Kingdom Brunel, the *Great Western* displaced 1,320 tons, was 212 feet (65 m) long, and

carried 148 passengers; it had four masts with reduced rigging and paddles driven by two engines. Its average speed without sails was 9 knots. On one of its last voyages it carried troops to the Crimea. The ship was broken up at Vauxhall, London, in 1856.



The *Great Western*, engraving by R.G. and A.W. Reeve after a painting by Joseph Walter

By courtesy of the Mariners Museum, Newport News, Va.

Great Western Mountains, also called GREAT WESTERN TIERS, mountains in central Tasmania, Australia. The mountains border the Central Plateau on the north and east. Basaltic in composition, their fault-formed scarps rise to 4,000 feet (1,200 m) near the River Mersey in the northwest; from Ironstone Mountain, the highest peak (4,736 feet [1,444 m]), they slope gradually to the south. Their eastern face overlooks the Macquarie River valley. The large drop afforded by streams plunging over the edge of the mountains is used in the Great Lake–South Esk and the Mersey–Forth hydroelectric projects. Gentle slopes at the base of the mountains provide good farmland.

Great Western Schism: *see* Western Schism.

great willow herb: *see* fireweed.

Great Yarmouth, district (borough), county of Norfolk, England. The town stands on a sandbank across the mouth of Breydon Water, an expanse of water formed by the Rivers Yare, Bure, and Waveney, whose combined waters now enter the North Sea at the southern end of Yarmouth.

In ancient times the area now covered by the sandbar was sea, and Roman forts at Caister-on-Sea (north of the present Yarmouth) and Burgh Castle (now several miles inland) stood on the coast. By Saxon times the Yarmouth sandbank existed and was inhabited. In 1208 King John granted the town its charter, and by the end of the 13th century it was walled. The old town grew around narrow streets ("rows") leading down to the river. The sandbank continued to expand southward, and in 1567 a Dutch engineer cut the present harbour entry.

Yarmouth is a major base for North Sea gas and oil exploration. It was a long-established herring port, famous for its smoked herring, the "Yarmouth bloater." In addition, the local economy has engineering, food processing, brewing, and various other light industries. Yarmouth has also become a holiday resort and centre for boating on the Broads, with which Breydon Water is connected. Its area is 67 square miles (173 square km). Pop. (1981) town, 55,398; (1986 est.) district, 85,600.

Greater Antilles, the four largest islands of the Antilles (*q.v.*)—Cuba, Hispaniola, Jamaica, and Puerto Rico—lying north of the Lesser Antilles chain. They constitute nearly 90 percent of the total land area of the entire West Indies.

Greater Caucasus (mountains, Asia): *see* Great Caucasus.

Greater Khingan Range, Chinese (Wade-Giles) TA HSING-AN LING, or (Pinyin) DA HINGGAN LING, major mountain system located in the Inner Mongolia Autonomous Region, northeastern China. The range extends some 750 miles (1,200 km) from north to south and constitutes the divide between the flat plains of the Northeast (Manchuria) to the east and the high Mongolian Plateau to the west. The Greater Khingan Range is bounded on the south by the Jehol Uplands (Ch'eng-te Plain) and on the north by the Amur River. The range is a major watershed between the Liao River system and the Sungari and Nen (Nonni) river systems of the Manchurian (Northeast) Plain to the east and the headwaters of the Amur River and its tributaries in the northwest. The western slopes of the southern section of the range drain into the Mongolian Plateau.

The Greater Khingan Range has an average elevation of from 3,950 to 4,250 feet (1,200 to 1,300 m), the highest peak reaching 6,673 feet (2,035 m), and the range is much broader in the north (190 miles [306 km]) than it is in the south (60 miles [97 km]). The range was formed during the Jurassic mountain-building period, and it is essentially a tilted fault block, its eastern edge, which faces the Manchurian Plain, being an ancient fault line. The ranges are markedly asymmetrical, with a sharp eastern face and a more gentle western slope down to the Mongolian Plateau, which at this point lies at an elevation of 2,600 to 3,300 feet (790 to 1,000 m). The ranges are composed largely of igneous rocks (*i.e.*, formed from the molten state), and the topography is characterized by smooth and rounded landforms; the mountains have flat peaks and comparatively gentle slopes. The eastern slopes are more heavily dissected by the numerous tributaries of the Nen and Sungari rivers.

Greater Khingan Range, southeast of Hailar, Inner Mongolian Autonomous Region, China

Richard Harrington—Miller Services Ltd.

The mountains form an important climatic divide. They take most of the rainfall from the southeasterly winds and produce a marked contrast with the arid region to the west. The climate of the whole region is comparatively wet (receiving more than 20 inches [500 mm] annually). The northern section of the mountains is the coldest part of eastern China, with extremely severe winters (mean temperature −18° F [−28° C]) and with large areas under permafrost. This area is covered by forests of larch, birch, aspen, and pine, with shrub cover on the highest elevations. It is rich in wildlife, including deer, elk, marten, hare, and many fur-bearing animals. The central and southern sections of the range, however, are considerably warmer and drier than in the north, with January temperatures of about −5° F (−21° C), annual precipitation of 10–12 inches (250–300 mm), and comparatively light snowfalls. The coniferous forests of the north gradually give way in the south to broad-leaved forests and then to patches of grassland interspersed with woodland. In the south the forests cover the higher ground above 5,000 feet (1,500 m), while the greater part of the area is covered with tall grassland. In May 1987 a devastating fire swept the Greater Khingan forests, destroying perhaps as much as 2,500,000 acres (1,000,000 hectares) of timber; it came to be known as the Black Dragon Fire, after the Black Dragon River (the Amur) that flows through the area.

The Greater Khingan region was to a large extent unexplored until the 20th century. The exploitation of the northern area began with the construction early in the 20th century of the first railway across the mountains—the Chinese Eastern Railroad from Tsitsihar to Man-chou-li, the latter in extreme northwestern Manchuria on the Russo-Chinese frontier. Under the Japanese occupation of Manchuria (1931–45), a number of railways were constructed into the mountains north and south of this line to extract lumber, the most important being those running into the area north of T'u-li-ho. More recently these lines have been extended eastward into the I-le-huli Mountains, which strike east and west and join the Greater Khingan Range proper to the Lesser Khingan Range. Further south a more recent line follows the T'ao-erh River valley northwest from Pai-ch'eng in Kirin province to So-lun and the hot springs at A-erh-shan in Inner Mongolia.

Much of the area is inhabited by Mongol and (in the north) Tungus peoples, such as the O-lun-chun (Oronchon, Mountain People) and Evenki. Chinese penetration of the area in the 19th and 20th centuries has been limited to the railway zones and the main lumbering areas. Logging continues to be the major economic activity.

Greater London, conurbation centred on London, occupying an area of 610 square miles (1,580 square km). The administrative structure of Greater London includes 32 separate borough councils, 12 of which constitute Inner London and the others Outer London. The Inner London boroughs are Camden, Greenwich, Hackney, Hammersmith and Fulham, Islington, Kensington and Chelsea, Lambeth, Lewisham, Southwark, Tower Hamlets, Wandsworth, and Westminster City. The 20 boroughs of Outer London are Barking and Dagenham, Barnet, Bexley, Brent, Bromley, Croydon, Ealing, Enfield, Haringey, Harrow, Havering, Hillingdon, Hounslow, Kingston upon Thames, Merton, Newham, Redbridge, Richmond upon Thames, Sutton, and Waltham Forest.

The City of London constitutes an area of 1.06 square miles (2.74 square km) that lies at the centre of Greater London; it is a centre of world finance. The Greater London conurbation is encircled by the Outer Metropolitan Area, which extends as far as 45 miles (72 km) from the centre of London. Pop. (1987 est.) Greater London, 6,770,400; metropolitan area, 12,282,600.

Greater Manchester, area in northwestern England. Formerly part of Lancashire, it encompasses one of the major conurbations of the country and comprises 10 administrative districts: Manchester and Salford, both city districts, and the boroughs of Bolton, Bury, Oldham, Rochdale, Stockport, Tameside, Trafford, and Wigan. (From 1974 to 1986 Greater Manchester had its own administrative metropolitan county council.) Its area is 497 square miles (1,287 square km).

The Pennines, dissected by deep valleys, rise to the east. Coal measures (mainly sandstones and shales) flanking the uplands form lower plateaus and benches. In the west, glacial clay-covered lowlands are traversed by the River Mersey, which rises in the Pennines.

Manchester (Mamucium) was a focal point in the Roman road network. From the mid-17th century, cotton began to be used in fabric manufacture, and Manchester became important in the fustian trade. By the late 18th century, following mechanization and the development of the factory system, the region was dominant in the cotton textile industry. Towns such as Bolton, Bury, Rochdale, and Oldham, specializing in cotton spinning, rapidly expanded, and Manchester became the major market centre. Increased demand for coal resulted in the extensive exploitation of the coalfield in the 18th and 19th centuries, and mining settlements north and east of Manchester and around Wigan grew rapidly.

The opening of the Manchester Ship Canal in 1894 made Manchester a seaport, and the area became an important centre for manufacturing and engineering industries. In the 20th century a variety of light industries, transport, and warehousing have been attracted to the region. Peripheral areas include much attractive countryside, and flourishing commuter settlements have developed since World War II. Pop. (1985 est.) 2,583,000.

Greathead, James Henry (b. Aug. 6, 1844, Grahamstown, S.Af.—d. Oct. 21, 1896, London), British civil engineer who improved the tunneling shield, the basic tool of underwater tunneling, essentially to its modern form.

Greathead arrived in 1859 in England, where he studied with the noted civil engineer P.W. Barlow between 1864 and 1867. The tunneling shield invented by Marc Brunel and used to drive the Rotherhithe Tunnel under the Thames River was large and unwieldy. In 1869 Greathead designed a smaller shield, circular in cross section, to complete the Tower Subway, which ran under the Thames near the Tower of London. The shield was advanced by screw jacks, and the tunnel was lined with cast-iron rings behind it.

Greathead, engraving after a photo, 1896

The Mansell Collection

In 1886 Greathead began work to carry the City and South London Railway under the Thames near London Bridge, using a larger version of his shield, and he bored twin tunnels about 10 feet (3 m) in diameter. In this project he pioneered the use of compressed air in conjunction with his shield. His shield, compressed air, and the cast-iron rings that were used to line the tunnels came to be adopted generally in tunnel construction.

Greb, Harry, byname of EDWARD HENRY GREB, also called THE HUMAN WINDMILL (b. June 6, 1894, Pittsburgh—d. Oct. 22, 1926, New York City), U.S. professional boxer who was one of the cleverest and most colourful performers in the ring. From 1913 to 1926 Greb lost only 7 of his 294 bouts.

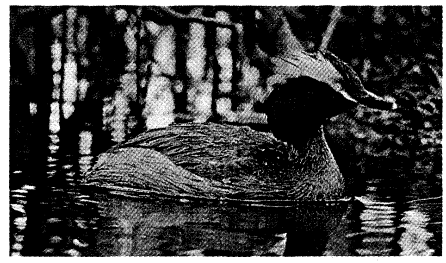
On May 23, 1922, Greb won the U.S. light-heavyweight title, giving Gene Tunney the only defeat of his career; after the fight, Tunney collapsed in his dressing room, while Greb was left unmarked. Greb won the world middleweight championship in 1923 but lost it three years later to Tiger Flowers in New York City. He died following eye surgery, and it was later confirmed that he was blind in one eye when he fought many of his later bouts. He was elected to the Boxing Hall of Fame in 1955.

Grĕban, Arnoul (b. 1420, probably Le Mans, Anjou, Fr.—d. 1471, probably Le Mans), French author of an important 15th-century religious drama known as *Mystère de la Passion* (1453/54), dramatizing the events of Jesus' life. In 1507 a performance of his Passion play, revised by Jean Michel to 65,000 lines, occupied six days. Grĕban also collaborated with his brother Simon on a long mystery play about the Acts of the Apostles. In 1455 he is known to have been organist and choirmaster of Notre-Dame in Paris; he later held a canonry at Le Mans.

grebe, order name PODICIPEDIFORMES, member of an order of diving birds containing a single family, Podicipedidae, with about 20 species.

A brief treatment of Podicipediformes follows. For full treatment, *see* MACROPAEDIA: Birds.

Grebes have a pointed bill, short, narrow wings, and a vestigial tail. Their legs, set at the rear of the body, make walking awkward. The wing feathers are curved to fit the back when closed, and the long, partially webbed toes are



Slavonian, or horned, grebe (*Podiceps auritus*)

Ingmar Holmasen

lobed at the ends. Many grebes have bright, erectile ear tufts and crests in summer but are dully garbed in winter; sexes look alike at all seasons.

Grebes feed chiefly on fish or invertebrates. Courting or rival birds perform elaborate aquatic dances in pairs. The nest, a floating mat of plant matter anchored to reeds, may have 2–8 chalky eggs, which become discoloured during the 20–30-day incubation period. Both parents participate in the incubation process. The young of most species are brightly striped.

Grebes are found in most tropical and temperate areas and often in subarctic regions. The Palaearctic little grebe, or dabchick (*Tachybaptus ruficollis*), is one of the smaller grebes, reaching a length of only about 25.5 cm (10 inches). The larger forms, which are also the most notable dancers, include the 48-centimetre (19-inch) great crested grebe (*Podiceps cristatus*), of the Old World and Australia, and the 70-centimetre (28-inch) western grebe (*Aechmophorus occidentalis*), of North and Central America, unique as the only grebe that spears its fish prey. Most grebes can fly, and some species are migratory; there are, however, a few Neotropical species that are flightless and limited in range to isolated bodies of water. These are Taczanowsky's, or Puna, grebe (*P. taczanowskii*), the short-winged grebe (*Rollandia,* or *Centropelma, micropterum*), and the giant pied-billed, or Atitlan, grebe (*Podilymbus gigas*).

Grebel, Konrad (b. *c.* 1498, Zürich—d. 1526, Maienfeld, Switz.), chief founder of the Swiss Brethren, an Anabaptist movement centred on Zürich.

His humanist education at Basel, Vienna, and Paris led him gradually to oppose the conservative Swiss Reformer Huldrych Zwingli, whom he had earlier supported. The slowness of reform and Grebel's increasing impatience to create a church free from control by the Zürich city council led to his permanent break with Zwingli in 1524.

That year, with several colleagues, Grebel began to organize the Brethren as an independent, radical Anabaptist church in Zürich. The dispute over infant versus adult Baptism culminated (January 1525) in the city council's defense of infant Baptism and in its order to Grebel to cease his efforts to organize the Brethren. In the same month, however, he disobeyed the edict by performing the first adult Baptism in modern history and by setting out to win converts in nearby cities.

Despite his missionary successes, he was harassed until his death. He was imprisoned on two occasions in Zürich for a total of at least six months. Like other Brethren, Grebel believed in living simply and in rejecting violence, in spite of the warfare that raged among religious factions. His only extant writings are the 69 letters preserved at Sankt Gallen. *The Life and Letters of Conrad Grebel* (1950) by H.S. Bender is a study of his life and work.

Grechaninov, Aleksandr (Tikhonovich), Grechaninov also spelled GRETCHANINOV (b. Oct. 25, 1864, Moscow—d. Jan. 4, 1956, New York City), Russian composer notable for his religious works and children's music.

Grechaninov studied piano and composition at the Moscow Conservatory, and from 1890 to 1893 he worked at composition and orchestration with Nikolay A. Rimsky-Korsakov at St. Petersburg (Leningrad). He soon became known for his songs and for his *String Quartet in G Major* (1894) and the first of his five symphonies (1894). An opera, *Dobrynya Nikitich,* was produced by the Bolshoi Theatre in 1903, with the famed basso Fyodor Chaliapin in the title role. Nine years later the opera *Soeur Beatrice* ("Sister Beatrice") was mounted but immediately withdrawn as an affront to religion. He composed in all media and produced a great quantity of piano music, songs, and choruses, all without a real personal stamp. His later religious music was written for instrumental accompaniment and thus could not be used in Eastern Orthodox liturgy.

Grechaninov received a pension for his religious music until the 1917 revolution. He then moved to western Europe, settling in Paris in 1925. In 1939 he immigrated to the United States (which he had visited frequently since 1929) and became a naturalized U.S. citizen in 1946.

Grechetto, Il: *see* Castiglione, Giovanni Benedetto.

Greco, El, byname of DOMÉNIKOS THEOTOKÓPOULOS (b. 1541, Candia [Iráklion], Crete—d. April 7, 1614, Toledo, Spain), master of Spanish painting, whose highly individual dramatic and expressionistic style met with the puzzlement of his contemporaries but gained newfound appreciation in the 20th century.

He also worked as a sculptor and as an architect.

Early life and works. El Greco never forgot that he was of Greek descent and usually signed his paintings in Greek letters with his full name, Doménikos Theotokópoulos. He is, nevertheless, generally known as El Greco ("the Greek"), a name he acquired when he lived in Italy, where the custom of identifying a man by designating country or city of origin was a common practice. The curious form of the article (*El*), however, may be the Venetian dialect or more likely from the Spanish.

Because Crete, his homeland, was then a Venetian possession and he was a Venetian citizen, he decided to go to Venice to study. The exact year in which this took place is not known; but speculation has placed the date anywhere from 1560, when he was 19, to 1566. In Venice he entered the studio of Titian, who was the greatest painter of the day. Knowledge of El Greco's years in Italy is limited. A letter of Nov. 16, 1570, written by Giulio Clovio, an illuminator in the service of Cardinal Alessandro Farnese, requested lodging in the Palazzo Farnese for "a young man from Candia, a pupil of Titian." On July 8, 1572, "the Greek painter" is mentioned in a letter sent from Rome by a Farnese official to the same cardinal. Shortly thereafter, on Sept. 18, 1572, "Dominico Greco" paid his dues to the guild of St. Luke in Rome. How long the young artist remained in Rome is unknown, because he may have returned to Venice, *c.* 1575–76, before he left for Spain.

The certain works painted by El Greco in Italy are completely in the Venetian Renaissance style of the 16th century. They show no effect of his Byzantine heritage except possibly in the faces of old men—for example, in the "Christ Healing the Blind." The placing of figures in deep space and the emphasis on an architectural setting in High Renaissance style are particularly significant in his early pictures, such as "Christ Cleansing the Temple." The first evidence of El Greco's extraordinary gifts as a portraitist appears in Italy in a portrait of Giulio Clovio and Vincentio Anastagi.

Middle years. El Greco first appeared in Spain in the spring of 1577, initially at Madrid, later in Toledo. One of his main reasons for seeking a new career in Spain must have been knowledge of Philip II's great project, the building of the monastery of San Lorenzo at El Escorial, some 26 miles (42 km) northwest of Madrid. Moreover, the Greek must have met important Spanish churchmen in Rome through Fulvio Orsini, a humanist and librarian of the Palazzo Farnese. It is known that at least one Spanish ecclesiastic who spent some time in Rome at this period—Luis de Castilla—became El Greco's intimate friend and was eventually named one of the two executors of his last testament. Luis' brother, Diego de Castilla, gave El Greco his first commission in Spain, which possibly had been promised before the artist left Italy.

In 1578 Jorge Manuel, the painter's only son, was born at Toledo, the offspring of Doña Jerónima de Las Cuevas. She appears to have outlived El Greco, and, although he acknowledged both her and his son, he never married her. That fact has puzzled all writers, because he mentioned her in various documents, including his last testament. It may be that El Greco had married unhappily in his youth in Crete or Italy and therefore could not legalize another attachment.

For the rest of his life El Greco continued to live in Toledo, busily engaged on commissions for the churches and monasteries there and in the province. He became a close friend of the leading humanists, scholars, and churchmen. Antonio de Covarrubias, a classical scholar and son of the architect Alonso de Covarrubias, was a friend whose portrait he painted. Fray Hortensio Paravicino, the head of the Trinitarian order in Spain and a favourite preacher of Philip II of Spain, dedicated four sonnets to El Greco, one of them recording his own portrait by the artist. Luis de Góngora y Argote, one of the major literary figures of the late 16th century, composed a sonnet to the tomb of the painter. Another writer, Don Pedro de Salazar de Mendoza, figured among the most intimate circle of El Greco's entourage.

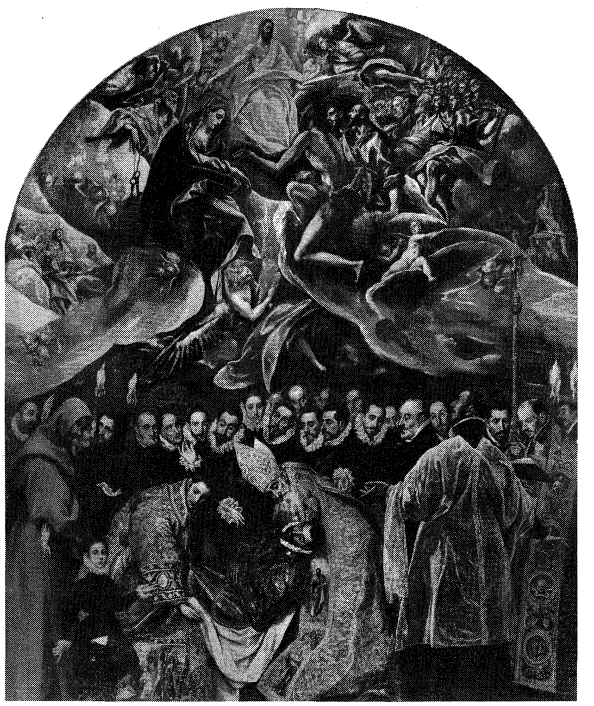
The inventories compiled after his death confirm the fact that he was a man of extraordinary culture—a true Renaissance humanist. His library, which gives some idea of the breadth and range of his interests, included works of the major Greek authors in Greek, numerous books in Latin, and others in Italian and in Spanish: Plutarch's *Lives,* Petrarch's poetry, Ludovico Ariosto's *Orlando Furioso,* the Bible in Greek, the proceedings of the Council of Trent, and architectural treatises by Marcus Vitruvius Pollio, Giacomo da Vignola, Leon Battista Alberti, Andrea Palladio, and Sebastiano Serlio. El Greco himself prepared an edition of Vitruvius, accompanied by drawings, but the manuscript is lost.

In 1585 and thereafter El Greco lived in the large, late-medieval palace of the Marqués de Villena. Although it is near the site of the now-destroyed Villena Palace, the museum in Toledo called the Casa y Museo del Greco ("Home and Museum of El Greco") was never his residence. It can be assumed that he needed space for his atelier more than for luxurious living. In 1605 the palace was listed by the historian Francisco de Pisa as one of the handsomest in the city; it was not a miserable ruined structure, as some romantic writers have presumed. El Greco surely lived in considerable comfort, even though he did not leave a large estate at his death.

El Greco's first commission in Spain was for the high altar and the two lateral altars in the conventual church of Santo Domingo el Antiguo at Toledo (1577–79). Never before had the artist had a commission of such importance and scope. Even the architectural design of the altar frames, reminiscent of the style of the Venetian architect Palladio, was prepared by El Greco. The painting for the high altar, "Assumption of the Virgin," also marked a new period in the artist's life, revealing the full extent of his genius. The figures are brought close into the foreground, and in the Apostles a new brilliance of colour is achieved. The technique remains Venetian in the laying on of the paint and in the liberal use of white highlights; yet the intensity of the colours and the manipulation of contrasts, verging on dissonance, is distinctly El Greco. For the first time the importance of his assimilation of the art of Michelangelo comes to the fore, particularly in the painting of the "Trinity," in the upper part of the high altar (now in the Prado Museum, Madrid), where the powerful sculpturesque body of the nude Christ leaves no doubt of the ultimate source of inspiration. In the lateral altar painting of the "Resurrection," the poses of the standing soldiers and the contrapposto (a position in which the upper and lower parts of the body are contrasted in direction) of those asleep are also clearly Michelangelesque in inspiration.

At the same time, El Greco created another masterpiece of extraordinary originality—the "Espolio" ("Disrobing of Christ"). In designing the composition vertically and compactly in the foreground he seems to have been motivated by the desire to show the oppression of Christ by his cruel tormentors. He chose a method of space elimination that is common to middle and late 16th-century Italian painters known as Mannerists, and at the same time he probably recalled late Byzantine paintings in which the superposition of heads row upon row is employed to suggest a crowd. The original altar of gilded wood that El Greco designed for the painting has been destroyed, but his small sculptured group of the "Miracle of St. Ildefonso" still survives on the lower centre of the frame.

El Greco's tendency to elongate the human figure becomes more notable at this time—for example, in the handsome and unrestored "St. Sebastian." The same extreme elongation of body is also present in Michelangelo's work, in the painting of the Venetians Tintoretto and Paolo Veronese, and in the art of the leading Mannerist painters. The increased slenderness of Christ's long body against the dramatic clouds in "Crucifixion with Donors" foreshadows the artist's late style.



"Burial of the Count de Orgaz," oil on canvas by El Greco, 1586–88; in the church of Santo Tomé, Toledo, Spain

Archivo Mas, Barcelona

El Greco's connection with the court of Philip II was brief and unsuccessful, consisting first of the "Allegory of the Holy League" ("Dream of Philip II"; 1578–79) and second of the "Martyrdom of St. Maurice" (1580–82). The latter painting did not meet with the approval of the king, who promptly ordered another work of the same subject to replace it. Thus ended the great artist's connection with the Spanish court. The king may have been troubled by the almost shocking brilliance of the yellows as contrasted to the ultramarine in the costumes of the main group of the painting, which includes St. Maurice in the centre. On the other hand, to the modern eye El Greco's daring use of colour is particularly appealing. The brushwork remains Venetian in the way that the colour suggests form and in the free illusionistic and atmospheric creation of space.

The "Burial of the Count de Orgaz" (1586–88) is universally regarded as El Greco's masterpiece. The supernatural vision of Gloria (Heaven) above and the impressive array of portraits represent all aspects of this extraordinary genius's art. El Greco clearly distinguished between heaven and earth: above, heaven is evoked by swirling icy clouds, semi-abstract in their shape, and the saints are tall and phantomlike; below, all is normal in the scale and proportions of the figures. According to the legend, Saints Augustine and Stephen appeared miraculously to lay the Count de Orgaz in his tomb as a reward for his generosity to their church. In golden and red vestments they bend reverently over the body of the count, who is clad in magnificent armour that reflects the yellow and reds of the other figures. The young boy at the left is El Greco's son, Jorge Manuel; on a handkerchief in his pocket is inscribed the artist's signature and the date 1578, the year of the boy's birth. The men in contemporary 16th-century dress who attend the funeral are unmistakably prominent members of Toledan society. El Greco's Mannerist method of composition is nowhere more clearly expressed than here, where all of the action takes place in the frontal plane.

Later life and works. From 1590 until his death El Greco's painterly output was prodigious. His pictures for the churches and convents of the Toledan region include the "Holy Family with the Magdalen" and the "Holy Family with St. Anne." He repeated several times the "Agony in the Garden," in which a supernatural world is evoked through strange shapes and brilliant, cold, clashing colours. The devotional theme of "Christ Carrying the Cross" is known in 11 originals by El Greco and many copies. El Greco depicted most of the major saints, often repeating the same composition: St. Dominic, Mary Magdalen, St. Jerome as cardinal, St. Jerome in penitence, and St. Peter in tears. St. Francis of Assisi, however, was by far the saint most favoured by the artist; it is no wonder that Francisco Pacheco, the Spanish painter and art theorist who visited El Greco in 1611, declared him the best interpreter of the founder of the Franciscan order. About 25 originals representing St. Francis survive and, in addition, more than 100 pieces by followers. The most popular of several types was "St. Francis and Brother Leo Meditating on Death."

Two major series ("Apostolados") survive representing Christ and the Twelve Apostles in 13 canvases: one in the sacristy of Toledo Cathedral (1605–10) and another, unfinished set (1612–14) in the El Greco House and Museum at Toledo. The frontal pose of the Christ blessing in this series suggests a medieval Byzantine figure, although the colour and brushwork are El Greco's personal handling of Venetian technique. In these works the devotional intensity of mood reflects the religious spirit of Roman Catholic Spain in the period of the Counter-Reformation. Although Greek by descent and Italian by artistic preparation, the artist became so immersed in the religious environment of Spain that he became the most vital visual representative of Spanish mysticism. Yet, because of the combination of these three cultures, he developed into an artist so individual that he belongs to no conventional school but is a lonely genius of unprecedented emotional power and imagination.

Several major commissions came El Greco's way in the last 15 years of his life: three altars for the Chapel of San José, Toledo (1597–99); three paintings (1596–1600) for the Colegio de Doña María de Aragon, an Augustinian monastery in Madrid; and the high altar, four lateral altars, and the painting "St. Ildefonso" for the Hospital de la Caridad at Illescas (1603–05).

Extreme distortion of body characterizes El Greco's last works—for example, the "Adoration of the Shepherds," painted in 1612–14 for his own burial chapel. The brilliant, dissonant colours and the strange shapes and poses create a sense of wonder and ecstasy, as the shepherd and angels celebrate the miracle of the newly born child. In the unfinished "Vision of St. John," El Greco's imagination led him to disregard the laws of nature even more. The gigantic swaying figure of St. John the Evangelist, in abstractly painted icy-blue garments, reveals the souls of the martyrs who cry out for deliverance. In like manner, the figure of the Madonna in the "Immaculate Conception," originally in the Church of San Vicente, floats heavenward in a paroxysm of ecstasy supported by long, distorted angels. The fantastic view of Toledo below, abstractly rendered, is dazzling in its ghostly moonlit brilliance, and the clusters of roses and lilies, symbols of the Virgin's purity, are unalloyed in their sheer beauty.

In his three surviving landscapes, El Greco demonstrated his characteristic tendency to dramatize rather than to describe. The "View of Toledo" (*c.* 1595) renders a city stormy, sinister, and impassioned with the same dark, foreboding clouds that appear in the background of his earlier "Crucifixion with Donors." Painting in his studio, he rearranged the buildings depicted in the picture to suit his compositional purpose. "View and Plan of Toledo" (1610–14) is almost like a vision, all of the buildings painted glistening white. An inscription by the artist on the canvas explains quite fancifully that he had placed the Hospital of San Juan Bautista on a cloud in the foreground so that it could better be seen and that the map in the picture shows the streets of the city. At the left, a river god represents the Tagus, which flows around Toledo, a city built on rocky heights. Although El Greco had lived in Italy and in Rome itself, he rarely used such classical Roman motives.

The one picture by El Greco that has a mythological subject, so dear to most Renaissance artists, is the "Laocoon." For ancient Troy he substituted a view of Toledo, similar to the one just discussed, and he displayed little regard for classical tradition in painting the highly expressive but great, sprawling body of the priest.

Although El Greco was primarily a painter of religious subjects, his portraits, though less numerous, are equally high in quality. Two of his finest late works are the portraits of "Fray Felix Hortensio Paravicino" (1609) and "Cardinal Don Fernando Niño de Guevara" (*c.* 1600). Both are seated, as was customary after the time of Raphael in portraits presenting important ecclesiastics. Paravicino, a Trinitarian monk and a famous orator and poet, is depicted as a sensitive, intelligent man. The pose is essentially frontal, and the white habit and black cloak provide highly effective pictorial contrasts. Cardinal Niño de Guevara, in crimson robes, is almost electrical in his inherent energy, a man accustomed to command. His portrait of "Jeronimo de Cevallos" (1605–10), on the other hand, is most sympathetic. The work is half-length, painted thinly and limited to black and white. The huge ruff collar, then in fashion, enframes the kindly face. By such simple means, the artist created a memorable characterization that places him in the highest rank as a portraitist, along with Titian and Rembrandt.

El Greco was buried at Toledo in the chapel in Santo Domingo el Antiguo. Because of a dispute with the nuns, his son, Jorge Manuel, transferred the family vault to San Torcuato. Since the destruction of that church a century ago, no sign of the artist's burial place survives. (H.E.W.)

BIBLIOGRAPHY. Surveys of the artist's life and the development of his painting include Antonina Vallentín, *El Greco* (1954); José Gudiol, *Domenikos Theotokopoulos, El Greco, 1541–1614* (1973, reissued as *The Complete Paintings of El Greco, 1541–1614*, 1983); and Jacques Lassaigne, *El Greco* (1973). Harold E. Wethey, *El Greco and His School*, 2 vol. (1962), provides both a biography and a catalog that separate the master's own work from school pieces, copies, and forgeries. Jonathan Brown *et al.*, *El Greco of Toledo* (1982), the catalog of an international exhibition, contains a catalogue raisonné and a bibliography.

Greco, Emilio (b. Oct. 11, 1913, Catania, Italy), Italian sculptor of bronze and marble figurative works, primarily female nudes and portraits.

At the age of 13, Greco was apprenticed to a stonemason, and he later studied at the Academy of Art in Palermo. Though he began exhibiting in Rome in 1943, he was not well-established until after World War II. His first one-man exhibition was held in 1946, and in 1948 he became a teaching assistant at Liceo Artistico in Rome.

His subject matter varied little throughout his career. In their refined, elongated forms and assertive balance, his works reflect the Mannerist tradition in Italian art (*e.g.*, "Bather No. 2," 1956–57). The expressive, luminous surface treatment in some pieces, however, strikes a clear parallel with the work of Giacomo Manzù and Marino Marini. He designed one of the bronze doors of the Cathedral at Orvieto (1961–64) and the monument to Pope John XXIII in Saint Peter's (1965–66). In 1974 a Greco Garden, dedicated to his works, was opened at the Open Air Museum, Hakone, Japan.

Greco-Persian Wars (*c.* 546–*c.* 448 BC), a series of wars fought by Greek states and Persia over a period of almost 100 years. The fighting was most intense during two invasions that Persia launched against mainland Greece between 490 and 479. Although the Persian empire was at the peak of its strength, the collective defense mounted by the Greeks overcame seemingly impossible odds and even succeeded in liberating Greek city-states on the fringe of Persia itself. The Greek triumph ensured the survival of Greek culture and political structures long after the demise of the Persian empire.

A brief treatment of the Greco-Persian Wars follows. For full treatment, *see* MACROPAEDIA: Greek and Roman Civilization, Ancient.

In the generation before 522, the Persian kings Cyrus and Cambyses extended their rule from the Indus valley to the Aegean Sea. After the defeat of the Lydian king Croesus (c. 546), the Persians gradually conquered the small Greek city-states along the Anatolian coast. In 522 Darius came to power and set about consolidating and strengthening the Persian empire. In 514 he made preparations for an invasion of Europe. His first attack, against the Scythians, took him far into what is now the Ukraine, where his army became overextended and was harassed by the Scythi-

ans during a long retreat. Darius then decided to establish a permanent base in southern Thrace, near the border between Europe and Asia.

In 499 the Ionian Greek states on the coast of Anatolia rebelled. They were defeated by 493, but their protracted resistance delayed Darius' planned invasion of the Greek mainland, and the coordinated conduct of their rebellion was to serve as a model for the later defense of the mainland.

When, in 491, it became clear that Darius would attack Eretria and Athens, Athens and Sparta ceased fighting between themselves to meet the common enemy. In 490 a Persian army of 25,000 men landed unopposed on the Plain of Marathon, and the Athenians sent word to Sparta to join forces against the invader. Owing to a religious festival the Spartans were detained, and the 10,000 Athenians had to face the Persians aided only by 1,000 men from Plataea. The Athenians were commanded by 10 generals, the most daring of whom was Miltiades. While the Persian cavalry was away, he seized the opportunity to attack. The Greeks won a decisive victory, losing only 192 men to the Persians' 6,400 (according to the historian Herodotus). The Greeks then prevented a surprise attack on Athens itself by quickly marching back to the city.

After their defeat at Marathon the Persians went home, but they returned in vastly greater numbers 10 years later, led by Darius' successor, Xerxes. The unprecedented size of his forces made their progress quite slow, giving the Greeks plenty of time to prepare their defense. A Greek alliance of 30 states was formed under the leadership of Sparta. Command of the army was given to Sparta, that of the navy to Athens, and the alliance as a whole was governed by a congress in which each state had one vote. The Greeks decided to deploy a force of about 7,000 men at the narrow pass of Thermopylae and a force of 271 ships under Themistocles at Artemisium. Xerxes' forces advanced slowly toward the Greeks, suffering losses from the weather.

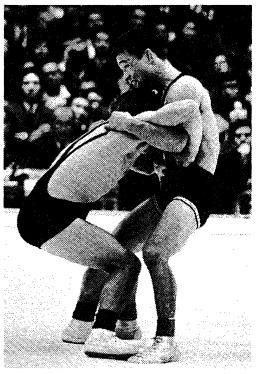
The Persians met the Greeks in battle over a period of three days in August 480. At sea a detachment of 200 Persian ships attempted to surprise the Greek fleet, but the Greeks, forewarned, engaged the main Persian navy. That night a tremendous storm destroyed the Persian squadron while the Greeks were safely in port. On land the Persians attacked the Greeks at Thermopylae for two days but suffered heavy losses. However, on the second night a Greek traitor guided the best Persian troops around the pass behind the Greek army. The Spartan general Leonidas dispatched most of the Greeks south to safety but fought to the death at Thermopylae with the Spartan and Thespian soldiers who remained. While the battle raged at Thermopylae, the Persian fleet attacked the Greek navy, with both sides losing many ships. Xerxes' army, aided by northern Greeks who had joined it, marched south. In September the Persians burned Athens, which, however, by that time had been evacuated. In the meantime, the Greeks decided to station their fleet in the Strait of Salamis. Themistocles devised a clever stratagem: feigning retreat, he lured the Persian fleet into the narrow strait. The Persians were then outmaneuvered and badly beaten by the Greeks' ships in the ensuing naval battle. Soon afterward, the Persian navy retreated to Asia.

Although Xerxes returned to Persia that winter, his army remained in Greece until the summer of 479. They were finally driven from the country after the battle of Plataea, where they were defeated by a combined force of Spartans, Tegeans, and Athenians. The Persian navy was defeated at Mycale, on the Asiatic coast, when they declined to engage the Greek fleet. Instead they beached their ships and, joining a land army, fought a losing battle against a Spartan force led by Leotychidas.

Although the Persian invasion was ended by the battles at Plataea and Mycale, fighting between Greece and Persia continued for another 30 years. Led by the Athenians, the newly formed Delian League went on the offensive to free the Ionian city-states on the Anatolian coast. They had mixed success, and in about 448 a treaty was finally concluded between Athens and its allies and the Persian king Artaxerxes I.

Greco-Roman Museum: *see* Alexandria Municipal Museum.

Greco-Roman wrestling, style of wrestling practiced in Olympic and international amateur competition. In Greco-Roman wrestling the legs may not be used in any way to obtain a fall, and no holds may be taken below the waist. Other rules and procedures for Greco-Roman wrestling are the same as those for freestyle wrestling (*q.v.*), the other international amateur style. For world champions, *see* Sporting Record: *Wrestling*. *See also* Olympic Games.



Olympic Greco-Roman bantamweight match, Tokyo

Rapho/Photo Researchers—EB Inc.

Greco-Roman wrestling originated in France in the early 19th century, in imitation of classical Greek and Roman representations of the sport. It became favoured in Scandinavian countries, and Swedish and Finnish wrestlers won many Olympic titles from 1912 to 1948, after which the Soviet Union and other countries came to the fore.

Greco-Turkish wars (1897 and 1921–22), two military conflicts between the Greeks and the Turks.

The first war, also called the Thirty Days' War, took place against a background of growing Greek concern over conditions in Crete, which was under Turkish domination and where relations between the Christians and their Muslim rulers had been deteriorating steadily. The outbreak in 1896 of rebellion on Crete, fomented in part by the secret Greek nationalistic society called Ethniki Etairia, appeared to present Greece with an opportunity to annex the island. By the beginning of 1897, large consignments of arms had been sent to Crete from Greece; on January 21 the Greek fleet was mobilized, and in early February Greek troops landed on the island, and union with Greece was proclaimed. The following month, however, the European powers imposed a blockade upon Greece to prevent assistance being sent from the mainland to the island. They took this step to prevent the disturbance from spreading to the Balkans. Thwarted in their attempt to assist their compatriots in Crete, the Greeks sent a force, commanded by Prince Constantine, to attack the Turks in Thessaly (April). By the end of April, however, the Greeks, who were inadequately prepared for war, had been overwhelmed by the Turkish army, which had recently been reorganized under German supervision. The Greeks then yielded to pressure from the European powers, withdrew their troops from Crete, and accepted an armistice on the mainland (May 20, 1897). A peace treaty, concluded on December 4, compelled Greece to pay the Turks an indemnity, to accept an international financial commission that would control Greek finances, and to yield some territory in Thessaly to Turkey. Subsequently, the Turkish troops also left Crete, which had been made an international protectorate, and an autonomous government under Prince George, the second son of the Greek king, was formed there (1898). Crete was finally ceded to Greece by the Treaty of London (1913), which ended the First Balkan War.

The second war occurred after World War I, when the Greeks attempted to extend their territory beyond eastern Thrace (in Europe) and the district of Smyrna (İzmir; in Anatolia). These territories had been assigned to them by the Treaty of Sèvres, Aug. 10, 1920, which was imposed upon the weak Ottoman government. In January 1921 the Greek army, despite its lack of equipment and its unprotected supply lines, launched an offensive in Anatolia against the Nationalist Turks, who had defied the Ottoman government and would not recognize its treaty. Although repulsed in April, the Greeks renewed their attack in July and advanced beyond the Afyonkarahisar–Eskişehir railway line toward Ankara. The Turks, however, commanded by the nationalist leader Mustafa Kemal (Kemal Atatürk), defeated them at the Sakarya River (Aug. 24–Sept. 16, 1921). A year later the Turks assumed control of Smyrna (September 1922) and drove the Greeks out of Anatolia. In Greece the war was followed by a successful military coup against the monarchy.

The Treaty of Lausanne, concluded on July 24, 1923, obliged Greece to return eastern Thrace and the islands of Imbros and Tenedos to Turkey as well as to give up its claim to Smyrna. The two belligerents also agreed to exchange their Greek and Turkish minority populations.

Greece, officially HELLENIC REPUBLIC, Greek ELLÁS, or ELLINIKÍ DHIMOKRATÍA, country occupying the southernmost extension of the Balkan Peninsula, covering an area of 50,949 square miles (131,957 square km). The capital is Athens. Along its northern border, from west to east, lie Albania, Yugoslavia, and Bulgaria; to the east is Turkey. The Greek mainland is a peninsula bounded by the Ionian Sea to the southwest, the Mediterranean Sea to the south, and the Aegean Sea to the east. Crete (Kríti), the country's largest island, stretching about 165 miles (266 km) from east to west, lies in the Mediterranean Sea and is separated from the peninsula by the Sea of Crete. The population of Greece was estimated in 1990 to be 10,087,000.

A brief treatment of Greece follows. For full treatment, *see* MACROPAEDIA: Greece; Greek and Roman Civilizations, Ancient.

Greece

For current history and for statistics on society and economy, *see* BRITANNICA WORLD DATA ANNUAL.

The land. The Greek landscape, with its 1,400-odd islands occupying a fifth of its territory and its rugged mainland coastline exceeding 2,500 miles (4,000 km) in length, is intimately linked with the sea. Only a small wedge of the Greek peninsula's interior is more than 50 miles (80 km) from the sea. Less than a fourth of it is lowland, much of this being coastal plains along the Aegean Sea. The only other lowlands are in the many narrow, mostly fertile mountain basins and valleys and the small plains that often lie near river mouths. The country's interior is dominated by the Pindus Mountains, which extend from Albania on Greece's northwestern border down through central Greece into the Peloponnese (the large peninsula, technically now an island, lying south of the Gulf of Corinth). Mount Olympus, the country's highest peak, reaches 9,570 feet (2,917 m).

The Greek Islands are generally subdivided into two groups, according to location. The Ionian Islands, located to the west of the mainland, include Corfu (Kérkira), Leucas (Levkás), Cephalonia (Kefallinía), and Zacynthus (Zákinthos) and many smaller ones. The Aegean Islands are much more numerous, including Euboca (Évvoia) and the Northern Sporades group in the west; Samothrace (Samothráki), Lemnos (Límnos), and Lesbos (Lésvos) in the north; Chios (Khíos) and the Dodecanese (Dhodhekánisos) group in the southeast; and the Cyclades (Kikládhes) group and Crete in the south.

Greece lies in a geologically active region. The most serious earthquake of modern times occurred in August 1953 among the Ionian Islands, leaving 445 dead and 90 percent of the islands' housing destroyed. Greece has a Mediterranean climate with extremely dry summers. Average annual rainfall decreases generally eastward and southward of the western coastal areas, from 52 inches (1,320 mm) on the northwestern island of Corfu to less than 16 inches (406 mm) in Athens. Winters are mild throughout the country, with temperatures averaging between 43° and 54° F (6° and 12° C), and summer temperatures average from 79° to 82° F (26° to 28° C).

About a fifth of Greece is forested, varying from noteworthy black-pine forests in the north to the classic Mediterranean complex (maquis) of the central and southern regions. The brown bear, wildcat, and roe deer can be found in the north; and the jackal, wild goat, and porcupine in the south.

The people. Ethnic Greeks make up all but a small portion of the total population, the remainder being composed of Macedonians, Turks, Albanians, Bulgarians, Armenians, and Gypsies. Nearly all of the people belong to the Greek Orthodox church, with the remainder being Muslims, Roman and Greek Catholics, Protestants, or Jews. The rate of population growth is one of the lowest in southern Europe, largely because of constant emigration due to poor economic conditions. Birth and death rates are comparable to those of the more developed countries of Europe.

The economy. Greece has an advanced developing, mainly private-enterprise economy. The gross national product (GNP) is growing more rapidly than the population; the GNP per capita, however, is one of the lowest in Europe. Agriculture produces one-seventh of the GNP but employs about one-fourth of the labour force. More than one-fourth of the arable land requires irrigation. The predominant crops include wheat, tomatoes, corn (maize), grapes, olives, potatoes, barley, and fruits. Greece is noted for its wine, olives and olive oil, tobacco, almonds, walnuts, and, recently, sunflower seeds. Pastures occupy about two-fifths of the land area, but many are rocky and marginal. They support sheep, goats, and cattle. Sheep and goats as well as cattle are important milk producers. Forests occupy about one-fifth of the land area; lumbering provides most of the national needs, but some is imported. A government reforestation policy seeks to replenish badly overcut woodlands. Fishing from the Mediterranean accounts for a majority of the annual catch, most of the remainder being from the Atlantic Ocean. Greece has some lignite. There are a few small offshore petroleum and natural-gas fields, and bauxite, magnesite (of which Greece is a major world producer), iron ore, zinc, and lead are mined and quarried on land.

Manufacturing accounts for about one-sixth of the GNP, employs about one-fifth of the labour force, and, although well-diversified, is located mostly in the Athens area. Principal products include food, beverages, and tobacco; textiles; chemicals; clothing; and transport equipment. Electrical-energy production is about nine-tenths from thermal-power plants and the rest from hydroelectric plants. Construction generates a small percentage of the GNP and employs about one-twelfth of the labour force.

Tourism, an important source of income, is centred upon Greece's antiquities and museums, winter vacations in the islands, and folk festivals and cultural events. One of the most popular tourist destinations in Europe since the 1960s, Greece attracts visitors primarily from the United Kingdom, Germany, and the United States.

Most of the 5,000 registered labour unions in Greece are affiliated with the Greek general Confederation of Labour.

Deficits in Greece's international-trade balance grew steadily in the 1970s and 1980s, and, in spite of limited price controls, devaluation of the Greek monetary unit (the drachma), and austerity budgets, annual inflation rose as well. Acceptance of Greece into the European Economic Community (EEC) in 1981 offered some economic improvement through wider markets for Greek products and EEC financial-aid benefits.

Greece has some 1,540 miles (2,479 km) of railway, and more than four-fifths of its road network is paved. The merchant fleet is one of the world's largest, and Greece is the principal maritime nation in the EEC. There are nine international airports, including Athens, Iráklion (Crete), and Rhodes; the state-owned Olympic Airways has domestic as well as international service.

Greece's exports include food (such as olive oil and concentrated tomato puree), beverages, and tobacco; clothing; petroleum products; and textile yarn—all such products going principally to Germany, Italy, and France. The nation's imports of machinery and transport equipment (including passenger cars), crude petroleum, food and beverages, and chemical products come from Germany, Italy, France, Japan, and Saudi Arabia.

Government and social conditions. Greece is a parliamentary democracy whose 1975 constitution established a 300-member, unicameral Parliament whose majority-party leader becomes prime minister. The Parliament legislates and elects a president whose duties are largely ceremonial. With the consent of the advisory body known as the Council of the Republic, the president can discharge the government and dissolve the Parliament. Highest judicial authority in Greece rests with the Supreme Court, State Council, and Comptroller's Council. There are four dominant political parties: the Democratic Socialist Party, the New Democracy Party, the Panhellenic Socialist Movement (Pasok), and the Communist Party of Greece.

Health and sanitary conditions in Greece have improved greatly since the end of World War II. Malaria, once a scourge, has been virtually eradicated. Modern causes of death are those of developed countries: cancer and cardiovascular and cerebrovascular diseases. Infant mortality in Greece is near the average rate for Europe as a whole, and life expectancy at birth is more than 72 years for men and 76 years for women.

All public education in Greece is free and compulsory between the ages of 6 and 15. Since the 1950s Greece's educational system has raised the country's literacy rate from less than 30 percent to nearly 95 percent. There are several major institutions of higher education, including the National Capodistrian University of Athens and the National Technical University of Athens, both founded in the 1830s.

There are more than 140 daily newspapers in Greece. Radio and television are operated by the state and rarely depart from a pro-government stance.

Statuary and other remains in the many museums of Greece (including the Acropolis Museum in Athens and the museum of Byzantine materials in Mistra) recall ancient Greece and the culture it bequeathed to the West. This legacy is important in the culture of contemporary Greece and helps the economy by attracting tourists. The later Christian traditions of the country continue to provide a fertile cultural source, generating varied folk-art and religious festivals. Modern Greek poets have attained international note, as have contemporary Greek musicians.

History. In many respects, ancient Greece was the mother of Western civilization. Its achievements were by any standards remarkable, and its legacy in the arts and sciences incalculable. Greece's beginnings, however, were inauspicious. Habitation is evident from Paleolithic times, but the Bronze Age history (3000–1000 BC) of Greece is trivial beside that of the great empires of the East and Egypt.

About 2000 BC an Aegean civilization known as Minoan developed on the island of Crete. The Minoans were literate, urban, and involved in maritime trade. Natural calamities and conquest brought an end to Minoan civilization sometime after 1400 BC.

Indo-European peoples began entering Greece in about 2000 BC. The resulting Mycenaean civilization dates from about 1600 BC and was heavily influenced by Crete. About 1200 BC the Dorians, another Indo-European people, invaded Greece, and a dark age followed, known mostly through the Homeric epics. At the end of this time, classical Greece began to emerge (*c.* 750 BC) as a loose composite of city-states with a heavy involvement in maritime trade and a devotion to art, literature, politics, and philosophy. This remarkable civilization reached its zenith after repelling the invasions of the Persians (5th century) but began to decline after the civil strife of the Peloponnesian War (431–404 BC). In 338 BC the Greek city-states were taken over by Philip II of Macedon. Though no longer an independent entity, Greece enjoyed a measure of immortality as its culture was spread by Philip's son Alexander the Great throughout his vast empire. The Romans, themselves heavily influenced by the culture of Greece, conquered the Greek states during 205–146 BC.

The barbarian invasions of the late Roman Empire found Greece reduced to a shadow of its former glory, but Greek culture, and particularly the Greek language, survived in the eastern half of the Roman Empire, the Byzantine Empire. Largely through the efforts of the Byzantine church, the peoples who invaded Greece from the 5th to the 7th century AD were converted to Greek Christianity. Greece remained part of the Byzantine Empire until the attempts of the Crusaders to establish states in Greece and the Middle East from the late 11th to the 15th century. Byzantium recaptured most of these states, but by 1460

virtually all of Greece had become part of the expanding Ottoman Empire. The Ottoman occupation was harsh, but the Orthodox Church was left intact. As a result, the church came to represent Greek nationalism.

Revolution against the Ottomans came in 1821, largely the result of Greek social developments and European interference. The struggle was long and hampered by internal dissensions, but Greek independence was recognized in 1830, and the Bavarian Otto I was placed on the throne in 1833.

Otto was deposed in 1862 and replaced by the Dane George I. Greek borders expanded during his reign, but an attempt to annex Anatolia after World War I was unsuccessful.

Instability has characterized 20th-century Greek government. A republic was proclaimed in 1924, but the monarchy was restored in 1935. Civil war followed World War II and lasted until 1949, when communist forces were defeated. There was a military coup d'état in 1967. The military rulers abolished the monarchy and proclaimed a republic in 1973, but the military government was itself overthrown at the end of the same year. Since then, democratically elected civilian governments have succeeded one another.

Greece, Church of, also called GREEK ORTHODOX CHURCH, the established church of Greece, and one of the most important autocephalous, or ecclesiastically independent, churches of the Eastern Orthodox communion. During the Byzantine Empire and the subsequent Turkish occupation of Greece, the Church of Greece was under the administration of the ecumenical patriarch of Constantinople. It was declared autocephalous by the Council of Nauplia in 1833, and its independence was recognized by the ecumenical patriarch in 1850.

The Church of Greece is organized as a state church according to the pattern adopted in Russia under Peter the Great. Supreme authority is vested in the synod of all the bishops under the presidency of the archbishop of Athens and all Greece. A second synod, under the same presidency, consists of 12 bishops, each serving for one year only. The former deals with general church questions, the latter with details of administration. With about 9,400,000 faithful in the late 20th century, the church is divided into 81 small dioceses; 20 of these, in northern Greece and in the islands, are nominally under the jurisdiction of Constantinople. Only a small minority of the church's priests have a university education, many village and town priests having merely studied theology for two years at higher seminaries after graduating from high school. The theological faculties at the universities of Athens and Thessaloníki train candidates for the episcopate, as well as religious teachers who remain laymen.

Orthodoxy as a popular religion still retains a powerful hold on the country, and the Church of Greece's adaptation to the modern secularized world has proved a major problem. Several monastic communities, chiefly the monastic republic of Mount Athos (*see* Athos, Mount), are the main strongholds of the traditional forms. With a few notable exceptions—the monastery of Longovarda on the island of Páros and the monastery of Saint John the Evangelist on Pátmos—the recruitment of candidates for the monastic communities is poor.

Greek alphabet, writing system that was developed in Greece in about 1000 BC. It is the direct or indirect ancestor of all modern European alphabets. Derived from the North Semitic alphabet via that of the Phoenicians, the Greek alphabet was modified to make it more efficient and accurate for writing a non-Semitic language by the addition of several new letters and the modification or dropping of several others. Most important, some of the symbols of the Semitic alphabet, which represented only consonants, were made to represent vowels: the Semitic consonants *'alef, he, yod, 'ayin,* and *vav* became the Greek letters *alpha, epsilon, iota, omicron,* and *upsilon,* representing the vowels *a,e,i,o,* and *u,* respectively. The addition of symbols for the vowel sounds greatly increased the accuracy and legibility of the writing system for non-Semitic languages.

Before the 5th century BC the Greek alphabet could be divided into two principal branches, the Ionic (eastern) and the Chalcidian (western); differences between the two branches were minor. The Chalcidian alphabet probably gave rise to the Etruscan alphabet of Italy in the 8th century BC and hence indirectly to the other Italic alphabets, including the Latin alphabet, now used for most European languages. In 403 BC, however, Athens officially adopted the Ionic alphabet as written in Miletus, and in the next 50 years almost all local Greek alphabets, including the Chalcidian, were replaced by the Ionic script, which thus became the classical Greek alphabet.

The early Greek alphabet was written, like its Semitic forebears, from right to left. This gradually gave way to the *boustrophedon* style, and after 500 BC Greek was always written from left to right. The classical alphabet had 24 letters, 7 of which were vowels, and consisted of capital letters, ideal for monuments and inscriptions. From it were derived three scripts better suited to handwriting: uncial, which was essentially the classical capitals adapted to writing with pen on paper and similar to hand printing; and cursive and minuscule, which were running scripts similar to modern handwriting forms, with joined letters and considerable modification in letter shape. Uncial went out of use in the 9th century AD, and minuscule, which replaced it, developed into the modern Greek handwriting form.

For a table of the Greek alphabet, *see* MACROPAEDIA: Languages of the World.

Greek Anthology, collection of Greek epigrams, songs, epitaphs, and rhetorical exercises that includes about 3,700 short poems, mostly written in elegiac couplets. Some of the poems were written as early as the 7th century BC, others as late as AD 1000. The nucleus of the *Anthology* is a collection made early in the 1st century BC by Meleager, who called it *Stephanos* (Greek: "crown," "collection of flowers"); he introduced it with a poem comparing each writer in the collection to a flower. In the late 9th century AD, Constantinus Cephalas joined Meleager's collection to those of Philippus of Thessalonica (1st century AD), Diogenianus (2nd century), and Agathias (6th century). Late in the 10th century the Cephalas collection was revised and augmented. This revision forms the first 15 books of the *Anthology,* preserved in the Palatine manuscript, discovered at Heidelberg, Ger. The 16th book is made up of poems culled from another manuscript version of Cephalas' collection (the Planudean manuscript) and compiled by Maximus Planudes in 1301.

The literary value of the *Anthology* lies in the distinction and charm of perhaps one-sixth of the whole. For the rest, it preserves a good deal that is of historical interest; it illustrates the continuity of Greek literature for almost 2,000 years, because the latest inclusions in it are in language, style, and feeling not too different from the earliest inclusions. The *Anthology* also had a persistent and considerable influence on later literature.

Greek art, the sculpture, architecture, painting, and other visual and decorative art forms as practiced by the ancient Greeks.

Greek art is treated in a number of articles in the MACROPAEDIA. For a general discussion of ancient Greek culture within its historical context, *see* Greek and Roman Civilizations, Ancient. For treatment of Greek achievements in specific art forms, *see* Architecture, History of Western; Decorative Arts and Furnishings; Painting, History of Western; Sculpture, History of Western.

Greek calendar, any of a variety of dating systems used by the several city-states in the time of classical Greece and differing in the names of their months and in the times of beginning the year. Each of these calendars attempted to combine in a single system the lunar year of 12 cycles of phases of the moon, totaling about 354 days, and the solar year of about 365 days. Generally, three extra months were intercalated in every period of eight solar years. This practice, which was adequate to keep the calendar roughly in step with the seasons, seems to have been in force as early as the 8th century BC. Months, each of which contained either 30 or 29 days, began with the new moon. The Greek calendar that has been most studied, the Athenian, customarily began its year with the first new moon after the summer solstice.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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Greek Catholic Church, an Eastern Catholic church of the Byzantine rite, in communion with Rome since the mid-19th century. A small body of Greek Catholics came into existence in Constantinople (modern Istanbul) and Thrace largely through the efforts of John Hyacinth Marango, a Latin priest, and Polycarp Anastasiadis, a Greek priest. An apostolic exarchate, eventually located in Athens, was created in 1911, and a separate exarchate at Istanbul was set up in 1932.

The term Greek Catholic properly applies only to members of the Catholic church, either Byzantine or Latin rite, who are of Greek nationality, but Catholic Melchites and Ukrainians also call themselves Greek Catholics.

Greek Civil War (December 1944–January 1945 and 1946–49), two-stage conflict during which Greek Communists unsuccessfully tried to gain control of Greece.

The first stage of the civil war began only months before Nazi Germany's occupation of Greece ended in October 1944. The German occupation had been resisted by two principal Greek guerrilla forces, the Communist-controlled EAM-ELAS (Ethnikón Apeleftherotikón Métopon-Ethnikós Laïkós Apeleftherotikós Strátos; "National Liberation Front-National Popular Liberation Army") and the EDES (Ellínikos Dímokratikos Ethnikós Strátos; "Greek Democratic National Army"), which occasionally cooperated in action. After eliminating all of its political and guerrilla rivals except the EDES in early 1944, EAM-ELAS set up a provisional government in the Greek mountains that by implication disowned both the Greek king and his government-in-exile. Upon the German troops' withdrawal from Greece in October, the Communists and royalist Greek guerrillas were brought together under British auspices in an uneasy coalition government in Athens. But this government disintegrated a few weeks later when the Communist members of the coalition refused to disband their guerrilla force. A bitter civil war broke out in Athens on December 3, which the British military forces managed to suppress with great difficulty, after EAM-ELAS had overrun virtually all of Greece except Athens and Salonika.

The Communists accepted defeat and the disbandment of their forces at a conference in February 1945, and a general election was held in Greece in March 1946. The Communists and their followers abstained from the voting,

however, and a royalist majority was returned. A plebiscite was then held in September 1946 which restored the Greek king to the throne. During 1946 a full-scale guerrilla war was reopened by the Communists, who had gone underground. The commitment of defending Greece became too much for Great Britain, and it was taken on by the U.S. government, with the announcement of the Truman Doctrine. Massive military and economic aid from the United States was much needed, for by the end of 1947 the Communists had proclaimed a provisional government in the northern mountains.

This second Communist rebellion lasted until 1949, when the U.S.-supplied and strengthened Greek Army managed to clear the rebel centres from the mountainous Greek interior. On Oct. 16, 1949, the Greek Communist broadcasting station announced the end of open hostilities, and many of the remaining Communist fighters fled the country into neighbouring Albania. It is estimated that more than 50,000 combatants died in the conflict, and more than 500,000 Greeks were temporarily displaced from their homes by the fighting. The internecine strife and fierce brutality that characterized the civil war left a lasting legacy of bitterness between segments of the Greek population.

Greek-cross plan, church plan in the form of a Greek cross, with a square central mass and four arms of equal length. The Greek-cross plan was widely used in Byzantine architecture and in Western churches inspired by Byzantine examples. *See* church (architecture).

Greek Democratic National Army: *see* EDES.

Greek fire, any of several flammable compositions used in warfare in ancient and medieval times. More specifically the term refers to a mixture introduced by the Byzantine Greeks in the 7th century. The employment of incendiary materials in war is of ancient origin; many writers of antiquity refer to flaming arrows, firepots, and such substances as pitch, naphtha, sulfur, and charcoal. But true Greek fire was evidently a petroleum-based mixture. It was invented during the reign of Constantine IV Pogonatus by a Greek-speaking Syrian refugee from the Arab conquest of Syria. It could be thrown in pots or discharged from tubes. It apparently took fire spontaneously and could not be extinguished with water.

Greek fire launched from tubes mounted on the prows of Greek ships wrought havoc on the Arab fleet attacking Constantinople in 673. Greek fire was later employed effectively by Leo III the Isaurian against an Arab attack in 717 and by Romanus I Lecapenus against a Russian fleet in the 10th century. Its deadliness in combat, especially at sea, has been cited as a prime reason for the long survival of the Byzantine Empire in the face of many enemies. The art of compounding the mixture was a secret so closely guarded that its precise composition remains unknown to this day.

Greek Independence, War of (1821–32), rebellion of Greeks within the Ottoman Empire, a struggle which resulted in the establishment of an independent kingdom of Greece. The rebellion originated in the activities of the Philikí Etaireía ("Friendly Brotherhood"), a patriotic conspiracy founded in Odessa in 1814. By that time the desire for some form of independence was common among Greeks of all classes, whose Hellenism, or sense of Greek nationality, had long been fostered by the Orthodox Church, by the survival of the Greek language, and by the administrative arrangements of the Ottoman Empire. Their economic progress and the impact of Western revolutionary ideas further intensified their Hellenism. The revolt began in March 1821 when Alexandros Ypsilantis, the leader of the Etairists, crossed the Pruth River into Turkish-held Moldavia with a small force of troops. Ypsilantis was soon defeated by the Turks, but, in the meantime, on March 25, 1821 (the traditional date of Greek independence), sporadic revolts against Turkish rule had broken out in the Peloponnese, in Greece north of the Gulf of Corinth, and on several islands. Within a year the rebels had gained control of the Peloponnese, and in January 1822 they declared the independence of Greece. The Turks attempted three times (1822–24) to invade the Peloponnese but were unable to retrieve the area.

Internal rivalries, however, prevented the Greeks from extending their control and from firmly consolidating their position in the Peloponnese. In 1823 civil war broke out between the guerrilla leader Theódoros Kolokotrónis and Geórgios Kountouriótis, who was head of the government that had been formed in January 1822 but that was forced to flee to the island of Hydra in December 1822. After a second civil war (1824), Kountouriótis was firmly established as leader, but his government and the entire revolution were gravely threatened by the arrival of Egyptian forces, led by Ibrāhīm Pasha, which had been sent to aid the Turks (1825). With the support of Egyptian sea power, the Ottoman forces successfully invaded the Peloponnese; they furthermore captured Missolonghi (April 1826), the town of Athens (August 1826), and the Athenian acropolis (June 1827).

The Greek cause, however, was saved by the intervention of the European powers. Favouring the formation of an autonomous Greek state, they offered to mediate between the Turks and the Greeks (1826 and 1827). When the Turks refused, Great Britain, France, and Russia sent their naval fleets to Navarino, where, on Oct. 20, 1827, they destroyed the Egyptian fleet. Although this severely crippled the Ottoman forces, the war continued, complicated by the Russo-Turkish War (1828–29). A Greco-Turkish settlement was finally determined by the European powers at a conference in London; they adopted a London protocol (Feb. 3, 1830), declaring Greece an independent monarchical state under their protection. By mid-1832 the northern frontier of the new state had been set along the line extending from south of Volos to south of Arta; Prince Otto of Bavaria had accepted the crown, and the Turkish sultan had recognized Greek independence (Treaty of Constantinople; July 1832).

Greek language, Indo-European language spoken primarily in Greece. It has a long and well-documented history—the longest of any Indo-European language—spanning 34 centuries from the 14th century BC to the present.

A brief treatment of the Greek language follows. For full treatment, *see* MACROPAEDIA: Languages of the World.

The form of Greek that is written and spoken today evolved in four phases. The first, Ancient Greek, is subdivided into Mycenaean Greek (14th–12th century BC), which is characterized by the use of a syllabic script called Linear B, and Archaic and Classical Greek (8th–4th century BC), which date from the adoption of the alphabet. The concept of an alphabet, particularly the revolutionary development of five letters that signify vowel sounds, is a Greek innovation. The Roman alphabet (used for English) and many other of the world's writing systems are based on the Greek model.

Ancient Greek was followed by Hellenistic Greek, or Koine (4th century BC–4th century AD), and the Byzantine phase (5th–15th century AD). In both of these phases, copies of the great works of Classical literature managed to survive, recorded not altogether accurately in the papyri of the Hellenistic phase and in Byzantine manuscripts.

The fourth stage of the evolution of the Greek language is Modern Greek, which dates from the 15th century. With some variation, the written and spoken styles found in this period are the same as those that are in use today. As is true of most languages, there are a number of dialects in Modern Greek. But until the Hellenistic phase, when an Ionic-Attic Greek became dominant, the dialects were considerably more numerous: they comprised a West group, an Aeolic group, an Ionic-Attic group, and an Arcado-Cypriot group. Two great events, the Dorian invasions of Greece and subsequent colonizations during the 8th century BC, shifted and mixed the local dialects. Much great literature, however, had already developed on a dialect basis. For example, the Homeric epic combines Aeolic and Ionic features, while choral lyric is Doric; Herodotus and Hippocrates wrote their famous prose in Ionic, and Thucydides and Plato wrote in the Attic dialect, which was also the language of dialogue in tragedy.

The fairly uniform variety of spoken Greek that came out of the political upheavals and the establishment of Alexander's empire in the 4th century BC is known as Koine (the common language), or Hellenistic Greek. Though this form had the advantages of unifying the formerly fragmented local dialects and simplifying the complicated Greek grammar by incorporating some foreign ideas, it also had a drawback in the minds of an influential school known as the Atticists. Differing as it did from the language of Plato and Demosthenes, Koine was dismissed as "impure" by the Atticists, who urged that the archaic language be used for all writing. Their suggestion was adopted, and thus the written form, known as Byzantine Greek, stayed rooted in the Attic tradition while the spoken language continued to develop. A chasm between written and spoken languages opened and gradually widened as Koine further developed.

The Modern Greek of today is of three kinds. The first includes all the local dialects which can be so different from one another as to seem separate languages. The second type is Demotic, a separate form, that is spoken in all urban centres and is understood by almost everyone. The third type is Katharevusa, the "pure" language of the Atticists, which is now used mostly for technical publications. Since 1976 Demotic has been the official language of the state, replacing Katharevusa as the language for government documents, public notices, education, newspapers, and many works of literature.

Greek grammar has come down through the ages fairly intact, though some simplifications have been implemented. Ancient Greek featured three numbers: singular, dual, and plural. Of these, only the singular and plural now remain. But the ancient categorizations of nouns into masculine, feminine, and neuter are still in use, and adjectives agree in gender, number, and case with their nouns. Modern Greek has a verb inflected for mood (indicative, subjunctive, imperative); aspect (perfective, imperfective); voice (active, passive); tense (present, past); and person (first, second, third, singular, and plural). In the Mycenaean period the Greek declension contained at least six cases—nominative, accusative, genitive, dative, locative, and instrumental—but the locative and instrumental cases have been dropped.

Above all, Greek is a language distinguished by an extraordinarily rich vocabulary and supple syntax. It is spoken today on the Greek peninsula, on most of the islands of the Aegean, and on the west coast of Anatolia, where groups of Greek-speaking Indo-Europeans established themselves in the 2nd millennium BC.

Greek law, legal systems of the ancient Greeks, of which the best known is the law of Athens. Although there never was a system of institutions recognized and observed by the nation as a whole as its legal order, there were a number of basic approaches to legal problems, certain methods used in producing legal effects, and a legal terminology, all shared to varying degrees by the numerous independent states constituting the Hellenic world. It should not be forgotten, however, that such common foundations as there were gave rise to a great variety of individual legal systems differing as to their completeness and elaboration and reflecting the tribal (*i.e.,* Dorian, Ionian, etc.) and historical backgrounds as well as the changing social, economic, political, and intellectual conditions of their respective societies.

Greek legal life of the 5th and 4th centuries BC was determined by three dominant factors. One was the existence of a multiplicity of city-states (*poleis*), each of which possessed and administered its own set of laws. The second element was the fact that in many, if not most, of the *poleis* (one certain exception was Sparta) the laws were laid down in written statutes, some of them being elaborate and more or less complete codes setting forth procedural methods and substantive rules for the administration of justice. This was the result of a great movement for legal codification that from the 7th century had swept the Greek world. Solon of Athens (594 BC), who had been preceded in 621 by Draco, is the best known of a number of famous lawgivers, other outstanding ones being Zaleucus of Locri Epizephyrii (south Italy) and Charondas of Cantana; Lycurgus of Sparta is considered legendary. A number of enactments rightly or wrongly attributed to Solon still are known from literary quotations rendering them in a modified form that reflects a legislative reform of 403–402 BC. One of the Draconian laws has been preserved in an Attic inscription giving it in a revised version dating from 409 or 408 BC. The law code of Gortyn, which is itself the revised version of an older code, is the only one that comes close to being fully preserved.

The third determining factor for Greek law was the absence of a body of jurisprudence comparable to that of the Romans. Even the Attic orators, for all their practical familiarity with the laws of the city, were mainly interested in presenting arguments suited to persuade the mass juries before whom they had to argue, not in analyzing the legal system with the object of obtaining a deeper insight into its implications. Nor, for that matter, did the philosophers care for the law as it was, their aim being the discovery of abstract standards of justice.

The three characteristics outlined here were important influences on the general character of Greek law. The first two of these factors resulted in a rather stiff positivism. Contrary to views held by scholars until recently, new research has shown that the Athenian dicasts who sat in judgment did not feel free to base their verdicts on vague notions of equity but adhered, at least in theory, to the literal meaning of the written statutes (*nomoi*), which they were bound by a solemn oath to observe. This somewhat narrow clinging to literal interpretation, combined with the absence of any attempt to deal with statutes or legal situations in an analytical manner, led to the result that Greek law never attained the doctrinal refinement of Roman law, notwithstanding the remarkable technical flexibility that characterized it in Hellenistic times.

At the present stage of research, the only judicial system sufficiently known to warrant description is that of 4th-century Athens. In the democratic period its justice was administered by magistrates, popular courts (*dikastēria*), and the Areopagus. Functionaries received the actions and arranged the trials that took place before the courts, with each functionary having a specific jurisdiction: the archon over matters pertaining to family and succession, the "king" (*archōn basileus*) over religious matters (including murder), the *thesmothetai* ("determiners of customs") and others over the rest. A special jurisdiction was that of the *polemarchos* (literally, "general") over the metics (resident aliens). The trial competence of the dicasteries rested on the principle, first introduced within certain limits by Solon and made universal after the establishment of full democracy, that the citizenry in its totality should judge the affairs of its members. The dicasts were selected by lot, every citizen over 30 years old being eligible. In rare cases of great political importance, the whole *hēliaia* (*i.e.,* the popular assembly organized as a court of 6,001 men) was convened. Normally sections of the *hēliaia* (specifically called *dikastēria*), composed of 1,501, 1,001, or 501 men in criminal cases and 201 men in civil cases, were charged with the decision.

Murder cases were argued before the Areopagus, a body composed of former archons. Probably transformed from an original council of the nobility, it was a relic of the predemocratic period.

In the Greek view, the trial served to determine the justification of a claim to seize the defendant's person or belongings or both by way of an enforcement proceeding (*praxis*). The claim (*dikē*) might be raised by the plaintiff in pursuance of a private right or as a "public" (*dēmosia*) *dikē* for the purpose of obtaining the defendant's punishment. The filing of a public *dikē* (technically called a *graphē*) was open to every citizen. Apart from this, the differences between private and criminal procedures were slight.

Both private *dikai* and *graphai* had to be initiated by summoning the defendant (who might be under arrest) to the magistrate having jurisdiction in the matter and by filing a written complaint with the latter, who would subject it to a preliminary examination (*anakrisis*). Parties to a civil suit concerning pecuniary affairs were then sent to a public arbitrator (*diaitētēs*). If one of them refused to accept the award or if the matter was not subject to compulsory arbitration, the case was referred to a dicastery presided over by the magistrate. The dicasts, after listening to the arguments and evidence submitted by the parties, found their decision, which could only be a choice between the two proposals made by the parties, by secret ballot without debate. Their judgment was final between the parties, but the loser might bring a private tort action (*dikē pseudomartyriōn*) against a witness whose false deposition had influenced the verdict. A victorious plaintiff in a private lawsuit had to enforce the judgment himself by attaching property of the defendant.

In distinct contrast with the Greek philosophy of justice, the positive law of ancient Greece had little influence on later developments. Its concepts and methods did, of course, widely determine the legislation and practice of Hellenistic monarchies, and a few institutions of Greek origin, such as the "Rhodian" maritime law of jettison or certain methods of documentation (mostly Hellenistic, to be sure), were adopted by the Romans. Contrary to views held some decades ago, however, the late Roman law, and with it west European legal doctrine, did not undergo any notable degree of Hellenization. Only in the customs of isolated places in Greece itself do some ancient traditions seem to survive; their extent is still a problem for legal historians.

Greek literature, body of writings in the Greek language by the peoples of mainland Greece, the Greek Islands, ancient Magna Graecia (Sicily and southern Italy), and Asia Minor. Its history embraces the ancient (before the 4th century AD), Byzantine (4th century AD–1453), and modern (after 1453) periods.

A brief treatment of Greek literature follows. For full treatment, *see* MACROPAEDIA: Greek Literature; Greek Dramatists.

Ancient. Most of the literary genres of the modern Western world were invented or at least formalized by the ancient Greeks: the epic (which in antiquity meant a long verse narrative using a wide canvas of characters and events); elegiac and lyric poetry; drama; the pastoral; history (as opposed to mere chronicle); oratory (studied in antiquity as a branch of rhetoric); and philosophy. From the late 4th century BC a selection of Greek texts was collected and annotated by scholars at Alexandria, so that what has survived of ancient Greek literature reflects that initial selection. (*See also* Greek Anthology.)

As epics the *Iliad* and *Odyssey* of Homer dominated the Greek mind as did no other works. They were the outcome of centuries of oral tradition, and it is as uncertain when they were actually written down (perhaps before 700 BC) as it is that there was one single person called Homer who wrote them. The *Iliad* is an episode in, and the *Odyssey* a sequel to, the story of the Trojan War. The graphic pictorial language, dramatic confrontations, and heroic characters in these works still make a powerful impression on modern readers. The didactic epics of Hesiod (possibly 7th century BC) were intended to instruct: his *Theogony* was a genealogy of the gods, and his *Works and Days* was part almanac, part agricultural treatise, and part homily.

Elegiac poetry developed from the end of the 8th century. Such poems were composed for different occasions—amatory, martial, and so on. Unlike epics they gave scope for individual viewpoint and were thus a prelude to the reflectiveness of lyric poetry. Three great elegiac poets emerged in the 7th and 6th centuries BC: Tyrtaeus, a high-minded soldier and politician; Mimnermus of Colophon, a hedonist with a melancholy tinge; and Theognis, an aristocrat and traditionalist. Concerning lyric poetry, a profusion of poets from the 7th, 6th, and 5th centuries BC are known mostly by tantalizing fragments of their works: Archilochus of Paros, Alcaeus, Alcman, Stesichorus, Ibycus, and Bacchylides. Sappho was especially important because of her power of describing intense feelings in direct and graphic language, while Anacreon of Teos impresses with his elegance and polish. Much has survived of the work of Pindar, including his *Olympiads,* written in celebration of the Olympic victors.

A language as versatile and inventive as Greek poses problems of translation, nowhere more acutely than in the tragedies of the playwright Aeschylus (525–456/455). Versions of his plays are still performed, sometimes with impact, but no translation can convey the richness and complexity of his poetical thought. Aeschylus' central theme of man's relationship with the gods is exemplified is his *Oresteia* trilogy. Sophocles (*c.* 496–406) focused on more individual crises such as that of *Antigone,* caught between the dictates of public authority and family duty. Euripides (*c.* 480–406) was controversial in his own time and was daringly modern in his interest in the pathology of extreme emotions such as, in *Hippolytus,* frustrated love. Greek comic drama reached its peak with Aristophanes (*c.* 450–385), who comments with profaneness and humanity on the Athenian scene. His titles—such as *The Frogs, The Clouds,* and *The Birds*—were satirical, but his plays have an underlying seriousness, and *Lysistrata* is a moving antiwar play. The domestic comedies of Menander in the 4th century BC belong to a slightly later and different era, the Hellenistic, and introduce a whole spectrum of stock characters.

Theocritus wrote pastorals of various types, including idylls, meaning literally "little poems," although some of them were more extended. He also produced bucolics, mimes, and epigrams.

True historical method, involving the sifting of evidence, really begins in Western culture with Herodotus (*c.* 484–before 420). He was a wide traveler and a brilliant narrator. Modern archaeology has confirmed parts of his history of the Greco-Persian Wars that were long disbelieved. Thucydides (*c.* 460–*c.* 400) documented the wars between Athens and Sparta with objective detachment, using a style that is a model of compression and terseness. Xenophon wrote copiously during the complex aftermath to the Peloponnesian War and is best remembered for the *Anabasis.*

In oratory the speeches of Demosthenes (384–322) were studied from antiquity onward as models in the art of persuasion. His invectives against Philip II of Macedon are especially famous. The philosophical works of Plato (*c.* 428–348/347), in addition to their philosophic content, are extended prose poems of enormous power. The monumental Aristotle (384–322) created for Western civilization a whole vocabulary of literary criticism and philosophical and scientific thought.

Byzantine. The literature written in Greek during the so-called Byzantine period (AD 330–1453) is a genuine expression of Byzantine civilization and forms an interregnum between the ancient literature written in Classical Greek and those modern works written in vernacular, or living, Greek.

Byzantine literature was influenced by the politics of empire and by court life in Constantinople (Byzantium). The capital drew all the significant powers of the empire to itself, and Byzantine literature thus acquired a metropolitan, aristocratic character. This development explains many of its peculiarities—for instance, the number and the solemnity of the laudatory speeches to the emperor and his family and the preponderance of poems on the emperor's glorious deeds.

The static character of Byzantine society is reflected in its conservatism in the use of outward literary forms and language. This language had to preserve the forms of the speech of the Greek New Testament and the Church Fathers and of Greek classical literature as well. The "Attic" language in which the Bible and the classical writings were preserved was up to that time the speech of the cultured in all the schools of the known world. Thus, the Byzantines would not permit this language to display in literature the leveling and simplifying influences that it underwent in daily use in the mouths of the people. Thus, while the language of daily life developed into modern Greek, in the literary field Byzantine literature clung to speech forms of the Hellenistic Greek stage.

In contrast to the failings of much other Byzantine literature, Byzantine historical writing preserved the best traditions of the Roman *historia* right through the centuries and accompanied Byzantine history to the end with a long series of highly finished accounts of events; it was the 12th century before western Europe had anything comparable to set beside this achievement. It must also be stressed that the traditionalism of the Byzantines saved for posterity the best of ancient Greek literature.

Modern. With the capture of Constantinople by the Turks in 1453, and the subsequent incorporation of Greece into the Ottoman Empire, many learned Greeks found refuge away from their native land and learned the languages of foreign peoples. When they wrote, they often used the languages of those peoples, though most of them also wrote in Greek.

Modern Greece inherited two literary styles—the archaic, known as the Katharevusa, and that of contemporary speech, known as the Demotic. In the progress of these two literary streams the Demotic movement of the 1880s reached a turning point when a group of young and gifted writers, the most important of whom was Kostís Palamás, founded the so-called new school of Athens. It was a reaction against the dead language and the exuberance of the Greek Romantics. In 1888 Ioánnes Psicharís (1854–1929) became the leader of the movement with the publication of *Tó taxídi mou* (ostensibly a series of traveling impressions, but really intended to awaken the linguistic conscience of the Greeks). The struggle of the proponents of Demotic against the dominance of Katharevusa soon broadened into a reaction against the whole classical tradition, advocating a return of Greek art and literature to contemporary life. This was helped by the study of modern Greek folklore, then promoted by Nikolaos Politis, and by the researches of Konstantínos Paparrhigópoulos into medieval and modern Greek history. The battle ended with the decisive victory of the living language, Demotic, for all writings of an imaginative character. Even in works of science and in official documents it eventually became the dominant form of the language.

From the fall of Constantinople until the War of Greek Independence (1821–29), the most developed poetry appeared in Crete, Rhodes, Cyprus, and other Greek lands under non-Turkish occupiers. In those parts of the Greek world under Turkish domination, the only noteworthy poetry is to be found in the folk songs and the klephtic ballads (ballads of Greek outlaws), which contain some of the most beautiful and vivid verse written in Greek.

The liberation of Greece from the Turks (1828) made Athens, the capital of the new kingdom, the main centre of Greek intellectual life. The Romantic school of poetry in Athens was founded in the mid-1800s by Aléxandros Soútsos, who influenced Greek poetry for years. Akhillefs Paráskhos was the leading figure in the last period of the school. By choosing Demotic over Katharevusa as the literary language, the poet Dhionísios Solomós pointed the way that Greek poetry was to follow after the Demotic movement of the 1880s. Moreover, he introduced a number of Western metrical forms, thus freeing Greek poetry from the monotony of the 15-syllable political verse mainly in use previously.

The feeling that Greek poetry was heading for utter sterility stirred a group of young poets to form a new school of Athens in about 1880. They aspired to become Greek Parnassians, masters of a restrained and objective art, but at the same time drawing their inspiration from contemporary Greece and using the living idiom. The one great Greek poet who remained untouched by the influence of the new school of Athens was Constantine Cavafy. In no other Greek poet is the tragedy of life so sensually expressed or sensuality felt more tragically, although his dark outlook is relieved by exquisitely lyrical and often ironical passages.

Of the many other poets who wrote in Greece after the end of World War I, several should be mentioned: Kostas Karyotakis, whose pessimistic and often sarcastic poems are most arresting; George Seferis, a genuine Symbolist, who records with true poetic touch the fate of modern man and was awarded the Nobel Prize for Literature in 1963; and Níkos Kazantzakís, better known as a novelist, who is also the author of a formidable "epic" poem 33,333 lines long, *Odyssey.* The chief poets who emerged after World War II—mainly Symbolists, Surrealists, or "poets of the absurd"—were Georgios Themelis, Miltos Sachtouris, Zoï Karelli, Dimitrios Papaditsas, Takis Sinopoulos, and Takis Varvitsiotis.

With the publication in 1888 of *Tó taxídi mou* by Ioánnes Psicharís and the development of the Demotic movement, modern Greek prose was changed forever. The vernacular was used not only in poetry but also in all prose works of an imaginative character. The writers of that period, notably the short-story writers Alexandros Papadiamantis and Andreas Karkavitsas, turned to their "living roots" for inspiration, finding them in the life of the Greek village. The urban novel was introduced into Greek literature in the late 19th century by Ioánnes Psicharís and by Gregorios Xenopoulos. They were followed in the early 20th century by Konstantinos Christomanos.

With the writers of the 1930s, Greek vernacular prose achieved maturity and Greek novels of real significance appeared for the first time. The "war trilogy" of Stratis Myrivilis, both lively and robust, was followed by many shorter stories of power and originality. Ilias Venezis made his appearance with a striking book on his life as a prisoner of the Turks, *Noumero 31328* (1922–23). One of the most gifted authors of the 1930s was Kosmas Politis, who in his *Eroica* (1938), a book on the actions and reactions of a gang of children, as well as in his later novels, proved himself a master of the long narrative. Georgios Theotokas' long novel *Argo* (1936) and his many other writings show him to be a writer of ability and versatility and one of the best writers of a flowing and simple Demotic.

After World War II the prewar generation remained the models for younger writers of both poetry and prose. Their continuing influence was exemplified in the achievement of Níkos Kazantzakís, who at an advanced age and after a long literary career turned to the novel and achieved international recognition. His novels show outstanding creative powers and a full mastery of his medium. In spite of certain crudities, Kazantzakís is one of the great masters of Greek Demotic prose, whose wealth and vigour he deeply explored.

The younger generation of writers that emerged from World War II and the ravages of the civil war that followed had found its own voice by the 1960s. Vasilis Vassilikos, Rodis Provellengios, Nikos Kazdaglis, and Kostas Tachtsis should be singled out for their use of prose as well as for their imaginative powers and Renos Apostolidis and Spyros Plaskovitis for their short stories.

Greek music, the music of the ancient Greeks. Scholars have long speculated about the music played in ancient Greece. It is known that ancient Greek philosophers held music in high esteem; its study was deemed essential to a liberal education. Both Aristotle and Plato believed that music permanently affected the human soul, and they even went so far as to categorize the various musical modes in terms of their effects, specifying which would be beneficial to the establishment of good character. The Pythogorean philosophers valued music because it was a manifestation of fundamental mathematical truths; they discovered the fact that certain mathematical relationships coincide with musical intervals.

The lack of extensive archaeological evidence, however, prevents a reconstruction of Greek music as it was performed in its day. About 20 unearthed fragments of notated music are extant. They have been deciphered with the aid of contemporary theoretical treatises, and their notational systems provide some knowledge of melodic and rhythmic style. Relics of ancient instruments have also survived, but they are unplayable, so our understanding of how the music sounded rests solely on contemporary writings.

These musical fragments show that Greek music was predominantly vocal, although instrumental pieces were sometimes presented. The music was homophonic; *i.e.,* it consisted

of single melodic lines. One of the most important compositions was the dithyramb, a poetic text set to music and sung by a chorus in honour of Dionysus. These choruses became more elaborate and more dramatic and eventually evolved into Greek tragic drama. Poetic texts were also sung by individuals, the most striking example being the epic poems of Homer, in which the singer accompanied himself on a lyre. Ancient Greek was a pitched language, so melody had to be an outgrowth of the natural inflections of the spoken language. Greek vowels had long and short values that corresponded to long and short notes in the musical settings. Thus musical rhythms were derived from metric forms, and melodic movement was governed by the natural rise and fall of the text.

Ancient Greece appears never to have had a developed instrumental art. Percussion, brass, wind, and string instruments were all played, but the two primary instruments were the aulos, a double-reed pipe that accompanied the chorus in the dithyramb, and the kithara, a hand-held lyre used to accompany solo songs. The exact nature of the accompaniment style is unknown, but since no evidence of counterpoint or harmony appears in contemporary accounts, the accompaniment probably played a version of the melodic line, occasionally adding two-note plucked chords.

Aristoxenus, a music theorist and philosopher in the 4th century BC, wrote extensively about the harmonic system used in Greek music. Musical modes were derived from various types of tetrachords, so called because each tetrachord contained four notes. The highest and lowest pitches of all tetrachords were always a perfect fourth apart. The two interior pitches varied; they could be whole tones, half tones, quarter tones, or other microtonal intervals. Tetrachords could be joined to make longer scales either by making the top note of one tetrachord the bottom note of another or by beginning a second tetrachord a whole step up from the first tetrachord. A three-octave scale that would cover the combined vocal range of men and women was constructed by connecting many tetrachords.

Though nothing remains of ancient Greek musical practice and few instruments survive, the influence of classical Greek music theory was wide and lasting. In early Christian times the Gnostics used the Greek scale in their incantations, and Byzantium adopted the Greek modes. The Romans acknowledged Greek musical leadership and transmitted Greek theory to Europe through Boethius (*c.* AD 480–524), and the early Christian church modes drew upon its modes. But Islām is the principal heir to Greek theory through the Persians, Arabs, and Turks, whose writings in turn influenced European music from the 9th century onward. *See also* church mode; tonos.

Greek mythology, the body of myths and stories developed by the ancient Greeks concerning their gods and heroes, the nature of the cosmos, and their own religious practices.

A brief treatment of Greek mythology follows. For full treatment, *see* MACROPAEDIA: European Religions, Ancient.

Greek mythology encompasses a large variety of narrative materials. According to one classification, some narratives are religious myths proper, relating timeless tales of the gods. Others are more properly legends, accounts of quasi-historical events. Common themes from folktales told for popular entertainment are often found as well. Among the Greeks themselves, attitudes toward the stories differed. At all times there must have been those who accepted them as true accounts. Some thinkers, however, rejected either the myths or their implications. Others tried to preserve the truth of traditional tales and at the same time reject their literal assertions through allegorical interpretation, a technique employed most consistently by the Stoics.

The Greek myths are known today primarily from Greek literature. The oldest known literary sources, the *Iliad* and the *Odyssey* (9th or 8th century BC), focus on events surrounding the Trojan War and the activities of the gods' society on Mt. Olympus. Two poems by Homer's near contemporary Hesiod, the *Theogony* and the *Works and Days,* contain accounts of the genesis of the cosmos, the succession of divine rulers, the succession of human ages, the origin of human woes, and the origin of sacrificial practices. Myths are also preserved in the Homeric hymns and in fragments of epic poems on the Trojan War (the Homeric Cycle); in lyric poems, especially those composed by Pindar; in the works of the tragedians of the 5th century BC, Aeschylus, Sophocles, and Euripides; in writings of scholars and poets of the Hellenistic Age (323–30 BC), such as Callimachus, Euhemerus, and Apollonius of Rhodes; and in writers of the time of the Roman Empire, for example, Plutarch and Pausanias.

Greek religious myths are concerned with gods or heroes in their more serious aspects or are connected with ritual. They include cosmogonical tales of the genesis of the gods and the world out of Chaos and the internecine struggles among immortal beings that culminated in the supremacy of Zeus, the ruling god of Olympus. They also include the long tale of Zeus's amours with goddesses and mortal women, which usually resulted in the births of younger deities and heroes.

The principal Greek cosmological myth is found in Hesiod's *Theogony.* According to Hesiod, the world was produced by the coming into existence of four divine beings, Chaos (Space), Gaea (Earth), Tartarus (the Abyss), and Eros (Love), followed later by the separation of Uranus (the Sky) from Gaea when he was mutilated by his son Cronus. Cronus was then violently overthrown by his son Zeus, who became the current chief of the gods.

Myths about the gods described their births, victories over monsters or rivals, love affairs, special powers, or connections with a cultic site or ritual. As these powers tended to be wide, the myths of many gods were correspondingly complex. Myths about Athena, the patroness of Athens, for instance, tend to emphasize the goddess's love of war and her affection for heroes and the city of Athens. Those concerning Hermes (the messenger of the gods), Aphrodite (goddess of love), or Dionysus describe Hermes' proclivities as a god of thieves, Aphrodite's lovemaking, and Dionysus' association with wine, frenzy, miracles, and even ritual death. Many myths of the gods, on the other hand, are trivial and lighthearted. Typical of such are the amusing descriptions of conjugal friction between Zeus and his wife, Hera, in the *Iliad.*

Myths were viewed by the Greeks as embodying divine or timeless truths, whereas legends (or sagas) were quasi-historical. Hence, famous events in epics, such as the Trojan War, were generally regarded as having really happened, and the heroes and heroines of the Homeric poems were believed to have actually lived. In another class of legends, the heinous offenses of mortals—such as attempting to make love to a goddess against her will, deceiving the gods grossly by inculpating them in crime or assuming their prerogatives—were punished by everlasting torture in the underworld.

Folktales, consisting of popular recurring themes and told for amusement, inevitably found their way into Greek myth. Such is the theme of lost persons (*e.g.,* Odysseus, Helen of Troy, Paris of Troy) found or recovered after long and exciting adventures. Journeys to the land of the dead were made by Orpheus (a hero who went to Hades to restore his dead wife, Eurydice, to the realm of the living), Heracles, Odysseus, and Theseus (the slayer of the Minotaur). The victory of the little man by means of cunning against impossible odds (*e.g.,* Odysseus) and the exploits of the superman (*e.g.,* Heracles) also occur repeatedly in Greek mythology.

Greek mythology formed the staple of most Greek poetry and epic, as well as of many dramatic works. It also influenced the thoughts of philosophers and historians to a marked degree. The Romans adopted Greek mythology virtually wholesale into their own literature. Through the medium of Latin and, above all, the works of Ovid, Greek myth was stamped indelibly on the medieval imagination. Through subsequent revivals and reinterpretations, its influence has permeated Western culture to an unparalleled extent, from the themes of art and literature to the vocabulary of science and technology.

Greek Orthodox Church, specifically, the Church of Greece (*see* Greece, Church of). The name is also commonly applied to Eastern Orthodoxy (*q.v.*) in general.

Greek Orthodox Patriarchate of Alexandria, autocephalous, or ecclesiastically independent, Eastern Orthodox patriarchate, second in honorific rank after the Church of Constantinople; its patriarch is considered the successor of St. Mark the Evangelist and heads the Orthodox Church in Africa. The Greek Orthodox Patriarchate of Alexandria and All Africa, as it is also known, is the continuation of the Melchite, or imperial, church of Egypt—mostly Greeks living in Egypt—that accepted the definition of the two natures of Christ proposed at the Council of Chalcedon (451 AD; *see* Melchite). The majority of Christian Egyptians rejected this definition and formed the Coptic Church, also headed by a "patriarch of Alexandria." The small Greek minority that remained in communion with the other Orthodox Christians came under Muslim rule in the 7th century and became smaller still but continued to exist in Alexandria and in Cairo after the mass conversions to Islām.

In the 19th century, Egyptian prosperity caused thousands of Greeks and Syrians to immigrate there, thus rapidly increasing the size of the Greek Orthodox Church in Egypt. Many Orthodox settlements were established in African countries outside Egypt in the 20th century, enabling the creation of Orthodox sees in Tripoli, Libya; Addis Ababa, Eth.; Tunis; Khartoum, Sudan; and Johannesburg. In Egypt itself the number of Orthodox faithful is steadily diminishing. The membership of the church is difficult to estimate, but by 1980 it was probably about 110,000.

Greek Orthodox Patriarchate of Antioch and All the East, also called ORTHODOX CHURCH OF ANTIOCH, autocephalous (ecclesiastically independent) Eastern Orthodox patriarchate, third in honorific rank after the churches of Constantinople and Alexandria; it is the largest Arab Christian church in the Middle East.

The authority of the Greek Orthodox Patriarch of Antioch and All the East was limited after the Council of Chalcedon (451) to the community known as Romans, or Melchites (Emperor's Men), because they were in communion with the Byzantine, or east Roman, emperor. The literary language of this community was Greek, but from the 9th century onward there were parishes where Arabic was the only language generally known, and therefore parts of the church services were translated into Arabic. In modern times the Orthodox Church of Antioch assumed the character of an Arab Eastern Orthodox institution.

Since the 14th century the patriarch has resided in Damascus, Syria, whereas the ancient city of Antioch, situated on Turkish

territory, has remained a small city. Since 1899 the patriarch and all of his bishops have been Arabs. There are metropolitans under his jurisdiction in Syria (Homs, Hama, Aleppo, al-Lādhiqīyah, and as-Suwaydā), Lebanon (Beirut, Tripoli, al-Ḥadath, Ḥalbā, Zaḥlah, and Marj ʿUyūn), and Baghdad; several new episcopal sees have been established in North and South America and in Australia. The principal liturgical language is now Arabic, though Greek is still used, and English has been adopted in the United States.

The number of faithful in the Orthodox Church of Antioch approaches 1,100,000; in Syria it is the largest Christian community, while in Lebanon it is second only to the Maronite Church. Since World War II, an active youth movement has provided new leadership in the church. A graduate theological school has been established in Dayr al-Balmand, near Tripoli, Lebanon, while several bishops and theologians have been active in the World Council of Churches.

Greek Orthodox Patriarchate of Jerusalem, autocephalous, or ecclesiastically independent, Eastern Orthodox patriarchate, fourth in honorific seniority after the churches of Constantinople, Alexandria, and Antioch. Since the beginning of Muslim rule in the 7th century, it has been the main custodian of the Christian holy places in Jerusalem.

Whereas the original Judaeo-Christian community, described in the Book of Acts (1–15) and headed by St. James, seems to have disappeared after the sack of Jerusalem by the Romans (AD 130), a new Christian Jerusalem was revived in the 4th century. It became a great centre of Christian religious life and pilgrimage and consequently was made a patriarchate by the Council of Chalcedon (451).

Under the rule of the crusaders, Western clergy acquired a predominant position in the holy places, but the Eastern Christians never abandoned the shrines. Under subsequent Ottoman rule, Greek monks, Syrians of various confessions, and Georgian, Armenian, Coptic, and Egyptian monks and Franciscan Friars struggled to acquire and preserve the right of worship in the various places.

The Greek Orthodox Patriarchate of Jerusalem embraces several scores of thousands of Arabs in Israel and Jordan. The patriarch and bishops, however, are all Greek and are drawn from the Brotherhood of the Holy Sepulchre, a body with monasteries in and near the holy places; this policy has been a cause of tension with the Arab population, from which the local married clergy is recruited. The liturgy is in Greek in the monasteries and in Arabic in the parish churches.

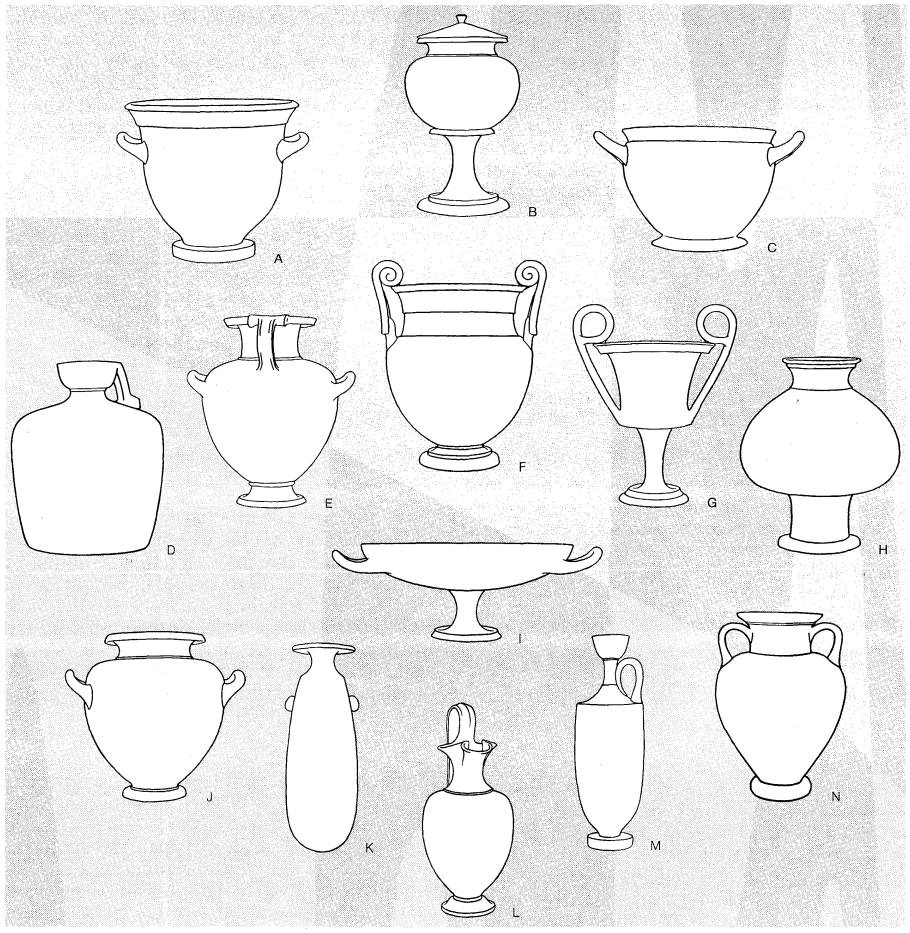
Greek pottery, the pottery of the ancient Greeks, important both for the intrinsic beauty of its forms and decoration and for the light it sheds on the development of Greek pictorial art. Because fired clay pottery is highly durable—and few or no Greek works in wood, textile, or wall painting have survived—the painted decoration of this pottery has become the main source of information about the process whereby Greek artists gradually solved the many problems of representing three-dimensional objects and figures on a flat or curved surface. The large number of surviving examples is also the result of a much wider reliance on pottery vessels in a period when other materials were expensive or unknown. The Greeks used pottery vessels primarily to store, transport, and drink such liquids as wine and water. Smaller pots were used as containers for perfumes and unguents.

Greek pottery developed from a Mycenaean tradition, borrowing both pot forms and decoration. The earliest stylistic period is the Geometric, lasting from about 1000 to 700 BC. This period is further broken down into a Proto-Geometric transition from Mycenaean forms. In this period the surface of the pot was completely covered with a network of fine patterns in which circles and arcs predominate. This abstract decorative vocabulary was later enriched by such devices as the meander (key pattern), checker, triangle, herringbone, and swastika. The succeeding true Geometric style is characterized by these forms and by the gradual appearance of animal and finally human figures. These too were geometrized, being given angular silhouettes and arranged symmetrically, usually in strips around the pot. Figures were invariably portrayed from the side, *i.e.*, in profile. The pots made at this time were the earliest in Greek art to show narrative scenes from popular myths, particularly those about Heracles.

Greatly expanded Greek trading activities during the late 8th and early 7th centuries BC led to a growing Eastern influence on Greek pottery painters. This "Orientalizing" phase is first apparent in works made in Corinth in about 700 BC. At this time Oriental motifs found their way onto all makes of Greek pots. Curvilinear patterns, sometimes of wild exuberance, supplant the older, rectilinear ones. New subjects appear, especially such monsters as the sphinx, siren, griffin, gorgon, and chimaera, as well as such exotic animals as the lion. The Corinthian painters created a silhouette technique in which figures painted in the characteristic black glaze were incised with thin lines to show detail.

Athenian painters adopted this black-figure pottery (*q.v.*) style around 630 BC but emphasized human figures rather than Oriental animal motifs as pictorial themes. The superior quality of their clay, pigment, and decoration quickly enabled the Athenian artists to overtake those of Corinth. From 600 BC on, Athens increasingly became the dominant centre for Greek pottery, eventually exporting its ware throughout the Mediterranean world. It was during this period that the practice of signing of pots by potters and painters first became common. Athenian pottery of the 6th century BC often features narrative scenes composed of black figures painted on a light inset background panel, while the surrounding vase surface is a deep, lustrous black. The method by which this distinctive colour was achieved, involving a complicated three-stage process of firing, has been successfully analyzed and reproduced in the 20th century.

Red-figure pottery (*q.v.*), invented at Athens about 530 BC, is just the reverse of the black-figure style in that the reddish figures appear light against the black background of the pot surface. Details of the figures such as eyes and interior lines were painted on in black, the brush allowing more subtle characterization than did an incising tool. The red-figure technique allowed a more naturalistic and aesthetically appealing treatment of human fig-



Attic black- and red-figure forms of Greek pottery
(A) Bell *krater,* large bowl for mixing wine and water (confined to red-figure pottery); (B) *lebes,* cauldron, sometimes provided with a stand, as here; (C) *skyphos,* drinking bowl with two horizontal handles; (D) *aryballos,* small unguent bottle; (E) *hydria,* three-handled jar for carrying water; (F) volute *krater,* large bowl for mixing wine and water (named for its handles; found in black- and red-figure pottery); (G) *kantharos,* drinking cup with two high vertical handles; (H) *psykter,* wine cooler; (I) *kylix,* shallow drinking cup, usually provided with a pedestaled foot; (J) *stamnos,* wine jar; (K) *alabastron,* small unguent bottle with rounded base; (L) *oinochoe,* wine jug with a trefoil lip, revived during the Renaissance and in the 18th-century Neoclassical period; (M) *lekythos,* oil flask, often used for funerary purposes; (N) *amphora,* two-handled jar for storing liquids (those with a pointed base are designed to stand in sand)

ures. The red hues mimicked the colour and tone of sun-bronzed skin and dramatically spotlighted the figures against the dark background. Around 500 BC Greek artists abandoned the convention of using only profile views and began to use three-quarter frontal poses, as well as foreshortenings and the carefully depicted overlapping of one figure on another. These advances ushered in the zenith of Greek pottery design and also give some idea of contemporaneous achievement in large-scale painting. The drawing on Greek ware of this period is often of the highest quality, and the subject matter is an inexhaustible mine of information on Greek life and thought. Greek artists sought to endow their figures with mood and character, as well as the capacity for action. Monotony was avoided by the use of different poses, gestures, and expressions to render emotion and clarify the narrative action. The repertoire of subjects was greatly enlarged, using scenes from everyday life as well as the standard heroic and mythological themes.

Greek pottery began to decline surprisingly early, in the mid-5th century BC. Because of the inherent limitations of the curving pot surface, pottery painters could no longer compete with the rapid strides toward naturalism taken by painters of larger works such as wall paintings. Various attempts to introduce spatial depth into their designs by the selective grouping of figures failed. After 430 BC pottery painting was increasingly trivialized in conception and sentimental in emotional tone. Drawing became overrefined and careless, and groups of figures were crowded together without meaning or interest. By the 4th century, the figured decoration of pottery had become a degenerate art, and it had died out in Athens by 320 BC.

Greek pottery was manufactured in a variety of different shapes and sizes according to the use to which a particular vessel would be put (*see* Figure). For specific treatments of the major physical types of Greek pottery, *see* alabastron; amphora; hydria; kantharos; krater; kylix; lekythos; oinochoe; psykter.

Greek religion, the complex of beliefs and practices that constituted the interrelation of the ancient Greeks and their gods.

A brief treatment of Greek religion follows. For full treatment, *see* MACROPAEDIA: European Religions, Ancient.

Lasting over a thousand years and extending its influence throughout the Mediterranean world and beyond, the religion of the Greeks was extremely diverse. It numbered in its ranks those who, like Homer's heroes, saw little hope of a blessed existence after death and those who, like Plato, expected a post-mortem judgment to separate the good and the wicked. It embraced the piety of simple peasants and the speculations of sophisticated thinkers, and its forms of observance ranged from the orgiastic excesses of the worshipers of Dionysus to the dietary restrictions used by those striving for purification. Many Greeks accepted foreign gods provided the local cults were observed as well.

The origins of Greek religion are lost in prehistory. Greek-speaking peoples moved south into the peninsula now known as Greece during the 2nd millennium BC. They brought with them the worship of Zeus, a sky-god whose name reveals an Indo-European predecessor shared with the Roman god Jupiter and the Indian god Dyaus. The Greeks assimilated cults of the pre-Greek inhabitants of the peninsula, for example, the primitive oracle at Dodona. They encountered the flourishing Minoan civilization on the island of Crete, whose central divinity, a goddess often depicted with wild animals and holding snakes, contributed many characteristics to several later Greek goddesses. In the latter half of the 2nd millennium BC the Greek Mycenean civilization centred on the mainland replaced the Minoan. Clay tablets written in a script known as Linear B provide records of the offerings—gold vessels, sheep, wheat, wine, honey, and so on—that these Greeks presented to their deities, some of whom continued to be worshiped in later Greece. A decline began about 1100, and the so-called Dark Ages continued until the 8th century BC. With the increase of cultural activity at the opening of the Archaic period (*c.* 750–*c.* 500 BC), Greek religion in the established sense began.

The Greeks worshiped a multitude of gods, all distinguished from men by their immortality. They were thought to control various natural or social forces: Zeus the weather, Poseidon the sea, Demeter the harvest, Hera marriage, and so on. These and other activities of the major deities were expressed by their epithets: Zeus Maimaktes was stormy; Zeus Xenios protected guests; Zeus Ktesios protected the house. Different deities were worshiped in different localities, but a unified system of thought was created by the bards of the Homeric epics, who portrayed the major gods as living on Mt. Olympus under the suzerainty of Father Zeus. Besides the Olympians, the Greeks worshiped various gods of the countryside, the goat-god Pan, Nymphs, Naeads (who dwelled in springs), Dryads (who dwelled in trees), Nereids (who inhabited the sea), Satyrs, and others. In addition, there were the dark powers of the underworld, such as the Furies, said to pursue those guilty of crimes against blood-relatives. Finally, the Greeks established cults for deceased figures of the past, the heroes. Among the most important were Heracles and Asclepius (the healer).

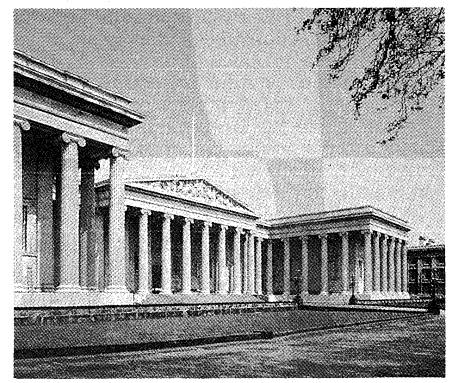
The most important act of Greek worship was the sacrifice. Sacrificial victims varied according to the gods addressed: *e.g.*, cows for Hera, bulls for Zeus, and pigs for Demeter. The procedure of the sacrifice also varied. An offering addressed to an Olympian was made at an altar at dawn. Certain portions were reserved for the god; the rest was shared in a common meal. Sacrifices offered to the chthonian (underworld) deities, however, were performed in the evening. Victims were characteristically black, and, instead of being eaten by the community, they were placed in a pit and burned completely. Cultic activities also included prayers, washing, libations and other offerings, processions, races and other contests, divination, particularly through oracles and birds, and incubation, in which the worshiper spent the night in a temple, waiting to be visited by the divinity in a dream.

Religious observances could be private, limited to particular groups, or celebrated by the entire city-state. Among the last were numbered the great festivals, such as the Panathenaea, in which the Athenians offered a new robe (*peplos*) to Athena Polias, and the City Dionysia at Athens, in the course of which actors performed the now-famous tragedies. Every four years the Greeks observed a festival to Zeus in the Western Peloponnese that, beginning in 776 BC, included the Olympic games, one of four sets of pan-Hellenic athletic contests. Festivals and other acts of worship often centred on temples. In Mycenaean times, only special parts of the palaces were set aside for the gods, but by the end of the Dark Ages they had temples (*naoi*) of their own. These were originally of simple design and wooden construction, but by 600 BC the massive, colonnaded edifices of marble and other durable materials had fully evolved. The images of the gods underwent a similar development. Crudely hewn prototypes of rough wood were succeeded in some cases by mammoth statues of gold and ivory, fashioned by the greatest sculptors of the Greek world.

Not all Greeks adhered to their religion with equal fervour. Already in the 6th century BC philosophers in Ionia were developing a rationalistic critique of traditional beliefs and practices. The criticism was continued by the Sophists and the dramatists Euripides and Aristophanes. Following the conquest of the Greek city-states and the Persian empire by Alexander the Great of Macedon, foreign cults entered the Greek world with much vigour. Although local cults still persisted, the Hellenistic period saw the flourishing of mystery religions, such as the Egyptian cults of Isis and Osiris, and astrology. During the first three centuries following the death of Jesus Christ, the new religion of Christianity slowly but inexorably secured the adherence of growing numbers of Greeks. With the death of the pagan Roman emperor Julian in AD 363, the old religion lost its last great proponent. A triumphant Christianity held the field, but elements of Greek religion survived in the cults of the Christian saints and in local traditions.

Greek Revival, architectural style, based on 5th-century-BC Greek temples, which spread throughout Europe and the United States during the first half of the 19th century.

The main reasons for the style's popularity seem to have been the general intellectual preoccupation with ancient Greek culture at the time, as well as a new awareness of the actual nature of Greek art brought about through widely circulated illustrations of notable ancient temples and the Elgin Marbles. The growing recognition of the Parthenon in Athens as a major monument helped secure the dominance of this Grecian form.



The British Museum, London, Greek Revival building designed by Sir Robert Smirke, 1823–47

A.F. Kersting

The British Museum (1847), in London, which utilizes the Greek Ionic order on a massive scale, is the most powerful image of the English version of the style. The Brandenburg Gate in Berlin (1793) was inspired by the Athenian Propylaea, and the Glyptothek (sculpture museum) in Munich utilized massive Grecian forms, as did the Altes (old) Museum in Berlin by Karl Friedrich Schinkel (1822–30). That there are so many important Greek Revival buildings in Germany is largely due to Ludwig I, king of Bavaria, whose son was king of Greece.

Many major examples of the Greek Revival survive in the United States, where the style was adopted on a large scale. It was also in the United States that, for both practical and ideological reasons, many strange distortions of the style found acceptance.

The Second Bank of the United States (Philadelphia, 1824) was designed with a Doric temple exterior by William Strickland with the support of the major patron of the style, Nicholas Biddle. It was a dignified example of the style that the two men knew—Biddle from observation and Strickland from reproductions—from the Parthenon. Biddle went further in his pursuit of the style in his own home, Andalusia (Pennsylvania, 1833), for

which his architect, Thomas Walter, created a majestic Doric facade to cover an existing structure. This use of Grecian columns (executed in wood) inspired many similar facades.

Other Walter commissions include the overpowering Founders Hall at Girard College (Philadelphia, 1847) and the wings for the United States Capitol (Washington, D.C., 1865).

Greek valerian (plant): *see* Jacob's ladder.

Greek War (323–322 BC): *see* Lamian War.

Greeley, city, seat (1874) of Weld County, northern Colorado, U.S., 50 mi (80 km) northnortheast of Denver, at an elevation of 4,665 ft (1,422 m). It was founded in 1870 as Union Colony, a cooperative agricultural enterprise organized by Nathan Meeker, agricultural editor of the *New York Tribune*, with the support of Horace Greeley, journalist-politician. An agricultural-based economy prevails, with food processing and canning as the principal industries. Cattle feeding is important and there are large terminal stockyards. The surrounding area is extensively irrigated from the Cache la Poudre and South Platte rivers and the Colorado-Big Thompson water-diversion project. Oil, gas, and coal are worked in the vicinity. Greeley is the seat of the University of Northern Colorado (1890) and Aims Community College (1967). Ft. Vasquez (a reconstructed fur-trading post, 1837) and Rocky Mountain National Park are nearby. Inc. city, 1885. Pop. (1980) city, 53,000; metropolitan area (SMSA), 123,438.

Greeley, Horace (b. Feb. 3, 1811, Amherst, N.H., U.S.—d. Nov. 29, 1872, New York City), U.S. newspaper editor who is known especially for his articulation of the North's vigorous antislavery sentiments during the 1850s.

A printer's apprentice in East Poultney, Vt., he moved to New York City, where he became

Greeley, watercolour on toned paper by Thomas Nast, 1872; in the National Portrait Gallery, Washington, D.C.

National Portrait Gallery, Smithsonian Institution, Washington, D.C.; Gift of the Trustees, National Portrait Gallery, London

senior editor for a new literary magazine, *The New Yorker* (1834). A liberal Whig, Greeley caught the attention of New York political boss Thurlow Weed and was asked to issue political campaign weeklies in the elections of 1838 and 1840. These publications substantially aided the Whig cause and marked the beginning of Greeley's political partnership with Weed and New York governor William H. Seward (secretary of state, 1861–69), which lasted till 1854.

His journalistic success encouraged him to embark on a more ambitious newspaper venture. The *New York Tribune,* which he founded in 1841 and edited until his death, became a daily Whig paper dedicated to a medley of reforms, economic progress, and the elevation of the masses. The *Tribune* set a particularly high standard in its news-gathering, intellectual interest, and moral fervour. Greeley, who produced a prodigious amount of high-quality editorial copy, came to be considered the outstanding newspaper editor of his time; his large and competent staff cooperated to make the paper a "political Bible" for many readers throughout the North. Reflecting his highly moral New England upbringing, he was an unrelenting foe of liquor, tobacco, gambling, prostitution, and capital punishment. He urged a variety of educational reforms, especially free common-school education for all; he championed producers' cooperatives but opposed women's suffrage.

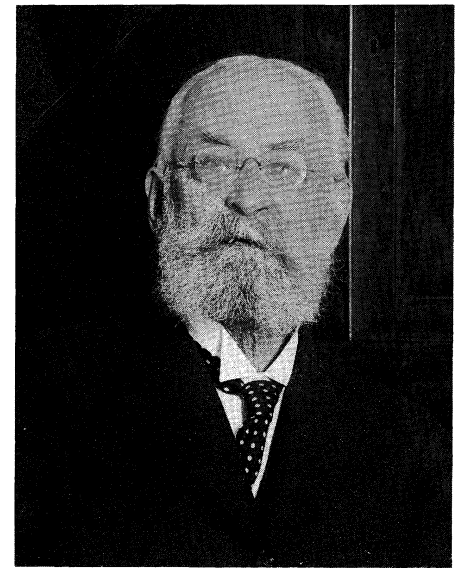
In the early 1850s, Greeley became increasingly bitter over the failure of his Whig colleagues to support him for high public office—a lifelong ambition. He also grew disenchanted with the party's ambivalence toward slavery, which he opposed on both moral and economic grounds. In 1854 he transferred his allegiance to the newly emerging Republican Party, which he helped organize. Throughout the decade, Greeley's newspaper constantly fed the rising antislavery excitement of the North; his paper became anathema to slaveholders of the South. His editorial columns consistently opposed compromising the slavery issue, as he argued against popular sovereignty (local option) in the territories, urged unrestricted free speech and mail privileges for Abolitionists, encouraged Free-Soilers, who would oppose slavery in the Kansas Territory, and advocated forcible resistance to federal fugitive-slave hunters.

After the onset of the Civil War (1861), Greeley pursued an erratic course, though generally he sided with the Radical Republicans in advocating early emancipation of the slaves and, later, civil rights for freedmen. He lost much public respect by opposing the renomination of Pres. Abraham Lincoln in 1864 and in signing the bail bond of former Confederate president Jefferson Davis in 1867.

Partly out of political pique and partly from disagreement with the corruption apparent in the first administration of Pres. Ulysses S. Grant (1869–73), he joined a group of Republican dissenters, forming the Liberal Republican Party, which opposed Grant in 1872. The party nominated Greeley for president, and, in the dreary campaign that followed, Greeley was so mercilessly attacked that, as he said, he scarcely knew whether he was running for the presidency or the penitentiary. Despite the faction's inexperience, Greeley polled more than 40 percent of the popular vote; he died before the electoral college met, and his 86 electoral votes went to four minor candidates. An authoritative biography is G.G. Van Deusen's *Horace Greeley, Nineteenth Century Crusader* (1953).

Greely, Adolphus Washington (b. March 27, 1844, Newburyport, Mass., U.S.—d. Oct. 20, 1935, Washington, D.C.), U.S. Army officer whose scientific expedition to the Arctic resulted in the exploration of a considerable amount of terrain on Ellesmere Island, Canada, and on coastal Greenland, where he also set a contemporary record by reaching 83°24′ N latitude; the mission, however, ended in tragedy.

During the first International Polar Year, a joint program of scientific research sponsored by 11 nations (1882–83), Greely commanded the U.S. station at Fort Conger on northeastern Ellesmere Island. From August 1881 to August 1883 the expedition, consisting of 25 officers and men, recorded 500 observations



Adolphus Greely

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each day on weather and tides and collected and studied samples of minerals, flora, and fauna. Discoveries made on sledge trips included Lake Hazen and Greely Fjord on the western side of Ellesmere. When a relief ship failed to arrive in early August 1883 the party abandoned Fort Conger and moved southward in small boats. Covering 500 miles (805 kilometres) in 51 days, the men landed at Bedford Pym Island in Smith Sound on October 15. There they faced a winter of 250 days with rations for 40 days and, before the ordeal was over, were reduced to eating their own leather clothing. Only Greely and six others survived.

Much of Greely's later army work involved laying communications lines in the Philippines, Alaska, and elsewhere. He was promoted to chief signal officer and brigadier general in 1887. In 1888 he helped found the American Geographical Society. His many published works include *Three Years of Arctic Service* (1886) and *Handbook of Polar Discoveries* (5th ed. 1910).

Green, Adolf (songwriter): *see* Comden, Betty; and Green, Adolf.

Green, Alice Stopford, *neé* ALICE SOPHIA AMELIA STOPFORD, (b. May 30, 1847, Kells, County Meath, Ire.—d. May 28, 1929, Dublin), Irish historian, supporter of Irish independence.

She lived in London from 1874, and in 1877 she married the historian John Richard Green. After his death in 1883, her home became a centre for such diverse Londoners as Florence Nightingale and Winston Churchill. Mrs. Green's first volume of history, *Henry II* (1888), was written for the "English Statesmen" series published by John Morley.

After writing *Town Life in the Fifteenth Century* (1894), she directed her attention to early Irish history and to contemporary Irish nationalism. In *The Making of Ireland and its Undoing* (1908), she contradicted the widespread English belief that Ireland had no civilization apart from what had been borrowed from other countries, particularly England. A supporter of the Treaty of December 1921 which gave Ireland independence, and

by then a Dublin resident, she was one of the first Irish senatorial nominees (December 1922). Her last major historical work was *A History of the Irish State to 1014* (1925).

Green, Anna Katharine (b. Nov. 11, 1846, Brooklyn, N.Y., U.S.—d. April 11, 1935, Buffalo), U.S. writer of detective fiction who helped to make the genre popular in America by creating well-constructed plots based on a good knowledge of criminal law.

Green intended to be an author of romantic verse. Inspired by her father's work as a lawyer, however, she began her writing career with the detective story *The Leavenworth Case* (1878), which introduced her detective hero, Ebenezer Gryce, and rapidly became popular. After two more detective novels, Green wrote two volumes of poetry; after that she concentrated on detective fiction.

Green's tendency to intersperse romantic characterizations and dialogue in her work sometimes makes her style old-fashioned, but her skillful plotting and technical accuracy are noteworthy. Some of her works are *Lost Man's Lane* (1898), *The Filigree Ball* (1903), *The House of the Whispering Pines* (1910), and *The Step on the Stair* (1923).

Green, Bartholomew (b. Oct. 12, 1666, Cambridge, Mass.—d. Dec. 28, 1732, Boston), British American printer and journalist who published the *Boston News-Letter* from 1704 to 1707 and again from 1711 to 1732. Green selected for publication in his paper only "those transactions . . . that have no relations to any of our [American-British] quarrels," thus refusing to take sides in the colonists' disputes with England. In 1727, in an effort to build the influence of his paper, he promised his readers that he would print up-to-date news rather than reports of "occurrencies of an old date."

Green was born to a family of printers. His own career spanned a half-century. He assisted his half-brother Samuel Green in managing Samuel Sewall's press from 1682, when he was 16 years old, to 1684. Then he operated a printing establishment of his own until 1690, later working for two years with his father, Samuel Green, who was also a publisher, in Cambridge. Resuming his own business, Bartholomew Green found his way into the colonial establishment and served for the next 40 years as chief printer of the Massachusetts colony.

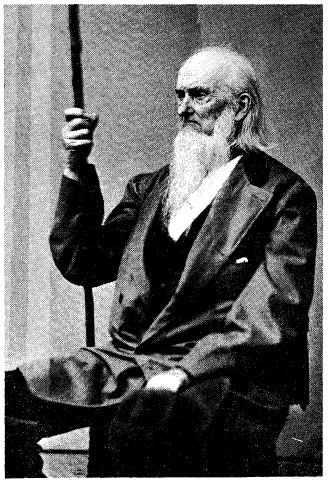
Green, Charles (b. Jan. 31, 1785, London—d. March 26, 1870, London), English balloonist whose outstanding achievement was his flight with two companions in 1836 from Vauxhall Gardens, London, to Weilburg, Ger.,

Charles Green, detail of an engraving by Hilaire Le Dru, 1835

By courtesy of the National Portrait Gallery, London

a distance of 480 miles. Green's 18-hour trip set a long-distance balloon record for flights from England not beaten until 1907. He was accompanied on the flight by Monck Mason and Robert Hollond, who financed it. Green had earlier introduced coal gas (1821) as a cheaper substitute for hydrogen, a practice thereafter followed by most balloonists. He planned, but never attempted, an Atlantic crossing. The small working model of his proposed balloon, flown in 1840, incorporated the first mechanically driven propeller ever to power an aircraft.

Green, Duff (b. Aug. 15, 1791, near Frankfort, Ky., Virginia Colony—d. June 10, 1875, Dalton, Ga.), U.S. political journalist, and an influential member of Pres. Andrew Jackson's inner advisory circle, the "kitchen cabinet."



Duff Green

By courtesy of the Library of Congress, Washington, D.C.

After serving in the War of 1812, Green became a government surveyor and mail contractor in Missouri, where he also served in the state constitutional convention (1819) and in the state legislature. As editor of his *St. Louis Enquirer*, he supported Jackson for president (1824). In 1826 he established the chief journalistic organ of the Jacksonian Democrats, the Washington, D.C., *United States Telegraph*, and was appointed printer to Congress after Jackson's election (1828). Green broke with Jackson in 1831, however, to support John C. Calhoun.

In 1840 he supported the Harrison–Tyler ticket editorially. After Pres. William Henry Harrison's death (April 1841), Pres. John Tyler appointed Green unofficial representative to England, where his political writings were widely read. Returning in 1844, Green founded a New York paper, *The Republic*, which advocated free trade, road construction and other internal improvements, civil service reform, and Western expansion.

Though he opposed secession, Green sided with the Confederacy and contracted his iron-works with it. Late in life he wrote books and pamphlets on economic issues and tried to recover railroad interests he had lost to the Crédit Mobilier in 1864.

Green, George (b. July 14, 1793, Sneinton, Nottinghamshire, Eng.—d. March 31, 1841, Sneinton), English mathematician who was first to attempt to formulate a mathematical theory of electricity and magnetism. His work in this field heralded the beginning of modern mathematical physics in Great Britain. He was a baker before he became a mathematician, through his own studies. That he was self-taught may perhaps explain his unusual methods of solving physical problems.

In his *Essay on the Application of Mathematical Analysis to the Theory of Electricity and Magnetism* (1828), Green generalized and extended the electric and magnetic investigations of the French mathematician Siméon Poisson. Green's memoir introduced the term "potential" and what is now known as Green's theorem, which is widely applied in the study of the properties of magnetic and electric field potential. His essay was practically unknown until William Thomson (later Lord Kelvin) had it reprinted in 1846.

In 1832 and 1833 Green published papers on the laws of equilibrium of fluids, on attractions in n-dimensional space, and on the motion of a fluid agitated by vibrations of a solid ellipsoid. At the age of 40 he entered the University of Cambridge, from which he graduated (1837) fourth highest in his class in mathematics. He was elected to a fellowship at Gonville and Caius College, Cambridge, in 1839.

Green, Henry, pseudonym of HENRY VINCENT YORKE (b. Oct. 29, 1905, near Tewkesbury, Gloucestershire, Eng.—d. Dec. 13, 1973, London), novelist and industrialist whose sophisticated satires mirrored the changing class structure in post-World War II English society. After completing his education at Eton and Oxford, he entered the family business, an engineering firm in Birmingham; he worked his way up to become the firm's managing director in London. During this time he produced his laconically titled social comedies, *Blindness* (1926), *Living* (1929), *Party Going* (1939), *Caught* (1943), *Loving* (1945), *Back* (1946), *Concluding* (1948), *Nothing* (1950), and *Doting* (1952). Underlying the pleasant surfaces of the novels are disturbing and enigmatic perceptions. An early autobiography, *Pack My Bag,* was published in 1943.

Green, Hetty byname of HENRIETTA HOWLAND ROBINSON (b. Nov. 21, 1835, New Bedford, Mass., U.S.—d. July 3, 1916, New York City), financier who was reputedly the wealthiest woman of her time in the United States. A fortune had been acquired by her family from shipping and trading interests. Her father, Edward Mott Robinson, and her aunt, Sylvia

Hetty Green, 1897

By courtesy of the Library of Congress, Washington, D.C.

Ann Howland, both died in 1865, leaving her an estate valued at $10,000,000. By shrewd management Mrs. Green increased the size of her fortune to more than $100,000,000 at her death.

Green, Julien (Hartridge) (b. Sept. 6, 1900, Paris), French American writer of sombre novels that show the influence of the U.S. Southern Gothic school. Written in French and usually set in French provincial towns, they deal with extremely neurotic and obsessive characters whose lives are centred on magnified trivialities. Green was the first person of American parentage to be elected to the Académie Française (1971).

The son of an American business agent in Paris, Green spent his youth in France. At 19 he entered the University of Virginia, Charlottesville, and later taught there for a year (1921–22), but he returned to France in 1922. During World War II he taught in the United States and then served in the U.S. Army (1942–45) before returning to France.

His first novel, *Mont-Cinere* (1926; *Avarice House,* 1927), was favourably received in

both France and the United States. *Adrienne Mesurat* (1927; *The Closed Garden,* 1928) was awarded the Femina Bookman Prize. Other fiction includes *Léviathan* (1929; *The Dark Journey,* 1929), *Épaves* (1932; *The Strange River,* 1932), *Le Visionnaire* (1934; *The Dreamer,* 1934), *Minuit* (1936; *Midnight,* 1936), *Si j'étais vous* (1947; *If I Were You,* 1949), *La Malfaiteur* (1955; *The Transgressor,* 1957), and *L'Autre* (1971; *The Other One,* 1973). Green has also written plays, one of which, *Sud* (1953; *South,* 1955), became in 1973 the basis of an opera, with music by Kenton Coe. *Memories of Happy Days* (1942) was Green's only book written in English. His *Journals,* covering the years from 1926 and published in several separate volumes, contain thoughts on God and death and also Green's conception of the artist's twofold obligation—to himself and to God. His other works include collections of essays. In 1970 the Académie Française awarded Green its grand prize for literature.

Studies of Green and his work include *Julian Green and the Thorn of Puritanism* (1955), by S.E. Stokes, and *Julien Green, Gallic-American Novelist* (1971), by M.G. Rose. Green's works were collected in *Oeuvres Complètes,* 10 vol. (1954–65).

Green, Paul (Eliot) (b. March 17, 1894, Lillington, N.C., U.S.—d. May 4, 1981, Chapel Hill, N.C.), U.S. novelist and playwright whose characteristic works deal with North Carolina folklore and regional themes; he was one of the first white playwrights to write perceptively about the problems of Southern blacks.

Green studied playwriting under Frederick Henry Koch at the University of North Carolina, Chapel Hill, and began writing plays for the Carolina Playmakers in 1919. His best known play, *In Abraham's Bosom,* concerned a man's attempt to establish a school for his fellow blacks; it was produced at the Provincetown Playhouse, New York City, and was awarded the Pulitzer Prize in 1927. During the Great Depression Green's work took on a stronger note of social protest. Among his plays from this period are *Hymn to the Rising Sun,* about a chain gang, and *Johnny Johnson,* an Expressionistic, episodic antiwar play for which Kurt Weill wrote the music; both plays were first performed in 1936. In 1941 Green collaborated with Richard Wright in the dramatization of Wright's novel *Native Son.* From the end of the 1930s Green wrote pageants performed throughout the South. He also wrote more than a dozen symphonic dramas, including *The Stephen Foster Story* (1959), *Trumpet in the Land* (1970), and *The Lone Star* (1977), which won wide popularity.

Green, T(homas) H(ill) (b. April 7, 1836, Birkin, Yorkshire, Eng.—d. March 26, 1882, Oxford), U.S. educator, political theorist, and Idealist philosopher of the so-called Neo-Kantian school. Through his teaching, Green exerted great influence on philosophy in late 19th-century England. Most of his life centred at Oxford, where he was educated, elected a fellow in 1860, served as a lecturer, and in 1878 was appointed professor of moral philosophy. His lectures provided the basis for his most significant works, *Prolegomena to Ethics* (1883) and *Lectures on the Principles of Political Obligation,* published in the collected *Works,* 3 vol. (1885–88).

Green's metaphysics begins with the question of man's relation to nature. Man, he said, is self-conscious. The simplest mental act involves consciousness of changes and of distinctions between the self and the object observed. To know, Green asserted, is to be aware of relations between objects. Above man—who can know only a small portion of such relations—is God. This "principle which renders all relations possible and is itself determined by none of them" is an eternal self-consciousness.

Green based his ethics on the spiritual nature of man. He maintained that man's determination to act upon his reflections is an "act of will" and is not externally determined by God or any other factor. According to Green, freedom is not the supposed ability to do anything desired but is the power to identify one's self with the good that reason reveals as one's own true good.

Green's political philosophy enlarged upon his ethical system. Ideally, political institutions embody the community's moral ideas and help develop the character of individual citizens. Although existing institutions do not fully realize the common ideal, the analysis that exposes their deficiencies also indicates the path of true development. His original view of personal self-realization also contained the notion of political obligation, for citizens intent upon realizing themselves will act as if by duty to improve the institutions of the state. Because the state represents the "general will" and is not a timeless entity, citizens have the moral right to rebel against it in the state's own interest when the general will becomes subverted.

Green's influence on English philosophy was complemented by his social influence—in part through his efforts to bring the universities into closer touch with practical and political affairs and in part through his attempt to reformulate political liberalism so that it laid more stress on the need for positive actions by the state than on the negative rights of the individual. His address "Liberal Legislation and Freedom of Contract" (1881) gave early expression to ideas central to the modern "welfare state."

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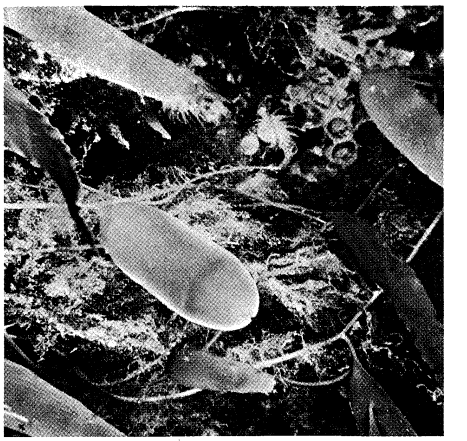
Green, William (b. March 3, 1873, Coshocton, Ohio, U.S.—d. Nov. 21, 1952, Coshocton), labour leader who was president of the American Federation of Labor (AFL) from 1924 until his death.

Green left school and became a coal miner at age 16. He was a subdistrict president of the United Mine Workers of America (UMWA; 1900–06) and national secretary-treasurer (1913–24). Green won appointment to the executive council of the AFL in 1913 and was elected president in 1924. The formation in 1935 of the Committee for Industrial Organization (CIO), headed by John L. Lewis, led to bitter public disputes between the two men, which finally culminated in 1936 in the expulsion of the CIO from the AFL. The two unions were not reunited until 1955, three years after Green's death.

William Green, late 1940s

By courtesy of the AFL-CIO

green algae, also called GRASS-GREEN ALGAE, members of the division Chlorophyta, comprising about 6,000 species. The photosynthetic pigments (chlorophylls a and b, carotene, and xanthophyll) are in the same proportions as those in seed and other higher plants. The typical green algal cell, which can be motile or nonmotile, has a central vacuole, pigments contained in plastids that vary in shape in different species, and a two-layered cellulose and pectin cell wall. Food is stored as starch in pyrenoids (proteinaceous cores within the plastids). Green algae, variable in size and shape, include single-celled (*Chlamydomonas,* desmids), colonial (*Hydrodictyon, Volvox*), filamentous (*Spirogyra*), and tubular (*Actebaularia, Caulerpa*) forms. Sexual reproduction is common, with gametes that have two or four whiplike flagella. Asexual reproduction is by cell division (*Protococcus*), motile and nonmotile spores (*Ulothrix, Oedogonium*), and fragmentation.



Caulerpa prolifera, a Mediterranean species of this normally tropical genus

Raniero Maltini and Piero Solaini—SCALA from Art Resource/EB Inc.

Most green algae occur in fresh water, usually attached to submerged rocks and wood or as scum on stagnant water; there are also terrestrial and marine species. Free-floating microscopic species serve as food and oxygen sources for aquatic organisms. Green algae are also important in the evolutionary study of plants; the single-celled *Chlamydomonas* is considered similar to the ancestral form that probably gave rise to land plants.

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Green Bank equation, equation that purports to yield the number N of technically advanced civilizations in the Milky Way Galaxy as a function of other astronomical, biological, and psychological factors. Formulated in large part by the U.S. astrophysicist Frank Drake, it was first discussed in 1961 at a conference on the "search for extraterrestrial intelligence" (SETI), held at the National Radio Astronomy Observatory in Green Bank, W.Va. The equation states

$$N = R_* f_p n_e f_l f_i f_c L.$$

The factor R_* is the mean rate of star formation in the Galaxy; f_p the fraction of stars with planetary systems; n_e the number of planets in such systems that are ecologically suitable for the origin of life; f_l the fraction of such planets on which life in fact develops; f_i the fraction of such planets on which life evolves to an intelligent form; f_c the fraction of such worlds in which the intelligent life form invents high technology capable at least of interstellar radio communication; and L, the average lifetime of such advanced civilizations. These numbers are poorly known, and the uncertainty

increases progressively with each factor on the right-hand side of the equation. Widely quoted but at best vaguely known values for these factors are: $R_* = 10/\text{yr}$, $f_p = 0.5$, $n_e = 2$, $f_l = 1$, $f_i f_c = 0.01$, and thus $N = L/10$. Accordingly, if civilizations characteristically destroy themselves within a decade of achieving radio astronomy, which is taken as a marker of an advanced civilization, then $N = 1$, and there are no other intelligent life forms in the Galaxy with whom terrestrial researchers can communicate. If, on the other hand, it is assumed that one percent of the civilizations learn to live with the technology of mass destruction and themselves, then $N = 1{,}000{,}000$, and the nearest advanced civilization would be on average a few hundred light-years away.

Green Bank Observatory: *see* National Radio Astronomy Observatory.

Green Bay, inlet of northwestern Lake Michigan, U.S., along the states of Wisconsin and Michigan (Upper Peninsula). It extends southwestward for 118 miles (190 km) from the head of Big Bay de Noc (Michigan) to the mouth of the Fox River (Wisconsin) and is 23 miles (37 km) at its widest point, opposite Rock Island Passage (the main entrance to the bay), located between Rock and St. Martin islands. The bay is partially sheltered from Lake Michigan by the Garden Peninsula (northeast) and Door Peninsula (southeast). The Sturgeon Bay and Lake Michigan Ship Canal cuts across the Door Peninsula to provide a short route to the ports of Green Bay and Marinette, Wis., and Menominee, Mich. Another important port is Escanaba, Mich., located on Little Bay de Noc. Entrance to the bay is difficult because of the prevalence of islands and submerged reefs and shoals. The Hiawatha National Forest and the Menominee State Forest (Michigan) lie along part of the northern shore. The first European to visit the bay was the French-Canadian explorer Jean Nicolet, in 1634. The bay was the head of an important portage route for the fur trade between the Great Lakes and the Mississippi River by way of the Fox and Wisconsin rivers. In 1968 a rich deposit of manganese was discovered on the floor of the bay. In 1973 the entrance channel to the port of Green Bay was deepened to 26 feet (8 m).

Green Bay, near the city of Sturgeon Bay, Wis.
Chas. J. Ott—Photo Researchers/EB Inc.

Green Bay, city, seat (1818) of Brown county, northeastern Wisconsin, U.S., where the Fox River empties into Green Bay, an inlet of Lake Michigan. The metropolitan area includes the city of De Pere and the towns of Preble (parts of which were annexed in 1941) and Allouez. A trading post was established in the vicinity in 1634 by Jean Nicolet, a French-Canadian explorer; in 1671 Claude-Jean Allouez, a Jesuit, founded a mission at De Pere, at which time the settlement was named La Baye. A fort built by the French (1717) at the mouth of the river became the heart of a small French-Canadian fur-trading community until after the War of 1812. British traders called the site Green Bay, and the French name was gradually dropped.

The United States took possession in 1816 when the army built Fort Howard within the present limits of Green Bay. The village was laid out in 1829, and Wisconsin's earliest newspaper, the *Green Bay Intelligencer,* appeared in 1833. With the decline of the fur trade and the opening (1825) of the Erie Canal, Green Bay developed as a lumbering and agricultural centre. Chief products are wood pulp, paper products, machinery, and cheese. A Great Lakes port of entry with heavy shipping, the city has a large wholesale and distributing business.

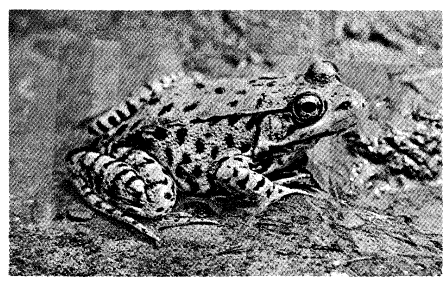
The city is famous for its professional football team, the Green Bay Packers, which it has supported since 1919. Cotton House (1840), restored within Heritage Hill State Park, is one of the best examples of Greek Revival architecture in the Midwest. The National Railroad Museum exhibits a wide collection of locomotives and equipment. University of Wisconsin–Green Bay was established there in 1965, and the Northeast Wisconsin Technical Institute was founded in 1913. Inc. 1854. Pop. (1988 est.) city, 95,081; MSA, 191,200.

Green Mountains, near East Bethel, Vt.
Eric Carle—Shostal/EB Inc.

green bean, widely cultivated, edible-podded legume of the species *Phaseolus vulgaris.* *See* bean.

green frog (subspecies *Rana clamitans melanota*), common aquatic frog (family Ranidae) found in ponds, streams, and other bodies of fresh water in the northeastern United States. The green frog is 5 to 10 cm (2 to 4 inches) long and green to brownish in colour. The back and legs are characteristically spotted or blotched.

Another race of this species, the bronze frog (*R. c. clamitans*), is found in such places as swamps and streamsides of the southeastern United States. It is brown above and grows to about 8.5 cm (3.3 inches). Its call, like that of the green frog, is a sharp, twanging note. The European marsh, pool, and edible frogs are also known as green frogs.



Green frog (*Rana clamitans melanota*)
Norman R. Lightfoot—Photo Researchers/EB Inc.

Green Glen (Scotland): *see* Glasgow.

Green Mountain Boys, patriot militia in the U.S. War of Independence. The militia was initially organized in 1770 at present-day Bennington, Vt., to confront a sheriff's party sent by New York to evict local residents who had received land grants from New Hampshire. New York, which then claimed present-day Vermont, disputed New Hampshire's right to grant land west of the Green Mountains. The victorious militia gave the New Yorkers whippings with birch rods.

The first American act of aggression in the U.S. War of Independence was the capture on May 10, 1775, of Fort Ticonderoga by 100 Green Mountain Boys and 100 others, under the joint command of Ethan Allen and Benedict Arnold. On Aug. 4, 1777, General John Burgoyne's British troops invaded Bennington to raid an arsenal and procure food. The patriots resisted, and failure to acquire supplies contributed to Burgoyne's eventual defeat.

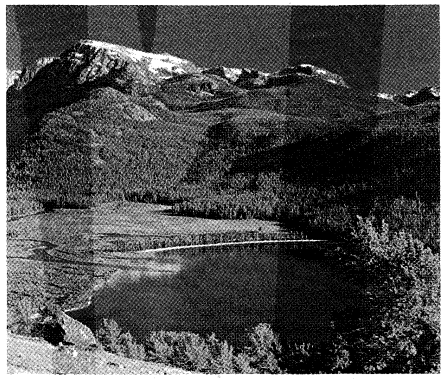
Green Mountains, part of the Appalachian Mountain system, U.S., extending for 250 miles (402 km) from north to south through the centre of Vermont and having a maximum width of 30 miles (50 km). Many peaks rise to more than 3,000 feet (900 m), with the loftiest being Mount Mansfield (4,393 feet [1,339 m]; highest point in Vermont) and Killington Peak (4,235 feet [1,291 m]). Highways cross at the passes cut by the Missisquoi, Lamoille, and Winooski rivers. The mountains are noted for their scenic beauty and form a popular tourist resort area. Well-known for their skiing facilities, the mountains are traversed by the Long Trail (partly identical with the Appalachian Trail), from which hikers may look down on famous slate, marble, and granite quarries. The Green Mountain National Forest (214,000 acres [86,600 hectares]) was established in 1932 to protect many of the spruce-, maple-, beech-, and birch-covered peaks.

Green Party (political party): *see* Greens, the.

Green River, river rising near Kings Mountain in Lincoln county, central Kentucky, U.S., and flowing for 360 miles (580 km) generally westward through a well-defined gorge, then northwestward to the Ohio River, which it enters just above Evansville, Ind. Dams and locks below Mining City Dam allow small boats to navigate 200 miles (320 km) of the lower course, through the western coalfield and into Mammoth Cave National Park. There it receives the waters of the Echo River. The Green River drains 9,430 square miles (24,425 square km), and its chief tributaries are Russell and Mud creeks, Barren and Pond rivers, flowing in from the south, and the

Nolin and Rough rivers, from the north. The main cities along the river are Greensburg, Munfordville, Brownsville, Morgantown, and Livermore.

Green River, river in the western United States, rising on the Continental Divide in the Wind River Range in west-central Wyoming. It flows generally south through southwestern Wyoming, where it is dammed below La



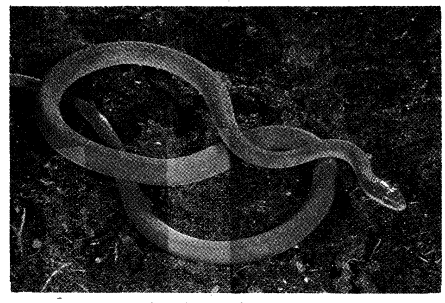
The lower Green River in southwestern Wyoming
J. Burnett—Shostal/EB Inc.

Barge to form the Fontenelle Reservoir. Below Green River city, Wyo., it cuts through Flaming Gorge National Recreation Area, where it is impounded to form a large reservoir. It continues through eastern Utah, with a loop into northwestern Colorado, on through the Canyon of Lodore in Dinosaur National Monument and back into Utah. It then flows generally southwest past Green River city, Utah, and southeast to join the Colorado River south of Moab, in Canyonlands National Park. Traversing rugged mountain regions through most of its 730-mile (1,175-kilometre) course, it drains about 45,000 square miles (117,000 square km). It is navigable only by special shallow-draft riverboats—and then only at high water. Its chief tributaries are the Yampa River, in Colorado, and the Duchesne, Price, White, and San Rafael rivers in Utah. Originally known as the Spanish River, it was renamed in 1824, probably for its colour derived in places from green soapstone banks along its course.

Green River, city, seat (1875) of Sweetwater county, southwestern Wyoming, U.S., 13 miles (21 km) west of Rock Springs. Surrounded by rock formations at an elevation of 6,600 feet (2,000 m), it originated as a trappers' rendezvous and an overland stage route stop on the river for which it is named. It became a division point after the arrival in 1868 of the Union Pacific Railroad and was later the eastern terminus of the Oregon Short Line Railroad. John Wesley Powell's exploration of the Green and Colorado rivers began there in 1869 and is commemorated by a national historical site. The town is now a trade centre for forest, livestock, and farm products. Most of the nation's soda ash comes from the trona mines nearby. Green River is a gateway to the Flaming Gorge Reservoir and National Recreation Area and to Ashley National Forest immediately to the south. Inc. 1891. Pop. (1988 est.) 13,637.

green snake, any of several species belonging to the family Colubridae, named for their colour. The North American green snakes are the two species of the genus *Opheodrys*. These docile, slender, harmless snakes often live in gardens. They lay eggs, and they subsist on insects and spiders. The smooth green snake (*Opheodrys vernalis*), sometimes called green grass snake, is about 50 cm (20 inches) long. The rough, or keeled (ridged), green snake (*O. aestivus*), often called vine snake, is about 75 cm (23 inches) long.

The African green snakes (*Chlorophis*) have

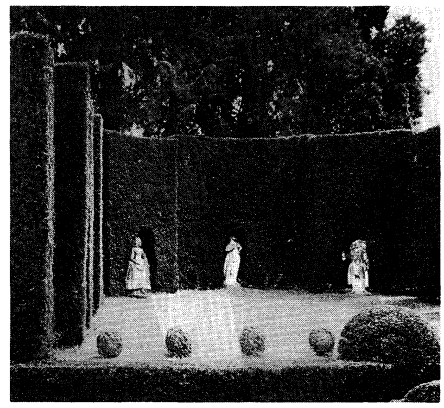


Rough green snake (*Opheodrys aestivus*)
G.J. Chafaris—EB Inc.

keeled ventral plates and are arboreal. Others of this genus are found in eastern and southern Asia.

green theatre, planting, usually of evergreens, designed to provide accommodation for outdoor theatrical entertainment. Intimate theatres included in 17th-century Italian gardens were often elaborate architectural and sculptural complexes not necessarily intended for actual performances but in themselves providing an opportunity for ingenious display.

Some green theatres were workable, however, providing a stage, on several levels, with the various entrances screened by trimmed



Green theatre, Villa Marlia, near Lucca, Italy
Edwin Smith

hedges. The best examples are at the Imperial Hill (Poggio Imperiale) and the Villa Marlia in Tuscany (near Lucca), Italy, and at the nearby Villa Garzoni at Collodi.

Greenaway, Kate, also called CATHERINE GREENAWAY (b. March 17, 1846, London, Eng.—d. Nov. 6, 1901, London), English artist and book illustrator known for her original and charming children's books.

The daughter of John Greenaway, a draftsman and wood engraver, Kate Greenaway grew up in various residences, including a farmhouse in Nottinghamshire, and studied art in various places, including London. She began to exhibit drawings in 1868, and her first published illustrations appeared in such magazines as *Little Folks*. In 1879 she produced her first successful book, *Under the Window,* followed by *The Birthday Book* (1880), *Mother Goose* (1881), *Little Ann* (1883), and other books for children, which had an enormous success and became very highly valued. "Toybooks" though they were, these little works created a revolution in book illustration; they were praised by John Ruskin, by Ernest Chesneau and Arsène Alexandre in France, by Richard Muther in Germany, and by other leading art critics throughout the world.

In 1890 Greenaway was elected to the Royal Institute of Painters in Water Colours, and in 1891, 1894, and 1898 she exhibited watercolour drawings, including illustrations for her books, at the gallery of the Fine Art Society (by which a representative selection was exhibited in 1902). From 1883 to 1897, with a break only in 1896, she issued a series of *Kate Greenaway's Almanacs.* Although she illustrated *The Pied Piper of Hamelin* (1889) and other works, the artist preferred to provide her

Illustration for "When We Went Out with Grandmamma" by Kate Greenaway for *Marigold Garden,* 1885
Mary Evans Picture Library, London

own text. She had great personal charm but was extremely shy of public notice.

Greenback movement (*c.* 1868–88), in U.S. history, the campaign, largely by persons with agrarian interests, to maintain or increase the amount of paper money in circulation. Between 1862 and 1865, the U.S. government issued more than $450,000,000 in paper money not backed by gold (greenbacks) to help finance the Union cause in the American Civil War. After the war, fiscal conservatives demanded that the government retire the greenbacks, but farmers and others who wished to maintain high prices opposed that move. In 1868 the Democrats gave partial support to the Greenback movement by endorsing a plan that called for the redemption of certain war bonds by the issuance of new greenbacks.

The Panic of 1873 and the subsequent depression polarized the nation on the issue of money, with farmers and others demanding the issuance of additional greenbacks or the unlimited coinage of silver. In 1874 champions of an expanded currency formed the Greenback Party, which drew most of its support from the Midwest; and after Congress, in 1875, passed the Resumption Act, which provided that greenbacks could be redeemed in gold beginning Jan. 1, 1879, the new party made repeal of that act its first objective. The 45th Congress (1877–79), which was almost evenly divided between friends and opponents of an expanded currency, agreed in 1878 to a compromise that included retention of the Resumption Act, the expansion of paper money redeemable in gold, and enactment of the Bland–Allison Act, which provided for a limited resumption of the coinage of silver dollars. In the midterm elections of 1878, the Greenback Party elected 14 members of Congress and in 1880 its candidate for president polled more than 300,000 votes, but after 1878 most champions of an expanded currency judged that their best chance of success was the movement for the unlimited coinage of silver.

Greenberg, Joseph H(arold) (b. May 28, 1915, Brooklyn, N.Y., U.S.), American anthropologist and linguist specializing in African culture and in language universals. Greenberg's classification of African languages, first published in 1955 and in a revised edition (*Languages of Africa*) in 1963, postulated four families: Niger–Kordofanian,

Afroasiatic, Nilo-Saharan, and Khoisan. As a linguist, Greenberg is also noted for his early interest in language universals: he edited *Universals of Language* (1963) and *Universals of Human Language,* 4 vol. (1978). His own contribution to the latter volume, "Some Universals of Grammar with Particular Reference to the Order of Meaningful Elements," concerns universal elements in the arrangement of modifiers within the sentence structures of verb-first and verb-last languages.

Greenberg received his Ph.D. in anthropology from Northwestern University, Evanston, Ill., in 1940. In 1962 he became a professor of anthropology and linguistics at Stanford (Calif.) University, where he also was made co-director of the project on language universals. In 1970 he was named first distinguished lecturer of the American Anthropological Association.

greenbul, any of certain bird species of the bulbul family. *See* bulbul.

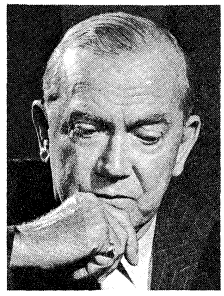
Greencastle, city, Putnam County, west central Indiana, U.S., near Big Walnut Creek, 40 mi (64 km) west-southwest of Indianapolis. Laid out in 1822 as the county seat and named for the hometown of its earliest settler, Ephraim Dukes of Greencastle, Pa., the city is now an agricultural (livestock, grain, and dairy products) shipping and trade centre with light manufactures (zinc products, crushed stone, business machines). Greencastle is the seat of De Pauw University (1837), which has the state's oldest Methodist Church on its campus. Nearby are Mansfield Reservoir and Cataract Lake, which offer recreational facilities. Fifteen covered bridges are located in the county. Pop. (1980) 8,403.

Greene, Charles Sumner and Henry Mather (respectively b. Oct. 12, 1868, Brighton, Ohio, U.S.—d. June 11, 1957, Carmel, Calif.; b. Jan. 23, 1870, Brighton, Ohio, U.S.—d. Oct. 2, 1954, Pasadena, Calif.), U.S. architects, brothers, known for their California regional design.

Together they attended the Massachusetts Institute of Technology (MIT) School of Architecture (Cambridge) and left without graduating in 1891. In 1893 they joined their parents in Pasadena (Calif.), where, in 1894, the brothers established a partnership. Still influenced by the academic eclecticism of their MIT training, the Greenes experimented in various styles but continually sought more direct, simple forms to suit southern California. Their solution was the bungalow, with its interpenetration of interior and exterior space, emphasizing close contact with nature and local materials and crafts. One of their best houses, the Gamble House (1908; Pasadena), was presented to the city of Pasadena and the University of Southern California School of Architecture and Fine Arts, and, on the centennial of Charles Greene's birth, it was dedicated as the Greene and Greene library.

The bungalow style evolved by the Greene brothers combined elements of Gustav Stickley's design philosophy, of Oriental design, and of California's mission heritage. Wood, exquisitely worked and finished, figured prominently in their houses. From 1914 their practice declined. Charles retired, and from 1922 Henry maintained the practice. In 1952 the brothers were belatedly honoured by the American Institute of Architects with a special citation.

Greene, Graham (b. Oct. 2, 1904, Berkhamsted, Hertfordshire, Eng.), English novelist who created a unique, imaginative world. His first novel appeared on the eve of the Great Depression, and many of his books of that period depict the shabby dissolution of the 1930s, when the world was sliding toward Fascism and war. His postwar volumes turned to more inward concerns, but even in the largely apolitical 1950s his *Quiet American* (1955) took up—prophetically—the implications of a U.S. involvement in Vietnam. A convert to Roman Catholicism, he said he should be known as a Catholic who is a novelist rather than as a Catholic novelist. The world his characters inhabit is a fallen one, and the tone of Greene's works emphasizes the omnipresence of evil.



Graham Greene, 1969
© Karsh

His father was the headmaster of Berkhamsted School, which Greene attended and from which he derived his first conception of evil from the schoolrooms that lay just the other side of his family's own comfortable quarters. After he ran away from school, he was sent to London to a psychoanalyst in whose house he lived while under treatment—those days, he later said, were among the happiest of his life.

Educated at Oxford University, he converted from the Anglicanism of his family to Catholicism in 1926. He moved to London, was employed on *The Times* later that year, and married in 1927. Upon publication of his first novel, in 1929, he quit *The Times* and became a free-lance writer and critic.

Greene's first three novels are held to be of small account. He began to come into his own with a thriller, *Stamboul Train* (U.S. title, *Orient Express,* both 1932). It was the first of his many novels to be filmed (1934). Similar to thrillers, with an added complexity and depth, are *A Gun for Sale* (1936; U.S. title, *This Gun For Hire;* filmed 1942), *The Confidential Agent* (1939; filmed 1945), and *The Ministry of Fear* (1943; filmed 1945). *The Third Man* (1949), a classic spy film of post-World War II Europe, was written as a film. *Our Man in Havana* (1958; filmed 1959) is a spoof of his spy novels. *Brighton Rock* (1938; filmed 1948) shares some elements with his thrillers—the protagonist is a hunted criminal—but here Catholicism comes to the fore. *The Power and the Glory* (1940; filmed 1962) had a more directly Catholic theme: the travails of a weak, alcoholic priest in Mexico during a period when the church was being repressed.

Greene worked for the Foreign Office during World War II and was stationed for a while at Freetown, Sierra Leone, scene of *The Heart of the Matter* (1948). *The End of the Affair* (1951) is narrated by an agnostic in love with a woman who forsakes him because of a religious conviction that brings her near to sainthood. *A Burnt-Out Case* (1961) is perhaps the most important of his later novels; its protagonist, a Catholic architect tired of adulation, bears some resemblance to Greene, who also disliked being cramped within a specific identity, no matter how admirable. Other notable novels include *The Honorary Consul* (1973), *The Human Factor* (1978; filmed), and *Monsignor Quixote* (1982).

Greene published several collections of short stories, among them *Nineteen Stories* (1947; revised as *Twenty-One Stories,* 1954), *A Sense of Reality* (1963), *May We Borrow Your Husband?* (1967), and *The Collected Stories* (1972). *Collected Essays* appeared in 1969. *A Sort of Life* (1971) is a memoir to 1931, to which *Ways of Escape* (1980) is a sequel.

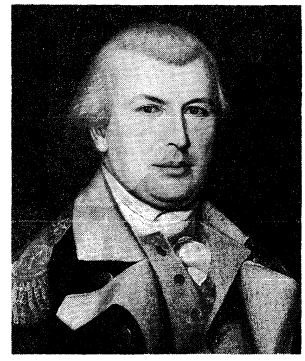
Greene, Nancy (Catherine), married name MRS. AL RAINE (b. May 11, 1943, Ottawa), skier who was the first Canadian woman to win the World Cup (1967–68).

Greene's family were all avid skiers, and she began skiing before she was six years old. Two of her sisters were also members of the national women's team. She was educated in public schools at Rossland, Business College in Trail, and at Notre Dame University in Nelson—all in British Columbia. She was a member of the national team (1959–68) and of the 1960, 1964, and 1968 Winter Olympic teams, winning the gold medal for the giant slalom race and the silver for the slalom in 1968. She turned professional thereafter and worked in support of the national team. She also organized a public relations firm and became a sports journalist and broadcaster.

Greene, Nathanael (b. Aug. 7, 1742, Potowomut, R.I.—d. June 19, 1786, Mulberry Grove, Ga., U.S.), general in the U.S. War of Independence (1775–83), considered by some historians as second only to Gen. George Washington as a military strategist.

After managing a branch of his father's iron foundry, Greene served several terms in the colonial legislature and was elected commander of the Rhode Island Army, organized in 1775; he was made a major general in 1776.

Greene served with Washington in the siege of Boston (1775–76), in the fighting in and around New York City (1776), and in the retreat across New Jersey after the British capture of Ft. Washington (November 1776). He also led troops at Trenton (December 1776) and, the following year, at Brandywine and Germantown.



Nathanael Greene, portrait by Charles Willson Peale, c. 1791; in Independence National Historical Park, Philadelphia
By courtesy of the Independence National Historical Park Collection, Philadelphia

He succeeded Thomas Mifflin as quartermaster general (March 1778) but resigned in August after a struggle with Congress over interference in army administration by the Treasury Board. On October 4 he succeeded Gen. Horatio Gates as commander in chief of the southern army. Opposed by a superior force under Lord Cornwallis, Greene decided to divide his own troops, thus forcing the division of the British as well. His strategy led to Gen. Daniel Morgan's victory at Cowpens, S.C. (Jan. 17, 1781). Although Greene was defeated at the Battle of Guilford Courthouse, N.C. (March 15, 1781), the British troops were so weakened that Cornwallis abandoned his plan to conquer North Carolina.

Taking the offensive, Greene began the reconquest of inner South Carolina, and by the end of June he had forced the British back to the coast. On September 8 Greene engaged the British under Lieut. Col. James Stuart at Eutaw Springs, where the British were so weakened that they withdrew to Charleston.

He held them there during the remainder of the war.

According to some historians, Greene's character was somewhat less solid than his generalship. Although charges of his having been in secret partnership with John Banks, army contractor for Greene in the South, were not proved, there is evidence that as quartermaster general he was in secret partnership with Jeremiah Wadsworth, commissary general of purchases. Nevertheless, South Carolina and Georgia voted Greene liberal grants of land and money. He settled in 1785 on an estate near Savannah, Ga.

Greene, Robert (b. July 1558?, Norwich, Eng.—d. Sept. 3, 1592, London), one of the most popular English prose writers of the later 16th century and Shakespeare's most successful predecessor in blank-verse romantic comedy. He was also one of the first professional writers and among the earliest English autobiographers.

Greene obtained degrees at both Cambridge and Oxford. He then went to London, where he became an intimate of its underworld. He wrote more than 35 works between 1580 and 1592. To be certain of supplying material attractive to the public, Greene at first slavishly followed literary fashions. His first model was John Lyly's *Euphues*.

In the later 1580s Greene wrote prose pastorals in the manner of Sir Philip Sidney's *Arcadia*, interspersed with charming, often irrelevant lyrics that have given Greene a reputation as a poet. The best of his pastorals is *Pandosto* (1588), the direct source of Shakespeare's *The Winter's Tale*.

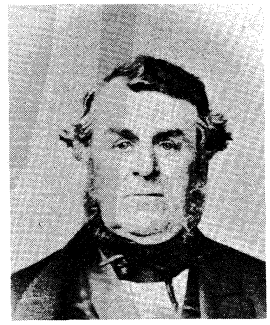
About 1590 Greene began to compose serious didactic works. Beginning with *Greenes never too late* (1590), he related prodigal son stories. That Greene drew on his own experience is evident from the tract *Greenes groatsworth of witte, bought with a million of Repentance*, printed posthumously in 1592 with Greene's admission that Roberto's experiences were essentially his own. In *Groatsworth* appears the first printed reference to Shakespeare, assailed as "an upstart Crow, beautified with our feathers, that with his *Tygers heart wrapt in a Players hide*, supposes he is as well able to bumbast out a blanke verse as the best of you . . . in his owne conceit the onely Shake-scene in a countrie." (The words in italics are from Shakespeare's *I Henry VI*.) Greene is thought to be criticizing Shakespeare the actor.

Greene's writings for the theatre present numerous problems; the dating of his plays is conjectural, and his role as collaborator has produced much inconclusive discussion. With *The Honorable Historie of frier Bacon, and frier Bongay* (written *c.* 1591, published 1594), the first successful romantic comedy in English, Greene realized his comic talent in drama. In *The Scottish Historie of James the fourth, slaine at Flodden* (written *c.* 1590, published 1598) he used an Italian tale but drew on fairy lore for the characters of Oberon and Bohan. It was a forerunner of *As You Like It* and *A Midsummer Night's Dream*. As Marlowe anticipated the tragedies of Shakespeare, so, in a lesser way, Greene furnished him a model in dramatic comedy and romance.

In his last year Greene wrote exposés of the Elizabethan underworld, such as *A Notable Discovery of Coosnage* (1591) and the successful and amusing *A disputation betweene a hee conny-catcher and a shee conny-catcher* (1592).

Greener, William (b. 1806, Felling, near Newcastle upon Tyne, Northumberland, Eng.—d. 1869), U.S. gunmaker and inventor who developed an early self-expanding rifle bullet, a predecessor of the later widely used Minié projectile.

Muzzle-loading rifles required a bullet smaller than the bore so it could easily be rammed into the muzzle and then, paradoxically, as



Greener
By courtesy of Leyton Greener

large as the bore so that upon firing it would snugly fill the grooves and fully use the force of the powder gases. A number of inventors had already devised self-expanding bullets when, in 1836, Greener developed such a bullet consisting of a flat-ended oval ball with a cavity in which a metal plug was inserted. When the gun fired, the plug drove forward and caused the bullet to expand and engage the rifle grooves. Greener submitted his invention to the British government, but it was rejected; later, when a French captain, Claude Minié, received £20,000 from the British government for a similar bullet, Greener sued for plagiarism and ultimately was awarded £1,000. Greener was the author of several books on gunnery; he also patented inventions in other fields, such as a process (co-invented by W.E. Strait) for the manufacture of pencils from the hard graphite carbon deposited in the interior of gas retorts.

His son, William Wellington Greener (1834–1921), invented a new type of shotgun mechanism and wrote several books, including *The Gun and Its Development* (1881).

Greeneville, town, seat (1783) of Greene County, northeastern Tennessee, U.S., near the Nolichucky River, in the Tennessee Valley, 70 mi (113 km) east-northeast of Knoxville. Settled by Scots-Irish Covenanters in 1780 and named for Nathanael Greene, the Revolutionary War general, it was the capital of the short-lived State of Franklin (1784–88), which seceded from North Carolina. It was incorporated under the laws of Tennessee in 1817.

The two homes in Greeneville of Pres. Andrew Johnson, his tailor shop, and grave are preserved as a national historic site. A monument to Gen. John H. Morgan (1826–64), a Confederate cavalry raider who was killed in Greeneville, stands near the courthouse. The birthplace of Davy Crockett, the frontiersman, is maintained in a state park a few miles northeast of the town. Tusculum College (1794) and the Tobacco Experiment Station of the University of Tennessee are in the city. The Unaka Division of the Cherokee National Forest lies to the south and east.

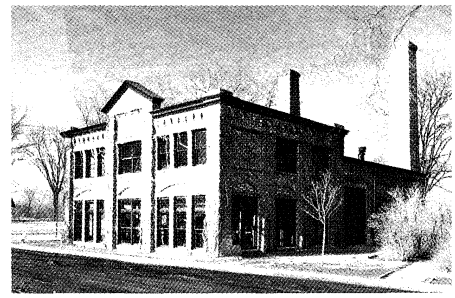
A major burley tobacco market, Greeneville is also a centre of diversified agriculture (beef and dairy cattle, corn, wheat, and poultry), trade, and manufactures, which include radio, television, and electronic equipment, steering gears, and furniture. Inc. city, 1875. Pop. (1980) 14,097.

Greenfield, city, Hancock County, central Indiana, U.S., 21 mi (34 km) east of Indianapolis. Founded in 1828 as the county seat, it was incorporated in 1850 and was probably named for John Green, an early settler. Mainly residential, it has some light industries (textiles, pharmaceuticals) and there are some adjoining farms producing tomatoes, soybeans, and wheat. Greenfield is mainly known, however, as the birthplace of the Hoosier dialect poet, James Whitcomb Riley (1849–1916), and the Riley Homestead on Main Street is preserved as a memorial-museum. In his early years Riley contributed literary pieces to the Greenfield *Commercial* and the Greenfield *News*. The city's Riley Memorial Park is crossed by Brandywine Creek with its "Old Swimmin' Hole" celebrated in Riley's simple sentimental verses. Pop. (1980) 11,439.

Greenfield, urban town (township), seat (1811) of Franklin County, northwestern Massachusetts, U.S., on the Connecticut River, 38 mi (61 km) north of Springfield. Located at the eastern entrance to the Mohawk Trail, it was settled in 1686 as part of Deerfield and separately incorporated in 1753. Manufacturing began in the early 19th century, and the town now produces silverware, paper, taps and dies, tools, and electrical components. Tourism (sustained by winter sports facilities and the area's scenic beauty), dairying, and apple growing are important to the economy. Greenfield Community College was established in 1962. Pop. (1980) 18,436.

Consult the INDEX *first*

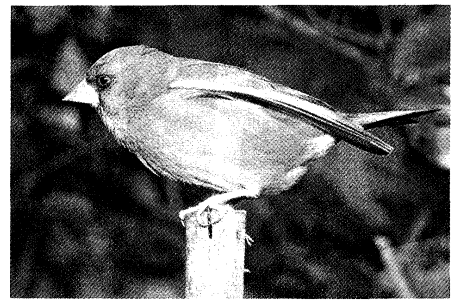
Greenfield Village, collection of nearly 100 historic buildings on a 200-ac (80-ha) site in Dearborn, southeastern Michigan, U.S. Established in 1933 by Henry Ford (who relocated or reconstructed buildings there from throughout the United States), the village includes the birthplaces of William Holmes McGuffey, Noah Webster, Luther Burbank, and Orville



A replica of the Detroit Edison Company, where Henry Ford worked in 1896, Greenfield Village, Mich.
Milt and Joan Mann from CameraMann

and Wilbur Wright. Also featured are Thomas A. Edison's New Jersey workshop and Florida laboratory, Stephen Foster's home, the courthouse where Lincoln practiced law, and representative early American homes, public buildings, and craft shops. The adjoining Henry Ford Museum houses a collection of Americana.

greenfinch, any of several small greenish birds, with yellow in the wings and tail, of the genus *Carduelis* (some formerly in *Chloris*), belonging to the songbird family Carduelidae (*q.v.*). Greenfinches are sociable seedeaters that have trilling and twittering calls. They usually nest in evergreens. The 14-centimetre



European greenfinch (*Carduelis chloris*)
John Markham

(5.5-inch) European greenfinch (*C. chloris*) has been introduced into Australia. The Chinese, or Oriental, greenfinch (*C. sinica*) of eastern Asia is a dooryard bird in Japan.

greenfly: *see* aphid.

greenheart, also called BEBEERU (*Ocotea rodiaei*), valuable South American timber tree of the laurel family (Lauraceae). A large tree, it grows to a height of 40 m (130 feet) and is native to the Guianas. The bark and fruits contain bebeerine, an alkaloid formerly used to reduce fever.

Greenheart wood, which is both strong and dense, is used chiefly in Europe for underwater applications, such as pilings for wharves and bridges and in ships. Its excessive weight makes it largely unfit for other purposes. Greenheart wood is dark green; its sapwood and heartwood are not easily distinguished.

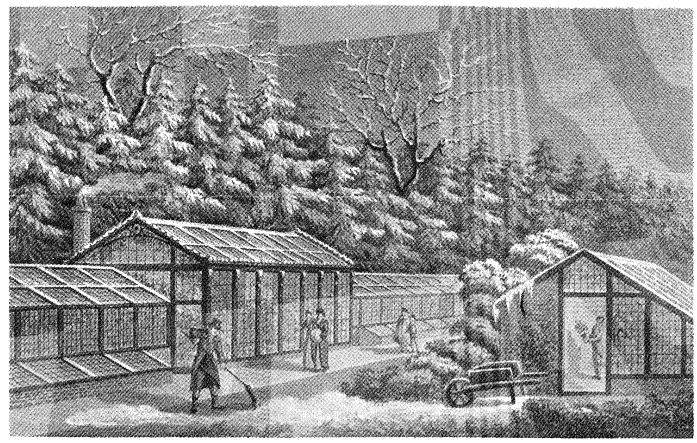
greenhood, any plant of the genus *Pterostylis*, family Orchidaceae, containing almost 100 species of orchids native to Australasia. Greenhoods have dull-coloured, hooded flowers that trap insects. The lip of the flower is hinged and seals the entrance route of an insect that enters the flower to obtain its sweet nectar.

Pterostylis obtusa
W.H. Hodge

The insect must leave by means of a special tunnel through the column that is lined with hairs. Packets of pollen grains become attached to the insect as it escapes, and the pollen is thus carried to other flowers.

Some species of greenhoods are commonly known as shell orchids. The jug orchid (*P. recurva*) is named for its shape. The hooded orchid (*P. banksii*) is native to New Zealand, and the closely related *P. baptisii* is from neighbouring Australia.

greenhouse, also called GLASSHOUSE, building designed for the protection of tender or out-of-season plants against excessive cold or heat. In the 17th century greenhouses were ordinary brick or timber shelters with a normal proportion of window space and some means of heating. As glass became cheaper and as more sophisticated forms of heating became available, the greenhouse evolved into a roofed and walled structure built of glass with a minimal wooden or metal skeleton. By the middle of the 19th century, the greenhouse had developed from a mere refuge from a hostile climate into a controlled environment, adapted to the needs of particular plants. A huge increase in the availability of exotic plants in the 19th century led to a vast increase in glasshouse culture in England.



Greenhouse and potting shed designed by Humphry Repton and illustrated in his *Observations on the Theory and Practice of Landscape Gardening,* 1803
By courtesy of the Pennsylvania Horticultural Society, Philadelphia

The modern greenhouse is usually a glass- or plastic-enclosed framed structure that is used for the production of fruits, vegetables, flowers, and any other plants that require special conditions of temperature. The basic structural forms are the span-type greenhouse, which has a double-sloped, or A-shaped, roof, and the lean-to greenhouse, which has only one roof slope and leans against the side of a building. Two or more span-type greenhouses are sometimes joined side by side so that they have fewer external walls, and heating costs are consequently less. A greenhouse has a large expanse of glazing on its sides and roof so that the plants are exposed to natural light for much of the day. Glass has been the traditional glazing material, but plastic films, such as polyethylene or polyvinyl, and fibreglass are increasingly used. The framing of the structure is made of aluminum, galvanized steel, or such woods as redwood, cedar, or cypress. A greenhouse is heated partly by the rays of the Sun and partly by artificial means, such as circulating steam, hot water, or hot air. Because a greenhouse can become too hot as well as too cold, some type of ventilating system is also needed; this usually consists of roof openings, which can be operated mechanically or automatically, and end-wall openings, through which electric fans draw air and circulate it throughout the interior.

The plants grown in greenhouses fall into several broad categories based on their temperature requirements during nighttime hours. In a cool greenhouse, the nighttime temperature falls to about 45°–50° F (7°–10° C). Among the plants suited to cool greenhouses are azaleas, cinerarias, cyclamens, carnations, fuchsias, geraniums, sweet peas, snapdragons, and a variety of bulbous plants including daffodils, irises, tulips, hyacinths, and narcissi. A warm greenhouse has nighttime temperatures of 50°–55° F (10°–13° C). Begonias, gloxinias, African violets, chrysanthemums, orchids, roses, Boston ferns, coleuses, and many kinds of ferns and of cacti and other succulents are suited to such temperatures. In a tropical greenhouse, or hothouse, which has nighttime temperatures of 60°–70° F (16°–21° C), caladiums, philodendrons, begonias, gardenias, poinsettias, bougainvilleas, passionflowers, and many kinds of palms and orchids can be grown. In Great Britain and other countries with cool climates, commercial greenhouses grow tomatoes and other warm-weather vegetables. *See also* conservatory.

greenhouse effect, a warming of the Earth's surface and lower atmosphere that tends to intensify with an increase in atmospheric carbon dioxide.

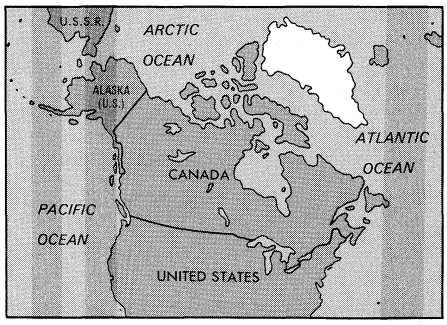
A brief treatment of the greenhouse effect follows. For full treatment, *see* MACROPAEDIA: Climate and Weather.

The atmosphere allows a large percentage of the rays of visible light from the Sun to reach the Earth's surface and heat it. A part of this energy is reradiated by the Earth's surface in the form of long-wave infrared radiation, much of which is absorbed by molecules of carbon dioxide and water vapour in the atmosphere and which is reflected back to the surface as heat. This is roughly analogous to the effect produced by the glass panes of a greenhouse, which transmit sunlight in the visible range but hold in heat.

The trapping of this infrared radiation causes the Earth's surface and lower atmospheric layers to warm to a higher temperature than would otherwise be the case. Without this greenhouse heating, the Earth's average temperature would be only about −73° C (−100° F); even the oceans would be frozen under such conditions. Alternatively, a "runaway" greenhouse effect like that found on the planet Venus would result in surface temperatures as high as 500° C (932° F).

Owing to the rise in atmospheric carbon dioxide caused by modern industrial societies' widespread combustion of fossil fuels (coal, oil, and natural gas), the greenhouse effect on Earth may be intensified and long-term climatic changes may result. An increase in atmospheric concentrations of other trace gases such as chlorofluorocarbons (Freons), nitrous oxide, and methane, due again largely to human activity, may also aggravate greenhouse conditions. A growing number of scientists have predicted that significant alterations in climate patterns will be seen by the turn of the century. They estimate that global average temperatures could increase by as much as 5° C (9° F) by the middle of the 21st century. Such global warming would cause the polar ice caps and mountain glaciers to melt rapidly and result in appreciably higher coastal waters. The rise in global temperature would also produce new patterns and extremes of drought and rainfall, seriously disrupting food production in certain regions.

Greenland, Danish GRØNLAND, Greenlandic KALAALLIT NUNAAT, the world's largest island, covering 840,000 square miles (2,175,600 square km) and lying more than two-thirds within the Arctic Circle in the North Atlantic Ocean. The capital is Nuuk (Godthåb). Extending about 1,660 miles (2,670 km) from north to south and more than 650 miles (1,050 km) from east to west at its widest extent, Greenland is separated from Canada's Ellesmere Island to the north by only 16 miles (26 km). The nearest European country is Iceland, lying about 200 miles (320 km) across the Denmark Strait to the southeast. Greenland's deeply indented coastline is 24,-



Greenland

430 miles long, a distance roughly equivalent to the Earth's circumference at the Equator. The population in 1986 was estimated to be 54,000.

A brief treatment of Greenland follows. For full treatment, *see* MACROPAEDIA: Arctic, The.

For current history and for statistics on society and economy, *see* BRITANNICA WORLD DATA ANNUAL.

The land. Greenland's major physical feature is its massive ice sheet, which is second only to Antarctica's in size. The glacier has an average thickness of 5,000 feet (about 1,500 m), reaches a maximum of more than 10,000 feet, and covers more than 700,000 square miles (nearly 85 percent of Greenland's total land area). The remaining ice-free land area occupies the country's coastal areas and consists largely of highlands; mountain chains parallel the island's east and west coasts, rising to 12,139 feet (3,700 m) at Gunnbjørns Fjeld in the southeast.

The climate of Greenland is arctic. Average winter (January) temperatures range from 21° F (−6° C) in the south to −31° F (−35° C) in the north. Summer temperatures along the southwestern coast are modified slightly by the Gulf Stream and average 45° F (7° C) during July. The average summer temperature in the far north is 39° F (3.6° C). Average annual precipitation decreases from more than 75 inches (1,900 mm) in the south to about 2 inches (50 mm) in the north.

The country's vegetation is characterized mainly as tundra; the limited ice-free areas are almost totally devoid of trees, although some dwarfed birch, willow, and alder scrub do manage to survive. In the extreme south, winter hay is grown for sheep, and such vegetables as radishes, cabbage, lettuce, and potatoes are grown along the southwestern coast. Seven species of land mammals—polar bears, musk-oxen, reindeer, arctic foxes, snow hares, ermines, and lemmings—are represented. Seals and whales are found in the surrounding waters, and the rivers contain salmon and trout.

Greenland has commercial deposits of lead, zinc, and cryolite. Exploration during the 1970s uncovered promising deposits of uranium, copper, and molybdenum, but climatic and ecological considerations severely limit the exploitation of mineral resources.

The people. More than four-fifths of the population are native Greenlanders; about one-sixth are immigrant Danes. The Greenlanders are principally of Eskimo, or Inuit, extraction, but they are very strongly admixed with early European immigrant strains. In the 1980s pure Inuit were found only in the extreme northwest, around Thule, and in East Greenland. The population of Greenland is widely dispersed, mostly in very small coastal settlements. The birth and death rates are low by world averages, and the annual growth rate is extremely low. Only about one-fourth of the total population is under 15 years of age.

The economy. Greenland has a mixed state and private-enterprise economy. The gross national product (GNP) per capita is comparable to those of western European countries. The GNP originates principally from fishing and mining.

Agriculture is possible on about 1 percent of Greenland's total area, in the southern ice-free regions. Hay and garden vegetables are the only crops raised. Most of the area is pasture for sheep and reindeer, which are raised for meat, wool, and milk. Hunting is important in the northern districts, where seals, foxes, and polar bears are caught for their pelts; seals also provide meat and blubber. Atlantic cod and prawns account for most of the annual fish catch. Besides supplying domestic needs, fish and crustaceans constitute Greenland's principal export. Zinc and lead are the principal ores mined. The chief industrial products are frozen, tinned, dried, and smoked fish and processed mineral-ore concentrates. Electricity is produced entirely by thermal power plants.

Revenues originating primarily from the Danish annual block grant, import duties, and taxes, generally are balanced with expenditures, which include contributions to municipalities, education, culture, and social welfare. Greenland participates in international organizations through Denmark.

Roadways in Greenland are limited to short stretches of ice-free coastal areas, and sleds are used inland. Shipping and air service are the principal means of transport.

Greenland's annual exports average about three-fifths of imports in value; they consist largely of fresh and processed fish and metal ores and concentrates. Principal imports include machinery and transport equipment, refined petroleum products, miscellaneous manufactured goods, and food products. Chief trading partners are Denmark, Norway, Germany, and the United States.

Administrative and social conditions. Although it is officially part of Denmark, Greenland's powers of home rule include jurisdiction over municipal regulations, taxes, education, the social welfare system, cultural affairs, and the state church. Denmark retains control of the island's constitutional affairs, foreign relations, and defense.

The centre of power in Greenland is the Landsting, a 26-member parliament elected to four-year terms by all adults 18 years of age and older. The leader of the majority party in the Landsting forms the seven-member Landsstyre, which assumes the island's executive responsibilities. Highest judicial authority rests with the Landsret, which is the only court with a professional judge. Greenland's voters elect two representatives to the Danish parliament (Folketing); another link between Greenland and the Danish government is provided by Denmark's Ministry for Greenland.

Using financial grants from Denmark, Greenland's government provides its citizens with a wide range of welfare services. Free health care, administered by the Danish government, is also available to the island's people. These social services have greatly improved Greenland's health conditions. Average life expectancy is only about 63 years.

Education in Greenland is compulsory for nine years of elementary schooling. Graduates of this level may attend a two-year "continuation" school and then a two-year "course" school. Greenland's school system has an insufficient number of native teachers, and consequently it hires many Danish-speaking and Danish-educated teachers. Only about half of the student population has mastered the Greenlandic language, despite the importance attached to it and the common practice of using it as the medium of instruction.

Cultural life. Despite the Western influence exerted by the Danish presence in Greenland, many of the island's people continue to practice traditional (Eskimo) cultural activities. Folk arts, especially soapstone carving and drum dancing, remain popular.

History. Migrations of Eskimo peoples into Greenland began sometime around 3000 BC. Two distinct cultures are known: the Sarqaq (*c.* 1400–700 BC) and the Dorset (*c.* 700 BC–AD 1300).

In 982 the Norwegian Erik the Red, who had been banished from Iceland for manslaughter, settled in Greenland. Returning to Iceland in 986, he organized an expedition to Greenland that resulted in the development of two main settlements: the East Settlement, near present-day Julianehåb, and the West Settlement, near present-day Godthåb. These settlements may have reached a maximum population of 3,000. Christianity arrived in the 11th century by way of Leif Eriksson, who had just returned from the recently Christianized Norway. A bishop's seat was established in Greenland in 1125.

Beginning sometime in the 13th century, the Norse (Norwegian) settlers began to interact with the expanding Eskimo Thule culture that had appeared in northern Greenland about 1100. The Norse West Settlement disappeared sometime in the 13th century, and the East some 150 years later. These disappearances remain largely a mystery, although the Eskimo Thules may have been partly responsible.

Whaling and the search for the Northwest Passage rekindled interest in Greenland beginning in the late 16th century. The presence of European whalers resulted in racial interbreeding that eventually created the distinctive Greenlanders of today.

Greenland had been subject to Norway (later Denmark-Norway) since 1261. After the disappearance of the original Norse settlements, no attempt at colonization was made until 1721, when Hans Egede, with Danish permission, founded a trading company and Lutheran mission near present-day Godthåb, marking the real beginning of Greenland's colonial era.

In 1776 the Danes assumed full monopoly of trade by creating the Royal Greenland Trade Department. The Greenland coast was closed to foreign access and not reopened until 1950.

Greenland fell under the protection of the United States during the Nazi occupation of Denmark (1940–45) and was returned to Denmark in 1945. Following the war, the Danes began to respond to severe criticisms brought against them by Greenlanders. Reforms to improve the local economy, transportation systems, and educational system were instituted. In 1953 Greenland became an integral part of the Kingdom of Denmark. Full home rule did not come about until 1979.

Greenland anticyclone, region of high atmospheric pressure over the glacial ice fields of the interior of Greenland. This high-pressure area results from the cooling of the lower layers of the atmosphere because of the cold, underlying ice surface, such that the layers of air immediately over the ice fields are colder than the surrounding air at the same altitude over the neighbouring oceanic areas. This colder air, being more dense than the surrounding warmer air, is presumed to give rise to the anticyclone. Because of the manner in which these anticyclones are formed, they tend to be shallow, surface phenomena, rarely extending to altitudes of 1,500 to 3,000 m (5,000 to 10,000 feet).

Greenland Current, surface oceanic current, a combination of polar sea surface drift, return flow of the North Atlantic Current, and Irminger Current waters. The East Greenland Current flows south along Greenland's east coast, transporting large fields of ice, and then turns north into the Labrador Sea. Salinities and temperatures as low as 30 parts per thousand and 36° F (2° C), respectively, occur during the summer months because of land drainage and melting ice. The current mixes with the warmer waters of the Irminger and Norwegian currents, creating excellent fish-

ing grounds near the coast of Iceland and in portions of the Norwegian Sea. At the southern extremity of Greenland (Cape Farewell), a branch turns to form the West Greenland Current, which flows north along the west coast of Greenland into the Davis Strait, where it joins the Labrador Current. Salinity and temperature increase outward from the Greenland coast. In contrast to the east coast of Greenland, the west coast is kept free of ice by warm North Atlantic waters that contribute to the current beyond the slope.

Greenland Ice Sheet, also called INLAND ICE, Danish INDLANDSIS, single ice cap or glacier covering about 80 percent of the island of Greenland and the largest ice mass in the Northern Hemisphere, second only in size to the Antarctic ice mass. It extends 1,570 mi (2,530 km) north–south, has a maximum width of 680 mi near its northern margin, and has an average thickness of about 5,000 ft (1,500 m). Although the Swedish explorer Baron Nordenskiöld ventured onto the ice sheet in 1870 and 1883, the first crossing was made by the Norwegian Fridtjof Nansen and his party in 1888, travelling from Angmagssalik (formerly Ammassalik) to Godthåbsfjord. Subsequent explorations included those by Robert Peary and Knud Rasmussen.

The ice sheet occupies a saucer-like basin that has a bedrock surface near sea level under most of Greenland. The ice mass, covering an area of 708,100 sq mi (1,833,900 sq km), is contained by coastal mountains on the east and west. It is thicker in the centre than along its margins and rises to two domes. The northern dome, located in east central Greenland and reaching more than 10,000 ft above sea level, is the area of maximum thickness of the ice sheet and has the lowest mean annual temperature on the ice cap (-24° F [-31° C]). It is separated from the southern dome (8,200 ft in elevation) by a depression with a maximum elevation of 7,900 ft that runs from the Disko Bugt (bay) area in the west to the Angmagssalik area in the southeast. The movement of the ice sheet is principally outward from the crest of the ice divide. The margin of the ice sheet reaches the sea in the area of Melville Bugt southeast of Thule in the form of large outlet glaciers that calve off into the ocean, producing numerous icebergs.

The ice cap is the largest and possibly the only relict of the Pleistocene glaciations in the Northern Hemisphere. In volume it contains 12 percent of the world's glacier ice, and if it melted, sea level would rise 20 ft. In the 1970s and early 1980s the Greenland Ice Sheet Program was organized by scientists from the United States, Denmark, and Switzerland. Deep ice cores from the Greenland Ice Sheet were obtained for comparison with deep cores from the Antarctic ice mass, to gain a better understanding of the factors controlling present and past ice mass dynamics, atmospheric processes, and the response of ice sheets to climatic change and to determine whether the past changes in climate were global or regional in character.

Greenland Sea, Danish and Norwegian GRØNLANDSHAVET, outlying portion of the Arctic Ocean, with an area of 465,000 sq mi (1,205,000 sq km). It lies south of the Arctic Basin proper and borders Greenland (west), Svalbard (east), the main Arctic Ocean (north), and the Norwegian Sea and Iceland (south). Average depth is 4,750 ft (1,450 m), with the deepest recorded point at 16,000 ft (4,800 m).

A line linking northeast Iceland, the isolated island of Jan Mayen, and Bjørnøya (Bear Island) forms the conventional border between the Arctic Greenland Sea and the Norwegian Sea to the southeast. The line also marks significant underwater ridges and indicates the average edge of Arctic ice.

The first scientific investigations of the region were carried out in 1876–78. Norwegian, Icelandic, and Soviet vessels, among others, have since carried scientific expeditions into the area. In 1909 Fridtjof Nansen helped detail the complex current system, and his scheme has been updated by Soviet studies.

The bed of the Greenland Sea deepens irregularly northward and is divided by the submarine Mohns Ridge into the Greenland Basin (Hollow) and, to the south, the North Icelandic Deep. Silts fill the submarine hollows and gorges; silty sands, gravel, boulders, and other products of erosion coat the shelves and ridges.

Bitter north and northeast winds cool the sea surface and drive the cold waters southward. Air temperatures reach as low as −57° F (−49° C) off Spitsbergen and as high as 77° F (25° C) off Greenland. Averages are 14° F (−10° C) in the south and −15° F (−26° C) in the north for February, the coldest month. August, the warmest month, averages 41° F (5° C) in the south and 32° F (0° C) in the north. The number of frosty days ranges from 225 (south) to 334 (north). Precipitation totals 10 inches (250 mm) annually in the north and double this amount in the south. Surface water temperatures range from 30° F (−1° C) in the north, in February, to 43° F (6° C) in the south, in August. Fogs are frequent.

The East Greenland Current brings ice down from the north and bifurcates near the central ridge. Branches of warm Atlantic currents push floating ice northward. The ice season lasts from October to the following August, and the ice includes Arctic pack ice (several yards thick), sea ice (about a yard thick), and freshwater ice in the form of towering icebergs. Tides, together with the complex current system, break up the ice sheet and cause a mixing of the various water layers.

The Greenland Sea is quite densely inhabited by lower life forms, which serve as the base of the food chain. Large invertebrates, fishes (including cod, herring, redfish, halibut, and plaice), birds (including gulls and ducks), and mammals (including seals, whales, and dolphins) all feed on the smaller invertebrates and small organisms. Mosses, lichens, and scanty bushes around the coasts support the few deer and musk oxen.

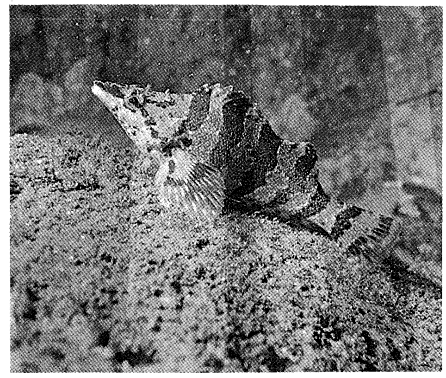
Greenland shark (*Somniosus microcephalus*), member of the spiny dogfish family Squalidae (class Selachii). This large shark, which can reach a length of 7 metres (24 feet) and a weight of 1,025 kilograms (2,250 pounds), is fished commercially near Greenland at a depth of 600 to 1,800 feet. In the early 1900s as many as 30,000 Greenland sharks were caught a year. About 30 gallons of oil can be obtained from a large specimen. The flesh is toxic and must be dried before eating. Greenland sharks are similar to spiny dogfish except that they lack a spine in front of the second dorsal fin and usually the one on the first dorsal fin.

Greenleaf, Ralph (b. *c.* 1899, Monmouth, Ill., U.S.—d. March 15, 1950, Philadelphia), world champion U.S. pocket-billiards (pool) player from 1919 through 1924 and thereafter intermittently from 1926 to 1937. His exceptional skill and colourful personality made him one of the leading U.S. sports figures of the 1920s.

As a boy Greenleaf attained prominence by defeating Bennie Allen, at that time (1913–15) the world pocket billiards champion, in an exhibition match at Monmouth. In Detroit in 1929 he made a run of 126 (a record for championship play on a table measuring 5 feet by 10 feet), to regain the world title from Frank Taberski in only two innings. In an exhibition he achieved a record run of 269.

greenlet, any of several tropical birds of the vireo family, Vireonidae. *See* vireo.

greenling, any of a number of marine fish of the family Hexagrammidae (order Scorpaeniformes). Greenlings are characterized, as a group, by such features as small scales, long dorsal fins, and strong jaw teeth. Members of



Painted greenling (*Oxylebius pictus*)
A. Giddings—Bruce Coleman Inc.

the family usually do not exceed a length of about 45 or 46 centimetres (18 inches). They are carnivorous fish, valued as food, and are found in the North Pacific. Included in the group are the Atka mackerel (*Pleurogrammus monopterygius*), a banded, black and yellow fish valued for food and sport; the lingcod (Ophiodon *elongatus*), a codlike, California species; and the ainame (*Hexagrammos otakii*), a common food fish of Japan.

Greenock, industrial burgh and shipbuilding port in the district of Inverclyde, Strathclyde region, Scotland, on the southern shore of the Firth of Clyde, and just west of the metropolitan complex of Glasgow. Hemmed in by hills, the town is largely confined to the waterfront, along which it stretches for approximately 4 mi (6.5 km). The cramped lower waterside industrial areas contrast with the later 19th-century residential areas, which occupy the higher land.

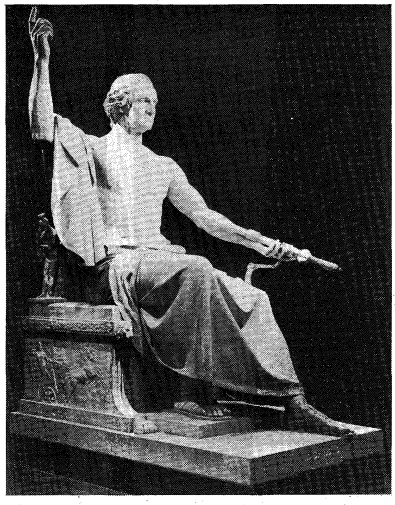
In the 17th century, Greenock was a small fishing village consisting of one row of thatched cottages. Port facilities were greatly improved during the 18th and 19th centuries, and shipbuilding, marine engineering, sugar refining, and textile manufacture developed and expanded. Although the local economy suffered a decline after World War II, ships and machinery are still the chief exports, and sugar the main import. Large numbers of warships and passenger liners have been built in Greenock's extensive shipyards, which stretch to Port Glasgow. The first harbour (finished in 1710) has been periodically improved, and there are several tidal harbours and graving docks (for cleaning ships' bottoms) and other dry docks. In 1964 a new dry dock, one of the largest of its kind in the world, was opened at Greenock. During World War II, Greenock was a Free French naval base and was heavily damaged by bombing. A granite cross above the town serves as a memorial to the French sailors who lost their lives in the Battle of the Atlantic.

James Watt (1736–1819), discoverer of steam power, was born in Greenock. He is commemorated by a statue, a scientific library, a museum, and the Watt Memorial School of Engineering, Navigation, Radio and Radar, which stands on the site of his birthplace. Pop. (1981) 59,015.

greenockite, cadmium sulfide (CdS), the only mineral containing an appreciable amount of cadmium. It forms coatings on sphalerite and other zinc minerals. It forms yellow or orange crystals that belong to the hexagonal system. Typical occurrences are Příbam, Czech.;

Pierrefitte, Fr.; and Joplin, Mo., U.S. For detailed physical properties, *see* sulfide mineral (table).

Greenough, Horatio (b. Sept. 6, 1805, Boston, Mass., U.S.—d. Dec. 18, 1852, Somerville, Mass.), neoclassical sculptor and important 19th-century American writer on art. He was one of the first American artists to receive a national commission.



"George Washington," over-life-size marble statue by Horatio Greenough, 1840; in the Smithsonian Institution, Washington, D.C.

By courtesy of the National Collection of Fine Arts, Smithsonian Institution, Washington, D.C.

Urged by his wealthy family and by the painter Washington Allston to study art, Greenough, after graduation from Harvard, went to Italy in 1825 for two years. He made a second trip in 1828, and this time he remained until a year before his death.

Greenough is best known for his toga- and sandal-clad statue of George Washington, which was based on the statue of Zeus at Olympia by the ancient Greek sculptor Phidias. Commissioned by Congress in 1832, it was designed to stand in the rotunda of the U.S. Capitol, but depicting a national hero in seminudity aroused such controversy that the statue was removed to the Smithsonian Institution.

Greenough's importance in the 20th century largely rests upon his few brief essays on art in which he outlined the functional relationship between architecture and decoration. These theories were influential in the development of functionalism in modern architecture. Originally entitled *The Travels, Observations, and Experience of a Yankee Stonecutter* (1852), these essays were reissued in 1947 under the title *Form and Function.*

Horatio's younger brother, Richard Saltonstall Greenough (1819–1904), was also a sculptor. His most famous work is a statue of Benjamin Franklin in front of Boston City Hall.

Greenpeace, international organization dedicated to preserving endangered species of animals, preventing environmental abuses, and heightening environmental awareness through direct confrontations with polluting corporations and governmental authorities. Greenpeace was founded in 1971 in British Columbia to oppose U.S. nuclear testing at Amchitka Island in Alaska. The loose-knit organization quickly attracted support from ecologically minded private individuals and began undertaking campaigns seeking, among other goals, the protection of endangered whales and seals from hunting, the cessation of the dumping of toxic chemical and radioactive wastes at sea, and the end of nuclear-weapons testing. The primary tactic of Greenpeace has been such "direct, nonviolent actions" as steering small inflatable craft between the harpoon guns of whalers and their cetacean prey and the plugging of industrial pipes discharging toxic wastes into the oceans and the atmosphere. Such dangerous and dramatic actions brought Greenpeace wide media exposure and helped mobilize public opinion against environmentally destructive practices. Greenpeace also actively sought favourable rulings from national and international regulatory bodies on the control of environmental abuses, sometimes with considerable success. The organization has a small staff and relies largely on voluntary staffing and funding.

On July 10, 1985, the Greenpeace ship *Rainbow Warrior,* which was due to sail to Moruroa Atoll to protest French atmospheric nuclear-weapons tests there, was sunk by two bomb explosions while berthed in Auckland Harbour, N.Z. Subsequent revelations that French intelligence agents had planted the bombs caused a major international scandal and led to the resignation of France's minister of defense and the dismissal of the head of its intelligence service.

Greens, the, also called GREEN PARTY, any of various environmentalist or ecological-oriented political parties formed in European countries and various countries elsewhere beginning in 1979. An umbrella organization known as the European Greens was founded in Brussels, Belg., in January 1984 to coordinate the activities of the various European parties, and Green representatives in the European Parliament sit in the Rainbow Group.

The first and most successful party known as the Greens (die Grünen) was founded in West Germany by Herbert Gruhl, Petra Kelly, and others in 1979 and arose out of the merger of about 250 ecological and environmentalist groups. The party sought to organize public support for the control of nuclear energy and of air and water pollution. The Greens became a national party in 1980. The program that they adopted called for the dismantling of both the Warsaw Pact and NATO, the demilitarization of Europe, and the breaking up of large economic enterprises into smaller units, among other proposals. This program attracted many members of the left wing of the Social Democratic Party into the Greens' ranks. The Greens won a sprinkling of seats in various *Land* (state) elections from 1979 on, and in 1983 they won a 5.6 percent share of the vote in national elections to the Bundestag (Federal Diet), thereby achieving their first representation in that legislative chamber. The Greens experienced almost constant ideological tensions between its left wing and a more pragmatic faction. Its members were largely well-educated young people, but the party drew considerable support from voters concerned about local or regional environmental and other issues.

By the end of the 1980s almost every country in western and northern Europe had a party known as the Greens or by some similar name (*e.g.,* Green List in Italy, Green Alliance in Ireland and Finland, Green Alternatives in Austria, Green Ecology Party in Sweden, Ecologist Party in Belgium). Green parties developed also overseas in such countries as Canada, Australia, New Zealand, Argentina, and Chile. After the revolutions of 1989, Green parties or groups also began to emerge in eastern Europe.

Greensboro, city, Guilford county, north-central North Carolina, U.S. The city forms a triangular metropolitan area with High Point and Winston-Salem. Established in 1808 as the county seat, it was named for General Nathanael Greene, who commanded the American Revolutionary forces at the Battle of Guilford Courthouse (March 15, 1781), the site of which is now a national military park, 6 miles (10 km) northwest of the central business district. Toward the end of the American Civil War, Greensboro was the temporary capital of both the Confederacy and North Carolina, and proposals were made (1865) there to end the war.

The city is a large wholesale distribution point, an agricultural market, and an important insurance centre. Textiles dominate its diversified industries. Greensboro is the site of North Carolina Agricultural and Technical State University (1891), Bennett College (1873), Greensboro College (1838), Guilford College (1837), and the University of North Carolina at Greensboro (1891).

Dolley Madison, wife of President James Madison, the short-story writer O. Henry (William Sydney Porter), and the news broadcaster Edward R. Murrow were natives of the Greensboro area. Inc. town, 1810; city, 1870. Pop. (1988 est.) city, 182,802; Greensboro–Winston-Salem–High Point MSA, 924,700.

greenschist facies, one of the major divisions of the mineral facies classification of metamorphic rocks, the rocks of which formed under the lowest temperature and pressure conditions usually produced by regional metamorphism. Temperatures below about 300° C (about 570° F) and relatively high shear stresses are typical. The more common minerals found in such rocks include quartz, orthoclase, muscovite, chlorite, serpentine, talc, and epidote; carbonate minerals and amphibole (actinolite) may also be present. The green colour of many of these minerals and their platy habit cause the rocks to be greenish and schistose (having a tendency to split).

greenshank (species *Tringa nebularia*), Old World shorebird of the family Scolopacidae (order Charadriiformes). Greenshanks are gray birds with greenish legs and a white rump. Rather slender, about 30 cm (12 inches) long, they are deep waders and have a long, slightly upturned bill.

Greenshanks breed in northern Europe and Asia during the summer, and they winter in southern Europe, Asia, Africa, and occasionally as far south as Tasmania and New Zealand. They nest on moors, in flat meadows or swamps near lakes, or in wooded bogs. A clutch of four speckled and cryptically coloured eggs, laid in late April or early May, is incubated for 23 or 24 days. The male and female usually share the nesting duties. Sometimes the family separates, each parent taking one or more chicks, or one parent may depart, leaving all responsibility to the other.

Greenville, city, seat (1827) of Washington county, west-central Mississippi, U.S. It is a port on the Mississippi–Yazoo River plain, 115 miles (185 km) northwest of Jackson. Old Greenville, named for the American Revolutionary War general Nathanael Greene, was sited just to the south; part of this original settlement caved into the river, and the remainder was burned by federal troops during the American Civil War. The present city was established on the Blantonia Plantation during the Reconstruction period. After the disastrous 1927 flood, higher levees were built. Lake Ferguson, a still-water harbour at the foot of Main Street, was created in the early 1930s when an S-shaped curve in the river was straightened. The city retains an agriculture-based economy, although industry (notably the manufacture of textiles, wood, paper and concrete products, screws, and saws) has developed. Just south of the city, a bridge spans the Mississippi to Lake Village, La. The Winterville (Indian) Mounds Historic Site is 3 miles (5 km) north. Inc. town, 1870; city, 1886. Pop. (1988 est.) 39,863.

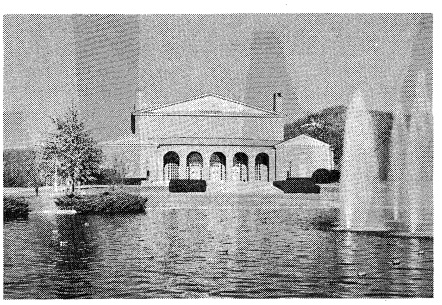
Greenville, city, seat of Pitt county, on the Tar River in eastern North Carolina, U.S. It was incorporated in 1774 as Mar-

tinsborough (2½ mi [4 km] east), which was reestablished in 1786 and named for Gen. Nathanael Greene, Revolutionary War hero. The Greenville and Raleigh Plank Road (chartered in 1850 as part of a tollway from Washington in Beaufort County) and the arrival (in 1889 and 1907) of the Seaboard Coast Line and the Norfolk and Southern railroads stimulated its development. Greenville is the site of East Carolina University (1907), Pitt Technical Institute (1963), and the Voice of America national and international operation. Manufacturing (notably pharmaceuticals) and educational and distributive factors now vie with agriculture, chiefly tobacco, as economic assets. Pop. (1980) 35,740.

Greenville, city, seat (1809) of Darke County, western Ohio, U.S., on Greenville Creek, 35 mi (56 km) northwest of Dayton. Laid out in 1808, it was the site of Ft. Greenville, named for Gen. Nathanael Greene and built by Gen. "Mad" Anthony Wayne (1793). After his victory at Fallen Timbers (near the present site of Toledo), Wayne signed a peace treaty at the fort with Indians (1795) that opened the Northwest Territory to settlers. The fort was burned (1796), but the site is marked by the Fort Greenville Treaty Memorial. The Garst Museum houses relics of the Indian wars and personal belongings of Annie Oakley (1860–1926), the female sharpshooter of Wild West shows, who was born on a nearby farm. Greenville's economy is basically agricultural, augmented by light manufactures (notably gas and oil filters, glass products, and kitchen appliances). Inc. city, 1902. Pop. (1980) 12,999.

Greenville, city, seat (1797) of Greenville County, northwestern South Carolina, U.S., on the Reedy River, in the foothills of the Blue Ridge Mountains. First called Pleasantburg when the area was settled in the 1760s, it was renamed Greenville in 1821, probably for Isaac Green, an early settler, and was chartered as a village in 1831. Before 1860 it was a summer resort community. As western terminus of the Greenville and Columbia Railroad, the city served as commercial centre for the Piedmont (rolling upland region) and for entry into the nearby Appalachian Mountains. Greenville strongly opposed nullification (in U.S. history, a doctrine holding that a state, within its territorial jurisdiction, has the right to declare null and void any federal law that violates its voluntary compact embodied in the Constitution) in 1832 and secession from the Union in 1860. Notable among the Unionists was Benjamin F. Perry, Greenville editor and later state governor.

After the Civil War, water power of the Reedy River was used to develop manufacturing. Textile mills dominate, although there have been expansions in the chemical, plastic film, machinery, fabricated-metals, electronics, and aircraft industries. Agriculture is important, farm income depending mainly on eggs, dairy products, cattle, and peaches.



McAlister Auditorium, Furman University, Greenville, S.C.
Milt and Joan Mann from CameraMann

Greenville is the home of Furman University, opened in 1827 as a theological school (Baptist) at Edgefield and moved to Greenville in 1851, Bob Jones University (1927; a Fundamentalist Bible college), and Greenville Technical College (1962). Greenville has a symphony orchestra, a little-theatre organization, and a county art museum. The Bob Jones Art Museum houses a large religious collection. Textile Hall is the site of the biennial Southern Textile Exposition. The noted Shriners' Hospital for Crippled Children is in Greenville. Inc. city, 1868; reincorporated, 1907. Pop. (1980) city, 58,242; Greenville–Spartanburg metropolitan area (SMSA), 568,758.

Greenville, city, seat (1846) of Hunt County, northeastern Texas, U.S., on the Sabine River, 52 mi (84 km) northeast of Dallas. Established in 1846 on the Republic of Texas' "National Road," an ox-wagon trail from Jefferson to Austin, and named for Gen. Thomas J. Green (who fought in the Texas Revolution), its development as a cotton-ginning and shipping point began in the 1880s, when eight railroads converged on the area. The location of a plant there by Chance Vought Aircraft Co. (later LTV Aerospace) in 1951 hastened the transformation from a farming to an industrial economy. Lake Tawakoni, 16 mi south, provides recreation and fishing facilities. East Texas State University (1889) is in nearby Commerce. Inc. 1874. Pop. (1980) 22,161.

Greenwich, outer borough of Greater London, on the south bank of the River Thames. Its area is 18 sq mi (46 sq km). Links to the north-bank boroughs of Tower Hamlets and Newham are facilitated by the Greenwich Tunnel (pedestrian) and Blackwall Tunnel, as well as by the Woolwich Ferry and foot tunnel.

The "Cutty Sark" clipper ship near Greenwich pier, London
J. Allan Cash

Humphrey, duke of Gloucester, enclosed Greenwich Park in 1423 and built a watchtower on the north-facing hill above the river, which was later occupied by the Royal Observatory. Placentia, a riverbank house, was subsequently converted into a royal palace by the Tudor monarchs; Henry VIII (reigned 1509–47) was born there and was married there three times. Inigo Jones's Queen's House, the first Palladian-style building in England, was completed in 1637. The old palace having fallen into disrepair, a new block was built for Charles II. In 1694 Sir Christopher Wren was commissioned to complete the building as a naval hospital in the style of the Chelsea hospital for soldiers. The construction was supervised by Sir John Vanbrugh and Nicholas Hawksmoor. In 1873 Wren's building became the Royal Naval College. Since 1937 the Queen's House has been part of the National Maritime Museum. Above these buildings stands the former Royal Observatory (its functions were transferred to Herstmonceux in Sussex by 1958), known as Flamsteed House after the first British astronomer royal, and also designed by Wren.

Woolwich, downstream, also rose to prominence in the Tudor period with the establishment of a naval dockyard. It remained the British Navy's chief dockyard until the advent of the "ironclad" battleship; it was closed in 1869. Royal Arsenal was so titled in 1805, although a gun-carriage workshop had been established as early as 1683. The Royal Military Academy moved from Woolwich Warren to Woolwich Common in 1806 and was amalgamated with the Royal Military College (now Academy) at Sandhurst in 1947. Eltham Hall is the Army Institute of Education headquarters.

Along the Greenwich riverfront, "Gipsy Moth IV," in which Sir Francis Chichester circumnavigated the globe alone in the 1960s, has joined the tea clipper "Cutty Sark" for public viewing at Greenwich Pier. East of Woolwich on Plumstead Marshes, Thamesmead, a Greater London Council in-town new town for 60,000 people, is rising from the spongy former firing ranges. Employment is provided at the Woolwich and Abbey Wood industrial estates. Elsewhere in Greenwich, particularly around Blackheath, old town houses are much sought after. Pop. (1982 est.) 216,000.

Greenwich, urban town (township), Fairfield County, southwestern Connecticut, U.S., on Long Island Sound. It was founded in 1640 by the New Haven Colony agents Robert Feaks and Capt. Daniel Patrick, who purchased land from the Indians for 25 English coats. Named for Greenwich, Eng., it soon came under Dutch control but was returned to Connecticut in 1650 and was organized as a town in 1665. During the Revolution it was plundered by British troops under Gen. William Tryon. Greenwich now serves as a residential suburb of New York City but has some industry (including printing and machinery). Its indented coastline has boating and recreation facilities. Wildlife interest is reflected in the Bruce Museum and the Audubon Center (a 477-ac [193-ha] sanctuary). Several private preparatory schools (including Whitby School [1960], headquarters of the Montessori Society in America) are in the town. Pop. (1980) 59,578.

Greenwich, John Campbell, duke of: *see* Argyll, John Campbell, 2nd duke of.

Greenwich Mean Time (GMT), the former name for mean solar time of the longitude (0°) of the former Royal Observatory at Greenwich, Eng. This longitude is called the Greenwich meridian (*q.v.*). Greenwich Mean Time was used for clearly designating epoch by avoiding confusing references to local time systems (zones). In accord with tradition, the epoch 0000 GMT (denoting the start of a solar day) occurred at noon. In 1925 the numbering system for GMT was changed so that the day began at midnight, as did the civil day. Some confusion in terminology resulted, though, and in 1928 the International Astronomical Union changed the designation of the standard time of the zero meridian to Universal Time (*q.v.*), which remains in general use. The term GMT is still used for some purposes, *e.g.*, navigation, in English-speaking countries. *See also* solar time.

Greenwich meridian, imaginary line used to indicate 0° longitude that passes through Greenwich, a borough of London, and terminates at the North and South poles. An international conference held in Washington, D.C., in 1884 designated "the meridian passing through the centre of the transit instrument at the Observatory of Greenwich as the initial meridian for longitude." The observatory (renamed the Royal Greenwich Observatory) was moved to Hailsham, East Sussex, during the 1950s, but the original site continues to serve as the location for 0° longitude.

As the prime meridian, the north–south line at Greenwich is used as the reference for all other meridians of longitude, which are numbered east or west of it. The Greenwich meridian also serves as the basis for the world's standard time zone system. The mean solar time at Greenwich is now called Universal Time (*q.v.*) and was formerly called Greenwich Mean Time (*q.v.*). Theoretically, standard time becomes successively one hour earlier at each 15° longitude west of the Greenwich meridian and one hour later at each 15° longitude east. (*See* standard time.)

Greenwich Village, residential section of Lower Manhattan, New York City, U.S., bounded by 14th Street, Houston Street, Broadway, and the Hudson River waterfront. A village settlement during colonial times, it became in successive stages an exclusive residential area, a tenement district, and, after 1910, a rendezvous for nonconformist writers, artists, students, bohemians, and intellectuals. By the 1980s high-rise apartments had turned much of it into a fashionable neighbourhood, and many of its former residents had moved to the East Village (Lower East Side) and Soho (the area south of Houston Street). Greenwich Village long was characterized by narrow, crooked streets, old houses, foreign restaurants, quaint shops, and offbeat night clubs. Washington Square, in its centre, is dominated by Washington Arch (1895) and New York University buildings.

Greenwood, city, seat (1871) of Leflore County, northwestern Mississippi, U.S., on the Yazoo River, 96 mi (154 km) north of Jackson. The original settlement (1834), known as Williams Landing, was incorporated (1844) and named for the Choctaw chieftain Greenwood Leflore, a wealthy cotton planter and slaveholder. It thrived as a Mississippi Delta cotton market but became paralyzed during the Civil War. Greenwood was used as a defensive post during the siege of Vicksburg, and Ft. Pemberton, built between the Tallahatchie and Yazoo rivers, withstood a Federal gunboat attack. The city's extensive cotton market is now supplemented by diversified farming (especially livestock) and light manufacturing. Mississippi Valley State University (1950) is in nearby Itta Bena. Ancient Indian mounds abound in the area, and Cottonlandia (1½ mi west) is a museum displaying both relics of the cotton industry and Indian artifacts. Pop. (1982 est.) 20,507.

Greenwood, city, seat (1897) of Greenwood County, western South Carolina, U.S., at the northern entrance to the Sumter National Forest. It was first settled in 1824 by John McGehee, and its growth was stimulated by the arrival (1852) of the Greenville and Columbia Railroad. Four other railroads converged to make it a transportation centre. Textile mills were built and cotton was shipped. Lander College (founded 1872 in Williamston) was moved there in 1904, and Piedmont Technical College was opened in 1966. A few miles east are Ninety Six (historic settlement and site of Star Fort, a British stronghold during the American Revolution) and Greenwood State Park, both of which border Lake Greenwood, which is impounded on the Saluda River by Buzzard Roost Dam. A basic textile economy prevails. Inc. town, 1857; city, 1927. Pop. (1982 est.) 22,105.

Greenwood, Arthur (b. Feb. 8, 1880, Hunslet, Yorkshire, Eng.—d. June 9, 1954, London), British Labour Party politician who was a noteworthy advocate of British resistance to the aggression of Nazi Germany just before World War II.

A teacher of economics, Greenwood became a civil servant during World War I and entered the House of Commons in 1922. In the first Labour Party government (January–November 1924) he was secretary to the minister of health, and in the next Labour government (1929–31) he sat in the Cabinet as minister of health, taking special interest in town planning. From 1935 to 1945 he was deputy leader of the Labour Party. His insistence that Great Britain intervene without hesitation in the impending war influenced Prime Minister Neville Chamberlain's subsequent reversal of the appeasement policy toward Germany.

When Winston Churchill formed his coalition government in 1940, Greenwood became minister without portfolio and a member of the war Cabinet and was charged with the study of reconstruction and postwar planning. He proved to be ineffective in this role, however, and was dropped in 1942. In Clement Attlee's postwar Labour government, he was lord privy seal (1945–47) and paymaster general (1946–47).

Greer, Germaine (b. Jan. 29, 1939, Melbourne), Australian-born English writer and feminist who championed the sexual freedom of women.

Greer was born of middle-class parents and educated at convent schools and at the universities of Melbourne and Sydney before taking a doctorate in 1967 in literature at Cambridge. She acted on television, wrote for several popular and underground journals, and lectured at the University of Warwick until her influential first book, *The Female Eunuch* (1970), was published. It postulates that passivity in women's sexuality is a characteristic associated with a castrate, hence the title, and is a role foisted on them by history and by women themselves. Greer moved to Italy and continued to lecture. Her other books include *The Obstacle Race: The Fortunes of Women Painters and Their Work* (1979) and *Sex and Destiny: The Politics of Human Fertility* (1984).

gregale, also called EUROCLYDON, or EUROAQUILO, strong and cold wind that blows from the northeast in the western and central Mediterranean region, mainly in winter. Most pronounced on the island of Malta, the gregale sometimes approaches hurricane force and endangers shipping there; in 1555 it is reported to have caused waves that drowned 600 persons in the city of Valletta. A gregale that lasts four or five days is usually the result of a flow of air from central or southern Europe toward Libya. One that lasts only one or two days is caused by the passage of a low-pressure centre over the southern Mediterranean. The gregale wind is referred to in the Bible, in Acts 27:14.

gregarine, any protozoan of the sporozoan subclass Gregarinia. Gregarines occur as parasites in the body cavities and the digestive systems of invertebrates. Representative genera are *Monocystis* in earthworms and *Gregarina*

Gregarine (*Monocystis lumbrici*)
Walter Dawn

in locusts and cockroaches. Long and wormlike, gregarines may reach a length of 10 millimetres (0.4 inch). They often develop in host cells, from which they emerge to reproduce in some body cavity. Feeding by osmosis, some forms attach themselves to a body cavity lining by an anterior hook (epimerite), while others move freely. Gregarinia may be divided into three orders on the basis of the type of life cycle. In the order Schizogregarinida, sometimes called Archigregarinida, a form of asexual reproduction called merogony (nuclear division followed by cytoplasmic division) precedes sexual union and spore formation; in the order Eugregarinida merogony is absent; and in the order Neogregarinida merogony occurs in the asexual phase, and each gametocyte produces one spore. The Neogregarinida are sometimes classified with the Schizogregarinida.

Gregg, John Robert (b. June 17, 1867, Rockcorry, County Monaghan, Ire.—d. Feb. 23, 1948, New York City), Irish-born American inventor of a shorthand system named for him.

Gregg developed an interest in speed writing when he was 10 years old, and by the age of 21, in Glasgow, he had published a 28-page pamphlet, *Light-Line Phonography* (1888), presenting his own shorthand alphabet, which was phonetic and based on the regular cursive movements of familiar longhand. This alphabet later was adapted to 13 languages.

In 1893 Gregg moved to the United States. From 1900 he edited the *Gregg Writer,* a monthly magazine; and from 1920 he edited the *American Shorthand Teacher,* later called *Business Education World.* The basic Gregg book was *Gregg Shorthand,* first published in 1902 as a revision of *Light-Line Phonography* and revised frequently thereafter. He also published such works as *Applied Secretarial Practice* (1941) and *The Private Secretary* (1943). Gregg was president of the Gregg Publishing Company, with headquarters in New York City, and chairman of the board of the Gregg Publishing Company, Ltd., of London and of the Gregg Schools, Ltd., of London.

Gregg shorthand, system of rapid writing based on the sounds of words that uses the curvilinear motion of ordinary longhand. Devised by the Irishman John Robert Gregg (1867–1948), who originally called it light-line phonography, and published under that name in pamphlet form in 1888 in England, the sys-

tem was taken in 1893 to the United States, where it is now taught and used more than any other system. It has also been adapted to numerous languages, among them French, Spanish, Hebrew, Russian, Italian, Tagalog, Chinese, and Polish.

Characteristics of Gregg shorthand include a total absence of shading or thickening (in contrast to Pitman shorthand), the expression of vowels by circles and hooks that are inserted in word outlines in their natural order, a preponderance of curved motion to aid writing, and on-the-line writing. Gregg shorthand also uses brief forms for some of the commonest words, consonant clusters, and suffix and prefix forms and has an abbreviation principle.

Grégoire (French personal name): *see under* Gregory, except as below.

Grégoire, Henri (b. Dec. 4, 1750, Vého, Lorraine, Fr.—d. May 20, 1831, Paris), French prelate who was a defender of the Constitutional Church, the nationalized Roman Catholic Church established in France during the Revolution.

Born into a poor peasant family, Grégoire entered the priesthood and became curé of Emberménil. In 1789 he was elected to the States General as a deputy for the clergy. After the Third Estate (the unprivileged order) converted the States General into the Revolutionary National Assembly (June 17, 1789), Grégoire worked for the union of the clergy with the Third Estate and for the abolition of Negro slavery. After expressing his objections to certain features of the Civil Constitution of the Clergy, which set forth the plan for nationalizing the church and was enacted in July 1790, he took the oath of allegiance to the government and then became the Constitutional bishop of Loir-et-Cher (the diocese of Blois).

As deputy of the third Revolutionary assembly, the National Convention, Grégoire in September 1792 proposed the abolition of the monarchy and in November demanded that Louis XVI be brought to trial. During the de-Christianizing campaign of late 1793 and early 1794, Grégoire continued to wear clerical dress and to profess his faith openly; as a member of the Committee of Public Instruction, he tried to save monastery libraries and religious works of art. After the collapse of the radical democratic Jacobin regime in July 1794, Grégoire was instrumental in securing the restoration of freedom of worship and guided the reorganization of the Constitutional Church.

Grégoire opposed the coup d'etat of 18 Brumaire (Nov. 9, 1799), by which Napoleon Bonaparte seized power. His election to the Senate in 1801 was regarded as a protest against Napoleon's consular regime and against the Concordat of 1801, which was a reconciliation with Rome that marked the end of the Constitutional Church. Grégoire voted against the proclamation of the empire in 1804 and proposed the deposition of Napoleon in 1814.

After the Second Restoration of the monarchy in 1815, Grégoire stood firmly by his views on the Civil Constitution. In 1819 he was elected a deputy but was not allowed to take his seat, resulting in a cause célèbre.

Grégoire, Père (French–Swiss educator): *see* Girard, Jean-Baptiste.

Gregoras, Nicephorus (b. 1295, Heraclea Pontica, Sultanate of Rūm—d. 1360, near Constantinople), Byzantine Humanist scholar, philosopher, and theologian whose 37-volume *Byzantine History,* a work of universal erudition, constitutes a primary documentary source for the 14th century.

Having gained the favour of the emperor Andronicus II Palaeologus (1282–1328) and of ecclesiastics in Constantinople, Gregoras was entrusted with diplomatic missions, including a legation to the Serbian king Stephan Uroš III in 1326. With the downfall of his patrons, however, Gregoras was, as was the custom, forced to retire to a nearby monastery. Gregoras emerged victorious in a philosophical disputation, accompanied by polemical tracts, against the monk Barlaam of Calabria, an outspoken Aristotelian scholastic, and was recognized as Constantinople's leading academician. A theological controversy with deep political ramifications followed, in which Gregoras contended with the doctrine of Hesychasm. After the accession of the emperor John VI Cantacuzenus (1347), the Hesychast party, led by the monks of Mt. Athos, enjoyed preference, requiring Gregoras to retire from public life.

His most renowned work, the *Byzantine History,* chronicles the events of the Eastern Empire from the time of the Latin conquest in the Fourth Crusade (1204) to the return of the exiled Palaeologus ruler in 1354. Supplementing the work of the earlier 14th-century historian George Pachymeres, Gregoras enlarged on the philosophical and theological disputes in which he had engaged. His *Correspondence,* containing more than 160 letters, is a rich source for knowledge of the outstanding Byzantine ecclesiastical and political figures of the period. Among Gregoras' other notable works are philosophical dialogues against the Sophists, studies in astronomy, a commentary on the *Almagest* of the 2nd-century astronomer Ptolemy, eulogies for several emperors, and a proposal for calendar reform that anticipated Pope Gregory XIII's revision of 1582.

Gregorian calendar, also called NEW STYLE CALENDAR, solar dating system now in general use. It was proclaimed in 1582 by Pope Gregory XIII as a reform of the Julian calendar.

By the Julian reckoning, the solar year comprised 365¼ days; the intercalation of a "leap day" every four years was intended to maintain correspondence between the calendar and the seasons. A slight inaccuracy in the measurement (the solar year comprising more precisely 365 days, 5 hours, 48 minutes, 46 seconds) caused the calendar dates of the seasons to regress almost one day per century.

Although this regression had amounted to 14 days by Pope Gregory's time, he based his reform on restoration of the vernal equinox, then falling on March 11, to the date (March 21) it had in AD 325, the time of the Council of Nicaea. The change was effected by advancing the calendar 10 days after Oct. 4, 1582, the day following being reckoned as October 15.

The Gregorian calendar differs from the Julian only in that no century year is a leap year unless it is exactly divisible by 400 (*e.g.,* 1600, 2000). A further refinement, the designation of years evenly divisible by 4,000 as common (not leap) years, will keep the Gregorian calendar accurate to within one day in 20,000 years.

Within a year the change had been adopted by the Italian states, Portugal, Spain, and the German Catholic states. Gradually, other nations adopted the Gregorian calendar: the Protestant German states in 1699; England and its colonies in 1752; Sweden in 1753; Japan in 1873; China in 1912; the Soviet Union in 1918; and Greece in 1923. Muslim countries tend to retain calendars based on Islām (*see* Muslim calendar).

Gregorian chant, monophonic, or unison, liturgical music of the Roman Catholic Church, used to accompany the text of the mass and the canonical hours, or divine office. Gregorian chant is named after St. Gregory I the Great, pope from 590 to 604. It was collected and codified during his reign. Charlemagne, king of the Franks (768–814), imposed Gregorian chant on his kingdom, where another liturgical tradition—the Gallican chant—was in common use. During the 8th and 9th centuries, a process of assimilation took place between Gallican and Gregorian chants; and it is the chant in this evolved form that has come down to the present.

The Ordinary of the mass includes those texts that remain the same for each mass. The chant of the Kyrie ranges from neumatic (patterns of one to four notes per syllable) to melismatic (unlimited notes per syllable) styles. The Gloria appeared in the 7th century. The psalmodic recitation, *i.e.,* using psalm tones, simple formulas for the intoned reciting of psalms, of early Glorias attests to their ancient origin. Later Gloria chants are neumatic. The melodies of the Credo, accepted into the mass about the 11th century, resemble psalm tones. The Sanctus and Benedictus are probably from apostolic times. The usual Sanctus chants are neumatic. The Agnus Dei was brought into the Latin mass from the Eastern Church in the 7th century and is basically in neumatic style. The concluding Ite Missa Est and its substitute Benedicamus Domino usually use the melody of the opening Kyrie.

The Proper of the mass is composed of texts that vary for each mass in order to bring out the significance of each feast or season. The Introit is a processional chant that was originally a psalm with a refrain sung between verses. By the 9th century it had received its present form: refrain in a neumatic style—a psalm verse in psalm-tone style—refrain repeated. The Gradual, introduced in the 4th century, also developed from a refrain between psalm verses. Later it became: opening melody (chorus)—psalm verse or verses in a virtuosically embellished psalmodic structure (soloist)—opening melody (chorus), repeated in whole or in part. The Alleluia is of 4th-century Eastern origin. Its structure is somewhat like that of the Gradual. The Tract replaces the Alleluia in penitential times. This chant is a descendant of synagogue music.

The sequence flourished primarily from about the 9th century to the 16th. In its modern form the texts are sacred poems with double-line stanzas having the same accentuation and number of syllables for each two lines. The melody of the first line was repeated for the second line of the stanza, a new melody being given to the next stanza; the music is syllabic. The Offertory originally consisted of a psalm and refrain, but by the 12th century only the refrain remained. The music is quite melismatic. Peculiar to the Offertory is repetition of text. The Communion is, like the Offertory, a processional chant. The music is neumatic in style.

The canonical hours consist of eight prayer services: Matins, Lauds, Prime, Terce, Sext, None, Vespers, and Compline. Each includes antiphons or refrains, short texts that precede or follow each psalm and are set mostly in syllabic chant; psalms, with each set to a psalm tone; hymns, usually metrical and in strophes or stanzas, and set in a neumatic style; responsories, which follow the lessons of Matins and the chapter, a brief lesson of the other hours, and have the form response–psalm verse–partially or entirely repeated response. The responsory is related to the form and style of the Gradual.

Gregorian Reform, an attempt by Pope Gregory VII (reigned 1073–85) to reform the medieval Western Church, especially by prohibiting lay investiture (*see* Investiture Controversy). In addition to strengthening the church temporally and spiritually, Gregory also brought about internal ecclesiastical reforms through innovations in canon law.

Gregorian University, in full PONTIFICAL GREGORIAN UNIVERSITY, Latin PONTIFI-

CIA UNIVERSITAS GREGORIANA, byname THE GREG, Roman Catholic institution of higher learning in Rome. It was founded in 1551 as the Collegium Romanum (College of Rome) by St. Ignatius of Loyola and St. Francis Borgia and constituted as a university by Pope Julius III. It received its present name as the result of the efforts of Pope Gregory XIII, who considerably expanded the institution in 1567. The university's rector is appointed by the pope, and the majority of its professors, who come from all over the world, are Jesuits. The Gregorian University functions primarily as an institution of higher learning for the Roman Catholic clergy, though others are not excluded. Among the university's graduates are 19 canonized saints, 16 popes, and 24 persons who have been beatified. Faculties include theology, canon law, philosophy, church history, missiology, social sciences; institutes of psychology, ascetics, and religious sciences; and a school of Latin language and style.

Gregorio (Italian personal name): *see under* Gregory.

Gregorius (Latin personal name): *see under* Gregory, except as below.

Gregorius (medieval Syrian scholar): *see* Bar Hebraeus.

Gregory, name of rulers grouped below by papacy or patriarchate and indicated by the symbol •.

Foreign-language equivalents:
Greek ..... Gregorios
Latin ..... Gregorius

PAPACY

• Gregory I, SAINT, byname GREGORY THE GREAT (b. *c.* 540, Rome—d. March 12, 604, Rome; feast day March 12), architect of the medieval papacy (reigned 590–604), a notable theologian who was also an administrative, social, liturgical, and moral reformer. Drawing upon St. Augustine of Hippo's *City of God* for his views, Gregory formulated ideas of a Christian society that became formalized in the Middle Ages. Among his accomplishments were a reform of the mass from which came the Gregorian chant. Since the 8th century he has been regarded as a doctor (teacher) of the church.

Early life and career. Gregory was the son of a Gordianus and Silvia, who may have belonged to the eminent patrician family of the gens Anicia. His great-grandfather was Pope Felix III (reigned 483–492), and Pope Agapetus I (reigned 535–536) also may have been related to him. During his early years in Rome, the Lombards threatened and then invaded Italy (568). In about 572 Gregory, at the age of 32, became *praefectus urbis* (urban prefect; *i.e.,* the administrative president of Rome). Political and social conditions apparently caused him to relinquish this highest civilian office only two years later. Having a great interest in monasticism, Gregory converted the palace at Caelian Hill, which he had inherited as part of a large paternal fortune, into St. Andrew's Monastery, but he did not become its abbot. He then utilized his entire estate for the establishment of six additional monasteries on his other holdings in Sicily. Pope Benedict I (reigned 575–579) assigned him a diaconate in Rome, and in 579 Pope Pelagius II (reigned 579–590) sent him to Constantinople (the capital of the Byzantine Empire) as a papal nuncio, or representative, the curia's (papal administrative office) only foreign post. Gregory probably served there under Emperor Tiberius II (reigned 578–582) and Emperor Maurice (reigned 582–602) until 584, on the whole without much success in securing aid for Rome against the Lombards, who were also at war with Byzantium.

Election to the papacy. After sincere efforts to evade election to the papacy, Gregory was elected in 590 to that highest ecclesiastical position in the West. He complained in letters that he had been forced to assume the office. He determined to be a pope for the people, and he immediately devoted himself to alleviating the misery of the populace and of the refugees, including 3,000 nuns who had fled from the Lombards. Gregory I had grain sent from Sicily and used the revenues from church property to aid those who were starving and living in severe poverty.

He centralized the entire papal administration and vigorously opposed the graft and negligence of those in positions of responsibility, who, according to his view, administered the property of the poor and therefore were obligated to live up to the norms of absolute justice. The corrupt Byzantine officials had to be kept in check with gifts. Gregory became the first pope especially known for his devotion to social concerns, a devotion succinctly stated in one of his letters (Epistle I:44): "We do not want the treasury of the church defiled by disreputable gain."

The Pope attempted to reform and save the church in Italy, which was endangered spiritually as well as materially. He began his attempt by slowly catholicizing, in spite of their external Arianism (a heresy that denied the essential unity of God the Father and God the Son), the uncivilized Lombards. He did not want to see them destroyed but rather won for the kingdom of God, without breaking with Byzantium. He protested against the oppressive fiscal policies of the Byzantine exchequer, which so harshly taxed the people that they sometimes had to sell their children or emigrate into areas controlled by the Lombards. The Lombards, in turn, so extorted the Pope on their behalf that he called himself the "paymaster of the city."

Romanus, the Byzantine governor of Ravenna, who wanted war instead of the proposed peace of the Pope, ignored the Lombard king Agilulf's (reigned 590–616) stipulations for peace. He acted badly toward Gregory and agitated against him before the emperor Maurice. The letters of Gregory during the Lombard danger, citing the intrigues of Romanus and the accusations of the Emperor, provide a vivid and illuminating interpretation of the history of the time as well as an insight into the character of the Pope. Not until 598 did a temporary peace result in Italy.

Relations with Byzantium. In 602 Phocas, a Thracian centurion in the imperial army, during a period of disorder, managed to get himself elected emperor. He had Emperor Maurice, Empress Constance, the couple's five sons—the oldest was the godson of the Pope—and three daughters executed. Knowing how to make use of the existing conditions of social and political disorder, Phocas, later a hated tyrant, also knew how to manipulate people. He gained the Pope's sympathy and approval of his Lombard policy, a blemish on Gregory's otherwise saintly character. Phocas, who was thus able to act with increasing terror, sought support from Gregory, whose blessing was tantamount to absolution for all offences. This action on the part of the head of the highest moral court of Europe established a precedent that was followed by many popes. The Byzantine Phocas, however, made peace with the Lombards, and thus peace for Italy in its relations with the Lombards was not secured by Gregory. The realization that a peace purchased at the price of agreement with Phocas also would incur negative consequences had not occurred to Gregory.

Phocas recognized the papal primacy of jurisdiction in the church and gave Gregory the impression of subordination. The Roman papacy had always valued such an attitude and in doing so overlooked other matters, including even the character of those with whom it came to terms. Gregory was deceived by Phocas, who conferred on him, rather than on John IV (the Faster), the patriarch of Constantinople, the disputed title of "ecumenical patriarch." The deposed and executed emperor Maurice, a devout humane ruler, had not previously granted the sought-after title to the patriarch of Constantinople. The patriarch John, therefore, conferred this title on himself, as had other patriarchs before him, a practice that Pope Pelagius II had previously disputed. Gregory in 595 protested against this designation out of his conviction regarding the primacy of the pope. Instead, Gregory conferred on himself the title "servant of God's servants," a title borrowed from St. Augustine, which in its far too great humility meant, in effect, the opposite.

A reign of anarchy under Phocas spelled the end of the late Roman era. Gregory, with foresight, clearly recognized the approaching importance of the migrating peoples of the West, who were hardly or not at all christianized, and that the future of the church of the West lay with them. The visionary ideals of his conception in practice, however, would be to bring the barbarian powers of the West under the political sovereignty of Byzantium in the sense of a united Christian world under the ecclesiastical authority of Rome. He intensified his influential connections with Theodolinda, the Catholic Bavarian wife of the Lombard king Agilulf, whose son Adaloald only became Catholic in 615, and with Brunhild, the powerful Merovingian queen with whom he dealt just as submissively as he had with Phocas.

Missions. In 596, under the protection of Brunhild, he initiated one of the greatest acts of his pontificate, the establishment of missions in England. His decision to do so may have emanated from his apprehension that the highly spiritual Irish–Scottish monasticism, which was strongly influenced by the Eastern Church and had not joined Rome, might finally take possession of the mission to England. He appointed Augustine (later first archbishop of Canterbury) and a band of 40 monks to begin the work in England. In contrast to other regions, Gregory had much regard for the pagan mentalities and customs in England, to which Augustine seldom adhered. The later English missionary monks St. Willibrord (658–739) and St. Boniface (*c.* 672/673–754) were able to conduct their missionary campaigns on the European continent because of the efforts of Gregory in regard to England.

Gregory, however, thought about missions in terms that were not always consistent with the monastic ideal of conversion by peaceful persuasion. He sometimes advocated a war of aggression against heathens in order to christianize them. His letter to Gennadius, the Byzantine governor from Africa, with the demand "to wage numerous wars"—in complete opposition to his peace efforts in Italy—in order to convert the subjugated to Christianity, can be viewed as the earliest conception of a crusade, a "holy war" differing from the spiritual battles of missionary activities. Gregory became, according to some misrepresentations, the model for the warring Pope Gregory VII (*c.* 1025–1085) as well as for Anselm of Lucca (Pope Alexander II) and Bonizone of Sutri, the well-known war theorists and contemporaries of Gregory VII. The earliest war benediction originated with Gregory; he has become, along with St. Augustine (354–430), a precedent setter for the ecclesiastical war ideology of the Middle Ages. He admonished Brunhild to prevent pagan sacrifices by means of armed forces.

In regard to the Jews, to whom he offered economic advantages at conversion, the Pope was essentially tolerant. Had forced conver-

sions been successful, however—such a policy was practiced in Spain by King Recared (died 601), who shortly beforehand (587) had become Catholic, and by the great church leader and adversary of the Jews, St. Isidore of Seville (*c.* 560–636)—it is probable that Gregory would have agreed to such a policy.

Other concerns. Gregory did not take any definite action against the slave trade. He bought and sold slaves but would also free them; and sometimes he threatened others with severe punishments for their mistreatment.

He advocated rigid asceticism, and—perhaps because of this—he suffered from a stomach disorder and then from arthritis, which caused him to become almost totally lame toward the close of his life.

He was an organizer, missionary, and manager, but not a politician. With the consolidation of the patrimony of Peter (lands controlled by the papacy), Gregory, without realizing it himself, became the founder of the later Papal States and of the temporal papal authority. According to his view, the patrimony of Peter ought to be at the immediate disposal of the church and of the poor. The view that this state would at one time serve the authoritative demands of the popes and would result in wars conducted by popes for augmentation of their imperialistic policies was inconsistent with his concept of the papacy's role in temporal affairs. He understood his period of rule as one of irrevocable service, as charity over the authority. His epitaph bears his policy's most suitable distinguishing mark: God's Consul.

Gregory did not comprehend that rulers and nations were incapable of following his conception of a *societas reipublicae Christianae* (a society of a Christian republic), which was formalized later in the Middle Ages. He was completely dependent upon the teaching (especially the concept of The City of God) of St. Augustine but not, however, predisposed to speculative theology. The Pope—in whose views and actions are found the first attempts to subjugate secular authority to ecclesiastic authority and to elevate the priest to an extremely high status—exhibited a strange mixture of withdrawal from the world and energy, idealism and realism, melancholy and trust in God, and otherworldliness and the desire for power.

As a monk, which he always remained, he naturally had the expansion of monasticism especially at heart. Through him the Benedictine monastic principle attained broader support and results. Because of his concern for people, he tried to make their faith more intelligible to themselves by popularizing miracles and the concept of purgatory, as well as by encouraging a reform of the mass—from which came the Gregorian chant. His numerous writings—including his letters—possess little originality, but his *Regulae pastoralis liber* ("Book of Rules for Pastors") became a spiritual and practical guide to medieval bishops. The *Moralia in Job,* a textbook on moral theology and biblical interpretation, also exerted much influence in succeeding centuries. His ecclesiastical training was not extensive; he rejected culture and art as characteristic values; he treated the pre-Christian spiritual life with hostility. Estimations of his character oscillate in history; and he has undergone highly contrary evaluation, ranging all the way from ecclesiastical adulation to sharp criticism.

Gregory's body lies buried in St. Peter's basilica in Rome. He had forbidden veneration of his corpse under penalty of excommunication. (H.Kü.)

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• **Gregory II,** SAINT (b. 669, Rome—d. Feb. 11, 731, Rome; feast day February 11), pope from 715 to 731.

Before his election (May 19) he had served as subdeacon and treasurer of the church. As pope, he greatly encouraged the Christianizing of Germany by SS. Boniface and Corbinian, whom he consecrated bishops in 722. Though a staunch adherent of the Eastern Roman Empire, he vigorously and successfully opposed the Byzantine emperor Leo III the Isaurian, who vehemently ordered all holy images to be destroyed. Gregory condemned Leo's act, launching the Iconoclastic Controversy and causing Leo to plot against his life. Supported by the Romans and the Lombards, Gregory fought Iconoclasm until his death, but as the 8th century advanced, the split between Rome and Constantinople worsened.

• **Gregory III,** SAINT (b. Syria—d. November 741; feast day November 28), pope from 731 to 741.

A priest when elected pope by acclamation, his pontificate was one of the most critical in papal history. He was immediately confronted with the Iconoclastic Controversy, begun when his predecessor St. Gregory II condemned the Byzantine emperor Leo III's destruction of religious images. Gregory denounced the Iconoclasts at a Roman council in 731. A comparatively peaceful period followed, during which he encouraged the Christianizing of the German tribes and appointed (732) St. Boniface, organizer of the Frankish church, as metropolitan of Germany. When in 739 the Lombards sacked the exarchate of Ravenna and threatened Rome, Gregory appealed to the Franks for aid. This unprecedented act began a relationship between the Franks and the Holy See that secured the papacy when Frankish power rose.

• **Gregory IV** (b. Rome—d. Jan. 25, 844, Rome), pope from 827 to 844.

Cardinal priest of St. Mark's Basilica, Rome, he succeeded Valentine as pope and is chiefly remembered for his mediation in the Carolingian dynastic struggle between Lothair I, the co-emperor, and the emperor Louis the Pious, when his father Louis granted part of his kingdom to Lothair's half-brother Charles the Bald. Reacting against this endowment, Lothair, whom Gregory supported, led a revolt and deposed Louis (833). Gregory promulgated the observance of the Feast of All Saints (November 1) and conferred the pallium—*i.e.,* granted the symbol of metropolitan jurisdiction—on the Frankish missionary St. Ansgar, the apostle of Scandinavia.

• **Gregory V,** original name BRUN VON KÄRNTEN, English BRUNO OF CARINTHIA (b. 972, Carinthia—d. Feb. 18?, 999, Rome), from 996 to 999, the first German pope, whose pontificate was among the most turbulent in history.

Grandson of the Holy Roman emperor Otto I the Great, he was the young cousin and chaplain to Otto III, who named him pope (consecrated May 3, 996). On May 21, 996, Gregory crowned Otto III emperor. He anathematized King Robert II the Pious of France for his marriage (996), considered technically incestuous, to Bertha, countess of Blois (they were first cousins, who, in the Roman Catholic Church, may not marry). When Otto was called back to Germany, a powerful noble named Crescentius II stirred a revolt in Rome that forced Gregory to flee (autumn of 996) and installed John XVI as antipope (997). When Otto returned (998), a reign of terror ensued: John was deposed and mutilated, Crescentius was executed, and Gregory V was reinstated as pope (998).

• **Gregory (VI)** (fl. early 11th century, Italy), antipope from May to December 1012.

From the middle 10th to the early 11th century, Rome, and particularly the papacy, was chiefly ruled by the Crescentii, a powerful Roman family. After Pope Sergius IV's death (1012), the Crescentii uncanonically installed their candidate, Gregory, in the Lateran. A power struggle flared between the Crescentii and the Tusculani, a rival family, whose candidate was Pope Benedict VIII. Compelled to flee Rome, Gregory went to Germany, where he appealed his case to King St. Henry II (later Holy Roman emperor). Henry forced him to relinquish his claim, thus restoring Benedict. Gregory's subsequent history is unknown.

• **Gregory VI,** original name GIOVANNI GRAZIANO (d. 1048, probably Cologne), pope from 1045 to 1046.

He was elected pope on May 5, 1045, after he paid Pope Benedict IX to resign in order to save the papacy from scandal arising from Benedict's licentious behaviour. But Gregory was accused of simony at the Council of Sutri, Papal States, held by the Holy Roman emperor Henry III in 1046, and he abdicated on December 20, retiring to Germany with his chaplain Hildebrand, later Pope Gregory VII.

• **Gregory VII,** SAINT, original name HILDEBRAND, Italian ILDEBRANDO (b. *c.* 1020, near Soana, Papal States—d. May 25, 1085, Salerno, Principality of Salerno; canonized 1606; feast day May 25), one of the great reform popes of the Middle Ages (reigned 1073–85). Mainly a spiritual rather than a political leader, he attacked various abuses in the church. From 1075 onward he was engrossed

Gregory VII, after his expulsion from Rome, lays a ban of excommunication on the clergy "together with the raging king"; drawing from the 12th-century chronicle of Otto von Freising; in the library of the University of Jena, Ger.

Leonard von Matt—EB Inc.

in a contest with Emperor Henry IV over lay investiture (the right of lay rulers to grant church officials the symbols of their authority).

Early career. Hildebrand was born of a workingman's family. He went to Rome at an early age and began his education at the

Monastery of St. Mary, where his uncle was abbot. He apparently became a monk but continued his education at the Schola Cantorum (School of Musicians) in the Lateran Palace. This was a school for clergy and, perhaps, for laymen also, since Gregory mentions that two Roman nobles were educated with him. One of his teachers there, Giovanni Graziano, later became Pope Gregory VI (reigned 1045–46). Gregory took Hildebrand into his service and, when he was deposed by Emperor Henry III (1017–56) at the Council of Sutri in 1046, Hildebrand went with his fallen patron into exile in Germany.

In Germany, Hildebrand found favour with Emperor Henry III and was called back to Rome by Pope Leo IX (reigned 1049–54). He formed one of the groups of reformers that Leo IX was assembling, a group that was to exert a profound influence on the 11th-century church. Hildebrand became the "man behind the throne" during the pontificate of his immediate predecessor, Pope Alexander II (1061–73), having already been an important member of the Roman reform group. He became a cardinal and archdeacon of Rome and was able to satisfy his monastic inclinations by reforming the famous Monastery of St. Paul. He demonstrated his love of people by curbing the activities of the petty nobles who had caused excessive disorder in Rome and the neighbourhood. He also served on several important papal legations. Perhaps the most important of these was his legation to the Synod of Tours at which Berengar professed his faith in the real Presence of Jesus in the Eucharist.

Election as pope. Elected by acclamation (April 22, 1073) to succeed Alexander II, Hildebrand took the name of Gregory VII. He was consecrated in St. Peter's Basilica on June 30, 1073.

The keynote of Gregory's pontificate was reform and renewal of the church. To understand Gregory's personality and influence it is necessary to realize how deeply he was committed to the spiritual values of his age. From the beginning of his career he was not successful as a politician or a statesman; his specialty was spiritual leadership.

Gregory tried to restrain the marauding Normans of France in their conquest of southern Italy (*c.* 1030–71) and to defend the Papal States, but he found it difficult to subdue these hard-fighting and acquisitive Frenchmen. Deeply interested in healing the still-young schism that had occurred between the Western and Eastern churches in 1054, he tried to encourage the European states to embark on a crusade to help Constantinople and the Eastern Christians, but in this he failed.

Ecclesiastical reforms. As a spiritual leader he was more successful even though he faced a task of awesome proportions. The efforts aimed at ecclesiastical reform by his predecessors, the attempts of the monks based at the Benedictine monastery at Cluny (France) to reform the church spiritually, and the preaching of reformers such as Peter Damian (1007–72) and Cardinal Humbert (*c.* 1000–61) were only partially successful. Gregory promptly began an attack on the chief problems of the church: simony (selling or purchasing ecclesiastical offices) and nicolaitism (clerical marriage or concubinage). He held a synod at Rome every Lent that decreed strong measures against the buyers and sellers of sacred offices and married clergy. He attempted to associate the bishops and the lay rulers with him in his effort to eliminate these problems. Since many bishops had purchased their positions and many also held very loose views of clerical celibacy, Gregory had his work cut out.

Because he found it difficult to work through the bishops, he tended to centralize authority. He used papal legates (representatives) freely and insisted on their precedence over local bishops. He sought uniformity in the Western Church and he discouraged the use of the Mozarabic liturgy (pre-Islāmic and Byzantine-influenced rite) in Spain and the use of Slavonic language in the liturgy in Bohemia.

Controversy over investiture. Gregory is chiefly known for his contest with the German emperor Henry IV (1050–1106) over lay investiture (the right of lay rulers to grant ecclesiastical officials the symbols of their authority), a contest that he helped to precipitate. Gregory's first concern was for reform, and he believed that secular rulers should support church authority in bringing it about. He had seen the beneficent results of the reform-minded emperor Henry III's (1017–56) interference, and he tried hard to work with young Henry IV. It was only when he lost confidence in Henry that Gregory began his attack on lay investiture.

The Pope's Roman Synod of 1075 struck hard at lay investiture and began the long conflict that was to go beyond Gregory's lifetime. At that synod Gregory excommunicated five of Henry's advisers. In late 1075 the situation deteriorated. Henry's defeat of the rebellious Saxons had increased his power and reduced his distractions. In Milan, Erlembald, the leader of the Patarines, a lay reform group, was killed and the anti-reform party got the upper hand. Henry now openly showed his hand, gave support to the anti-reform party in Milan, and placed a new bishop in the position of the legitimate bishop, Atto (flourished 1085). He also appointed bishops to Spoleto and Fermo.

In 1075, while Gregory was saying Christmas mass in St. Mary Major, he was attacked, slightly wounded, and carried off by Cencius, a Roman noble. The Romans, who had much admiration for Gregory, rallied to his defense, attacked Cencius' stronghold, and forced him to release the Pope, who went back to St. Mary Major to continue his mass. Gregory spared the life of Cencius.

Although Gregory had written to Henry in December 1075, holding out the possibility of negotiations on the issue of lay investiture, Henry gave no satisfaction to the legates that the Pope had sent to Germany. Indeed, he openly defied Gregory and with his bishops renounced obedience to Gregory and bade him step down from the papal throne. Supported by northern Italian bishops, Henry sent the Roman Synod of 1076 a letter beginning: "Henry, King not by usurpation, but by the pious ordination of God to Hildebrand now not Pope but false monk."

Excommunication of Henry IV. The reading of such a document aroused indignation in the synod, and Gregory struck back hard. He and the synod excommunicated Henry, and the Pope declared him deposed. Gregory defended his actions against Henry in two letters to Bishop Hermann of Metz: the emperor is in the church and therefore he may be called to account by the pope. Gregory defended this position by arguments from Scripture, the Fathers, and history.

The excommunication had its effect. The number of Henry's partisans dwindled, and the restless Saxons once more rose in arms. Plans were set on foot by the magnates to depose Henry and elect another king. Apparently, at the persuasion of Gregory's legates, a more moderate position was taken, though the terms drawn up by the magnates were severe enough. Henry was to leave the decision of his case to the Pope, who was to come to a meeting of the magnates at Augsburg on Feb. 2, 1077. He was expected to repudiate his rebellion against the Pope and to urge his advisers who had been excommunicated to seek absolution. Thus was the stage set for a famous action at Canossa.

Early in 1077 Gregory went north to cross the Alps but found, instead of the guards the Germans had promised, the news that Henry was hastening to Italy. Alarmed, the Pope withdrew to the castle of Canossa, a stronghold of his faithful friend and supporter, Matilda (*c.* 1046–1115), countess of Tuscany. Henry, however, was coming not as a foe but as a suppliant. For three cold January days he stood outside the castle pleading for absolution while Matilda and St. Hugh, abbot of Cluny, added their pleas to his. Gregory was in a quandary. The nobles and bishops of Germany were awaiting his presence at Augsburg to discuss Henry's fate, and here was Henry in the cold begging piteously for absolution. The priest in Gregory prevailed over the politician, and the Pope absolved Henry from excommunication. It is to the Pope's credit as a spiritual leader that he absolved Henry, even though the action was disastrous to his own cause.

Henry promptly regarded himself as legitimate king again, and Gregory had to write somewhat apologetically to the German magnates explaining his action. The Germans cancelled the Augsburg meeting and called for another gathering at Forchheim on March 13. Gregory desired to attend this meeting, but apparently neither Henry nor the leader of the opposition, Rudolf of Rheinfelden (died 1080), really desired the Pope's presence. Gregory, however, sent legates who pleaded with the assembled nobles and bishops not to proceed with an election until the Pope could be present. The magnates went ahead, however, and elected Rudolf of Rheinfelden, thus precipitating a bloody civil war. Gregory tried to mediate between Henry and Rudolf. He recalled his legates, and, when Henry imprisoned one of them, the other excommunicated Henry. To prevent the Pope from confirming this excommunication the King sent ambassadors to plead with the Pope. They succeeded, and the Pope contented himself with calling for a great meeting to settle the quarrel. For two years, 1078–80, Gregory maintained a mediator's position and was abused by both sides.

Later reign. By 1080 the Pope was convinced that Henry was intransigent and once more excommunicated him and declared him deposed. This meant war. Henry had the support of his faction in Germany and that of the Lombard (northern Italian) anti-reform party. Gregory sought the aid of the formidable Robert Guiscard, duke of Apulia and Calabria (*c.* 1015–85). Henry's German bishops met at Brixen (Italy) and declared Gregory deposed. To replace him they chose Guibert, archbishop of Ravenna, who took the name Clement III (1080, 1084–1100).

The tide began to flow strongly in favour of Henry when Rudolf of Rheinfelden was killed at the Battle of the Elster (1080). Henry, freed from pressure in Germany, came over the Alps, defeated the forces of Countess Matilda, and besieged Rome. Gregory renewed his excommunication of the King. He tried to stir up opposition to Henry in Germany by urging Welf I of Bavaria (died 1101) and the princes to hold an election to replace Rudolf, but this did not deter Henry from besieging Rome in 1081, 1082, and 1083. Still firm, Gregory held a synod at the Lateran in November 1083 to attempt a settlement, but Henry prevented some bishops from attending.

The fathers of the synod, very much aware of the menacing presence of Henry's soldiers across the Tiber, pleaded with Gregory not to renew his excommunication of Henry at this time, whereupon the Pope contented himself with a general excommunication of all who prevented attendance of the synod. All attempts at peace failed, and on March 21, 1084, Henry's troops took the city. Gregory sought refuge in the castle of St. Angelo and suffered the chagrin of seeing Guibert of Ravenna (now Clement III) crowned in St. Peter's. Guibert

in turn crowned Henry emperor. Help, however, was on the way. Robert Guiscard, back from an unsuccessful attempt on the Byzantine Empire, marched on Rome and rescued the Pope. Gregory's safety was dearly bought, for in a fight between the Normans and the Romans a large part of the city was burned down. Gregory, now unpopular with the embittered Romans, left with Guiscard. He died at Salerno in 1085. A biographer placed on his dying lips the words, "I have loved justice and hated iniquity, therefore I die in exile."

(J.S.Br.)

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• **Gregory (VIII),** original French name MAURICE BOURDIN, Portuguese MAURÍCIO BORDINHO, or BORDINO (b. Limoges?, Aquitaine—d. *c.* 1137), antipope from 1118 to 1121.

A Benedictine educated at the abbey of Cluny, he was made bishop of Coimbra, Port., in 1098. While archbishop of Braga, Port. (consecrated 1111), he quarrelled with Archbishop Bernard of Toledo, Castile, and was suspended by Pope Paschal II in 1114. Later he was cleared and became part of the papal court.

When the Holy Roman emperor Henry V invaded Italy in 1116, because Paschal denied him the right to grant clerical offices to ecclesiastics, the Pope fled to Benevento and sent Gregory to confer with Henry. Gregory, however, defected to Henry's cause and was excommunicated. On Paschal's death, Henry set Gregory up as antipope against Pope Gelasius II, but Gregory was excommunicated by Gelasius (1118) and by Pope Calixtus II (1119). He died in exile.

• **Gregory VIII,** original name ALBERTO DE MORRA (b. Benevento, Papal States—d. 1187, Pisa), pope from Oct. 21 to Dec. 17, 1187.

A Cistercian of noble birth, he was appointed cardinal (1155–56) by Pope Adrian IV before being elected (October 21) at Ferrara, Romagna, to succeed Pope Urban III. He began reforms in the Curia and took immediate measures to restore Jerusalem to the Christians by initiating the Third Crusade but died during an effort to reconcile the rival Italian seaports of Pisa and Genoa in order to expedite shipments to the Holy Land.

• **Gregory IX,** original name UGO, or UGOLINO, DI SEGNI (b. before 1170—d. Aug. 22, 1241, Rome), one of the most vigorous of the 13th-century popes (reigned 1227–41), a canon lawyer, theologian, defender of papal prerogatives, and founder of the papal Inquisition. Gregory promulgated the *Decretals* in 1234, a code of canon law that remained the fundamental source of ecclesiastical law for the Catholic Church until after World War I.

Ugo, nephew of Pope Innocent III, studied theology at the University of Paris, but his early ecclesiastical career marked him as a diplomat. Shortly after his creation as a cardinal-deacon by his uncle in 1198, he was involved in peace negotiations with Markwald of Anweiler in southern Italy. Twice before 1210 he served Innocent as a papal legate in

Gregory IX consecrating the chapel of St. Gregory, detail of a fresco, 13th century; in the lower church of Sacro Speco, Subiaco, Italy

Alinari—Art Resource/EB Inc.

Germany. In 1206 Innocent promoted him to the cardinal bishopric of Ostia, the port city of Rome. During the pontificate of Pope Honorius III (1216–27), Ugo continued to play a leading role. He enjoyed not only the support of the Pope but also that of the youthful emperor-elect, Frederick II, king of Sicily, whose cause he had supported during the reign of Innocent III. Ugo was a deeply religious man, closely attuned to the great spiritual movements of his time. He was friend to both St. Dominic and St. Francis of Assisi, founders of the first mendicant orders. He served as cardinal-protector of the Franciscans and adviser to St. Clare of Assisi, the founder of the Poor Clares. Like his predecessors, Ugo firmly supported the crusading movement, and it was from his hands that Frederick II took the cross as a symbol of his intention to lead a crusade. Ugo was an austere man of decisive mind and somewhat harsh personality. Even those he loved and admired most sometimes felt the strength of his convictions and the force of his will. But there can be no doubt about his moral integrity and dedication to the church. Still, it was his quickness to anger and his impatience with opposition that marked the character of his pontificate.

When Ugo ascended the papal throne as successor to Honorius III on March 19, 1227, he had already lost patience with the moderate policies of his predecessor. In particular, he had grown increasingly disenchanted with Emperor Frederick II. Frederick's delays in embarking on his promised crusade and his efforts to hold both the imperial throne and the crown of Sicily aroused opposition to him in the Roman Curia. The rupture broke into the open shortly after Gregory's election, when Frederick, who had finally launched his crusade, was forced to return to Brindisi because of an outbreak of plague. Already suspicious of Frederick's sincerity, the Pope excommunicated him on Sept. 29, 1227, and issued a pained and angry encyclical to justify his action. Frederick responded by an attack on the excommunication as unjustified and a denunciation of the Roman Curia.

Nevertheless, Frederick embarked for the East, where he conquered Cyprus and negotiated with the Sultan of Egypt for Jerusalem. Gregory was incensed at Frederick's presumption in leading a crusade while under ban of excommunication. Claiming provocation by Frederick's vicar in the Kingdom of Sicily, Gregory raised an army and launched an attack on the kingdom. This war marked the end of the policy of negotiation. Though Frederick's return witnessed the defeat of the papal forces, the deep fears aroused by his policies remained unsettled by the Treaty of San Germano (1230). In 1231 Gregory sharply protested Frederick's issuance of the *Liber Augustalis,* or Constitutions of Melfi, a code of laws for the Kingdom of Sicily. Though there was little in these laws that was actually objectionable, their thrust in the direction of a strong monarchy contained a threat to the church.

During the early 1230s Gregory took advantage of the respite in his struggle with the Emperor to turn his attention more to the internal and spiritual problems of the church. He ordered the canonist Raymond of Peñafort to compile the *Decretals,* a code of canon law based both on conciliar decisions and on papal letters, which he promulgated in 1234. He also entered into negotiations with the Greek Orthodox Church that resulted in a series of conferences at Nicaea in January 1234 but proved abortive. Gregory continued the policies of his predecessors against heresy in southern France and northern Italy. He strengthened the Inquisition and entrusted its operations to the Dominicans. One of these inquisitors, Bernardo Gui, wrote the principal contemporary biography of Gregory IX.

The truce between Gregory and Frederick II was severely strained in 1235 by imperial accusations that the Pope had been working with the Lombards of northern Italy to undermine imperial influence. While Gregory denied the charge, the work of the Dominicans among heretics in northern Italy, many of whom were leagued with Frederick's supporters, did provide a foundation for imperial fears. Frederick's invasion of Sardinia, a papal fief, on behalf of the candidacy of his son Enzio for the Sardinian crown, led to a renewal of the excommunication on March 20, 1239, and caused Gregory to seek supporters in northern Italy. The propaganda war that accompanied the renewed hostilities is noted more for vitriolic than for reasoned argumentation. Gregory accused Frederick of crimes against the church in the Kingdom of Sicily and labelled him a blasphemer. The effort to find a settlement between the secular and the spiritual powers of medieval society received a decisive blow in this struggle. No definitions of separate spheres of authority would ever again overcome the reality of the fears that dominated both the papal Curia and secular powers.

With Frederick's army invading the Papal States, Gregory summoned a general council of the church, which met in Rome on Easter Sunday 1241. The capture of a large number of prelates on their way to the council by Frederick's Pisan allies put an end to this project, at least during Gregory's pontificate. Gregory IX died soon after, his work unfinished. He had attempted to carry on the work of Innocent III and was successful in many of his efforts. Historians have judged him harshly because of his conflict with Frederick II, but too often their judgments have turned on the defects of his personality rather than the objectives of his policy.

(J.M.Po.)

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• **Gregory X,** BLESSED, original name TEDALDO, or TEBALDO, VISCONTI (b. *c.* 1210, Pi-

acenza, Lombardy—d. Jan. 10, 1276, Arezzo, Tuscany; beatified Sept. 12, 1713; feast days January 28, February 4), pope from 1271 to 1276, who created the assembly of cardinals that elects the pope.

In 1270 he joined the future king Edward I of England on a crusade to the Holy Land. At St. Jean d'Acre in Palestine, he was notified of his election as pope at Viterbo, Papal States (Sept. 1, 1271). Gregory, who at the time of his selection was not even a member of the priesthood, was a compromise candidate put up to end a three-year vacancy of the Roman see that followed the death of Pope Clement IV.

He succeeded in saving the Holy Roman Empire from disintegrating by promoting the election of Rudolf I of Habsburg as emperor. At the same time he kept the peace with King Charles I of Naples, who also had claims on the imperial throne. In return for his support, Gregory made Rudolf promise to lead a new crusade and to renounce claims on behalf of the Holy Roman Empire in Rome and the papal territories. To avoid further vacancies between pontificates, in 1274, at the 14th ecumenical council at Lyon, Gregory issued his constitution (*Ubi Periculum*), which created the conclave; *i.e.*, a regulated assembly of cardinals to elect a new pope. Through this council he initiated a new crusade and effected a degree of reunion between the Greek and Roman churches.

• **Gregory XI,** original name PIERRE-ROGER DE BEAUFORT (b. 1329, Limoges-Fourche, Fr.—d. March 26/27, 1378, Rome), the last French pope and the last of the Avignonese popes, when Avignon was the papal seat (1309–77); he reigned from 1370 to 1378.

Beaufort was made cardinal in 1348 by his uncle, Pope Clement VI. Although not a priest, he was unanimously elected pope at Avignon on Dec. 30, 1370, to succeed Urban V. As pope, he immediately considered returning the papacy to Rome to conduct negotiations for reuniting the Eastern and Western churches, and to maintain papal territories against a Florentine revolt being led by the powerful Visconti family.

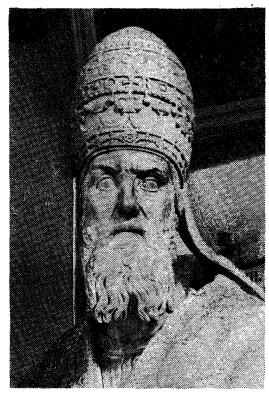
Gregory temporarily shelved his Roman plan, however, to labour (unsuccessfully) for peace between England and France, because another phase in the Hundred Years' War had begun in 1369. In 1375 Gregory defeated Florence in its war against the Papal States. The following year the great mystic (later patron saint of Italy) St. Catherine of Siena encouraged Gregory to move to Rome. In December 1376 peace was concluded with Florence. On Jan. 17, 1377, Gregory returned the papacy to Rome over the opposition of France and of several cardinals. Although his months there were marked by strife, his move was a highly significant act in papal history, for the papacy, despite the reign of antipopes later in other cities, thenceforth remained at Rome.

• **Gregory XII,** original name ANGELO CORRER (b. *c.* 1325, Venice—d. Oct. 18, 1417, Porto, near Rome), pope from 1406 to 1415. He was the last of the Roman line during the Western Schism (1378–1417), when the papacy was contested by antipopes in Avignon and in Pisa.

He was bishop of Castello, Papal States (1380), when made a cardinal (1405) by Pope Innocent VII, whom he succeeded on Nov. 30, 1406. His pontificate was challenged by the Avignonese antipope Benedict XIII, with whom he was to have negotiated for their mutual abdication to end the Schism. After the French declared neutrality (1408) in the dispute between Rome and Avignon, the Council of Pisa pronounced both the Roman and Avignonese popes deposed (June 1409). Gregory protested but resigned on July 4, 1415. He first, however, approved the Council of Constance (Germany), which denounced Benedict as a heretic and elected Pope Martin V. Gregory died as cardinal bishop of Porto, a title conferred on him by the council.

• **Gregory XIII,** original name UGO BONCOMPAGNI, or BUONCOMPAGNI (b. June 7, 1502, Bologna, Romagna—d. April 10, 1585, Rome), pope from 1572 to 1585, who promulgated the Gregorian calendar and founded a system of seminaries for Roman Catholic priests.

Educated at the University of Bologna, he



Gregory XIII, detail from a monument by Pier Paolo Olivieri, 16th century; in the church of Sta. Maria in Aracoeli, Rome

Alinari—Art Resource/EB Inc.

taught jurisprudence there from 1531 to 1539. Because of his expertise in canon law, he was sent by Pope Pius IV in 1561 to the Council of Trent (Trento, Italy), where he remained until 1563. Pius made him cardinal in 1565 and emissary to Spain. He was elected pope on May 14, 1572, succeeding St. Pius V.

Gregory began promoting church reform and the Counter-Reformation by pledging to execute the reforming decrees of the Council of Trent. He appointed committees of cardinals to investigate abuses among ecclesiastics and to draft the *Index Librorum Prohibitorum.* To carry out the council's decree ordering the establishment of seminaries, he founded several colleges and seminaries, including the Gregorian University, and delegated their direction to the Jesuits, whom he patronized. These schools trained missionaries for those countries that had established Protestant state religions.

He is often criticized for backing the Irish rebels against the anti-Catholic actions of Queen Elizabeth I of England and for his reaction to the Massacre of St. Bartholomew's Day, the slaughter of Huguenots (French Protestants) that began in Paris on Aug. 24, 1572, and spread throughout France. He celebrated the massacre with a *Te Deum* (hymn of praise to God) at Rome.

Aided chiefly by the Neapolitan astronomer and physician Luigi Lilio Ghiraldi (d. 1576) and the German Jesuit and mathematician Christopher Clavius, Gregory corrected the errors of the Julian calendar created by Julius Caesar in 46 BC and issued the Gregorian calendar in 1582.

Gregory's building program, which included the Quirinal Palace in Rome, together with his political ventures, exhausted the papal treasury, causing serious repercussions in the Papal States.

• **Gregory XIV,** original name NICCOLÒ SFONDRATO (b. Feb. 11, 1535, Somma, near Milan—d. Oct. 16, 1591, Rome), pope from 1590 to 1591.

Appointed bishop of Cremona, Duchy of Milan (1560), he was made cardinal by Pope Gregory XIII (1583) and elected pope on Dec. 5, 1590. He continued the policies of his immediate predecessors, particularly in furthering the internal reform of the church.

Gregory XIV, commemorative medallion, 1590

By courtesy of the St. Charles Seminary Library, Philadelphia; photograph, Robert S. Halvey

• **Gregory XV,** original name ALESSANDRO LUDOVISI (b. Jan. 9, 1554, Bologna, Papal States—d. July 8, 1623, Rome), pope from 1621 to 1623.

Of noble birth, he was educated at the Università degli Studi, Bologna. He was appointed archbishop of Bologna in 1612 and cardinal in 1616 by Pope Paul V. He succeeded Paul as pope on Feb. 9, 1621. Gregory's pontificate achieved two significant reforms: he introduced the secret ballot in papal elections, and he established the Roman Congregation

Gregory XV, detail from a monument by Pierre II Legros; in the Church of S. Ignazio, Rome

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of Propaganda (Congregatio de Propaganda Fide) for missionary work, through which the church recovered many of its losses from the Protestant Reformation. He canonized SS. Ignatius of Loyola, Francis Xavier, Philip Neri, and Teresa of Ávila.

• **Gregory XVI,** original name BARTOLOMEO ALBERTO MAURO CAPPELLARI (b. Sept. 18, 1765, Belluno, Venetia, Austrian Empire—d. June 1, 1846, Rome), pope from 1831 to 1846.

Of noble birth, he joined the Camaldolese order and entered the monastery of San Michele di Murano, near Venice. Ordained priest in 1787, he published *Il trionfo della Santa Sede contro gli assalti dei novatori* (1799; "The Triumph of the Holy See Against the Assaults of the Innovators"), advocating absolute papal Ultramontanism. In 1814 he became vicar general of the Camaldolese, and in 1825 he was made cardinal by Pope Leo XII. He was elected pope on Feb. 2, 1831, and was confronted by a revolt in the Papal States, which he suppressed with the aid of the Austrians.

He did not favour the cause of Italian nationalism. An ascetic by temperament, he concerned himself largely with the reform of the religious orders and the priesthood and with the development of missions. Gregory also restored the Benedictines and Dominicans in France.

PATRIARCHATE

• **Gregory II** CYPRIUS, original name GEORGE OF CYPRUS (b. 1241, Cyprus—d. 1290, Constantinople), Greek Orthodox patriarch of Constantinople (1283–89) who strongly opposed reunion of the Eastern Orthodox and Roman Catholic churches.

In the beginning of his career as a cleric in the Byzantine Imperial Court, Gregory supported the policy of both his emperor, Michael VIII Paleologus, and the Patriarch of Constantinople, John XI Becchus, favouring a union between the two churches. With the accession in 1282 of the anti-unionist emperor Andronicus II Palaeologus, who stressed the individuality and autonomy of the Eastern Church, Gregory reversed his position, allying himself with the Emperor and battling against Becchus. When mounting pressure on Becchus forced him to resign, Gregory was named to succeed him on the patriarchal throne, with the patronal name of Gregory II replacing his baptismal name of George.

Gregory's stand against Becchus and against the theology of the Roman Church led him to write *Tomos pisteos* ("Tome on Faith"), which refuted the Latin position that the Holy Spirit proceeded from God the Son as well as God the Father. The text, however, was denounced as unorthodox by the patriarchs of Alexandria and Antioch; and, along with a subsequent apology (*Homologia*), it antagonized both enemies and supporters of reunion. Continued criticism from the exiled Becchus forced him to resign as patriarch in 1289 and retire to a monastery, where he died the following year.

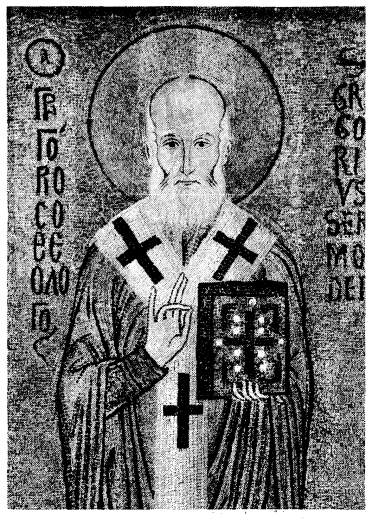
Although Gregory reveals himself in his writings as a mediocre theologian, he appears as a prime example of 13th-century Byzantine humanism in his literary works. Notable is his autobiography (*Diegesis merike*), designed to preface his collection of letters.

Gregory, SAINT (pope): *see* Gregory I *under* Gregory (Papacy).

Gregory NAREKATZI, SAINT, also called GREGORY OF NAREK (b. 951—d. 1001; feast day February 27), poet and theologian generally considered the first great Armenian poet and the principal literary figure in Armenia during the 10th century. He was renowned for his mystical poems and hymns, biblical commentaries, and sacred elegies. A major prose work was *Commentary on the Song of Songs.*

Gregory OF NAZIANZUS, SAINT (b. *c.* 330, Arianzus, near Nazianzus, in Cappadocia, Asia Minor—d. *c.* 389, Arianzus; Eastern feast day January 25 and 30; Western feast day January 2), 4th-century Church Father especially important for his defense of the doctrine of the Trinity (God as Father, Son, and Holy Spirit).

Gregory's father, also named Gregory, was converted to the Christian faith from the monotheistic sect known as the Hypsistarii (Worshippers of the Most High) under the influence of his Christian wife. He was soon afterward consecrated bishop of his native city, Nazianzus (the exact location of which is not known; Cappadocia was in eastern Anatolia), by bishops on their way to the Council of Nicaea in 352. Born some years later, the younger Gregory thus grew up in a Christian and clerical family. Nevertheless, he received a classical as well as religious education, studying first at Caesarea, the provincial capital, at least briefly at Alexandria, and finally at Athens (*c.* AD 351–356). He was a close friend of Basil, his fellow student and later bishop of Caesarea, and in his panegyric at Basil's death in 379 he gave a vivid picture of student life of the period. Among Gregory's other contemporaries as a student at Athens was the future emperor Julian, who in his brief two-year reign attempted to revive paganism. Soon after returning to Cappadocia, Gregory joined the monastic community that Basil had founded at Annesi in Pontus. During this time, in order to preserve the thought of the great Alexandrian theologian Origen, many of whose speculative views were under attack, the two friends collaborated in editing the *Philocalia,* an anthology of theological and devotional selections from the works of Origen.



St. Gregory of Nazianzus, detail of a mosaic in the Palatine Chapel, Palermo, Italy, 12th century

Anderson—Alinari from Art Resource/EB Inc.

In 362 Gregory accepted ordination to the priesthood to assist his father, though he went to Annesi for further preparation and remained there until the following Easter. For the next 10 years he worked at Nazianzus supporting Basil—who was first presbyter and from 370 to 379 bishop of Caesarea—in his struggles with personal rivals, with Arians (who denied the divinity of Christ and were semi-Origenists), and with the Arian emperor Valens. Basil was attempting to retain control of the church in at least part of the new province of Cappadocia Secunda, which had been created by Valens to diminish orthodox authority. Gregory, under pressure from Basil to assist him in this conflict, reluctantly accepted consecration (372) to the episcopate for the village of Sasima. He never took possession of the bishopric, however, and withdrew with a sense of grievance against Basil for having presumed on their friendship. He briefly administered the church of Nazianzus again after his father's death in 374, but when a successor was installed in that bishopric he retired to a monastery in Isauria, in south central Anatolia.

The death of Valens in 378 at the Battle of Adrianople ended the imperial patronage of Arianism, and after Basil died on the following January 1, Gregory became the outstanding spokesman in Asia Minor of the Nicene party that accepted the decrees of the Council of Nicaea of 325. He was invited to take charge of the Nicene congregation at Constantinople, a city torn by sectarian strife. His Chapel of the Resurrection (Greek Anastasia) became the scene of the birth of Byzantine (from Byzantium, the earlier name of Constantinople) Orthodoxy—*i.e.,* the post-Nicene theology and practice of the majority of Eastern Christianity. Among the sermons he preached there, the *Five Theological Orations* are a striking presentation of trinitarian doctrine, and his memorial addresses and others on special occasions are important historical sources. Though Gregory wrote no commentaries, he was famous for his deep knowledge of Scripture; among his hearers at Constantinople was the biblical scholar Jerome, who gained a greater understanding of the Greek scriptures from Gregory. A religious adventurer, Maximus the Cynic, however, was set up as a rival to Gregory by bishops from Egypt, who broke into the Anastasia at night for a clandestine consecration.

When the new emperor, Theodosius, came east in 380, the Arian bishop of Constantinople, Demophilus, was expelled, and Gregory was able to lead his congregation to the Great Church (probably the earlier basilica on the site of the present-day Hagia Sophia). The council (later recognized as the second ecumenical council) that met at Constantinople in 381 was prepared to acknowledge Gregory as bishop of Constantinople; but on the arrival of Bishop Timothy of Alexandria, his position was challenged on technical grounds. Weary of disputes and intrigues, Gregory withdrew after an eloquent farewell discourse. The council, however, supported his policy, condemning old and new heresies, denying all validity to the consecration of Maximus, and forbidding bishops to interfere outside their own areas of authority (a step toward the system of patriarchates). It endorsed the trinitarian doctrine of three equal Persons (Father, Son, and Holy Spirit) as taught by Gregory and expressed in the "creed commonly called the Nicene," which is still regarded as authoritative in East and West alike, including most Protestant churches.

For the rest of his life Gregory lived quietly on the family property at Arianzus near Nazianzus, except for a brief period as administrator of the church of Nazianzus during a vacancy. He continued his interest in church affairs through correspondence, even during one year when he took a vow of silence for Lent. He wrote to his successor, the amiable but ineffective Nectarius, and others against the heresy of Apollinaris, who denied the existence of a human soul in Christ.

His writings of the period include a long autobiographical poem (commonly referred to as *Carmen de se ipso,* "Song Concerning One-self") and many short poems, mostly on religious subjects. His preserved works include a number of sermons, not improperly called orations, and a large collection of letters. His death is dated according to a statement of Jerome. (E.R.Ha.)

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and on the Council of 381 and the Creed, J.N.D. Kelly, *Early Christian Creeds,* 2nd ed., ch. 10, pp. 296–321 (1960).

Gregory OF NYSSA, SAINT, Latin GREGORIUS NYSSENUS (b. *c.* 335, Caesarea, in Cappadocia, Asia Minor—d. *c.* 394; feast day March 9), philosophical theologian and mystic, leader of the orthodox party in the 4th-century controversies over the doctrine of the Trinity. Primarily a scholar, he wrote many theological, mystical, and monastic works in

St. Gregory of Nyssa, detail of a mosaic in the Palatine Chapel, Palermo, Italy; 12th century
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which he balanced Platonic and Christian traditions.

A younger son of a distinguished family, Gregory was educated in his native province but was more deeply influenced by his philosophical training than by the other two Cappadocian Fathers, his brother Basil of Caesarea and their friend Gregory of Nazianzus. He began his adult life as a teacher of rhetoric and may have been married—although several references that suggest this are capable of a different interpretation, and the strictures on marriage in his treatise *On Virginity* seem to imply the contrary. In the 360s he turned to religious studies and Christian devotion, perhaps even to the monastic life, under Basil's inspiration and guidance. As part of Basil's struggle with Bishop Anthimus of Tyana—whose city became the metropolis (civil and therefore ecclesiastical capital) of western Cappadocia in 372—Gregory was consecrated as bishop of Nyssa, a small city in the new province of Cappadocia Secunda, which Basil wished to retain in his ecclesiastical jurisdiction. In 375, however, Gregory was accused of maladministration by the provincial governor as part of the Arianizing campaign of the emperor Valens (an attempt to force the church to accept the views of the heretic Arius, who denied the divinity of Christ). He was deposed in 376 by a synod of bishops and banished. But on Valens' death in 378 his congregation welcomed him back enthusiastically.

Though Basil had considered Gregory unsuited for ecclesiastical diplomacy, after his return to his diocese he was active in the settlement of church affairs in the years that followed. In 379 he attended a council at Antioch and was sent on a special mission to the churches of Arabia (*i.e.,* Transjordan); his visit to Jerusalem on this occasion left him with a dislike for the increasingly fashionable pilgrimages, an opinion he expressed vigorously in one of his letters. In 381 he took part in the General (second ecumenical) Council at Constantinople and was recognized by the emperor Theodosius as one of the leaders of the orthodox communion in Cappadocia, along with Basil's successor at Caesarea. Gregory declined election to the important bishopric of Sebaste; however, the care of his small diocese left him free to preach at Constantinople on such special occasions as the funerals of Theodosius' wife and daughter. Under the unlearned Nectarius, the successor of Gregory of Nazianzus at Constantinople, Gregory of Nyssa was the leading orthodox theologian of the church in Asia Minor in the struggle against the Arians.

Gregory was primarily a scholar, whose chief contribution lay in his writings. Besides controversial replies to heretics, particularly the Arians—in which he formulated the doctrine of the Trinity (Father, Son, and Holy Spirit) that emerged as a clear and cogent answer to Arian questioning—he completed Basil's *Hexaëmeron* ("Six Days"), sermons on the days of the creation, with *The Creation of Man,* and he produced a classic outline of orthodox theology in his *Great Catechesis* (or *Address on Religious Instruction*). The latter work is especially notable for developing systematically the place of the sacraments in the Christian view of restoration of the image of God in human nature—lost through sin in the fall of Adam. His brief treatise *On Not Three Gods* relates the Cappadocian Fathers' theology of three Persons in the Godhead (*i.e.,* the Trinity) to Plato's teachings of the One and the Many. As a Christian Platonist, Gregory followed the great Alexandrian theologian Origen (*c.* 185–*c.* 254), though not slavishly; most notably, he shared Origen's conviction that man's material nature is a result of the fall and also Origen's hope for ultimate universal salvation. In imitation of Plato's *Phaedo,* Gregory presented his teaching on resurrection in the form of a deathbed conversation with his sister, the Abbess Macrina.

Platonic and Christian inspiration combine in Gregory's ascetic and mystical writings, which have been influential in the devotional traditions of the Eastern Orthodox Church and (indirectly) of the Western Church. His *Life of Macrina* blends biography with instruction in the monastic life. *On Virginity* and other treatises on the ascetic life are crowned by the mystical *Life of Moses,* which treats the 13th-century-BC journey of the Hebrews from Egypt to Mt. Sinai as a pattern of the progress of the soul through the temptations of the world to a vision of God. A notable emphasis of Gregory's teaching is the principle that the spiritual life is not one of static perfection but of constant progress. His greatest achievement is his remarkably balanced synthesis of Hellenic (Greek) and Christian traditions, in an age when both were represented by vigorous and acute minds.

Gregory did not, however, neglect his practical and pastoral duties, as is attested by his preserved letters and sermons. Many of the latter were written in praise of the saints venerated in Cappadocia or to celebrate the great days of the church year. Others, such as Gregory's attacks on usury and on the postponement of Baptism, deal with ethical problems of the church in his time. His more intimate discourses on the Lord's Prayer and the Beatitudes (Matthew 5:3–12) combine ethical and devotional interests, as does his commentary on the Song of Solomon. Gregory disliked attending gatherings of bishops but was periodically invited to preach at such occasions. His last public appearance was at a council at Constantinople. Gregory's ecclesiastical career was less successful than those of Basil and Gregory of Nazianzus, but his work as scholar and writer was creative, and in the 20th century it is being rescued from undeserved neglect. (E.R.Ha.)

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Gregory OF RIMINI, Italian GREGORIO DA RIMINI (b. late 13th century, Rimini, near Venice—d. November 1358, Vienna), Italian Christian philosopher and theologian whose subtle synthesis of moderate Nominalism (*q.v.*) with a theology of divine grace borrowed from St. Augustine (354–430) strongly influenced the mode of later medieval thought characterizing some of the Protestant Reformers.

In 1357 Gregory was elected superior general of the Augustinian monastic order after an academic career at universities in Paris, Bologna, and Padua, where opposition to his Nominalist philosophy required the intervention of Pope Clement VI (1342–52) before he could obtain his degree and a teaching position. Becoming the leading proponent of moderate Nominalism, which mitigated the more extreme skepticism of the early-14th-century philosopher William of Ockham, Gregory allowed for proofs of the existence of God and a rational demonstration of the spirituality of the soul. He assigned more importance to experience than did the Ockhamist school and, under Augustinian influence, claimed that the intellect knows the individual objects of experience by an intuitive process before it can fashion any abstract ideas. Further, he maintained that the immediate object of knowledge and science is not the object that exists outside the mind but rather the total meaning of logical propositions.

On the question of man's salvation and spiritual beatitude, Gregory taught what he conceived to be Augustinian doctrine, emphasizing the incapacity of man to lead a moral life by free will alone without divine grace. Following Augustine, he held as a transcendent principle the autonomy of God's gratuitous election of the just and their predestination to eternal glory. Sensitive to any manner of Pelagianism, a heretical doctrine that man is responsible for initiating the process of salvation by choosing a moral, and even ascetical, life independent of God's help, Gregory, to the contrary, insisted on the insufficiency of goodwill to acquire the perfect love necessary for the vision of God to which Christians aspire.

He proposed, moreover, that children dying without Baptism would suffer eternal punishment, thus earning the nickname "infant torturer." Gregory's teachings were assembled in his principal work, *Lectura in librum I et II sententiarum* ("Commentary on Book I and II of the Sentences," referring to the theological synopses of the 12th-century Scholastic philosopher Peter Lombard). The widespread influence of Gregory's doctrine over much of late medieval Europe is evidenced by the similar teaching emanating from the 16th-century Augustinian faculty at the University of Wittenberg, Germany, the monastic order and the school of the Protestant Reformer Martin Luther.

Gregory OF SINAI, also called GREGORY SINAITES (b. late 13th century—d. Nov. 27, 1346, Mt. Paroria, near modern Burgas, Bulg.), Greek Orthodox monk, theologian, and mystic, the most prominent medieval advocate of Hesychasm, a Byzantine form of contemplative prayer directed toward ecstatic mystical experience.

Originally a Cypriot monk, Gregory later joined a community on Mt. Sinai. He then travelled throughout Palestine and became a devotee of the school of disciplined mental prayer descended from the celebrated mystics St. John Climacus (7th century) and Symeon the New Theologian (11th century). Joining the monks on Mt. Athos, northern Greece, the focus of Greek monasticism and Byzantine Orthodoxy, he devised a program for a moderate form of Hesychasm and made Mt. Athos a source of Hesychast influence. Harassed by incursions of the Ottoman Turks, he fled first to the Black Sea coast and then to Mt. Paroria in Bulgaria, where *c.* 1325 he established a monastery that became the intellectual and spiritual centre of the Balkans.

Gregory's best known work is the *137 Chapters; or Spiritual Meditations,* containing his doctrine that extended the Hesychast movement throughout Europe and the Byzantine world. Essentially, his Hesychasm expressed the fundamental purpose and longing of Greek spirituality, namely to bridge the gulf between human and divine existence. Hesychast prayer aspires to attain the highest form of God–man communion in the form of a vision of the "divine light" or "uncreated energy" analogous to the Gospel account of Christ's transfiguration on Mt. Tabor (Matt. 17; Mark 9). Hesychast literature recounts a similar transforming experience in a period of intense concentration, controlled breathing, and repetitive prayer utterances (the "Jesus prayer"). The theological apology for this experience was given by Gregory's contemporary St. Gregory Palamas of Mt. Athos in the religious–political turmoil raging during the mid-14th century. Other disciples spread Hesychast doctrine throughout eastern Europe and Russia.

Among Gregory of Sinai's other writings are tracts on Christian asceticism, verses on the divine Trinity (nature of God), liturgical hymns, and arguments against the Roman theory that the Holy Spirit relates to the eternal Son as well as to the Father (the *Filioque* controversy). A biography of Gregory composed by his friend Callistus I, patriarch of Constantinople, was edited by P. Syrkou in 1909. Important studies on Hesychasm have been made by I. Hausherr (1927) and V. Krivošein (Eng. trans., 1954).

Gregory OF TOURS, SAINT, original name GEORGIUS FLORENTIUS (b. Nov. 30, 538/539, Augustonemetum, Aquitaine—d. 594/595, Tours, Neustria; feast day November 17), bishop and writer whose *History of the Franks* is a major source for knowledge of the 6th-century Franco-Roman kingdom. The complicated political situation of that period actively involved Gregory himself in numerous political events and in open dispute with the king. He also wrote *Lives of the Fathers,* seven books of miracles, and a commentary on the Psalms.

St. Gregory of Tours, statue by Emmanuel Frémiet, 19th century; in the Panthéon, Paris
H. Roger-Viollet

Gregory was born to an aristocratic family. On both sides his family supplied several of the chief bishops of what today is central France. He was educated at Arvernia in the bishop's household. In 573 he succeeded his cousin as bishop of Tours.

At that moment the Frankish kingdom (which included present Rhineland Germany) was divided into three kingdoms under the three surviving grandsons of the great Clovis, the founder of the Merovingian dynasty in western Europe: Guntram, ruling Burgundy and Provence; Chilperic, ruling Neustria, the western kingdom; and Sigebert, ruling Austrasia, the eastern kingdom, but with appendages at Tours and in the south. Just as Gregory became bishop, one of the fratricidal wars endemic among the family of Clovis broke out; Sigebert was murdered (575), and Chilperic seized Tours. Gregory was bishop for 10 years under the capricious and tyrannical Chilperic.

Outside the city of Tours was the sanctuary of St. Martin, the revered 4th-century bishop of Tours, where well-known criminals or persecuted persons sought shelter. Chilperic's own son Merovech sought shelter there from his father; and, in consequence of trying to protect Merovech and the right of sanctuary, Bishop Gregory became embroiled with his king and especially the queen, Fredegund. He was alternately threatened and cajoled with offers of bribes and had to defend himself formally, at the Council of Berny in 580, against the charge of spreading scandal that the Queen had committed adultery with the Bishop of Bordeaux. The council accepted Gregory's denial on oath and acquitted him. Gregory stood up to Chilperic to protect a fellow bishop and to resist the King's unorthodox opinions on the Trinity. "It would be no sensible man but a lunatic that would adopt views like yours," he told the man whom he once described as the Nero and Herod of his time.

In 584 Chilperic was murdered, and Tours came under King Guntram of Burgundy. With Guntram, who possessed a certain degree of political ability, his relations were far happier. In 587 the Treaty of Andelot between Guntram and Sigebert's son Childebert II restored Tours to Austrasia, and Gregory came under Childebert. As bishop he restored the great church of St. Martin at Tours, dedicated a number of churches, protested successfully against excessive taxation in his diocese, and arbitrated in Frankish vendettas. His last years were disturbed by a riot that he had to quell in the nunnery of St. Radegunda at Poitiers.

Gregory wrote several groups of lives of saints, called the *Lives of the Fathers,* and seven books of miracles. These afford unique evidence of the piety and social life of Merovingian France. In addition, he wrote a commentary on the Psalms (of which only fragments survive) and a treatise on church offices. But his fame rests on his *History of the Franks* (which he called simply the *History;* its complete title is not the original). It was written in three separate sections: the first (books 1–4) covered the period to the death of Sigebert in 575 and was written soon afterward; the second (books 5–6) was composed about 581–584; the third (books 7–10) was written about 590–591. The manuscripts show two texts, a longer one and a shorter one, and perhaps Gregory himself personally edited the additions or subtractions. In an age of dry annalists his history has only one Latin competitor, namely, the work of Bede, the Anglo-Saxon historian. In his pages France of the 6th century comes alive as nowhere else. Gregory's chronicle is an unforgettable portrait of the western kingdoms just after the breakup of the western Roman Empire.

Though he was a compulsive writer, he lamented his confusion over grammar, especially genders and prepositions, and thought that he wrote like a country bumpkin. He once asked his mother about the matter: she said that if he wrote in everyday language, everyone would understand. He tended, nevertheless, to drag in classical quotations when he could. He arranged his presentation by years but was never dull like the contemporary monastic chroniclers. Yet the story is at times disordered and confused. His genius as a writer was for graphic, fast-moving, blunt narrative, understated rather than rhetorical. He had no interest in personal details or the habits of society, and none of his characters (except himself) comes alive. His strength lay primarily in describing dramatic situations.

His philosophy of history (insofar as someone so unphilosophical could be said to have one) saw the world as groaning and the church as fighting the battle to save humanity from its bonds. He stated his aim thus: "to record the wars of kings with their enemies, of the martyrs with the heathen, and of the churches with the heretics." He looked for villainy to find its just punishment, and virtue its just reward, in this life as well as in the next. He thought an orthodox faith to be important and judged kings partly by whether or not they professed it. Gregory made no effort to paint the church of his day in rosy colours, describing warrior bishops or adulterous and drunken priests with equal impartiality. He generally used his authorities well, though he did not transcribe them well. In describing events of his own time (in books 4–10) he was most successful as a chronicler.

Gregory enjoyed the world, shared deeply in the superstitions of the age, travelled constantly and knew France as well as any man of his time, was affectionate to little children, and gave in his writings the unconscious impression of a likable, down-to-earth, courageous, not very spiritual, but Christian and humane, man. (W.O.C.)

BIBLIOGRAPHY. Editions of Gregory's works may be found in the *Patrologiae cursus completus . . .*, vol. 71, and in B. Krusch and W. Levison, *Scriptores Rerum Merovingicarum,* vol. 1; rev. ed. by R. Buchner, 2 vol. (1955). An English translation of the histories, with a valuable introduction by

O.M. Dalton, is *The History of the Franks, by Gregory of Tours,* 2 vol. (1927). For background information, see H.G.J. Beck, *The Pastoral Care of Souls in South-East France During the Sixth Century* (1950); S. Dill, *Roman Society in Gaul in the Merovingian Age* (1926); and J.M. Wallace-Hadrill, "Gregory of Tours and Bede: Their Views on the Personal Qualities of Kings," in *Frühmittelalterliche Studien,* 2:31–44 (1968).

Gregory PALAMAS, SAINT: *see* Palamas, Saint Gregory.

Gregory THAUMATURGUS, SAINT (b. *c.* 213, Neocaesarea, Pontus Polemoniacus—d. *c.* 270, Neocaesarea; feast day November 17), Greek Christian apostle of Roman Asia and champion of orthodoxy in the 3rd-century Trinitarian (nature of God) controversy. His Greek surname, meaning "wonder worker," was derived from the phenomenal miracles, including the moving of a mountain, that he reputedly performed to assist in propagating Christianity.

A law student, Gregory was introduced to Christianity through studies with the leading Christian intellectual of his time, Origen, at Caesarea, near modern Haifa, Israel. On his return to Neocaesarea, Gregory was made bishop and committed his life to Christianizing the largely pagan region. The Roman emperor Decius' persecution (250–251) compelled Gregory and his community to withdraw into the mountains, and with the return of normal conditions he instituted liturgical celebrations honouring the Decian martyrs.

Manifesting an ecclesiastical role more of a practical, pastoral nature than of a speculative theologian, Gregory mostly catechized and administered the church. His *Canonical Epistle, c.* 256, contains valuable data on church discipline in the 3rd-century East, resolving moral questions incident to the Gothic invasion of Pontus (modern northwest Turkey), with the rape, pillage, and apostasy that attended it. With his brother, a fellow bishop, Gregory assisted at the first Synod of Antioch, *c.* 264, which rejected the heresy of Paul of Samosata, who held that Christ's relationship to divinity was purely in the moral order, not involving his own being. The *Exposition of Faith,* Gregory's principal work, was a theological apology for Trinitarian belief, which, in general, incorporated his doctrinal instructions to Christian initiates, expressed his arguments against heretical groups, and was the forerunner of the Nicene Creed that was to appear in the early 4th century. An Eastern tradition records that the *Exposition* was given to him in a vision of St. John the Evangelist with the intercession of the Virgin Mary, the first instance noted of a Marian apparition. A letter "To Theopompus, on the Passible and Impassible in God," which responds to the Hellenistic theory of God's incapacity for feeling and suffering, and *Panegyric to Origen,* a florid eulogy including a critique differentiating "pagan" from "Christian" philosophy, comprise the remainder of Gregory's significant writings. Several other moral works, sermons, and letters bearing Gregory's name are not authentic.

Gregory THE GREAT (pope): *see* Gregory I.

Gregory THE ILLUMINATOR, SAINT (b. 240, Valarshapat, Armenia—d. 332, Armenia; feast day September 30), according to tradition, the 4th-century apostle of Christianity in Armenia.

Semilegendary 5th-century Armenian chronicles describe Gregory as a Parthian prince who fled the Persian invasion and was educated as a Christian in the Greek culture of Caesarea, Cappadocia (modern Kayseri, Tur.). He returned to Armenia in the midst of a Christian persecution pressed by King Tiridates III, a zealot for the regional idols, and was imprisoned in a burial pit. After being rescued, Gregory reputedly converted the King *c.* 300, who then became the first monarch in history to impose Christianity on his people. He did so about 20 years before Constantine I. Neighbouring Cappadocian bishops then installed Gregory as patriarchal bishop of Armenia. He subsequently evangelized parts of the country remaining under Roman control and influenced Christianity in Albania and other regions of the Caucasus mountains.

Gregory initiated an original Armenian ecclesiastical dynasty, wherein the office of metropolitan, or senior bishop, remained in his family down to the 5th century. He consecrated as bishops his two sons, Vhartanes and Aristakes. Having organized the Armenian Church along lines of Greek and Syriac biblical texts and liturgical practices, he passed his last years in contemplative solitude, dying in a mountain cave. A number of letters, rules of church discipline (canons), liturgical prayers, and sermons ascribed to Gregory are not completely genuine, since they contain theological terminology of a later period.

Gregory, Cynthia (b. July 8, 1946, Los Angeles), U.S. ballerina, a noted classical dancer.

Gregory began dancing as a child with Eva Lorraine and performed with Lorraine's California Children's Ballet Company for four years, after which she studied with Carmelita Maracci, Michel Panaieff, and Robert Rosellat.

Gregory was awarded a Ford Foundation Scholarship (1960) to work with Lew Christensen's San Francisco Ballet. She left to study in New York City in 1965 and soon joined the American Ballet Theatre. In nine months Gregory was promoted to principal performing roles that made her an internationally acclaimed ballerina. Gregory's strength and impeccable technique allowed her to excel in such classics as *Swan Lake* as well as in such modern works as Alvin Ailey's *The River* (1971). She retired briefly from dancing in 1975 and in 1977 but returned both times; she made her acting debut, in a television serial, in 1981.

Gregory, Horace (Victor) (b. April 10, 1898, Milwaukee—d. March 11, 1982, Shelburne Falls, Mass.), U.S. poet, critic, translator, and editor noted for both conventional and experimental writing.

Gregory began to write poetry while studying Latin in college, and he first contributed to periodicals in the early 1920s. Finding formal verse inadequate, he tried to combine the idiom of modern life with literary influences in *Chelsea Rooming House* (1930), his first success. Gregory's poetry, critical of middle-class mores, also appeared in many avant-garde magazines during the 1920s and '30s. His well-crafted work views the present in light of the classical and covers a wide range of emotion. A later volume was *Another Look* (1976).

Gregory wrote biographies of Amy Lowell (1958) and James McNeill Whistler (1959). His *Pilgrim of the Apocalypse* (1933; 2nd ed., 1957) was one of the first important criticisms of D.H. Lawrence. Gregory edited the works of writers ranging from Lord Byron to e.e. cummings, and with his wife, Marya Zaturenska, he wrote *A History of American Poetry, 1900–1940* (1946). His essays are collected in *Spirit of Time and Place* (1973), and his translated works include *Love Poems of Ovid* (1964). He also taught at Sarah Lawrence College in Bronxville, N.Y. (1934–60).

Gregory, Isabella Augusta, Lady, *née* PERSSE (b. March 5, 1852, Roxborough, County Galway, Ire.—d. May 22, 1932, Coole), Irish writer and playwright who—by her translations of Irish legends, her peasant comedies and fantasies based on folklore, and her work for the Abbey Theatre—played a considerable part in the late-19th-century Irish literary renascence.

In 1880 she married a neighbouring landowner and member of Parliament, Sir William Henry Gregory; her literary career did not begin until after his death (1892). In 1898 she met William Butler Yeats and became his lifelong friend and patron. She took part in the foundation of the Irish Literary Theatre (1898) and became a director (1904) of the Abbey Theatre, which owed much of its success to her skill at smoothing the disputes among its highly individualistic Irish nationalist founders. As a playwright, she wrote pleasant comedies based on Irish folkways and picturesque peasant speech, offsetting the more tragic tones of the dramas of Yeats and Synge.

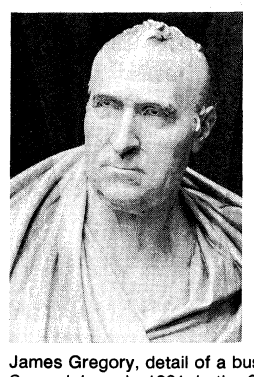
Lady Gregory, lithograph by Flora Lion, 1913; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Lady Gregory wrote or translated nearly 40 plays. *Seven Short Plays* (1909), her first dramatic works, are among her best, vivid in dialogue and characterization. The longer comedies, *The Image* and *Damer's Gold,* were published in 1910 and 1913 and her strange, realistic fantasies, *The Golden Apple* and *The Dragon,* in 1916 and 1920. She also arranged and made continuous narratives out of the various versions of Irish sagas, translating them into an Anglo-Irish peasant dialect known as "Kiltartan." These were published as *Cuchulain of Muirthemne* (1902) and *Gods and Fighting Men* (1904).

Colin Symthe edited *Seventy Years, Being the Autobiography of Lady Gregory* (1975), but it is basically excerpts of diaries and letters with comment.

Gregory, James (b. November 1638, Drumoak, Aberdeen, Scot.—d. October 1675, Edinburgh), Scottish mathematician and astronomer who published the first proof of the fundamental theorem of calculus and otherwise contributed to the discovery of calculus. In his treatise *Optica Promota* (1663; "The Advance of Optics") he described the first practical reflecting telescope, now known by



James Gregory, detail of a bust by Samuel Joseph, 1821; in the Scottish National Portrait Gallery, Edinburgh

By courtesy of the Scottish National Portrait Gallery, Edinburgh

his name. Gregory also introduced estimation of stellar distances by photometric methods.

About 1665 he went to the University of Padua, where he studied mathematics and wrote *Vera Circuli et Hyperbolae Quadratura* (1667; "The True Squaring of the Circle and of the Hyperbola"), in which he used infinite convergent series to find the areas of the circle and hyperbola. In this work he became one of the first to draw a distinction between convergent and divergent series. In his *Geometriae Pars Universalis* (1668; "The Universal Part of Geometry"), he gave a series of rules for finding the areas of curves and the volumes of their solids of revolution.

He was professor of mathematics at the University of St. Andrews (1669–74) and at the University of Edinburgh (1674–75). *James Gregory: Tercentenary Memorial Volume* (ed. by H.W. Turnbull; 1939) contains Gregory's letters and posthumous manuscripts and shows that he anticipated several mathematical discoveries in number theory and differential calculus, such as the celebrated Taylor's expansion.

Gregory the Great, Liturgy of Saint: *see* Preconsecrated Offerings, Liturgy of the.

Greiff, León de (b. July 22, 1895, Medellín, Colom.—d. July 11, 1976, Bogotá), Latin-American poet notable for his stylistic innovations.

De Greiff was of Swedish and German ancestry. His first book, *Tergiversaciones* (1925; "Tergiversations"), while displaying the musicality common to the Latin-American modernist poets, was innovative in its invention of words, use of strange adjectives, and breaking of the flow of language in an attempt to portray a world laden with symbolic meanings. *Libro de los signos* (1930; "Book of Signs") uses the same stylistic devices; the predominant themes of this poetry collection are solitude, the tedium of existence, and the past. There is a conscious striving for formal perfection in an attempt to create a union of the language of poetry with the sounds of music. *Variaciones alrededor de la nada* (1936; "Variations About Nothing") contains deeply confessional poems with philosophical speculations on the nature of love, the artistic ideal, and the poet's feeling of life as an adventure.

Obras completas (1960, rev. 1975; "Complete Works") reveals the poet's continued interest in language and sound experiment. The later poems treat themes that show the paradoxical side of human nature. De Greiff's poetry is often ironic, humorous, and satirical to the point of self-mockery.

Greifswald, city, Mecklenburg-West Pomerania *Land* (state), northeastern Germany. It lies 20 miles (30 km) southeast of Stralsund near the mouth of the Ryck River, which empties into Greifswalder Bay on the Baltic Sea. First mentioned in 1209 as a market settlement of the Eldena monastery and chartered in 1250, Greifswald joined the Hanseatic League in 1278. It passed to Sweden in 1648 and to Prussia in 1815. Notable landmarks include the town hall (1350) and several 13th- and 14th-century churches, including St. Mary's, St. Jacob's, and the Cathedral of St. Nicholas. A university was founded in 1456 and renamed after World War II the Ernst Moritz Arndt University of Greifswald. Greifswald is a port and rail junction that trades in grains, wood, and coal and manufactures machinery, textiles, and foodstuffs. Pop. (1989 est.) 68,-597.

Grein, Jack Thomas, original name JACOB THOMAS GREIN (b. Oct. 11, 1862, Amsterdam—d. June 22, 1935, London), critic, playwright, and theatre manager who influenced British drama at the turn of the century.

Drawn to the theatre as a boy, Grein became a drama critic at 18. Family misfortunes forced him to go to London, where he became a naturalized citizen in 1895. Inspired by André Antoine's Naturalistic Théâtre-Libre, Paris, he founded (1891) the Independent Theatre, London, which was dedicated—despite critical opposition—to new plays chosen not for their commercial but for their literary and artistic value. Among the works produced by Grein were Henrik Ibsen's *Ghosts* (1891) and George Bernard Shaw's *Widower's Houses* (1892). Grein wrote drama criticism for *Life* (1889–93), *Illustrated London News,* and other publications. His volumes of published criticism appeared from 1898 to 1903 and in 1921 and 1924. He did much to promote the transmission of new plays between England and the European continent.

greisen, modification of granite, an intrusive igneous rock; it consists essentially of quartz and white mica (muscovite) and is characterized by the absence of feldspar and biotite. The rock usually has a silvery, glittering appearance from the abundance of layered muscovite crystals, but many greisens resemble a pale granite. The white mica mostly forms large plates with imperfect crystalline outlines. The quartz is rich in fluid enclosures. The most common accessory minerals are tourmaline, topaz, apatite, fluorite, and iron oxides; altered feldspar and brown mica also may be present.

Greisen occurs typically in belts or veins that intersect granite, and it passes into granite at the outer edges of these. The transition between the two rocks is gradual, indicating that the greisen has been produced through alteration of the granite by vapours or fluids rising through fissures. These vapours or fluids must contain fluorine, boron, and probably lithium, because these elements are contained in topaz, mica, and tourmaline, the new minerals of the granite. The change is induced by the vapours set free by the granite magma as it cools.

Greisen is closely connected with schorl, both in its mineralogical composition and in its mode of origin. Schorl is a pneumatolytic product consisting of quartz, tourmaline, and, often, white mica and thus passes into greisen. Both of these rocks frequently contain small percentages of cassiterite (tin oxide) and may be worked as ores of tin; the central filling of the fissure often contains much wolframite, the chief ore of tungsten.

grêmio (Portuguese: "guild"), any of the organized guilds that were founded during the Moorish occupation of Portugal (7th–14th century) by men who worked in the same craft and who generally lived on the same street in a given city. Each guild selected a patron saint, usually one who had shared its profession, and designed a banner with the saint depicted on it. For this reason, guilds were popularly known as *bandeiras* ("banners"). In the 14th century, with the development of overseas trades, the autonomous guilds became more closely linked to the royal provincial governments and councils.

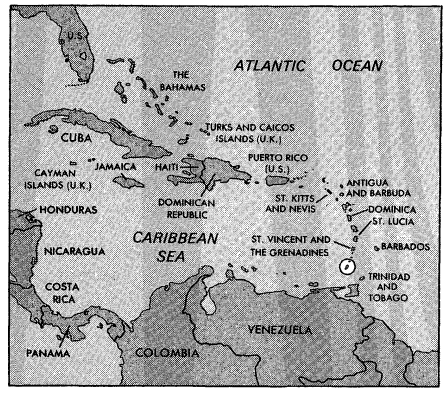
Jurisdiction over all the guilds was in the hands of the Casa dos Vinte e Quatro ("House of Twenty-four"), which was composed of two elected representatives from each of 12 guilds. Members of the house, who had to be 40 years old, were elected by a vote of two-thirds of the masters of their respective guilds.

With the passing of the guilds' autonomous status, they came to be used as sources of military draftees for the kings of Portugal. The guilds also became influential in the decision making of the Cortes (parliament).

Grenada, byname ISLE OF SPICE, island of the West Indies, the most southerly of the Windward Islands, situated about 100 miles (160 km) north of the coast of Venezuela in the eastern Caribbean Sea. Grenada covers a total land area of 133 square miles (345 square km), including the dependency of the southern Grenadines to the north-northeast. The capital is St. George's. Oval in shape, Grenada island is about 21 miles (34 km) long from north to south and 12 miles (18 km) wide from east to west. The population in 1990 was estimated at 110,000.

A brief treatment of Grenada follows. For full treatment, *see* MACROPAEDIA: West Indies.

For current history and for statistics on society and economy, *see* BRITANNICA WORLD DATA ANNUAL.



Grenada

The land. Volcanic in origin, the island is dominated by a thickly forested mountain ridge running north–south down its centre and rising to an elevation of 2,757 feet (840 m) at Mount St. Catherine. Short, swift-flowing rivers and natural springs have deeply dissected the central highlands. The southern coast of the island is indented with many beaches, bays, and natural harbours.

The island has a tropical maritime climate with a rainy season from June to December, though showers occur periodically throughout the year. Temperatures along the coast rise to about 85° F (29° C) in the afternoon, fall to about 74° F (23° C) at night, and vary little from month to month. Occasional hurricanes can cause extensive damage. Grenada's warm temperatures, high annual rainfall, and fertile black soil support a rich tropical vegetation, and bananas, limes, mangoes, and coconuts grow in profusion. The country is well known for its production of such spices as nutmeg, cinnamon, pepper, cloves, ginger, and vanilla, as well as cocoa. The animal life, apart from domesticated livestock (cattle, sheep, goats, and pigs), includes the mona monkey, the agouti, the armadillo, the mongoose, a variety of turtles, and land crab.

The people. Blacks, mulattoes, and a few thousand East Indians make up most of the population. In addition there are white (French, British, and American immigrants and descendants), Indian, and Carib minorities. English is the official language; a French-African patois, a remnant of French rule, is also spoken. Nearly two-thirds of the population is Roman Catholic, and more than one-fifth is Anglican. The annual growth rate of the population is comparatively high for the West Indies because of the country's high birth rate, while the death rate is near the regional average. More than one-third of the population is under 15 years of age. The town of St. George's is Grenada's only urban settlement.

The economy. Grenada has a developing market economy that is heavily dependent on agricultural exports and tourism. Unemployment affects about one-third of the work force. The gross national product (GNP) is growing more rapidly than the population; the GNP per capita is among the lowest in the Caribbean.

Agriculture accounts for approximately one-fifth of the GNP and employs more than one-fourth of the work force. The nation's arable land is mostly divided into privately owned small holdings and is underutilized; agricultural cooperatives have been formed from some large estates. Bananas, cocoa, nutmeg, and mace are produced for export. Fisheries are being developed, and the country has a fish-processing plant. Industry consists mostly of the processing of agricultural products. Tourism, which ordinarily accounts for one-tenth of the GNP, declined sharply after the coup of 1979 and had recovered only partly by the late 1980s. Construction of an international airport at Point Salines was completed in 1984.

Government and social conditions. Grenada is a constitutional monarchy and a member of the Commonwealth. The country's 1974 independence constitution provides for a governor-general of the island who is appointed by the British monarch and for a bicameral parliament. This legislative body consists of a popularly elected, 15-member House of Representatives and a Senate whose 13 members are appointed on the advice of other government leaders, such as the prime minister, who must himself be a member of the House of Representatives.

Health conditions in Grenada compare favourably to those of many developing countries, and the average life expectancy is about 67 years. Education is free and compulsory between the ages of 6 and 14 years. The educational system includes primary, junior, and secondary schools, as well as technical centres and a teacher-training college.

History. The warlike Carib Indians dominated Grenada in 1498, the date Christopher Columbus sighted the island. The Caribs had migrated from South America and wiped out the prior inhabitants, the more peaceful Arawaks. For 150 years after Columbus, the Caribs ruled over Grenada. In 1650 the French governor of Martinique purchased the island from a French company and established a settlement at St. George's. In 1672 the island became subject to the French crown and remained so until 1762, when British forces captured it.

Grenada remained in British control during the later 18th and 19th centuries. In 1833 the island's black slaves were freed with a minimum of economic and social upheaval. Grenada was the headquarters of the government of the British Windward Islands from 1885 to 1958. From 1958 until 1962 the island was a member of the West Indies Federation. Grenada became a self-governing state in association with the United Kingdom in 1967.

On Feb. 7, 1974, Grenada became an independent state. In 1979 the left-wing New Jewel Movement staged a bloodless coup, proclaimed the People's Revolutionary Government (PRG), and named its leader, Maurice Bishop, as prime minister. Relations between the new government and Western-oriented Latin-American countries became strained in the early 1980s as Grenada leaned toward Cuba and the Soviet bloc. Dissension within the PRG led to the deposition and execution of Bishop and several other ministers in an internal coup led by General Hudson Austin in mid-October 1983. On October 25 U.S. troops invaded Grenada. The island was soon occupied, Austin and the other radical PRG members were placed under arrest, and a number of Cuban guest workers and soldiers were sent home. U.S. and Caribbean peacekeeping forces were gradually withdrawn from Grenada during 1983–85, and a general election in December 1984 resulted in the re-establishment of democratic self-government on the island.

Grenada, city, seat (1870) of Grenada county, north-central Mississippi, U.S. It lies along the Yalobusha River at the eastern edge of the Mississippi River valley, 113 miles (182 km) north-northeast of Jackson. It was formed in 1836 by the merger of Tullahoma and Pittsburg, two villages established by rival speculators in 1833. Grenada's cotton economy was virtually destroyed during the American Civil War. General J.C. Pemberton of the Confederacy headquartered there while resisting General Ulysses S. Grant's Federal troops at Vicksburg in 1862. Grenada is now a centre of agricultural trade (cotton, corn [maize], dairying) with light manufacturing. Grenada Lake, impounded on the Yalobusha, has more than 100 miles (160 km) of shoreline and is the site of two state parks; with Holly Springs National Forest, immediately to the north, it forms the basis of a tourist industry. Inc. 1836. Pop. (1987 est.) 10,870.

grenade, small explosive, chemical, or gas bomb that is used at short range. The word *grenade* probably derived from the French word for pomegranate, because the bulbous shapes of early grenades resembled that fruit. Grenades came into use around the 15th century and were found to be particularly effective when exploded among enemy troops in the ditch of a fortress during an assault. They eventually became so important that specially selected soldiers in 17th-century European armies were trained as grenade throwers, or grenadiers (*see* grenadier). After about 1750, grenades were virtually abandoned because the range and accuracy of firearms had increased, lessening the opportunities for close combat. Grenades did not come back into use on an important scale until the Russo-Japanese War (1904–05). The grenade's effectiveness in attacking enemy positions during the trench warfare of World War I led to its becoming a standard part of the combat infantryman's equipment, which it has continued to be. More than 50,000,000 fragmentation grenades alone were manufactured by the United States for use in World War II.

The grenades most commonly used in wartime are explosive grenades, which usually consist of a core of TNT or some other high explosive encased in an iron jacket or container. Such grenades have a fuse that detonates the explosive either on impact or after a brief (usually four-second) time delay that is long enough for the grenade to be accurately thrown but is too brief for enemy soldiers to toss the grenade back once it has landed among them. A common type of explosive grenade is the fragmentation grenade, whose iron body, or case, is designed to break into small, lethal, fast-moving fragments once the TNT core explodes. Such grenades usually weigh no more than 2 pounds (0.9 kg). Explosive hand grenades are used for attacking the personnel in foxholes, trenches, bunkers, pillboxes, or other fortified positions and in street fighting.

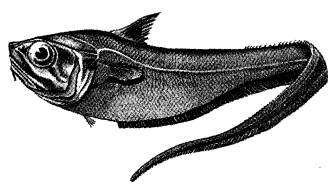
Another major class is chemical and gas grenades, which usually burn rather than explode. This class comprises smoke, incendiary (fire-setting), illuminating, chemical-warfare, and tear-gas grenades. The latter are used by police for riot and crowd control. Several uses may be combined, as in a white phosphorous grenade that has smoke, incendiary, and antipersonnel effects.

Rifle grenades are launched from the muzzle of a rifle and are propelled either by the force of a cartridge or by the expanding gases of a blank cartridge. Such grenades usually have long, streamlined bodies, in contrast to the round shapes of hand grenades. A special type of rifle grenade is the antitank grenade, which is designed to be launched at close, point-blank range at armoured vehicles. It contains a special armour-piercing explosive, called a shaped charge, that explodes on impact and can knock out a tank if it hits the tank at the right spot.

grenadier, soldier particularly selected and trained to hurl grenades. The earliest grenadiers (late 16th century) were not organized in special units, but by the mid-17th century they formed special companies within battalions. Exceptional strength and courage were needed for hurling the grenade, and accidents were not uncommon. Grenadiers earned higher pay, received special privileges, and were distinguished by their height, dashing uniform, and tall, mitre-shaped headdress (shako). Armed with heavy hatchets for chopping through barricades and other obstructions, they were employed particularly in siege and trench warfare.

During the 18th century there was a gradual decline in the use of grenades, but grenadiers were retained as elite troops. The gradual adoption throughout Europe of the four-company battalion progressively encouraged the recruitment of separate grenadier formations, but their duties had come to differ little from those of the ordinary regiments of the line. Horse grenadiers made a brief appearance in the British and Belgian forces. In World War I, battalion subunits were trained both to throw hand grenades and to fire rifle grenades. The grenadier has since disappeared as a special type of infantryman, and the term has become obsolete save in historical names such as the Grenadier Guards.

grenadier, also called RAT-TAIL, any of about 300 species of abundant deep-sea fishes of the family Macrouridae found along the ocean bottom in warm and temperate regions. The typical grenadier is a large-headed fish with a tapered body ending in a long, ratlike tail bordered above and below by the anal and



Grenadier (*Macrourus ceavus*)
Painting by C.M. Richardson

second dorsal fins. The eyes are large, and the mouth is on the underside of the head. The often extended snout presumably aids in rooting about the bottom for food. Some species have light organs, and some can produce sounds by means of paired muscles attached to the swim bladder. The fish is usually from about 30 to 60 cm (1 to 2 feet) long.

grenadine: *see* carnation.

Grenadines, also called GRENADINE ISLANDS, chain of about 600 islands and islets in the southeastern part of the Lesser Antilles in the West Indies, ranging over 60 miles (100 km) generally southwesterly from St. Vincent to Grenada. The northern Grenadines are administratively part of Saint Vincent and the Grenadines (*q.v.*), while the southern islands are a dependency of Grenada (*q.v.*). The Saint Vincent group consists of Bequia, Canouan, Mayreau, Mustique, Union Island, and associated islets. Carriacou Island, the largest of the Grenada group, has an area of 13 square miles (34 square km).

Few of the islands are inhabited. The low, uncertain rainfall makes agriculture and settlement precarious, and the islands are only lightly cultivated, the main product being Sea Island cotton grown on Carriacou. Nevertheless, the Grenadines were, in the past, plantation areas settled by the French.

A ridge of hills rising 980 feet (300 m) crosses Carriacou from northeast to southwest; on the west coast there are two good harbours, Hills-

borough Bay (site of the chief town, Hillsborough) and Tyrell Bay, farther south. Resorts and home sites, hotels, and yachting marinas were developed in the 1970s on Bequia, Palm (formerly Prune), Petit St. Vincent, Union, and Youngs islands. There is an airstrip on Carriacou.

Grenfell, Sir Wilfred (Thomason) (b. Feb. 28, 1865, Parkgate, Cheshire, Eng.—d. Oct. 9, 1940, Charlotte, Vt., U.S.), English medical missionary who was the tireless benefactor of the people of Labrador.

While still a medical student at London

Sir Wilfred Grenfell
BBC Hulton Picture Library

University in 1887, Grenfell was impressed by the sermons of the U.S. evangelist Dwight L. Moody and, in the same year, joined the Royal National Mission to Deep Sea Fishermen. During the next five years he served as surgeon on the first hospital ship dispatched to the North Sea fisheries, and in 1892 he initiated missionary service to the fishermen of Labrador. Soon absorbed in improving the living conditions of the permanent inhabitants of the Labrador coast, he undertook to raise funds from numerous speaking tours and popular books, such as *Vikings of To-day* (1895).

After withdrawal of the Mission's support in 1912, he founded the International Grenfell Association, with branches in England, the United States, Newfoundland, and other parts of Canada. Largely because of this organization's efforts, there existed in Labrador when Grenfell retired (1932) 6 hospitals, 4 hospital ships, 7 nursing stations, 2 orphanages, 2 large schools, 14 industrial centres, and a cooperative lumber mill. He was knighted in 1927.

Grenoble, town, capital of Isère *département*, Rhône-Alpes region, southeastern France (Dauphiné), southeast of Lyon. It stands on the Isère River, 702 ft (214 m) above sea level, at the foot of Mont (mountain) Rachais. The Isère divides the city into two unequal parts. The oldest part of the town, cramped between the river and the mountains, lies on the right bank; the major part of the city spreads out into the plain on the left bank. The town has one of the highest population growth rates in France. Its population multiplied fivefold between 1860 and 1960 and continued to increase throughout the ensuing decade. To deal with the rapid expansion, a vast urban renewal plan was drawn up and largely executed in time for the 1968 Winter Olympic Games.

The town's numerous industries include the manufacturing of plastics, rubber, cement, and paper. Advanced techniques are used in the chemical, metallurgical, and nuclear industries. Although a university was founded in 1339, Grenoble became an important intellectual centre only at the beginning of the 20th century. A nuclear research station and a school of electronic engineering are now affiliated with the university. The fine 15th- and 16th-century Palais de Justice formerly housed the Dauphinois Parliament. The sports stadium and the Maison de la Culture are interesting examples of contemporary French architecture. The library has a rich collection of manuscripts, including most of the works of Stendhal, who was born there in 1783. The museum, in the same building, is reputed for its gallery of modern paintings.

The present name of the town is derived from Gratianopolis (4th century), given in honour of the Roman emperor Gratian. After being occupied by the Arabs in the 9th century, the town passed into the hands of the counts of Albon. In 1349 it was ceded to France with the rest of the province of Dauphiné. Grenoble suffered during the Wars of Religion, as well as after the revocation of the Edict of Nantes. In June 1788 the town successfully rebelled against a royal decree limiting the powers of the local parliament. During World War II, the French resistance movement was particularly active in Grenoble. Pop. (1982) 156,437.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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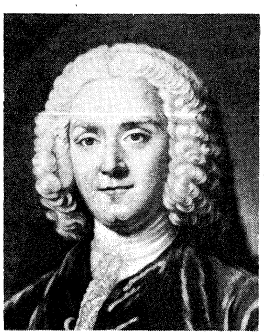
Grenoble I, II, and III, Universities of, French UNIVERSITÉS DE GRENOBLE I, II, ET III, coeducational, autonomous, state-financed institutions of higher learning in Grenoble, France, founded under France's 1968 Orientation Act providing for the reform of higher education. They replaced the original University of Grenoble founded in 1339 and confirmed by papal bull. The university was established to serve the professions by unifying the teaching of theology, law, and medicine. It was a leader in the Renaissance revival of the classics and development of liberal arts. Suppressed by the French Revolution in 1789, it was reopened in 1810. In 1896 it was reconstituted as an autonomous state-financed university.

The 1968 act created teaching and research faculties that are administratively and academically independent. Each of the three new universities represents a different field of specialty: science, mathematics, and medicine at Grenoble I; law, economics, and social sciences at Grenoble II; and language, literature, and the humanities at Grenoble III.

Grenville, George (b. Oct. 14, 1712—d. Nov. 13, 1770, London), English politician whose policy of taxing the American colonies,



George Grenville, detail of an engraving by James Watson after a painting by William Hoare
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

initiated by his Revenue Act of 1764 and the Stamp Act of 1765, started the train of events leading to the American Revolution.

He entered Parliament in 1741, one of the "cousinhood" of men interrelated by blood or marriage, in opposition to Sir Robert Walpole, who held power from 1721 to 1742. After holding a number of ministerial appointments, Grenville was recommended to George III by Lord Bute to be his successor as first lord of the Treasury (prime minister). Grenville's ministry (1763–65) was unhappy and disastrous, largely because of his lack of finesse, eloquence, and imagination and his determination to control all crown patronage. His relationship with the King suffered from George III's habit of continual consultation with Bute. Apart from American taxation, other notable incidents during the Grenville administration included the prosecution of John Wilkes for seditious libel and the clumsy handling of the Regency Act of 1765 that had been introduced as a result of a severe illness the King had suffered. This bumbling finally alienated the King and led to the fall of the ministry. In opposition after 1765, Grenville castigated politicians opposed to American taxation and helped to bring about the passage of Townshend's Revenue Act of 1767, which renewed tension between Britain and the colonies.

Grenville, George Nugent Temple: *see* Buckingham, George Nugent Temple-Grenville, 1st marquess of.

Grenville, Richard, also called RICHARD GRENVILLE-TEMPLE: *see* Temple, Richard Grenville-Temple, 1st Earl.

Grenville, Sir Richard (b. June 15, 1542—d. September 1591), colourful and daring English naval commander who fought heroically, against overwhelming odds, in a celebrated encounter with a Spanish fleet off Flores Island in the Azores.

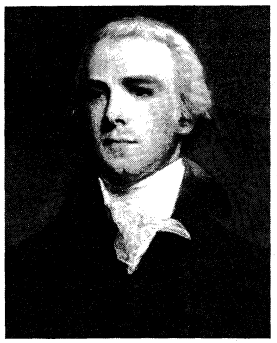
He fought with the imperial army against the Turks in Hungary (1566–68). Next he helped to suppress an uprising in Munster, Ireland, in 1568–69, and, between 1573 and 1575, he made preparations for a voyage of discovery to the South Pacific, hoping to locate a northwest passage from England to China. For political reasons the expedition was never made, but Sir Francis Drake adopted the plan for his circumnavigation voyage of 1577–80.

In 1585 Grenville commanded the fleet that carried 100 English colonists to Roanoke Island in present-day North Carolina, and in 1589–91 he worked to establish a plantation in the Irish province of Munster (modern counties of Clare, Cork, Kerry, Limerick, Tipperary, and Waterford).

Recalled to England in 1591, Grenville was made second in command (under Lord Thomas Howard) of a squadron of about 15 vessels sent to intercept a Spanish treasure fleet off the Azores. When 53 Spanish vessels approached to protect their treasure ships, the English retreated, but Grenville was delayed and cut off. Undaunted, he attempted to run his ship, the "Revenge," through the Spanish line. After 15 hours of hand-to-hand combat against 15 Spanish galleons and a force of 5,000 men, the "Revenge" with her 190-man crew was captured (Sept. 9/10, 1591). A few days later the wounded Grenville died on board the Spanish flagship. His exploit is commemorated in Tennyson's poem "The Revenge"; A.L. Rouse has recounted the commander's career in *Sir Richard Grenville of the Revenge* (1949).

Grenville, William Wyndham Grenville, Baron (b. Oct. 25, 1759—d. Jan. 12, 1834, Dropmore, Buckinghamshire, Eng.), British politician, son of prime minister George Grenville; he was himself head of the coalition "Ministry of all the Talents," Feb. 11, 1806–March 25, 1807. His greatest achievement was the abolition of the British overseas slave trade by a bill that became law the day he left office.

Entering the House of Commons in 1782, Grenville became its speaker in January 1789, home secretary in June of that year, and president of the Board of Control in March 1790. Created Baron Grenville on Nov. 25, 1790, he then became leader of the House of Lords. From June 8, 1791, to Feb. 10, 1801, he served under his cousin William Pitt the Younger as secretary of state for foreign af-



Baron Grenville, detail of a portrait by John Hoppner; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

fairs. To crush English radicalism encouraged by the French Revolution, Grenville introduced the Habeas Corpus Suspension Act (1794) and other measures. He and Pitt resigned (1801) when King George III refused to consider granting political rights to Roman Catholics.

When Pitt resumed the premiership in May 1804, Grenville declined to join the government because his greatest political ally, Charles James Fox, was excluded from office at the King's insistence. After Pitt's death (Jan. 23, 1806) Grenville formed a coalition of the former prime minister Henry Addington's followers, Foxites, and his own friends. His government failed to make peace with Napoleonic France and otherwise accomplished little apart from outlawing the slave trade in 1807. Its advocacy of a Catholic Relief Bill caused George III to dismiss Grenville in March 1807 after the latter refused to pledge himself never again to trouble the King on the subject. Grenville's refusal kept him out of office in 1809 and again in 1812. Until 1817, when he supported the government's measures to suppress radicalism, he generally voted with the Whigs in opposition. A paralytic stroke ended his active political career in 1823. Grenville was chancellor of Oxford University from 1810 to 1834.

He died without male issue, and his title became extinct.

Grenville Series, major division of Precambrian rocks and time in northeastern North America (the Precambrian began about 4,600,000,000 years ago and ended 570,000,000 years ago). The rock series occurs in southern Ontario and into the Adirondack Mountains of New York and was named for exposures studied at Grenville township, Ontario. Grenville rocks, a very thick sequence of sediments that are metamorphosed to varying degrees, consist of silty mudstones and large amounts of limestone and dolomite. Two major divisions within the Grenville Series are recognized: the lowermost division is known as the Grenville Subsequence, the upper is known as the Hastings Subsequence. Grenville and Hastings rocks are commonly intruded by various igneous bodies including sills, stocks, and batholiths. In outcrops, both Grenville and Hastings rocks are frequently strongly folded and contorted. The Hastings Subsequence is separated from the Grenville Subsequence by a disconformity, representing an erosional period of the Grenville before deposition of the Hastings. Deformation of both the Grenville and Hastings subsequences indicates a major period of mountain building in the region now dated at about 950,000,000 years ago (± 150,000,000 years) and known as the Grenville orogeny.

Gresham, Sir Thomas (b. 1518/19, London—d. Nov. 21, 1579, London), English merchant, financier, and founder of the Royal Exchange.

Gresham was educated at the University of Cambridge and later trained as a lawyer. He was an agent of the English government in the Low Countries, where he engaged in espionage, smuggled war materials and bullion, and negotiated with the Crown's foreign creditors. Repayment of loans raised by the Crown and payment of interest caused exchange fluctuations, which increased the sums that the Crown had to repay; Gresham operated in the foreign-exchange market to alleviate these fluctuations. He understood the power of governments to affect the rate of exchange and even suggested the creation of an exchange-equalization account. It was Gresham who advised Queen Elizabeth I to pursue recoinage following her father's debasement of the currency with inferior metal. Thus, his name would later be associated with the monetary principle, hence known as Gresham's law (*q.v.*), which may be summarized by the aphorism that "bad money drives out good."

In order to provide a convenient meeting place for the bankers (exchange dealers) in London, Gresham built the Royal Exchange (1566–68), which at first was called the "Bourse" and received its present name by royal proclamation in 1571.

Gresham, Walter Quintin (b. March 17, 1832, near Lanesville, Harrison Co., Ind., U.S.—d. May 28, 1895, Washington, D.C.), leading Republican politician in the post-Civil War years who abandoned his party to serve as U.S. secretary of state (1893–95) under the Democratic administration of Grover Cleveland.

After serving as a brevet major general in the Union Army during the Civil War, Gresham, a lawyer, was active in Indiana Republican affairs. At the appointment of Pres. Ulysses S. Grant, he served as a U.S. district judge in Indiana during 1869–83. Chester A. Arthur, who was considering Gresham as a possible running mate, appointed him as postmaster general (1883–84); Gresham also served Arthur briefly as secretary of the treasury (Sept.–Oct. 1884).

By the time of the Republican convention of 1884 Gresham had become a prominent and respected Republican; he was considered by the party as a presidential candidate but lost to James G. Blaine. In 1888 Gresham was again a leading candidate for the Republican presidential nomination; he ran second to John Sherman of Ohio on the first ballot but ultimately lost the nomination to Benjamin Harrison. Along with other disaffected Republicans, Gresham in 1892 endorsed Grover Cleveland, the Democratic candidate for president. Gresham was especially drawn to Cleveland because of the latter's pledge to reduce the tariff.

Appointed secretary of state by Cleveland in 1893, he urged the President to withdraw from Senate consideration the controversial treaty annexing Hawaii, which had been negotiated by the Harrison administration. Earlier, Gresham had denounced as imperialism U.S. complicity in the Hawaiian revolution. Although he brought about diplomatic solutions to many international disputes, Gresham is not remembered for any major contributions to U.S. foreign policy.

Gresham's law, observation in economics that "bad money drives out good." If two coins have the same nominal value but are made from metals of unequal value, the cheaper will tend to drive the other out of circulation. Sir Thomas Gresham, financial agent of Queen Elizabeth I, was not the first to recognize this monetary principle, but his elucidation of it in 1558 prompted the economist H.D. Macleod to suggest the term "Gresham's law" in the 19th century.

Money functions in ways other than as a domestic medium of exchange; it also may be used for foreign exchange, as a commodity, or as a store of value. If a particular kind of money is worth more in one of these other functions, it will be used to buy foreign exchange or will be hoarded rather than used for domestic transactions. For example, during the period from 1792 to 1834 the United States maintained an exchange ratio between silver and gold of 15:1, while the ratios in European countries ranged from 15.5:1 to 16.06:1. This made it profitable for owners of gold to sell their gold in the European market and take their silver to the United States mint. The effect was that gold was withdrawn from domestic circulation; the "inferior" money had driven it out.

Gresset, Jean-Baptiste-Louis (b. Aug. 29, 1709, Amiens, Fr.—d. June 16, 1777, Amiens), French poet and dramatist who received immediate and lasting acclaim for his irreverently comic narrative poem *Ver-Vert*

Gresset, oil painting by Louis Tocqué; in the Château de Versailles

Alinari—Art Resource/EB Inc.

(1734; *Ver-Vert, or the Nunnery Parrot,* 1790), describing with wit tinged with malice the adventures of a parrot who attempts to maintain his decorous convent background while on a visit to another convent.

Brought up by Jesuits, Gresset was a brilliant pupil and, after entering the Jesuit order in 1726, continued his education in Paris before returning to teach in Amiens and Tours. *Ver-Vert,* which was circulated privately and printed without the author's permission, brought him instant success in Parisian circles, where the literati were astounded that such a refined wit could come from within the Catholic church.

In spite of the objections of some of his superiors, Gresset continued to write light occasional verse, within a year publishing *La Carême impromptu* ("The Lenten Impromptu") and *Le Lutrin vivant* ("The Living Lectern"). Returning to Paris in 1735 for a year's study of theology, he wrote *La Chartreuse* ("The Carthusian") and *Les Ombres* ("The Shadows"). These lively accounts of life in a Jesuit college, precise and pointed in detail, led first to his banishment to the provinces and then to his expulsion from the order; his keen eye for absurdity and his natural frivolity were seen as anticlerical and impious. Supported by an official pension, he turned to drama; his first plays, the tragedy *Édouard III* (performed 1740), which included the first murder ever enacted on the French stage, and a verse comedy, *Sidney* (1745), were not especially successful, but *Le Méchant* (1747; "The Sorry Man"), a witty exposé of salon life, was highly praised for its pithy, polished dialogue. Admitted to the Académie Française in 1748, he caused a stir with his criticism of nonresident bishops (1754). In 1759 Gresset wrote *Lettre sur la comédie,* in which he renounced all his previous poetic and dramatic works as irreligious.

Gressly, Amanz (b. July 17, 1814, Bärschwil, Switz.—d. April 13, 1865, Bern), Swiss geologist who originated the study of stratigraphic facies when he discovered lateral differences in the character and fossil content of strata in the Jura Mountains, reflecting a variation of the original environment of deposition.

At a time when geologists mainly studied the vertical succession of rock and fossil beds, Gressly observed the great horizontal changes in each individual layer. In "Observations géologiques sur le Jura Soleurois" (1838–41), he coined the term facies to describe the aspects (or "faces") of the terrain. Gressly worked closely with Louis Agassiz at Neuchâtel, and, when Agassiz went to the United States in 1846, Gressly turned to engineering work on tunnels for the alpine railroads. His discoveries there, combined with his extensive fossil collection, enabled him accurately to predict sedimentary strata in regions he had not visited. He is considered to have laid the foundations for modern paleography.

Gretchaninov, Aleksandr (Tikhonovich): *see* Grechaninov, Aleksandr (Tikhonovich).

Gretna, city, seat (1884) of Jefferson parish, southeastern Louisiana, U.S. It lies on the west bank of the Mississippi River (there bridged) opposite New Orleans. Founded in the early 1800s as Mechanicsham by Nicholas Noel Destréhan, a plantation owner, it was renamed for Gretna Green in Scotland (a Scottish border town noted as the goal of couples eloping from England because marriages could be performed there with quick ease). In 1913 it merged with nearby McDonoghville to form an incorporated city. Once a shipping point for plantations, truck farms, and dairies, it has grown as a residential–industrial suburb of New Orleans. Pop. (1988 est.) 20,144.

Gretna Green, village in Annandale and Eskdale district, Dumfries and Galloway region, Scot., just north of the River Sark, the dividing line between England and Scotland. It was long famous as the goal of eloping English couples seeking hasty marriage.

Because of a change in English law in 1754, English couples seeking a quick marriage were obliged to cross the border into Scotland, where Scottish law required only that the couples declare before witnesses their wish to be married. At Gretna Green the ceremony was usually performed by the blacksmith, though any person might officiate, and the tollhouse, the inn, or (after 1826) Gretna Hall were the scenes of many such weddings. As many as 200 couples were married at the tollhouse in a year. In 1856 the law required one of the contracting parties to reside in Scotland for 21 days before marrying. The Marriage (Scotland) Act of 1939 declared that marriages must be conducted by a minister or registrar, beginning July 1, 1940. But young runaway couples still came because, under Scottish law, parental consent was not required from the age of 16 (it was 21 in the rest of Britain). An act of 1969 made the age of consent uniform throughout Britain at age 18. The legal reason to marry in Gretna Green had vanished; still, many marrying couples continue to seek out Gretna Green because of its somewhat romantic associations.

Nearby Springfield, which with Gretna Green forms Gretna, competed with Gretna Green for the marriage trade until 1830, when a new Sark Bridge diverted traffic. Both Gretna Green and Springfield are now primarily agricultural villages. Pop. (1981) Gretna, 2,811.

Grétry, André-Ernest-Modeste (b. Feb. 10/11, 1741, Liège, Bishopric of Liège [now in Belgium]—d. Sept. 24, 1813, Montmorency, near Paris, Fr.), French composer of operas, a leader in the evolution of French opéra comique from light popular plays with music into semiserious musical drama.

Grétry studied singing, violin, and harmony and in 1759 was sent to Rome to study composition. In 1766 he went to Geneva as a music teacher. There he met Voltaire, at whose suggestion he went to Paris in 1767. From 1768 he produced more than 50 works for the stage, including *Le Tableau parlant* (1769; "The Speaking Picture") and *Zémire et Azor* (1771). His masterpiece, *Richard Coeur de Lion* (1784), is one of the earliest examples of French Romantic opera.

Grétry's music is noted for its finesse and melodic grace. He excelled in the development of dramatic scenes through melody and careful setting of words. Widely honoured during his life, he received a pension from Napoleon in 1802. In 1789 he published his *Mémoires; ou, essais sur la musique* ("Memoirs; or, Essays on Music").

Grettis saga (*c.* 1320), latest and one of the finest of Icelandic family sagas. Its distinction rests on the complex, problematic character of its outlaw hero, Grettir, and on its skillful incorporation into the narrative of numerous motifs from folklore. Its theme is summed up in the gnomic style of the sagas: "Good gifts and good luck are often worlds apart."

Wellborn, brave, and generous but headstrong and trouble-prone, Grettir, at age 14, kills a man in a quarrel and is outlawed for three years. He spends these years in Norway performing many brave deeds. On his return to Iceland he saves the people from the malicious ghost of Glam the shepherd, who is ravaging the countryside. The dying fiend imposes a curse on Grettir, predicting he will grow afraid of the dark. Later, on an errand of mercy, Grettir accidentally sets fire to a hall in which a chieftain's son burns to death and so is outlawed again. During his long outlawry, Grettir is pursued by kinsmen of men he has wronged, by other outlaws for the price on his head, and by trolls and other magic beings. Though his life depends on solitary hiding, his growing fear of the dark compels him to seek centres of human society. At last his enemies overwhelm him with the aid of witchcraft. His death is avenged, according to the code of the time, by his brother; but the farfetched story of this vengeance, which takes place in Byzantium, is considered a blemish on the narrative. The best English translation is by D. Fox and H. Pálsson in 1974.

Gretzky, Wayne, byname THE KID, or THE GREAT GRETZKY (b. Jan. 26, 1961, Brantford, Ont., Canada), Canadian ice hockey player who became perhaps the greatest player in the history of the National Hockey League (NHL). He was the first player to win the Hart Trophy, given to the most valuable player each season, eight consecutive years (from the 1979–80 through the 1986–87 season). He led the Edmonton Oilers to the Stanley Cup victory in the 1983–84, 1984–85, 1986–87, and 1987–88 seasons.

Gretzky began skating at the age of two and a half on his family's backyard rink, and he was first taught hockey by his father, an amateur player. By the age of 6 the son was playing as an all-star in novice hockey with other boys 10 and 11 years old. He progressed through organized age-group hockey until in the 1977–78 season he set a Junior A novice record of 182 points (the total of the number of goals and assists). In 1977 at the Junior World Cup competition, he was the youngest player and the leading scorer.

Gretzky turned professional for the 1978–79 season, playing for the Indianapolis Racers in the World Hockey Association. His contract soon was sold to the Edmonton Oilers, who joined the NHL at the beginning of the 1979–80 season. In that season, Gretzky scored 51 goals and 86 assists (137 total points). In the 1980–81 season, he became the first player in NHL history to average more than two points a game. In the 1981–82 season, he set the following NHL regular-season scoring records: 92 goals, 120 assists, and 212 total points. He won the Art Ross Trophy (leading NHL scorer) for seven consecutive years, from the 1980–81 to the 1986–87 season. He played centre for the Oilers and was team captain until after the 1987–88 season, at which time he was traded to the Los Angeles Kings.

Greuze, Jean-Baptiste (b. Aug. 21, 1725, Tournus, Fr.—d. March 21, 1805, Paris), French genre and portrait painter who initiated a mid-18th-century vogue for sentimental and moralizing anecdotes in paintings.

Greuze studied first at Lyon and afterward at the Royal Academy in Paris. He first exhibited at the Salon of 1755 and won an immediate success with his crowded and moralizing work "The Father Reading the Bible to His Children" (1755). Although Greuze's attention at this time was fixed on a less-pretentious type of genre painting in which the influence of 17th-century Dutch masters is apparent, the congratulations he received turned his head and established the lines of his future career.

In 1755 he left for Italy but remained impervious to the influence of Italian painting. In 1759 he became acquainted with Denis Diderot, who encouraged his inclination toward melodramatic genre, and throughout the 1760s Greuze reached new heights of popular acclaim with such works as "The Village Betrothal" (1761) and "The Father's Curse" and "Prodigal Son" (both *c.* 1765).

Greuze submitted to the Salon in 1769 a large and rather dreary historical painting, "Septimius Severus Reproaching Caracalla,"

"The Broken Pitcher," oil painting by Jean-Baptiste Greuze, *c.* 1773; in the Louvre, Paris

Giraudon—Art Resource/EB Inc.

which he hoped would entitle him to admission to the academy as a history painter. But the academy would only admit him to membership as a genre painter, and so the resentful artist exhibited his works to the public only in his own studio for the next 30 years. He maintained his popularity by painting young girls in poses of feigned innocence and calculated disarray.

Throughout the 1770s Greuze was kept busy painting morality pictures, but by the 1780s his work had gone out of fashion and his income was precarious. By 1785 his once considerable talent was exhausted. The reaction against his sentimental genre paintings resulted in critical neglect of his drawings and portraits, in which Greuze's superb technical gifts are displayed with great integrity.

Grevelingenmeer, English GREVELINGEN LAKE, nontidal saltwater lake, southwestern Netherlands, located between the joined islands of Schouwen and Duiveland to the south and Goeree and Overflakkee to the north. As part of the Delta Project for land recla-

mation and tidal flood protection, this former (14 mi [22 km] tidal estuary of the Maas and Rhine rivers became a lake after the completion of the Brouwersdam (in 1972) at the North Sea on the west and the Grevelingendam (in 1965) at the Krammer Strait on the east.

Mussels and oysters cultivated in the lake were more commercially profitable before Grevelingenmeer became essentially closed to the North Sea; towns on the lake include Brouwershaven, Scharendijke, and Herkingen.

Greville, Fulke, 1ST BARON BROOKE (b. Oct. 3, 1554, Beauchamp Court, Warwickshire, Eng.—d. Sept. 30, 1628, Warwick), English writer who, on his tomb, styled himself

Baron Brooke, engraving by Robert Cooper from a drawing by William Hilton

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd

"Servant to Q. Eliz., councellor to King James, and friend to Sir Philip Sidney," but who is best remembered as a powerful philosophical poet and exponent of a plain style of writing.

Greville's *Life of the Renowned Sir Philip Sidney* (1652) is a valuable commentary on Elizabethan politics. His sonnet collection *Caelica* (first printed 1633) differed in tone from most Elizabethan cycles, its treatment being realistic and ironic. His mind was melancholy and Calvinistic, emphasizing the "wearisome condition of humanity," torn between this world and God's commands. His tragedies on Oriental themes traced the political results of this division, and his verse treatises showed how statesmen can best keep order in a naughty world. His poem "Humane Learning" was skeptical about the instruments and aims of earthly knowledge and, in stressing practical improvements, probably owed something to his friend Francis Bacon. Greville was a favourite of Queen Elizabeth.

After matriculating at the University of Cambridge in 1568, he was given a post in the Court of the Welsh Marches in 1576 but the next year went on an embassy to Europe—the first of several diplomatic missions—and later visited the Low Countries, Ireland, and France. Grants of land and minor offices enriched him, and in 1598 he became treasurer of the navy.

By alienating the influential Sir Robert Cecil, he forfeited immediate promotion to high office at James I's accession but was made a Knight of the Bath. He later restored Warwick Castle (bestowed on him in 1605 by James) and wrote verse treatises and plays. His tact and business ability were finally rewarded: he was made chancellor of the Exchequer in 1614 and a baron in 1621.

Works definitely by Greville are *Certaine learned and elegant workes* (1633) and *Remains* (1670). The tragedy *Mustapha* was printed (probably piratically) in 1609, and some songs were set to music.

He never married but was "a constant courtier of the ladies." He died of stab wounds inflicted by a disgruntled manservant.

Grévin, Jacques (b. 1538, Clermont-en-Beauvais, Fr.—d. Nov. 5, 1570, Turin, Savoy), French poet and dramatist who is credited with writing the first original French plays to observe the form of classical tragedies and comedies.

Before becoming a doctor of medicine at the University of Paris, Grévin wrote several successful comedies, including *La Trésorière* (performed 1559; "The Paymistress"). His comedies, licentious in tone, imitated the regular form of the Roman playwrights Plautus and Terence but took contemporary subjects and a Parisian setting. They were published in *Grévin's Théâtre* (1561), along with his *La Mort de César,* a tragedy on the Senecan model, for which he drew material from classical and contemporary sources. A friend and disciple of the poet Pierre de Ronsard, Grévin also wrote love sonnets and satirical sonnets.

Forced to flee France in 1560 because of his Protestant faith, Grévin took refuge at the Turin court of the Duchess of Savoy (Margaret of France), where he became her physician and counsellor and wrote medical treatises on antimony and poisons.

Grévy, (François-Paul-) Jules (b. Aug. 15, 1807, Mont-sous-Vaudrey, Fr.—d. Sept. 19, 1891, Mont-sous-Vaudrey), French Republican political figure whose term as president (1879–87) confirmed the establishment of the Third Republic (1870–1940) in France.

Grévy served in the Constituent Assembly of 1848 where, fearing the rise of Louis-Napoléon (later Emperor Napoleon III), he advocated a weak executive, a viewpoint he held throughout his career. He was out of office in 1851–68, practicing law but also engaging in Republican political activities. In 1868 he was elected to the Corps Législatif, where he quickly emerged as a leader of the liberal opposition. After the fall of the Second Empire in 1870, he served as president of the new National Assembly (1871–73) and as president of the Chamber of Deputies (1876).

In January 1879 when Marshal de MacMahon, president of the republic, resigned, Grévy was elected to the post over the younger and more flamboyant Léon Gambetta. As president, Grévy strove to minimize his powers, preferring a strong legislature. His foreign policy was especially judicious as he resisted nationalist demands for revenge against Germany in the aftermath of the disastrous Franco-German War (1870–71) and opposed colonial expansion, which was then a major political issue. He was reelected in 1885 but was forced to resign in 1887 in a furor over the sale of decorations for the Légion d'Honneur by his son-in-law, even though he himself was not implicated. He wrote *Discours politiques et judiciaires,* 2 vol. (1888; "Political and Judicial Speeches").

Grew, Nehemiah (baptized Sept. 26, 1641, Mancetter Parish, Warwickshire, Eng.—d. March 25, 1712, London), English botanist, physician, and microscopist, who, with the Italian microscopist Marcello Malpighi, is considered to be among the founders of the science of plant anatomy. Grew's first book on plant anatomy, *The Anatomy of Vegetables Begun* (1672), was presented to the Royal Society of London at the same time as Malpighi's manuscript on the subject.

Grew, detail from an engraving

BBC Hulton Picture Library

Grew received his B.A. from Pembroke Hall, Cambridge University, in 1661 and his M.D. from the University of Leyden, the Netherlands, in 1671. He first practiced medicine in Coventry, Warwickshire, but later moved to London. His training in animal anatomy led to his interest in the anatomy of plants. His *Anatomy of Vegetables Begun* included much detail of the structure of bean seeds. It noted the existence of cells and created many terms: radicle for the embryonic root; plume for what is now known as the plumule, or primary bud of a plant embryo; and parenchyma for unspecialized cells.

Grew's best and most popular work, *The Anatomy of Plants* (1682), includes a section on the anatomy of flowers and many excellent wood engravings that represent the three-dimensional, microscopic structure of plant tissue. The book is best remembered for the idea, suggested to Grew by the physician Sir Thomas Millington, that the stamen, with its pollen, is the male sex organ and that the pistil corresponds to the sex organ of the female.

grey: *see under* gray, except as below.

Grey EARLES, titled English nobility in the family Grey, grouped below chronologically and indicated by the symbol •.

• **Grey, Charles Grey, lst Earl,** VISCOUNT HOWICK, also called (1801–06) BARON GREY DE HOWICK (b. 1729, Howick, Northumberland, Eng.—d. Nov. 14, 1807, Howick), British general in the American Revolution who commanded in victories in several battles, notably against the American general Anthony Wayne and at the Battle of Germantown (1777–78).

The member of an old Northumberland family and son of Sir Henry Grey, Baronet, Grey entered the army at age 19 and, by 1755, had become lieutenant colonel, serving with forces in France and Germany in the years 1757–61 and in the capture of Havana (1762). Out of service, on half-pay, after the peace of 1763, he returned to service as a colonel in 1772. In 1776 he went to America with General Sir William Howe, receiving the rank of major general. His successes as a commander were remarkable, first in the northern theatre from Pennsylvania to eastern Massachusetts and then in Virginia. Returning home in 1782, he was promoted to lieutenant general and appointed commander in chief in America, though, the war soon ending, he never took command. After the French Revolution he saw service in the West Indies. He retired and was given a barony in 1801; in 1806 he was raised to Viscount Howick and Earl Grey.

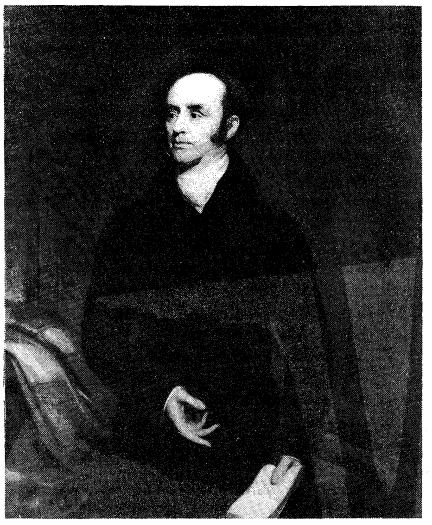
• **Grey, Charles Grey, 2nd Earl,** also called (1801–06) BARON GREY, or (1806–07) VISCOUNT HOWICK (b. March 13, 1764, Falloden, Northumberland, Eng.—d. July 17, 1845, Howick, Northumberland), British politician, leader of the Whig (liberal) Party, and prime minister (1830–34), who presided over the passage of the Reform Act of 1832, modernizing the franchise and the electoral system.

Entry into politics. Grey received a conventional aristocratic education at Eton and Cambridge. When only 22 he was elected member of Parliament for Northumberland. Entering the London world in 1786, he gravitated immediately to the fashionable but rakish circle of the leader of the liberal Whig Party, Charles James Fox; the politician-playwright Richard Sheridan; and the Prince of Wales. Handsome, witty, and attractive, Grey soon became prominent among the aristocratic Whig set that provided the political opposition to

the conservative government of William Pitt (1759–1806). When the French Revolution in 1789 revived the political agitation caused by the American Revolution, Grey was one of the young Whig aristocrats who formed the Society of the Friends of the People (1792) to encourage lower and middle-class demands for parliamentary reform. These activities—which at the time were considered radical—followed by the outbreak of war with revolutionary France in 1793, split the Whig Party. The emotions generated by the conflict with France, the repressive, though popular, measures taken by the government, and the extreme and often absurd lengths to which Fox carried his pro-French sympathies turned his following into an impotent and discredited minority. Grey's parliamentary reform bill of 1797 was heavily defeated, and for some years afterward Fox's faction of the Whigs virtually withdrew from parliamentary life.

Grey's marriage in 1794 to Mary Elizabeth Ponsonby, the daughter of a leading Irish liberal family, strengthened his sympathies with the cause of Catholic emancipation; however, it weakened his zeal for politics. A devoted husband with a growing family (numbering 15 children by 1819), Grey found contentment in a close and affectionate home life. In 1801 his bachelor uncle Sir Henry allowed him to use Howick, a country house on the Northumberland coast, as his permanent residence. Howick was four days travel from London, and Grey's dilatoriness in coming south for the parliamentary sessions frequently evoked Fox's good-humoured reproaches. Some of Grey's political extremism had also waned. His criticisms of the government for resuming the war with France in 1803 were noticeably milder than those of his chief.

Foreign secretary. When on Pitt's death in 1806 Lord Grenville formed the so-called government of All the Talents that included the Fox group, Grey (now Lord Howick) became first lord of the Admiralty. When Fox died the same year, Grey took his place as foreign secretary and leader of the Foxite Whigs. The dismissal of the ministry the following year, because of a disagreement with the King over relieving Catholic disabilities, left Grey with an ingrained distaste for office without freedom of action or pledges without certainty of performance. The loss of his seat for Northumberland as a result of his Catholic sympathies, followed by his removal in 1807 to the House of Lords, increased his political detachment. In the political negotiations of 1810–12, which were initiated by the Prince of Wales when he became regent, Grey and Grenville frigidly declined to accept anything less than complete power. The end of the war came with the Pittite Cabinet of Robert Banks Jenkinson, 2nd earl of Liverpool, firmly established in office.



2nd Earl Grey, painting attributed to T. Phillips, *c.* 1820; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Between 1815 and 1830 Grey was patron, rather than leader, of the quarrelsome and divided Whig opposition. While holding that Catholic Emancipation was a condition of any genuine Whig government, he accepted the fact that parliamentary reform must wait until there was solid support for it in the country. He thought the political stability of Britain was endangered both by the reactionary post-war policy of the administration of Lord Liverpool and by the demands for democratic reform put forward by doctrinaire agitators. His private conclusion was that the task of a Whig ministry, if one could ever be formed, would be to produce a measure of reform large enough to satisfy respectable opinion and yet conservative enough to preserve the basic principles of the aristocratic constitution.

Grey's Reform Bill. In 1830 Grey's opportunity came at last. The grant of Catholic emancipation in 1829 had destroyed the last cohesion of the conservative Liverpool party. The collapse of the Duke of Wellington's ministry in 1830 brought Grey into office on his own terms and with popular backing for a reform of the antiquated parliamentary representative system. But the extent of the changes proposed in his bill of 1831 staggered even his own supporters, and it needed a fresh general election and the coercion of the House of Lords before the bill ultimately passed into law. Grey had misjudged the temper of both houses and involved himself in a painful conflict with the new king William IV when he had reluctantly to ask for enough new peers to be created to carry the bill. He had not, however, misjudged the temper of the country. A wave of popular enthusiasm sustained him during the long battle for reform in 1831–32 and returned a vast liberal majority to the House of Commons in 1833. The epochmaking Reform Act of 1832 was the crowning achievement of the old Whig Party, and he had shown courage and imagination in forcing it through to the statute book. But the measure that he envisaged as a conservative and healing act of statesmanship was regarded by many of his new supporters as a springboard for further extensive changes in church and state. The strains of the new era produced quarrels and resignations in his Cabinet, and Grey retired from politics two years later. (N.G.)

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• **Grey, Henry George Grey, 3rd Earl,** also called (1806–45) VISCOUNT HOWICK (b. Dec. 28, 1802, Howick, Northumberland, Eng.—d. Oct. 9, 1894, Howick), British statesman who, as secretary of state for war and the colonies (1846–52), became the first British minister to pursue a policy of self-government for the colonies, so far as it then seemed possible.

A member of the House of Commons from 1826 to 1845, Grey subsequently was Whig leader in the House of Lords. During the prime ministry of his father, the 2nd Earl Grey, he served as undersecretary of state for the colonies (1830–33), and later (1835–39) he was secretary at war. After his resignation in 1852 he never again held office.

Striving to introduce free trade into relations between Great Britain and her colonies, Grey was mainly successful in Canada. There his appointment of the 8th Earl of Elgin as governor general (an office later held by his nephew, the 4th Earl Grey), and his subsequent support of Elgin's policies, led to the first British recognition (in the late 1840s) of local self-government. His constitution for New Zealand, in contrast, proved unworkable, as did his attempt to settle convicts in the Cape Colony (South Africa).

Grey, Sir Edward, 3RD BARONET, also called (from 1916) 1ST VISCOUNT GREY OF FALLODON (b. April 25, 1862, London—d. Sept. 7, 1933, Fallodon, near Embleton, Northumberland, Eng.), British statesman whose 11 years (1905–16) as British foreign secretary, the longest uninterrupted tenure of that office in history, were marked by the start of World War I, about which he made a comment that became proverbial: "The lamps are going out all over Europe; we shall not see them lit again in our lifetime."

A relative of the 2nd Earl Grey, the prime minister who carried the Reform Bill of 1832, Edward Grey was reared in a strong Whig–Liberal tradition. He succeeded to his grandfather's baronetcy and estate in 1882. From 1885 to 1916, when he was created a viscount, he sat in the House of Commons, and in 1923–24, despite increasing blindness, he led the Liberal opposition in the House of Lords. When his party divided over the South African War (1899–1902), he sided with the Liberal imperialists, led by H.H. Asquith.

On Dec. 10, 1905, Grey began his service as foreign secretary, under the new Liberal prime minister, Sir Henry Campbell-Bannerman. During the Morocco crisis (1905–06), Grey continued the policy of his predecessor, the 5th Marquess of Lansdowne, supporting France against Germany, but with reservations that caused serious diplomatic confusion up to the outbreak of war in 1914. Grey allowed it to be known that, in the event of a German attack, Britain would aid France. He also authorized conferences between the British and French general staffs, but (with the Prime Minister's permission) withheld that decision from the Cabinet to avoid criticism by the more radical ministers. He maintained the British alliance with Japan and, in 1907, concluded an agreement with Russia.

When Asquith became prime minister (April 5, 1908), Grey retained his office. In the 1911 Moroccan (Agadir) crisis, he indicated that Britain would defend France against Germany, and in November 1912 he made similar statements in private correspondence with Paul Cambon, French ambassador in London. He made no objection, however, when Asquith told the House of Commons that Great Britain was in no way bound. France and Russia, nonetheless, counted on British armed assistance and dealt with Germany as if Grey had unequivocally promised it.

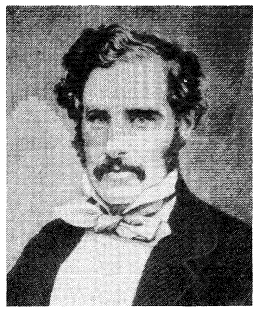
After the assassination of the Austrian archduke Francis Ferdinand at Sarajevo (June 28, 1914), Grey and the German emperor William II independently proposed that Austria-Hungary, without resorting to war, obtain satisfaction from Serbia by occupying Belgrade, which the Serbian government had abandoned. When all peace moves failed, Grey won over a divided Cabinet to accept the war by tying British intervention to Germany's invasion of neutral Belgium rather than to Britain's dubious alliance with France. He was responsible for the secret Treaty of London (April 26, 1915), by which Italy joined Great Britain and her allies, and tried to solicit U.S. support for the Allied cause.

On Dec. 5, 1916, Grey retired from office along with Asquith, and he was awarded a viscountcy. In 1919 he was sent on a special mission to the United States in a futile attempt to secure U.S. entry into the League of Nations. His memoirs, *Twenty-five Years, 1892–1916,* appeared in 1925.

Grey, Sir George (b. April 14, 1812, Lisbon—d. Sept. 19, 1898, London), British colonial administrator who was called upon to govern in periods of crisis, most notably in New Zealand, South Australia, and the Cape Colony (South Africa).

After military service (1829–37) and two explorations in Western Australia (1837–39), Grey was made governor of South Australia in 1840. His advocacy of rapid assimilation of natives impressed the British Colonial Office, and when war broke out in New Zealand between the Maoris and British settlers over land rights, he was named governor there. In his first term he established peace and became a pioneer scholar of the Maori culture, writing a study of their mythology and oral history in 1854. He was knighted in 1848.

In 1854 Grey was appointed governor of Cape Colony, where his resolution of hostilities between the natives and European settlers was praised by both sides. He was sent to



Sir George Grey, detail of an engraving by W.W. Alais, c. 1861

By courtesy of The Mitchell Library, Sydney

New Zealand again in 1861, where war had broken out between settlers and the Maoris. Although Maori resistance was quelled by the mid-1860s after a decade of fighting, Grey was caught between competing authorities and was unable to carry out much of his legislative program. Grey was a member of the New Zealand legislature from 1874 to 1894 and served as premier (1877–79).

Grey, Henry: *see* Suffolk, Henry Grey, duke of.

Grey, Lady Jane, also called (from 1553) LADY JANE DUDLEY (b. October 1537, Bradgate, Leicestershire, Eng.—d. Feb. 12, 1554, London), titular queen of England for nine days in 1553. Beautiful and intelligent, at the age of 15 she reluctantly allowed herself to be put on the throne by unscrupulous politicians; her subsequent execution by Mary Tudor aroused universal sympathy.

Lady Jane Grey, detail of a panel attributed to Master John, c. 1545; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Lady Jane was the great-granddaughter of Henry VII through her mother, Lady Frances Brandon, whose own mother was Mary, the younger of King Henry VIII's two sisters. Provided with excellent tutors, she spoke and wrote Greek and Latin at an early age; she was also proficient in French, Hebrew, and Italian. When Lady Jane was barely nine years old she went to live in the household of Queen Catherine Parr, and on the latter's death in September 1548 she was made a ward of Catherine's second husband, Thomas Seymour, Lord Seymour of Sudeley, who planned her marriage to his nephew and her cousin, the young king Edward VI. But Seymour was beheaded for treason in 1549, and Jane returned to her studies at Bradgate.

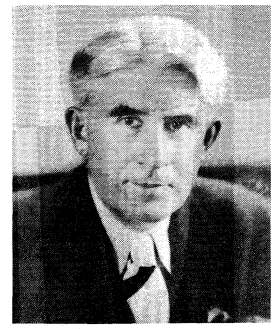
After Lady Jane's father, hitherto Marquess of Dorset, was created Duke of Suffolk in October 1551, she was constantly at the royal court. On May 21, 1553, John Dudley, Duke of Northumberland, who exercised considerable power at that point in the minority of King Edward VI, joined with Suffolk in marrying her to his son, Lord Guildford Dudley. Her Protestantism, which was extreme, made her the natural candidate for the throne of those who supported the Reformation, such as Northumberland. With the support of Northumberland, who had persuaded the dying Edward to set aside his half-sisters Mary and Elizabeth in favour of any male heirs who might be born to the Duchess of Suffolk and, failing them, to Lady Jane, she and her male heirs were designated successors to the throne.

Edward died on July 6, 1553; on July 10, Lady Jane—who fainted when the idea was first broached to her—was proclaimed queen. The rightful heir, Edward's sister Mary Tudor, had the support of the populace, and on July 19 even Suffolk, who by now despaired of success in the plans for his daughter, attempted to retrieve his position by proclaiming Mary queen. Northumberland's supporters melted away, and the Duke of Suffolk easily persuaded his daughter to relinquish the unwanted crown. At the beginning of Queen Mary's reign, Lady Jane and her father were committed to the Tower of London, but he was soon pardoned. Lady Jane and her husband, however, were arraigned for high treason on Nov. 14, 1553. She pleaded guilty and was sentenced to death. The execution of the sentence was suspended, but the participation of her father, in early February 1554, in Sir Thomas Wyat's rebellion sealed her fate. She and her husband were beheaded on Feb. 12, 1554; her father was executed 11 days later. Biographies include *The Nine Days' Queen* (1909) by R. Davey and *Lady Jane Grey* (1962) by H.W. Chapman.

Grey, Walter de (archbishop of York): *see* Gray, Walter de.

Grey, Zane, original name PEARL GREY (b. Jan. 31, 1872, Zanesville, Ohio, U.S.—d. Oct. 23, 1939, Altadena, Calif.), prolific writer whose romantic novels of the American West largely created a new literary genre, the western.

Trained as a dentist, Grey practiced in New York City from 1898 to 1904, when he published privately a novel of pioneer life, *Betty Zane,* based on an ancestor's journal. Deciding to abandon dentistry for full-time writing, he published in 1905 *The Spirit of the Border*—also based on Zane's notes—which became a best-seller. Grey subsequently wrote more than 80 books, a number of which were published posthumously; more than 50 were in print in the last quarter of the 20th century. The novel *Riders of the Purple Sage* (1912) was the most popular; others included *The Lone Star Ranger* (1915), *The U.P. Trail* (1918), *Call of the Canyon* (1924), and *Code*



Zane Grey, 1938

By courtesy of Zane Grey Inc.

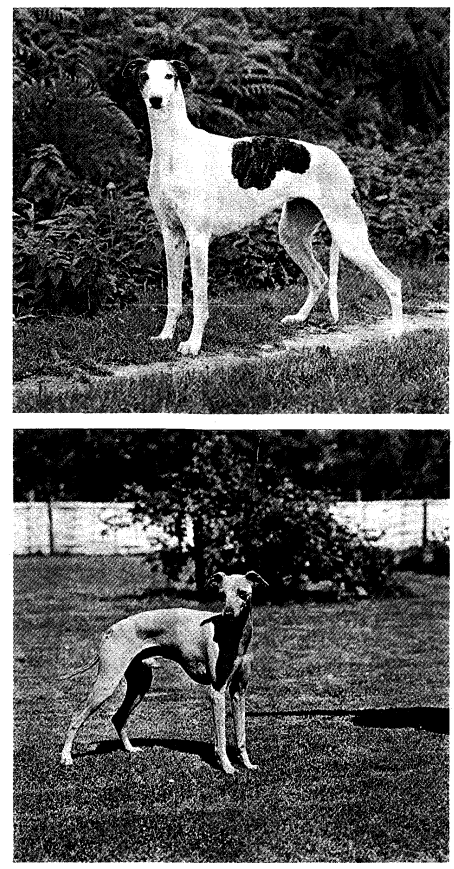
of the West (1934). Prominent among his nonfiction works is *Tales of Fishing* (1925).

Grey Cup, trophy awarded annually to the winner of the professional Canadian Football League playoffs. The cup was donated in 1909 by Earl Grey, governor general of Canada, to represent the amateur rugby championship, and the early years of competition were dominated by collegiate teams. The development of professional teams, however, led to its being taken over by professionals and the change of the game from rugby to Canadian football, a game closely related to U.S. football. For winners, *see* Sporting Record: *Football.*

Grey Hills: *see* Monadhliath Mountains.

Greyerz (Switzerland): *see* Gruyère, La.

greyhound, also spelled GRAYHOUND, fastest of dogs, one of the oldest of breeds, and



(Top) Greyhound, (bottom) Italian greyhound

Sally Anne Thompson—EB Inc.

long symbolic of the aristocracy. Its likeness appears on an Egyptian tomb dating from about 3000 BC. A streamlined, slender, but strong dog, the greyhound can attain a speed of about 60 km (37 miles) per hour. It has a narrow head, long neck, deep chest, long, muscular hindquarters, and a long, slim tail. Its coat is short and smooth and of various colours. The greyhound stands 64 to 69 cm (25 to 27 inches) and weighs 27 to 32 kg (60 to 70 pounds). It hunts by sight and is used mainly to pursue hares but can also hunt deer, foxes, and small game. Greyhounds are also raced for sport, chasing a mechanical rabbit.

The Italian greyhound is a breed of toy dog apparently derived from the greyhound. It has existed in its present form for more than 2,000 years and has been a favourite of the aristocracy. A miniature version of the greyhound, it stands 15 to 25 cm (6 to 10 inches) high and weighs 3 to 4.5 kg (7 to 10 pounds). It has large eyes and a thin, glossy coat that may be red-brown, fawn- or cream-coloured, white, blue-gray, or gray. The Italian greyhound is usually an active, gentle dog.

Greyhound (foaled 1932), American harness racehorse (Standardbred), considered by many to have been the greatest trotter that ever raced. A tall (about 66 inches [168 cm]) gray gelding sired by Guy Abbey out of Elizabeth, he competed for seven seasons (1934–40), winning 71 of 82 heats (divisions of races) and 33 of 37 full races. In 1935 he won the Hambletonian Stake, the great race for three-year-old trotters. On Sept. 29, 1938, he established a world trotting record for 1 mile in 1:55¼ (subsequently broken). He also excelled in trotting under saddle, a form of racing now obsolete; he set saddle records of 3:02½ for 1.5 miles (1937), 4:06 for 2 miles (1939), and 2:01¾ for 1 mile (1940). Greyhound was named outstanding trotter of the 20th century in a membership poll of Hall of Fame of the Trotter in 1971.

Greyhound Lines, Inc., American corporation that has provided the major intercity bus transportation in the United States and Canada. Its headquarters are in Dallas, Texas.

The company traces to 1925–26, when Eric Wickman and Orville S. Caesar, intercity bus operators, joined forces, acquired financing, and merged several bus companies into the Motor Transit Management. Some of the early backers were the railroads, first the Great Northern Railroad and then the Southern Pacific, Pennsylvania, and New York Central railroads. A network of lines quickly spread across the country, through purchase of existing companies and inauguration of new lines. In 1930 Motor Transit officially became Greyhound Corporation, with the "running dog" as its trademark. By 1933 Greyhound had 40,000 route miles (65,000 km). In 1961, however, a policy decision was made to diversify; and in the succeeding decades the company became a conglomerate, expanding into several new products and services, such as toiletries and household-products manufacturing, catering, airport-terminal services, and financial services. (From 1970 to 1983 it also owned the meat-packing Armour & Company.) Greyhound's business operations became international.

In the early 1980s deregulation of the bus-transit industry caused Greyhound Corporation to drop many of its local bus routes, isolating many small towns in rural United States. In 1987 Greyhound Corporation (later renamed Greyhound Dial Corporation), based in Phoenix, Ariz., sold its historic bus operations. Greyhound Lines, Inc., based in Dallas, became an independent corporation devoted entirely to intercity bus transportation. In subsequent years, however, the company experienced considerable financial difficulties and strikes by dissatisfied employees.

greyhound racing: *see* dog racing.

greylag, also called GREYLAG GOOSE, greylag also spelled GRAYLAG (species *Anser anser*), most common Eurasian representative of the so-called gray goose and ancestor of all Occidental domestic geese. It belongs to the subfamily Anserinae, family Anatidae (order Anseriformes). It nests in temperate regions and winters from Britain to North Africa, India, and China. The greylag is pale gray in colour, with pink legs; the bill is pink in the eastern race, orange in the western.

Greylock, Mount, highest point (3,491 feet [1,064 m]) in Massachusetts, U.S. It lies 5 miles (8 km) south-southwest of North Adams, in the Berkshire Hills. Two roads ascend the mountain to the top, where a granite war-memorial beacon tower is located. Crossed by the Appalachian Trail (for hikers), the cragless peak is within the Mount Greylock State Reservation (10,760 acres [4,355 hectares]) and is popular for winter sports. The name Greylock is from that of an early 18th-century Waranoke Indian chief.

Greymouth, borough and port, western South Island, New Zealand. Established in 1863 as a government depot at the mouth of the Grey River, on the north Westland Plain, the settlement grew as the result of local gold finds. Originally known as Crescent City and then Blaketown, it was renamed Greytown and, finally, Greymouth after its river, which had been named (1846) after Governor Sir George Grey. It was declared a town in 1864 and a borough in 1868.

With the decline of gold mining, Greymouth became a timber and coal centre. Bituminous coal, discovered in 1848, remains an important industry; sheep and cattle raising and dairying are minor in comparison. The junction of rail and road lines from Westport (94 miles [151 km] north) and Hokitika (24 miles [39 km] south), Greymouth has coal-gas and engineering plants, as well as railway workshops, breweries, and sawmills; concrete and furniture are also manufactured. Pop. (1988 est.) 7,480.

greywacke: *see* graywacke.

Gṛhya-sūtra, any of the Hindu religious manuals detailing the domestic (*gṛhya*) religious ceremonies performed by the householder over his own fire. They make up, together with the *Śrauta-sūtras* (which deal with the grand Vedic sacrifices) and the *Dharma-sūtras* (which deal with rules of conduct), the *Kalpa-sūtras*—collections of brief aphoristic texts that emerged within the different schools of the Veda (the earliest sacred literature of India). The *Gṛhya-sūtras* describe the ceremonies (samskaras) that mark each stage of a man's life, from the moment of his conception to his final death rites; the five daily sacrifices (*mahāyajña*); seasonal ceremonies; and those observed on special occasions, such as house-building or cattle-breeding.

gribble (genus *Limnoria*), any of approximately 20 species of wood-boring, marine crustaceans of the order Isopoda. They feed on algae, driftwood, and the submerged wood of docks and wharves and sometimes attack the nonwoody insulation of submarine cables.

Limnoria lignorum, which occurs throughout the seas of the Northern Hemisphere, grows to 5 mm (0.2 inch) in length and has a gray body consisting of 14 clearly defined segments. It burrows about 12 mm (0.5 inch) into wood. *L. tripunctata* occurs in the Atlantic Ocean from New England (U.S.) to Venezuela and in the Pacific Ocean from California to Mexico. It even penetrates wood that has been impregnated with creosote, an offensive chemical that repels most wood-boring invertebrates. *L. pfefferi* is found in the Pacific and Indian oceans; *L. saseboensis* is found on the Atlantic coast of the southeastern United States and on the coast of Japan.

Gribeauval, Jean-Baptiste Vaquette de (b. Sept. 15, 1715, Amiens, Fr.—d. May 9, 1789, Paris), French military officer and engineer whose developments of French artillery contributed to the brilliant military successes of Napoleon in the late 18th and early 19th centuries.

Gribeauval entered the French army in 1732 as a volunteer and became an officer in 1735. In 1757 he was lent to the Austrian army, with which he served as a general of artillery during the Seven Years' War (1756–63). In 1776 he became inspector general of artillery in France and began his reforms.

Gribeauval reduced the existing multiplicity of different-calibred field pieces to just three, firing 12-, 8-, and 4-pound balls, respectively. He reduced the length and weight of field pieces yet managed to obtain greater firing ranges with smaller powder charges by using perfectly spherical balls of the precisely correct diameter. Under Gribeauval, the French artillery began using prefabricated, highly uniform, and easily handled powder-and-shot combinations instead of the old imprecise amounts of loose powder. Gribeauval also introduced interchangeable wheels and other parts for his redesigned gun carriages, gave them iron elevating screws for easier raising of the barrels, and equipped the carriages with iron axletrees that could withstand rough cross-country travel. Another notable innovation was his disposition of the draft horses that pulled the gun carriages in double files instead of single files, thus increasing their pulling capacity and reducing the numbers necessary in a team. All of these new methods greatly increased the mobility and effectiveness of the French field artillery.

Gribeauval also separated French artillery into three clearly defined categories according to the gun's intended use: either for use in the field, in sieges, or in coastal defense. His improvements were later put to good tactical use by Napoleon, who had himself trained in the artillery service.

Griboyedov, Aleksandr Sergeyevich, Griboyedov also spelled GRIBOEDOV (b. Jan. 15 [Jan. 4, Old Style], 1795, Moscow, Russia [now in Russian S.F.S.R.]—d. Feb. 11 [Jan. 30], 1829, Tehrān, Iran), Russian playwright whose comedy *Gore ot uma* (*Wit Works Woe*) is one of the finest in Russian literature.

A graduate of Moscow University, he led an active and eventful life; he joined the hussars during the war of 1812 against Napoleon and served in White Russia. After resigning his commission in 1816, he lived in St. Petersburg (now Leningrad), where he joined the diplomatic service and was appointed secretary in the Russian mission in Tehrān. A friend of Aleksandr Pushkin and a sympathizer with the Decembrist revolt of 1825 against Nicholas I,

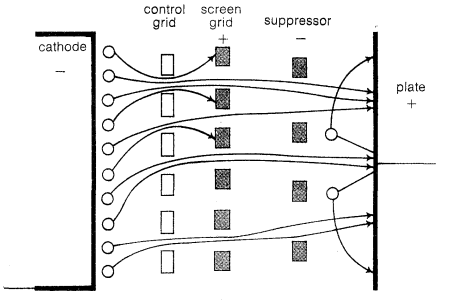
Griboyedov, portrait by V. Mashkov, 1827; in the State Literature Museum, Moscow

By courtesy of the State Literature Museum, Moscow

he was arrested in the following year but soon released. In 1828 he was appointed Russian minister in Tehrān. He died there at the hands of a mob that attacked the Russian embassy.

Although Griboyedov left an interesting correspondence and several plays, which include *Molodye suprugi* (1815; "Young Married People") and *Student* (1817; "The Student"), his reputation rests on a single work—*Gore ot uma* (1822–24; *Wit Works Woe,* 1933), a satirical play in rhymed iambic lines of varying length. Production of the play was prohibited and only fragments of it were published during Griboyedov's lifetime. To Russians it has become their most important play, with the possible exception of Gogol's *Revizor.* The style is a masterpiece of conciseness, colloquialism, and wit, so that many of Griboyedov's lines have become proverbial. The same is true of many of the characters: Chatski, the hero, and especially those through which Griboyedov satirizes the old-fashioned Russia of bribery, place-seeking, and pomposity. Together with Pushkin's hero Yevgeny Onegin, Chatski is the first example in Russian literature of the "superfluous man," a type much discussed later by critics.

grid, in an electron tube, an electrode that has one or more openings for controlling electrons or ions as they pass through it. Unmodified, the term applies to a control grid, which is ordinarily placed between a cathode and an anode (or plate) of an electron tube to initiate or vary the current between two or more elec-

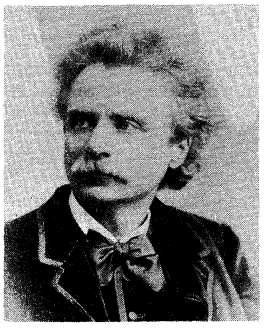


Action of control, screen, and suppressor grids

trodes. A screen grid—usually maintained at a fixed potential—is placed between a control grid and an anode to reduce the electrostatic influence of the plate on the control grid. A suppressor grid is interposed between two positive electrodes—usually the screen grid and the anode—to reduce the flow of secondary electrons from one to the other.

Grieg, Edvard (Hagerup) (b. June 15, 1843, Bergen, Nor.—d. Sept. 4, 1907, Bergen), composer who was a founder of the Norwegian nationalist school of music.

His father, Alexander Grieg, was British consul at Bergen. The Grieg (formerly Greig) family was of Scottish origin, the composer's


Edvard Grieg
Brown Brothers

grandfather having emigrated after the Battle of Culloden. His mother, Gesine Hagerup, who belonged to a well-established Norwegian family, studied music at Hamburg. From the age of six Grieg received piano lessons from her, and in 1858, at the recommendation of the violin virtuoso Ole Bull, he entered the Leipzig Conservatory, where he was influenced by the tradition of Mendelssohn and Schumann. During this period he suffered a severe attack of pleurisy from which he never really recovered. In 1863 he went to Copenhagen, where his development came from his association in 1864 with the young Norwegian nationalist composer Rikard Nordraak. "Through him," said Grieg, "I first learned to know the northern folk tunes and my own nature." In the winter of 1864–65 Grieg became one of the founders of the Copenhagen concert society, Euterpe, for the production of works by young Scandinavian composers. In 1867 he married his cousin, Nina Hagerup, who became an authoritative interpreter of his songs. He spent the winters of 1865–66 and 1869–70 in Rome, where he first met Ibsen and also Liszt, who was roused to enthusiasm by his piano concerto. In 1866 he settled in Christiania (now Oslo), remaining there until 1874, when he was granted an annual stipend of 1,600 crowns by the Norwegian government. In 1885 he built his home, "Troldhaugen," near Bergen. In spite of poor health, Grieg made several tours in Scandinavia, on the Continent, and in England, playing his piano concerto in London in 1888.

Rooted in the national folk tradition of Norway, Grieg's music is noted for a refined lyrical sense. Between 1867 and 1901 he wrote ten collections of *Lyric Pieces* (*Lyriske Stykker*) for piano. His spirited rhythms often have a folk song association. His harmonies, developed from the late Romantic style, were considered novel. In his few works in the larger forms—the *Piano Concerto,* Opus 16; the *String Quartet in G Minor,* Opus 27; and the three violin and piano sonatas—he uses a free sonata form. His original *Ballad* for piano, Opus 24, is a set of variations on a folk theme. Among his most popular works are his incidental music to *Peer Gynt,* Opus 23, and the suite *Holberg,* Opus 40. His arrangements of Norwegian dances and songs, Opus 17 and Opus 66, and especially his *Slåtter, Norwegian Peasant Dances,* Opus 72, show his characteristic sense of rhythm and harmony. His vocal works include the songs on texts of A.O. Vinje, Opus 33; and the *Haugtussa* cycle, Opus 67. Intuitively, he identified himself with the poet's imagery in these songs and discovered its musical equivalent.

Articles are alphabetized word by word, not letter by letter

Grieg, (Johan) Nordahl Brun (b. Nov. 1, 1902, Bergen, Nor.—d. Dec. 2, 1943, over Berlin), lyric poet, dramatist, and novelist; a socially committed writer whose resistance to the Germans during the occupation of Norway and whose death in World War II made him a hero of postwar Norway.

Grieg studied at King Frederick's University, Kristiania (now Oslo), and at Oxford and spent some time at sea. His first books were the sea poems *Rundt Kap det Gode Haab* (1922; *Around the Cape of Good Hope,* 1979), influenced by Kipling, and the novel *Skibet gaar videre* (1924; *The Ship Sails On,* 1927), which deals realistically with the sailor's life. In spite of his cosmopolitan outlook, he was strongly nationalistic, and his love for Norway was expressed in the poems *Norge i våre hjerter* (1929; "Norway in Our Hearts").

After publishing six highly personal essays on Keats, Shelley, Byron, Rupert Brooke, C.H. Sorley, and Wilfred Owen, *De unge døde* (1932; "The Young Dead Ones"), he spent two years in Moscow (1932–34), where he turned Communist. Russian theatre and especially the techniques of the cinema inspired his most powerful social play, *Vår ære og vår makt* (1935; "Our Power and Our Glory"), denouncing profit-seeking owners of the Norwegian merchant fleet in World War I. *Nederlaget* (1937; *The Defeat,* 1944), a play dealing with the Paris Commune of 1870, was inspired by the Republican defeat in the Spanish Civil War. When Germany occupied Norway, Grieg escaped to Britain with the Norwegian government-in-exile and in his war poems (Eng. trans., 1944) and radio talks became the leading voice of free Norway. He also participated in the war actively and was killed in an Allied bombing raid over Berlin.

Grier, Robert C(ooper) (b. March 5, 1794, Cumberland County, Pa., U.S.—d. Sept. 25, 1870, Philadelphia), associate justice of the United States Supreme Court (1846–70).

Educated at home, Grier took over his father's educational academy in Northumberland, Pa., at the age of 21 and taught Latin, Greek, mathematics, astronomy, and chemistry at the same time that he was studying law. After being admitted to the bar in 1817 he practiced successfully in the towns of Bloomsburg and Danville and was appointed president of the District Court of Allegheny County in 1833. In 1846 he was appointed to the U.S. Supreme Court by Pres. James K. Polk.

Despite his early associations with the Democrats, Grier was a staunch Unionist during the Civil War. Although he concurred in the proslavery Dred Scott decision (1857), he spoke for the court in the 1863 Prize Cases, which upheld the power of the president to proclaim a blockade of Confederate ports and to seize neutral shipping.

Grierson, Sir George Abraham (b. Jan. 7, 1851, Glenageary, County Dublin, Ire.—d. March 9, 1941, Camberley, Surrey, Eng.), Irish linguistic language scholar and civil servant who conducted the Linguistic Survey of India (1898–1928), obtaining information on 364 languages and dialects.

While a student of mathematics at Trinity College, Dublin, Grierson took prizes in Sanskrit and Hindi. Grierson went to Bengal in October 1873, where—in addition to carrying out his duties in a succession of government posts until 1898—he devoted much time to language research. The first of his enormous output of papers, reviews, and books appeared in 1877.

Two of his most important works are *Seven Grammars of the Dialects and Subdialects of the Bihari Language* (1883–87) and *Bihar Peasant Life . . .* (1885). The latter work, in addition to offering much linguistic information, describes the life, farming methods, and beliefs of the Bihar peasantry. His research also extended to Hindi, the northwestern Dardic languages, and Kashmiri.

In 1898 Grierson began work on the Linguistic Survey, and for the next 30 years he was responsible for gathering a vast amount of data in nearly 8,000 pages of 19 volumes. Five of the volumes, on non-Indo-European languages, were prepared by the Norwegian linguist Sten Konow, the remainder mostly by Grierson. The survey was a triumph of organization, covering as it did the Indo-European, Chinese, Austro-Asiatic, and Dravidian families of India together. In addition to vocabularies, for most of the languages and dialects skeletal grammars and brief texts were also included. During the course of the survey, which he directed from his home in Camberley beginning in 1903, Grierson published a number of works, among them *A Dictionary of the Kashmīrī Language* (1916–32). He was knighted in 1912.

Grierson, John (b. April 26, 1898, Kilmadock, Stirlingshire, Scot.—d. Feb. 19, 1972,

Bath, Somerset, Eng.), founder of the British documentary-film movement and its leader for almost 40 years. He was one of the first to see the potential of motion pictures to shape people's attitudes toward life and to urge the use of the film for educational purposes.

Grierson was educated at the University of Glasgow and the University of Chicago. He returned to England in 1928, and the next year the Empire Marketing Board Film Unit sponsored his first and only personally directed film, *Drifters* (1929), a study of the lives of North Sea herring fishermen. This film initiated the documentary movement in Britain. He then solicited financial support from business and industry and enlisted the participation of artists interested in realistic filmmaking.

Grierson assisted in the formation of the National Film Board of Canada (1939), and during World War II he supervised information films for the Canadian government. Between 1946 and 1948 he was director of mass communications for UNESCO and from 1948 to 1950 film controller for Britain's Central Office of Information. Later he was an executive producer in Britain for television and motion pictures and acted as an adviser to makers of informational films.

Griesbach, Johann Jakob (b. Jan. 4, 1745, Butzbach, Hesse—d. March 24, 1812, Jena, Thuringia), Rationalist Protestant German theologian, the earliest biblical critic to subject the Gospels to systematic literary analysis.

Griesbach studied at Halle (then belonging to Prussia) under J.S. Semler, and from 1775 until his death he was professor of New Testament studies at the University of Jena. He originated the term synoptic to designate the first three Gospels and, rejecting the traditional view, held that Mark was derived from Matthew and Luke (the "usage hypothesis"). Griesbach also published a corrected Greek edition of the New Testament.

Griesbachian Stage, division of Triassic rocks and time (the Triassic Period began about 225,000,000 years ago and lasted about 35,000,000 years). The Griesbachian Stage is the lowermost stage of the Triassic Period and precedes the Dienerian Stage. Griesbachian rocks are predominantly marine and are characterized by a distinctive fossil assemblage dominated by ammonoid cephalopods. Though first recognized in western Europe, Griesbachian rocks have been correlated with strata of similar age throughout the world, primarily on the basis of fossil evidence.

Grieve, Christopher Murray: *see* MacDiarmid, Hugh.

Griffenfeld, Peder Schumacher, greve af (count of) (b. Aug. 24, 1635, Copenhagen—d. March 12, 1699, Trondheim, Nor.), powerful Danish statesman of the 17th century.

He was born Peder Schumacher to a wealthy Copenhagen family. After study and travel abroad in 1654–62, he returned to enter state service as royal librarian. Soon winning the favour of the absolutist king Frederick III, he became secretary of the King's chamber, in which post he drafted the 1665 Kongeloven (King's Law), a justification of absolutism. In 1670, the year of the King's death, Schumacher was made Count Griffenfeld. By 1674 he had risen to the post of high chancellor of Denmark under King Christian V.

In foreign policy Griffenfeld sought a neutral course, but he had to yield to the King's desire to go to war against Sweden in 1675. He attempted to maintain good relations with France without consulting with the King, thus providing his many official enemies with an issue that turned the King against him. On Christian V's orders, Griffenfeld was arrested

Griffenfeld, detail of an oil painting by Abraham Wuchters; in Frederiksborg Castle, Denmark

By courtesy of the Nationalhistoriske Museum paa Frederiksborg, Denmark

for bribery in 1676, tried, and sentenced to death. His sentence was commuted to life imprisonment at the last moment, and he died in a Norwegian prison.

Griffes, Charles (Tomlinson) (b. Sept. 17, 1884, Elmira, N.Y., U.S.—d. April 8, 1920, New York City), first native U.S. composer to write Impressionist music.

Intending to become a concert pianist, he went to Berlin in 1903 to study piano and composition, but his teacher, Engelbert Humperdinck, turned his main interest toward composition. In 1907 he returned to the U.S. and took a job as a music teacher at the Hackley School for Boys at Tarrytown, N.Y. He died at 35, on the threshold of his artistic maturity.

Griffes was fascinated by Impressionist music and carefully studied the scores of Debussy and Ravel. Other influences were the works of Scriabin and Mussorgsky. The singer Eva Gauthier, for whom he composed several songs, introduced him to Oriental music, which impressed him deeply. His masterpieces are *The White Peacock* (1915, part of the piano suite *Four Roman Sketches*), which he orchestrated in 1919 for a ballet sequence; *The Pleasure Dome of Kubla Khan* (1919, after Coleridge); and the *Poem* for flute and orchestra (1918), written for Georges Barrère. Other works include the dance dramas *Sho-Jo* (1917), built on Japanese melodies, and *The Kairn of Koridwen* (1917), for piano, celesta, flute, clarinets, horns, and harp; and the powerful *Piano Sonata in F Major.* In his music he gradually integrated Impressionist, Oriental, and Russian influences into a personal and original idiom.

griffin, also spelled GRIFFON, or GRYPHON, composite mythological creature with a lion's body (winged or wingless) and a bird's head, usually that of an eagle. The griffin was a favourite decorative motif in the ancient Near Eastern and Mediterranean lands. Probably originating in the Levant in the 2nd millennium BC, the griffin had spread throughout western Asia and into Greece by the 14th century BC. The Asiatic griffin had a crested head, whereas the Minoan and Greek griffin usually had a mane of spiral curls. It was shown either recumbent or seated on its haunches, often paired with the sphinx; its function may have been protective.

In the Iron Age the griffin was again prominent in both Asia and Greece. Greek metalworkers evolved a handsome stylized rendering, the beak open to show a curling tongue and the head provided with horses' ears and a large knob on top. Apparently the griffin was in some sense sacred, appearing frequently in sanctuary and tomb furnishings. Its precise nature or its place in cult and legend remains unknown.

Griffin, Donald Redfield (b. Aug. 3, 1915, Southampton, N.Y., U.S.), U.S. biophysicist and animal behaviourist known for his research in animal navigation, acoustic orientation, and sensory biophysics.

Griffin received a Ph.D. from Harvard University in 1942 and a D.Sc. from Ripon College, Wisconsin, in 1966. As a Harvard undergraduate, he discovered that bats produce ultrasonic sounds and avoid objects that reflect these sounds, thus proving that the animals orient themselves by echolocation. He was a research assistant in the Psycho-Acoustic Laboratory, Fatigue Laboratory, and other biological laboratories at Harvard from 1942 until 1945. He utilized biophysical principles during World War II to help the armed forces to design communication equipment, insulated clothing, and infrared viewing devices. He taught zoology at Cornell University, Ithaca, N.Y. (1946–53) and at Harvard (1953–65). In 1965 he became a professor at Rockefeller University in New York and a research zoologist for the New York Zoological Society.

Griffin wrote *Listening in the Dark* (1958), *Echoes of Bats and Men* (1959), *Animal Structure and Function* (1962), *Bird Migration* (1964), and *The Question of Animal Awareness* (1976), as well as many articles.

Griffin, Walter Burley (b. Nov. 24, 1876, Maywood, Ill., U.S.—d. Feb. 13, 1937, Lucknow, India), U.S. architect, landscape designer, and city planner whose most ambitious work is the Australian capital, Canberra.

After studying at the University of Illinois, Urbana, Griffin worked in Frank Lloyd Wright's architectural studio at Oak Park, Ill., in the first decade of the 20th century. There he met the architect-renderer Marion Mahony, whom Griffin married in 1911 and who took an active part in his practice. Among his early independent commissions were the William H. Emery House, Elmhurst, Ill. (1902), influenced by Wright's Prairie houses, and the landscaping of the campus of Northern Illinois State Teachers' College (afterward University), DeKalb (1906). He laid out the Rock Glen residential development, Mason City, Iowa (1910–16), and designed several of its houses.

Early in 1912 Griffin won an international competition to plan Canberra, the new federal capital of Australia, and he spent most of the rest of his life in that country. Starting with the "Garden City" ideal of strict separation of functions within a community, he adopted a geometric formalism. The main streets of the city were to radiate from focuses—the houses of Parliament, a municipal centre, and a commercial district. From 1915 Griffin was in charge of construction, but in 1920, following a dispute with Prime Minister William Morris Hughes, he lost control of the project. Other works by Griffin in Australia include Newman College, University of Melbourne (1915), and the Castlecrag residential community, Sydney (1918).

Donald Leslie Johnson's, *The Architecture of Walter Burley Griffin* was published in 1977.

Griffith, town, south central New South Wales, Australia, in the Murrumbidgee Irrigation Area. Surveyed in 1916 and designed by the U.S. architect Walter Burley Griffin, it was proclaimed a town in 1918 and named after Arthur Griffith, then state minister for works. It was subsequently the site of a large post-World War II soldier (veterans) settlement program. The Commonwealth Scientific and Industrial Organization Irrigation Research Centre is prominent in the town, which serves an area of intensive farming (cattle, wheat, rice, sheep, fruits, grapes, and vegetables). Secondary industries include fruit and vegetable packing, wine making, rice milling, and engineering works. Gypsum deposits are worked locally. Griffith has air, rail, and road connec-

tions to Sydney (296 mi [476 km] east). Pop. (1981) 13,187.

Griffith, Arthur (b. March 31, 1872, Dublin—d. Aug. 12, 1922, Dublin), journalist and Irish nationalist, principal founder of the powerful Sinn Féin (We Ourselves) movement, vice president of the Irish Republic from Jan. 21, 1919, and its president from Jan. 10, 1922, until his death.

Arthur Griffith, 1920
BBC Hulton Picture Library

After working as a typesetter in Dublin and then (1896–98) as a miner and journalist in South Africa, Griffith edited political newspapers named *The United Irishman, Sinn Féin, Eire,* and *Nationality,* and spent his life in near poverty.

Griffith sought to divert the Irish from their attempt to win self-government through legislative action in the British House of Commons. Instead, he urged passive resistance. Irishmen were to refuse to pay British taxes, while Irish members of the Commons were to stay away from Westminster and to sit in Ireland as a national council. At a meeting in Dublin (October 1902), the Cumann nan Gaedheal (Society of Gaels) announced this policy, which was called Sinn Féin. By 1905 the name had been transferred from the policy to its adherents.

Angered by the suggestion that Ireland be partitioned (which he was later constrained to accept), Griffith attacked the unsuccessful third Irish Home Rule Bill (1912). When the formation (1912) of the Ulster Volunteers, who supported the Anglo-Irish union, threatened to lead to violence, he aided the counterorganization of the Irish Volunteers. From the beginning of World War I he opposed Irish participation in the British war effort.

Taking no part in the Easter Rising in Dublin (1916), Griffith lost influence with the extreme nationalists. He recovered his reputation when the British authorities incarcerated him with other Sinn Féin members in Frongoch, a detention camp in Merioneth, Wales (May–December 1916). After their release, Eamon De Valera was elected leader. Returning to newspaper work, Griffith was jailed twice more for his anti-British journalism.

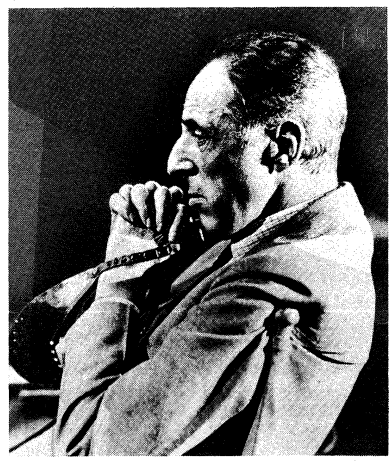
After the Sinn Féin electoral victory in December 1918, the Irish members of the House of Commons met as the Dáil Éireann (Assembly of Ireland). They went beyond Griffith's plan, however, and declared for a republic with De Valera as president and Griffith as vice president. During De Valera's long absence in North America (1919–20), Griffith acted as head of the Irish Republic and carried out his own program of civil disobedience.

In the fall of 1921, Griffith unwillingly went to London as leader of the Irish delegation to the self-government treaty conference. Finally agreeing to exclude six Ulster counties from the republic, he was the first Irish delegate to accept the British terms, later embodied in the Anglo-Irish Treaty (Dec. 6, 1921). Though not satisfied, Griffith insisted that the treaty offered Ireland the best possible opportunity to advance toward full freedom. When the Dáil narrowly approved the treaty (Jan. 8, 1922), De Valera resigned, and Griffith was elected president of the Irish Republic. He was not, however, the head of the new Irish Free State provisional government; Michael Collins had been awarded its chairmanship. Although the two men greatly respected each other, their official actions and utterances were frequently irreconcilable. Opposition to the treaty led to the outbreak of civil war in Ireland (June 28, 1922). Exhausted from overwork, Griffith died soon afterward.

The noted Irish man of letters Padraic Colum wrote a biography, *Arthur Griffith* (1959; U.S. title, *Ourselves Alone!,* 1959).

Griffith, D(avid) W(ark) (b. Jan. 22, 1875, Floydsfork, Ky., U.S.—d. July 23, 1948, Hollywood), pioneer U.S. motion-picture director, credited with developing many of the basic techniques of filmmaking, in such films as *The Birth of a Nation* (1915), *Intolerance* (1916), *Broken Blossoms* (1919), *Way Down East* (1920), *Orphans of the Storm* (1921), and *The Struggle* (1931).

Early life and influences. D.W. Griffith, the son of Jacob Griffith, a former Confederate colonel, was born in a tiny hamlet not far from Louisville, Ky. He received his early education in one-room schools, largely under the tutelage of his older sister, and was subject to the strong influence of his father's imaginative stories of the Mexican and Civil wars and family readings of the works of Dickens, Shakespeare, and Sir Walter Scott. The Griffith family was impoverished upon the death of Jacob Griffith, when David was seven years old. After a brief stay with relatives, the family moved to Louisville. Griffith's formal education was terminated in secondary school by the necessity of contributing to the family's financial needs. He became, successively, an elevator operator in a dry-goods store and a clerk in a bookstore. During the latter clerkship, Griffith was exposed to the literati of Louisville and to the actors and actresses who played at Louisville's Temple Theatre.



D.W. Griffith
Wide World Photos

Griffith began an acting career with several amateur theatre groups and made his professional debut in small roles with a stock company at the Temple Theatre. A barnstorming career with various touring companies followed, concluding with a Boston engagement in the spring of 1906. Following this engagement, Griffith completed a play, *A Fool and a Girl,* based on his personal experiences in the California hop fields, which was produced in Washington, D.C., in the fall of 1907. The play was a failure, despite the presence of Fannie Ward in the leading role. After the closing of the play, Griffith wrote a second play, *War,* which was based on events that occurred in the American Revolution. This later play remains unproduced.

On the advice of a former acting colleague, Griffith sold some scenarios for one-reel films, first to Edwin Porter, the director of the Edison Film Company, and then to the Biograph Company, both located in New York City. Griffith appeared as an actor in one film for the Edison Company, *Rescued from an Eagle's Nest,* under Porter's direction, and in several films for the Biograph Company. When an opening for a director developed at Biograph, Griffith was hired. During the next five years, from 1908 to 1913, Griffith made more than 400 films for Biograph, the majority in the one-reel format, lasting approximately 12 minutes. His first film was *The Adventures of Dollie* (1908), about a baby stolen by and recovered from Gypsies. During the latter part of his employment, he experimented with longer films; his last Biograph film, *Judith of Bethulia* (1913), a biblical story of Judith and Holofernes, based loosely on a play of the same title by Thomas Bailey Aldrich, comprised four reels.

During his Biograph period D.W. Griffith introduced or refined the techniques of motion-picture exposition, including the close-up, a film shot in which a single object or face filled the screen; the scenic long shot, showing an entire panoramic view; and cross-cutting, a technique of editing scenes at various locations together and intermixing them to give the impression to the viewer that the separate actions were happening simultaneously. With the assistance of his brilliant cinematographer, G.W. "Billy" Bitzer, Griffith made effective use of the fade-out and fade-in, a technique in which the screen darkens gradually to black or lightens from black to a full image, to indicate the end or the beginning of the story or of an episode, and the framing of film images through the use of special masks to produce a picture in other than the standard rectangular image. Griffith introduced to the screen young actors and actresses who were to become the motion-picture personages of the future. Included among these were Mary Pickford, Lillian and Dorothy Gish, Mack Sennett, Mae Marsh, Lionel Barrymore, and Harry Carey.

The Birth of a Nation and Intolerance. In 1913 Griffith left Biograph and entered into an agreement with Mutual Films for the direction and supervision of motion pictures. From this association, among other films, came *The Birth of a Nation.* With the official opening of the film under the title *The Clansman,* at Clune's Auditorium in Los Angeles on Feb. 8, 1915, the infant art of the motion picture was revolutionized. The film was subsequently lionized for its radical technique and condemned for its "racist" philosophy. Filmed at a cost of $110,000, it returned millions of dollars in profits, making it, perhaps, the most profitable film of all time, although a full accounting has never been made.

As a result of public opposition to its alleged racist message, however, *The Birth of a Nation* was censored in many cities, including New York City, and Griffith became an ardent opponent of censorship of the motion picture. His next important film, *Intolerance* (1916), was, in part, an answer to his critics.

Intolerance, a film of epic proportions, combined four separate stories: the fall of ancient Babylon to the hordes of Cyrus, the St. Bartholomew's Day Massacre of the Huguenots in 16th-century France, the Crucifixion of Jesus, and a contemporary story dealing with a wrongfully condemned man. The giant settings, especially the one representing ancient Babylon, have remained a benchmark for motion-picture spectacle, and the opulent settings for 16th-century Paris were almost equally impressive. Griffith interwove the four stories in an increasingly complex manner until all were brought to resolution in a controlled torrent of images that still

leaves the viewer breathless. Only the contemporary story was given a happy ending. The film ends with an allegorical plea for the end of war through divine intervention, indicated through superimpositions of heavenly hosts above a flower-strewn battlefield. The film was an artistic success on its presentation in New York City on Sept. 5, 1916, but proved to be a financial failure. Nevertheless, tribute has been paid to its seminal influence on the work done by many film directors. Almost unanimously, critics have hailed *Intolerance* as the finest achievement of the silent film.

Most of Griffith's profits from *The Birth of a Nation* were used and lost in the making of *Intolerance,* but he was able to secure the financing for the building of his own studio in Mamaroneck, N.Y. His films were to be released through United Artists, a motion-picture distributor of which he was a founding partner, with Mary Pickford, Charles Chaplin, and Douglas Fairbanks. Despite making such distinguished films as *Broken Blossoms* (1919) and *Orphans of the Storm* (1921), and an extremely profitable film, *Way Down East* (1920), his studio foundered on the failure of lesser films and the business recession of the first half of the 1920s.

Griffith was subsequently employed as a director by Paramount Pictures and as contract director by United Artists. His view of the American Revolution was realized in *America* (1924), and his next-to-last film, *Abraham Lincoln* (1930), was another view of the American Civil War in a somewhat ponderous biographical style. Despite his past success and the general acknowledgement of his vital contributions to the syntax of the motion picture, Griffith was unable to find permanent employment after *Abraham Lincoln.* His last film, *The Struggle* (1931), a grim study of the degeneration of an alcoholic husband, was an abject failure, withdrawn by United Artists after a brief run. Griffith had produced *The Struggle* independently and, although not destitute, was never again able to finance another film or to find regular employment in the motion-picture industry.

Assessment. More than any other individual, Griffith developed the techniques through which motion pictures became an art form—an instrument able to express emotions and ideas. A genius in the art of the film, who never worked with a script, he innovated continually in the use of the camera angles and movement, in lighting, and, especially, in editing and tempo, and his influence throughout the world on the most creative directors of the next generation, such as Erich von Stroheim and Sergey Eisenstein, is inestimable.

(R.M.He.)

MAJOR WORKS. *The Adventures of Dollie; The Taming of the Shrew* (both 1908). *Edgar Allan Poe; The Curtain Pole; The Voice of the Violin; The Drunkard's Reformation; Resurrection; The Cricket on the Hearth; The Lonely Villa; The Mended Lute; 1776: or, The Hessian Renegades; Pippa Passes; In the Watches of the Night; Through the Breakers; Lines of White on a Sullen Sea; The Red Man's View; A Corner in Wheat* (all 1909). *In Old California; The Unchanging Sea; Ramona; The Usurer; The Message of the Violin* (all 1910). *His Trust; His Trust Fulfilled; Fisher Folks; The Lonedale Operator; Enoch Arden; Fighting Blood; The Last Drop of Water; The Battle; The Miser's Heart* (all 1911). *The Mender of Nets; The Goddess of Sagebrush Gulch; A Girl and Her Trust; Old Lena and the Geese; Man's Genesis; The Sands of Dee; A Pueblo Legend; An Unseen Enemy; The Musketeers of Pig Alley; The Massacre; The New York Hat* (all 1912). *The Battle at Elderbush Gulch; Judith of Bethulia* (both 1913); *The Battle of the Sexes; The Escape; Home Sweet Home; The Avenging Conscience* (all 1914). *The Birth of a Nation* (1915); *Intolerance* (1916); *Hearts of the World; The Great Love; The Greatest Thing in Life* (all 1918). *A Romance of Happy Valley; The Girl Who Stayed at Home; Broken Blossoms; True Heart Susie; The Mother and the Law; Scarlet Days; The Greatest Question* (all 1919). *The Idol Dancer; The Love Flower; Way Down East* (all 1920). *Dream Street; Orphans of the Storm* (both 1921); *One Exciting Night* (1922); *The White Rose* (1923); *America* (1924); *Sally of the Sawdust; Isn't Life Wonderful?; That Royle Girl* (all 1925); *Sorrows of Satan* (1927); *Drums of Love; The Battle of the Sexes* (both 1928); *Lady of the Pavements* (1929); *Abraham Lincoln* (1930); *The Struggle* (1931).

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Griffith, Emile (Alphonse) (b. Feb. 3, 1938, U.S. Virgin Islands), professional U.S. boxer who won world championships on five occasions, an achievement surpassed only by Sugar Ray Robinson's total of six.

Griffith was encouraged to become a boxer by his employer, the owner of the hat factory where Griffith worked. In 1958, after winning the New York City and Intercity Golden Gloves amateur welterweight (147-pound) titles, he began his professional career. He held the welterweight professional championship three times, winning it from Benny (Kid) Paret by a 13-round knockout on April 1, 1961; losing it to Paret by a 15-round decision on Sept. 30, 1961; regaining it by a 12-round knockout of Paret on March 24, 1962 (Paret died after that fight); surrendering it to Luis Rodríguez by a 15-round decision on March 21, 1963; and recapturing it once more by a 15-round decision over Rodríguez on June 8, 1963.

On April 25, 1966, Griffith won the world middleweight (160-pound) title by outpointing champion Dick Tiger in 15 rounds. His attempt to retain both championships (contrary to U.S. boxing rules) was disallowed, and he relinquished the welterweight title. On April 17, 1967, he was defeated by Nino Benvenuti on points in a 15-round middleweight title match. On September 29 of that year he won the 160-pound championship for the second time by outscoring Benvenuti in 15 rounds, but he lost it again to Benvenuti by a 15-round decision on March 4, 1968. Griffith retired from the ring in 1977.

Griffith, Sir Richard John, 1ST BARONET (b. Sept. 20, 1784, Dublin—d. Sept. 22, 1878, Dublin), Irish geologist and civil engineer who has sometimes been called the "father of Irish geology."

Griffith spent two years studying to be a civil engineer in London and then went to Cornwall to gain mining experience. He attended chemistry and natural history classes in Edinburgh for two years and was elected to the Royal Society of Edinburgh at age 23. In 1812 he became mining engineer to the Royal Dublin Society and government inspector of the mines in Ireland. One of his major accomplishments was the preparation, by 1835, of the first geological map of Ireland, which was followed by published large-scale maps in 1838 and 1839. Among his many other publications was a work on the Carboniferous limestone fossils of Ireland, in which he described many new species. His other endeavours included surveying coalfields and bogs in Ireland, supervising numerous public works, and serving as commissioner of valuation for land. He was created a baronet in 1858.

Griffiths, John Willis (b. Oct. 6, 1809, New York City—d. March 30, 1882), American naval architect who created the first extreme clipper ship, the *Rainbow,* which was designed to engage in the China trade. The *Rainbow* was launched in 1845 and began a new era in shipbuilding.

Griffiths began to write and lecture on shipbuilding in 1836 and soon became the leading spokesman for a scientific approach to shipbuilding. He was both an influential theorist and a practical designer of ships. His sharp and slender vessels were attacked at first by skeptics who called them unsafe, but they quickly proved to be the fastest ships of their time. His extreme clipper *Sea Witch* was launched in 1846. Griffiths made numerous innovations in shipbuilding, including an iron keelson, a timber-bending machine, a bilge keel, and an improved rivet. In 1858 he was appointed a naval constructor, and in that capacity he built the *Pawnee,* a naval gunboat propelled by twin screws. He edited *American Ship* from 1878 and was the author of *The Ship-builder's Manual and Nautical Referee* (1853) and *The Progressive Ship Builder* (1874–75).

griffon (mythology): *see* griffin.

Grigan (Mariana Islands): *see* Agrihan.

Grigioni (Switzerland): *see* Graubünden.

Grignard, (François-Auguste-)Victor (b. May 6, 1871, Cherbourg, Fr.—d. Dec. 13, 1935, Lyon), French chemist and corecipient, with Paul Sabatier, of the Nobel Prize for Chemistry in 1912 for his development of the Grignard reaction. This work in organomagnesium compounds opened a broad area of organic synthesis.

In 1898, while a student under Philippe Barbier at Lyon, Grignard began his prizewinning work with a study of the alkylzinc compounds developed earlier by Sir Edward Frankland. It was Barbier who had Grignard repeat some experiments on the preparation of a tertiary alcohol from a mixture of methyl heptyl ketone, magnesium, and methyl iodide. Grignard hit upon the idea of treating the iodide with the magnesium first and carried out the reaction in ether. This first of the Grignard reagents was a complete success. Grignard's doctoral dissertation (1901) described the preparation of alcohols, acids, and hydrocarbons by means of reactions of organomagnesium compounds. He became professor of chemistry at Nancy (1910) and at Lyon (1919). At the time of his death some 6,000 papers reporting applications of the Grignard reaction had been published.

Grignard reagent, any of numerous organic derivatives of magnesium (Mg) commonly represented by the general formula RMgX (in which R is a hydrocarbon radical: CH_3, C_2H_5, C_6H_5, etc.; and X is a halogen atom, usually chlorine, bromine, or iodine). The chemical behaviour of these substances—which are named after their discoverer, the French chemist Victor Grignard—resembles that of the carbanions; *e.g.*, the Grignard reagent methylmagnesium iodide (CH_3MgI) is a strong base and a strong nucleophile, as is the methide ion (CH_3^-), a typical carbanion.

Grignard reagents commonly are prepared by reaction of an organic halide with magnesium in a nitrogen atmosphere because the reagent is very reactive toward oxygen and moisture. Organic halides vary greatly in their rates of

reaction with magnesium. For example, alkyl iodides generally react very rapidly, whereas most aryl chlorides react very slowly, if at all.

Except for hydrocarbons, ethers, and tertiary amines, almost all organic compounds react with Grignard reagents. Many of these reactions are used for synthetic purposes, notably those with carbonyl compounds—*e.g.*, aldehydes, ketones, and acid chlorides—and those with halogen compounds of certain metals—*e.g.*, zinc, cadmium, lead, mercury—to form the alkyl derivatives of the metals.

Grignion de Montfort, Saint Louis-Marie de: *see* Montfort, Saint Louis-Marie Grignion de.

Grigny, Nicolas de (baptized Sept. 8, 1672, Reims, Fr.—d. Nov. 30, 1703, Reims), French organist and composer, member of a family of musicians in Reims.

Grigny was organist (1693–95) at the abbey church of Saint-Denis in Paris. By 1696 he had returned to Reims and shortly thereafter was appointed organist at the cathedral there, a post he held until his death. His organ music is distinguished for its rich texture, complex counterpoint, expressive melody, and its free exploitation of the contrasting colours of the instrument. His volume *Premier livre d'orgue* (1699) sums up the work of his predecessors and stands with that of Couperin at the apex of the French classical organ tradition. J.S. Bach so admired it that he transcribed the entire volume for his own use.

Grigorovich, Yuri (Nikolayevich) (b. Jan. 2, 1927, Leningrad), Soviet dancer, choreographer, and ballet director.

Grigorovich graduated from the Leningrad Choreographic School in 1946 and joined the Kirov Ballet, specializing in demi-caractère roles. He is best known, however, as a choreographer. *The Stone Flower* (1957) was one of his earliest successes at the Kirov, and two years later he was asked to remount it for the Bolshoi Ballet in Moscow. In 1962 Grigorovich became the Kirov's ballet master; two years later he was appointed the chief choreographer and artistic director of the Bolshoi. Grigorovich's productions have included *The Sleeping Beauty* (1965), *The Nutcracker* (1966), *Spartacus* (1968), *Swan Lake* (1969), *Ivan the Terrible* (1975), and *Angara* (1976).

Grigorovich was named People's Artist of the Russian S.F.S.R. (1966), and he received the Lenin Prize (1970) and the State Prize (1977). He was also the editor in chief of the *Encyclopedia of Ballet* and was codirector of the dance section of the International Theatre Institute under UNESCO.

Grigoryev, Apollon Aleksandrovich, Grigoryev also spelled GRIGORIEV (b. *c.* Aug. 1 [July 20, old style], 1822, Moscow—d. Oct. 7 [Sept. 25, old style], 1864, St. Petersburg [Leningrad]), Russian literary critic and poet remembered for his theory of organic criticism, in which he argued that the aim of art and literature, rather than being to describe society, should instead be to synthesize the ideas and feelings of the artist in an organic and intuitively felt unity that has nothing to do with real life.

Grigoryev grew up in the merchants' quarter of Moscow in an atmosphere of strong Russian nationalist feeling. He attended the University of Moscow, where he came in contact with the currents of Romanticism and Idealism of that time. From 1850 to 1856 Grigoryev was the editor of the Moscow journal *Moskvityanin* ("The Muscovite"), in which position he abandoned his earlier Romantic utopian fantasies and came to appreciate Russian grass-roots virtues and the stability of existing institutions. His nationalist sentiments were not well received by the Westernizers of the capital, and he worked as a tutor until about 1861, when he was able to resume journalism with the publication of the literary journal *Vremya* ("Time"). His literary criticism includes influential evaluations of Pushkin, Gogol, and the young Tolstoy. Grigoryev also translated works of Sophocles, Shakespeare, Byron, Goethe, Heine, and others.

Grigoryev was known as much for his erratic and self-consciously tempestuous life-style as for his prose and poetry. Grigoryev's autobiographical, highly subjective poetry is mostly forgotten, but several of his lyrics and ballads based on Russian gypsy songs remain popular in the Soviet Union.

Grigson, Geoffrey (Edward Harvey) (b. March 2, 1905, Pelynt, Cornwall, Eng.—d. Nov. 25, 1985, Broad Town, Wiltshire), English editor, poet, and literary critic who became known in the 1930s primarily as the founder-editor of the influential periodical *New Verse* (1933–39) and afterward as the editor and author of many poetry anthologies.

Grigson's later career as polemical journalist, art critic, anthologist, and editor of many varied works tended to obscure his achievement as a poet—he was a miniaturist with a fine and highly individual gift for precise and delicate observation. The austerity of his early poetry was gradually replaced by more personal and emotional verse. His poetic output was brought together in *Collected Poems* (1963) and *Collected Poems 1963–80* (1984). He also wrote an autobiography, *The Crest on the Silver* (1950), as well as many critical studies. Grigson was best known to the public as a literary journalist; he combined a fluent, versatile prose style with an acerbic temperament in his widely read critical articles and reviews. He also edited more than 12 anthologies of poetry, including the *Oxford Book of Satirical Verse* (1980).

Grijalba, Juan de, Grijalba also spelled GRIJALVA (b. 1480?, Cuéllar, Spain—d. Jan. 21, 1527, Honduras), Spanish explorer, nephew of the conquistador Diego Velázquez; he was one of the first to explore the eastern coast of Mexico.

Grijalba accompanied his uncle, Velázquez, in the conquest of Cuba (1511) and founded the city of Trinidad (1514). In 1518, Velázquez, by then governor of Cuba, sent Grijalba to explore the Yucatán. Setting sail from Cuba with four ships and about 200 men, Grijalba became the first navigator to set foot on Mexican soil and the first to use the term New Spain. He and his men mapped rivers and discovered Cozumel Island. In the course of their explorations, the men heard tales of a rich civilization in the interior. At last Grijalba met with its representatives, thus becoming the first European to have contact with the Aztecs. From the Indians, Grijalba learned of the existence of Montezuma, and Montezuma, depressed and fatalistic, learned of the landing of the white men.

When he returned to Cuba, his uncle had already heard reports of the riches of the new lands and was furious that his nephew had made no attempt at settlement, although Grijalba's orders had been to explore only. As a result, Grijalba was passed over and the job of colonization was given to Hernán Cortés. Grijalba accompanied Cortés on his expedition (1519); after joining Pedro Arias Dávila's expedition to Central America, he was ambushed and killed by Indians. It was Grijalba's explorations that paved the way for the Cortés exploration, thereby leading to the conquest of Mexico and all of Central America by Spain.

Grijalva River, Spanish RÍO GRIJALVA, river in southeastern Mexico. Its headstreams, the largest of which is the Cuilco, rise in the Sierra Madre of Guatemala and the Sierra de Soconusco of Mexico. The Grijalva flows generally northwestward through Chiapas state, where it is known locally as the Río Grande de Chiapa, or the Río Chiapa. After leaving a lake created by the Malpaso Dam, it turns northward and eastward, roughly paralleling the Chiapas–Tabasco border. Veering northward again at Villahermosa, the capital of Tabasco, it receives the main arm of the Usumacinta River and empties into the Gulf of Mexico and the Bay of Campeche, 6 mi (10 km) north-northwest of Álvaro Obregón. The river is navigable for shallow-draft vessels for approximately 60 mi upstream from the bay and for several stretches along its middle and upper course. The total length of the river, named after the Spaniard Juan de Grijalva, who discovered it in 1518, is approximately 400 mi.

Grillparzer, Franz (b. Jan. 15, 1791, Vienna—d. Jan. 21, 1872, Vienna), Austrian dramatist who wrote tragedies that were belatedly recognized as the greatest works of the Austrian stage.

His father was a reticent, patriotic lawyer who died in debt in 1809; his markedly neurotic mother, who belonged to a talented musical family, committed suicide 10 years later. Grillparzer studied law at the University of Vienna and spent much of his life in government service. Beginning in 1814 as a clerk in the department of revenue, he became clerk in the treasury (1818) and later director of the treasury archives; but his hopes for a higher position were never fulfilled, and he retired from government service in 1856.

In 1817 the first performance of Grillparzer's tragedy *Die Ahnfrau* (*The Ancestress*) evoked public interest. Previously he had written a play in blank verse, *Blanka von Castilien* (*Blanche of Castile*), that already embodied the principal idea of several later works—the contrast between a quiet, idyllic existence and a life of action. *Die Ahnfrau,* written in the trochaic Spanish verse form, has many of the outward features of the then popular "fate tragedy" (*Schicksalsdrama*), but the characters are themselves ultimately responsible for their own destruction. A striking advance was the swiftly written tragedy *Sappho* (1818). Here Sappho's tragic fate is attributed to her unhappy love for an ordinary man and to her inability to reconcile life and art, clearly an enduring problem for Grillparzer. Work on the trilogy *Das Goldene Vlies* (1821; *The Golden Fleece*) was interrupted by the suicide of Grillparzer's mother and by illness. This drama, with Medea's assertion that life is not worth living, is the most pessimistic of his works and offers humanity little hope. Once more the conflict between a life of meditation and one of action seems to lead inevitably to renunciation or despair.

More satisfying, both aesthetically and emotionally, is the historical tragedy *König Ottokars Glück und Ende* (written 1823, but because of censorship difficulties not performed or published until 1825; *King Ottocar, His Rise and Fall*). Here the action is drawn from Austrian history, and the rise of Rudolph of Habsburg (the first of Grillparzer's characters

Grillparzer, detail of a lithograph by Joseph Kriehuber, 1841

By courtesy of the Historisches Museum der Stadt Wien

to avoid guilt and tragedy) is contrasted with the fall of the tyrant Ottokar of Bohemia, so that Ottokar's fate is not presented as representative of all humanity. Grillparzer was disappointed at the reception given to this and a following play and became discouraged by the objections of the censor. Although he loved Katharina Fröhlich (1800–79), whom he had met in the winter of 1820–21, he felt unable to marry, possibly because of a conviction that as an artist he had no right to personal happiness. His misery during these years is reflected not only in his diaries but also in the impressive cycle of poems entitled *Tristia ex Ponto* (1835).

Des Meeres und der Liebe Wellen (1831; *The Waves of Sea and Love*), often judged to be Grillparzer's greatest tragedy because of the degree of harmony achieved between content and form, marks a return to the classical theme in treating the story of Hero and Leander, which is, however, interpreted with a psychological insight anticipating the plays of Ibsen. Hero, the priestess, who lacks a true sense of vocation, forgets her vows in her blind passion for Leander and, when her lover is ensnared to his death, she dies of a broken heart. The following of vital instincts is shown to rob the individual of inner harmony and self-possession. *Der Traum ein Leben* (1834; *A Dream Is Life*) owes much to Grillparzer's intensive and prolonged studies of Spanish drama. This Austrian *Faust* ends happily, for the ambitious young peasant Rustan only dreams the adventures that involve him in crime and awakes to a realization of the vanity of earthly aspirations. Grillparzer's only comedy, *Weh dem, der lügt!* (1838; "Woe to Him Who Lies!"), was a failure with the public, chiefly because the theme—the hero succeeds because he tells the truth when everyone thinks he is lying—was too subtle and too serious for comic treatment.

Grillparzer wrote no more for the stage and very little at all after the 1840s. The honours that were heaped on him in old age came too late. In 1861 he was elected to Vienna's upper legislative house (Herrenhaus), his 80th birthday was the occasion for a national celebration, and his death in Vienna in 1872 was widely mourned. Three tragedies, apparently complete, were found among his papers. *Die Jüdin von Toledo* (*The Jewess of Toledo*), based on a Spanish theme, portrays the tragic infatuation of a king for a young Jewess. He is only brought back to a sense of his responsibilities after she has been killed at the queen's command. *Ein Bruderzwist in Habsburg* (*Family Strife in Hapsburg*), a profound and moving historical tragedy, lacks the theatrical action that would make it successful in performance and is chiefly remarkable for the portrayal of the emperor Rudolph II. Much of Grillparzer's most mature thought forms the basis of the third play, *Libussa,* in which he foresees human development beyond the rationalist stage of civilization.

Apart from his critical studies on Spanish drama and a posthumous autobiography, Grillparzer's finest prose work is *Der arme Spielmann* (1848), the story of a poor musician who cheerfully accepts life's failures and dies through his efforts to help others.

Grillparzer's work looks back to the great Classical and Romantic achievements and the painful evolution from the disillusionment of idealism to a compromise with reality. Grillparzer was unusually gifted not only as a dramatic poet but also as a playwright capable of creating dramas suitable for performance. Unlike his great predecessors, Goethe and Schiller, he distinguishes between the speech of the cultured person and that of the uneducated. He also introduces colloquialisms, humour, and elements from the popular farce. Although the central dramatic conflict of Grillparzer's plays is often rooted in his personal problems, it is presented objectively. Grillparzer's solution is renunciation rather than acceptance. He undoubtedly suffered from the censorship and repression imposed by the Metternich regime, but it is probable that his unhappiness originated principally in an inability to resolve his own difficulties of character.

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Grimald, Nicholas, Grimald also spelled GRIMALDE, GRIMVALD, or GRIMOALD (b. 1519/20, Huntingdonshire, Eng.—d. *c.* 1559), English scholar and poet, best known as a contributor to *Songes and Sonettes* (1557), known as *Tottel's Miscellany,* an anthology of contemporary poetry he may have edited.

Grimald was educated at Cambridge and Oxford universities. He graduated with an M.A. from Oxford (1543) and then returned to Christ Church College, Cambridge, where he lectured on theology. He was licensed as a preacher in 1551–52 and named chaplain to Nicholas Ridley, bishop of London. After the accession of the Catholic queen Mary I in 1553, Ridley was imprisoned, removed from his bishopric, and in 1554 executed. In 1555 Grimald was also imprisoned but was released, presumably because he recanted. In 1558 he is said to have returned to the Protestant belief.

The first edition of *Tottel's Miscellany,* published in June 1557, contained 40 poems by Grimald, including two early examples of English blank verse. Only 10 of his poems appeared in the second edition (published two months later) and in later editions, perhaps because of his religious inconstancy. Grimald also wrote two plays in Latin: a tragicomedy, *Christus Redivivus* (1543), produced at Oxford, and a tragedy about John the Baptist, *Archipropheta* (1548), produced at Cambridge. His plays and his surviving poems, edited by L.R. Merrill, were published in 1925.

Grimaldi FAMILY, one of the major families of Genoa, prominent in Guelf (pro-papal) politics and supporters of the Angevin kings of Naples. The Grimaldis became lords of Monaco in the 15th century.

Descended from a 12th-century Grimaldo who was several times consul of the Genoese commune, the Grimaldi and another important family, the Fieschi, headed the Guelf party during the struggles between the papacy and the empire and allied themselves with the French prince Charles of Anjou, then king of Naples. In 1297 the Grimaldi seized power in Monaco, turning it into a base of operations against the Genoese Ghibellines. But over the next century they alternately lost and won control of the city, during a period of turbulent politics and wars throughout Italy.

The Grimaldi contributed many admirals and ambassadors to Genoa during the popular dogeship (1339–1528) but continued their intermittent connection with Monaco; in 1395 Giovanni and Luigi Grimaldi profited by civil strife in Genoa to seize Monaco, losing it, however, shortly after to the French. In 1419 a branch of the family succeeded in taking what proved to be final possession of Monaco, though they did not assume the title of prince until 1659.

During the French Revolution the Grimaldi were dispossessed, and Monaco was annexed to France. With the Treaty of Paris of 1814, they regained the principality. Notable among the Grimaldi princes was Albert I (1848–1922), who gave Monaco a constitution in 1911. An enthusiastic oceanographer, he founded the Oceanographic Museum in Monaco and the Oceanographic Institute in Paris. His great-grandson Rainier III became prince in 1949, marrying Grace Kelly, American motion-picture actress, in 1956.

Other lines of the family remained in Genoa and continued to constitute one of that city's wealthiest and most numerous families. During the period of the "aristocratic republic" (1528–1797), six Grimaldi were Genoese doges, while other members of the family served as senators, magistrates, diplomats, and prelates.

Grimaldi, Joseph (b. Dec. 18, 1778, London—d. May 31, 1837, London), English clown and pantomimist.

Grimaldi came from a family of dancers and entertainers and made his debut as a dancer at the age of two at the Sadler's Wells Theatre. For a number of years he appeared at two theatres nightly, running from one to the other. In 1806 he joined Covent Garden Theatre, where, in the pantomime *Harlequin and Mother Goose,* he enjoyed his greatest success. In this production he created a new type of clown combining rogue and simpleton, criminal and innocent dupe in one character, a role subsequently adopted by many other English clowns.

In 1816 Grimaldi terminated his relationship with the Sadler's Wells Theatre but two years later purchased a part interest in it. In 1822 his health began to fail and he was unable to fulfill his remaining commitments at Covent Garden. He was made assistant manager at Sadler's Wells in 1825 and gave his last public performance in 1828. At the height of his powers, Grimaldi was considered to have no equal as a comedic performer. In recognition of his talent and influence clowns to this day are nicknamed Joey.

Grimalus, Laurentius (Polish prelate): *see* Goślicki, Wawrzyniec.

Grimké, Sarah (Moore) and Angelina (Emily) (respectively b. Nov. 26, 1792, Charleston, S.C., U.S.—d. Dec. 23, 1873, Hyde Park, Mass.; b. Feb. 20, 1805, Charleston—d. Oct. 26, 1879, Hyde Park), American antislavery crusaders and women's rights advocates.

Despite the fact that their father was an aristocratic slaveholding judge in the Deep South, both girls developed an early dislike of slavery. Their independent thinking was strengthened in their 20s when they joined the Society of Friends (Quakers) in Philadelphia, and they both subsequently moved to the North and became active in the anti-slavery movement. In 1835 Angelina wrote a letter of approval to Abolitionist leader William Lloyd Garrison, who published it in his newspaper, *The Liberator.* The following year she composed an impassioned pamphlet, *An Appeal to the Christian Women of the South,* in which she urged her Southern sisters to use moral suasion to help overthrow the oppressive institution. A few months later Sarah made a similar plea in *An Epistle to the Clergy of the Southern States.* These eloquent appeals were welcomed by antislavery agitators in the free states, but South Carolina officials burned copies of them and threatened the authors with imprisonment should they ever return home. At the same time, the sisters attested their sincerity by freeing the slaves whom they had persuaded their mother to apportion to them as their part of the family estate.

The Grimkés' speaking career began when Angelina appeared before small groups of Philadelphia women in private homes. In 1836 the sisters moved to New York, where they addressed larger gatherings in churches and public halls. Their talks in New England before mixed audiences prompted a pastoral letter from the General Association of Congregational Ministers of Massachusetts castigating women preachers and reformers. As a result of such opposition, the sisters became pioneers in the women's rights movement and were largely responsible for linking it to the antislavery crusade.

In 1838 Angelina married the noted Abolitionist Theodore Dwight Weld. Ill health forced her to give up public speaking shortly afterward, and Sarah followed her into retirement. The sisters helped Weld conduct liberal schools in New Jersey, following which they moved to Massachusetts and continued to support Abolitionism and women's rights.

Grimm, Friedrich Melchior, Freiherr von (baron of) (b. Sept. 26, 1723, Ratisbon—d. Dec. 19, 1807, Gotha, Saxe-Gotha), critic of German descent who played an important part in the spread of 18th-century French culture throughout Europe.

Freiherr von Grimm, engraving after a drawing by Carmontelle, 1769

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

After studying in Leipzig, Grimm attached himself to the powerful Schönberg family. In 1748 he went to Paris as escort to their second son and, later, worked at various times for the Prince of Saxe-Gotha, the Count of Friesen, and the Duc d'Orléans. At the same time he was admitted to progressive literary and philosophical circles in Paris, thanks to his acquaintance with Jean-Jacques Rousseau.

He became a close friend of the encyclopaedist Denis Diderot (for whom he wrote an article on lyric poetry) and the lover of Madame d'Épinay, a writer and patron of a Parisian literary circle. His position, together with his many connections with the nobility, equipped him to launch a cultural newsletter, which he wrote and edited for the benefit of foreign sovereigns and nobility anxious to keep abreast of French cultural affairs. Beginning May 15, 1753, it was issued every two weeks and was usually sent to its subscribers through diplomatic channels.

Published in 1812 as *Correspondance littéraire,* it shows sound critical taste and is an invaluable social document, containing information about every aspect of the age. Grimm's carefully nurtured social standing and prosperity were swept away in the French Revolution. Financially ruined and embittered, supported only by a pension from Catherine II the Great of Russia, he retired to Gotha, where he died.

Grimm, Hans (Emil Wilhelm) (b. March 22, 1875, Wiesbaden, Ger.—d. Sept. 27, 1959, Lippoldsberg), German writer whose works were popular expressions of Pan-Germanism

Hans Grimm

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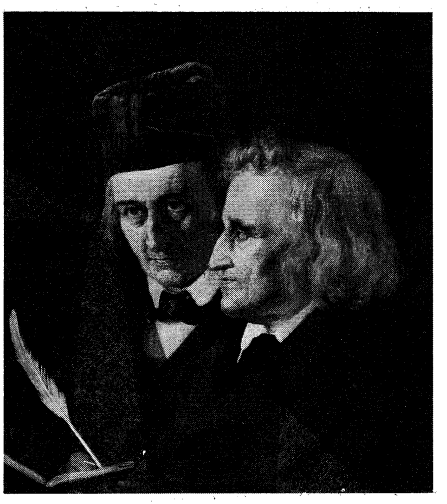
and helped to prepare the climate of opinion in Germany that embraced the nationalist and expansionist policies of Adolf Hitler.

Educated in Munich and Lausanne, he received commercial training in England, and from 1901 to 1910 he was a merchant in Cape Colony, S.Af.

Grimm's experiences in South Africa furnished material for his literary works, the first of which, *Südafrikanische Novellen,* appeared in 1913. His novel *Volk ohne Raum* (1926; "Nation Without Room"), in which he contrasts the wide-open spaces of South Africa with Germany's cramped position in Europe, deals with the German settlers in South West Africa, their involvement in the South African War, and their determination to retain their land despite the provisions of the Treaty of Versailles. Grimm's style was influenced by the Old Icelandic sagas.

Grimm, Jacob Ludwig Carl and Wilhelm Carl, byname BROTHERS GRIMM, German BRÜDER GRIMM (respectively b. Jan. 4, 1785, Hanau, Hesse-Kassel—d. Sept. 20, 1863, Berlin; b. Feb. 24, 1786, Hanau—d. Dec. 16, 1859, Berlin), German brothers famous for their classic collections of folk songs and folktales, especially for *Kinder- und Hausmärchen* (1812–22; generally known as *Grimm's Fairy Tales*), which led to the birth of the science of folklore. Jacob, especially, did important work in historical linguistics and Germanic philology.



Jacob (right) and Wilhelm Grimm, oil portrait by Elisabeth Jerichau-Baumann, 1855; in the National-Galerie, Berlin

By courtesy of the Staatliche Museen zu Berlin

Beginnings and Kassel period. Jacob Ludwig Carl Grimm and Wilhelm Carl Grimm were the oldest in a family of five brothers and one sister. Their father, Philipp Wilhelm, a lawyer, was town clerk in Hanau and later justiciary in Steinau, another small Hessian town, where his father and grandfather had been ministers of the Calvinistic Reformed Church. The father's death in 1796 brought social hardships to the family; the death of the mother in 1808 left 23-year-old Jacob with the responsibility of four brothers and one sister. Jacob, a scholarly type, was small and slender with sharply cut features, while Wilhelm was taller, had a softer face, and was sociable and fond of all the arts. After attending the high school in Kassel, the brothers followed their father's footsteps and studied law at the University of Marburg (1802-06) with the intention of entering civil service. At Marburg they came under the influence of Clemens Brentano, who awakened in both a love of folk poetry, and Friedrich Karl von Savigny, cofounder of the historical school of jurisprudence, who taught them a method of antiquarian investigation that formed the real basis of all their later work. Others, too, strongly influenced the Grimms, particularly the philosopher Johann Gottfried Herder (1744–1803), with his ideas on folk poetry. Essentially, they remained individuals, creating their work according to their own principles. In 1805 Jacob accompanied Savigny to Paris to do research on legal manuscripts of the Middle Ages; the following year he became secretary to the war office in Kassel. Because of his health, Wilhelm remained without regular employment until 1814. After the French entered in 1806, Jacob became private librarian to King Jérôme of Westphalia in 1808 and a year later *auditeur* of the Conseil d'État but returned to Hessian service in 1813 after Napoleon's defeat. As secretary to the legation, he went twice to Paris (1814–15), to recover precious books and paintings taken by the French from Hesse and Prussia. He also took part in the Congress of Vienna (September 1814–June 1815). Meantime, Wilhelm had become secretary at the Elector's library in Kassel (1814), and Jacob joined him there in 1816. By that time the brothers had definitely given up thoughts of a legal career in favour of purely literary research. In the years to follow they lived frugally and worked steadily, laying the foundations for their lifelong interests. Their whole thinking was rooted in the social and political changes of their time and the challenge these changes held. Jacob and Wilhelm had nothing in common with the fashionable "Gothic" Romanticism of the 18th and 19th centuries. Their state of mind made them more Realists than Romantics. They investigated the distant past and saw in antiquity the foundation of all social institutions of their days. But their efforts to preserve these foundations did not mean that they wanted to return to the past. From the beginning, the Grimms sought to include material from beyond their own frontiers—from the literary traditions of Scandinavia, Spain, The Netherlands, Ireland, Scotland, England, Serbia, and Finland.

They first collected folk songs and tales for their friends Achim von Arnim and Brentano, who had collaborated on an influential collection of folk lyrics in 1805, and the brothers examined in some critical essays the essential difference between folk literature and other writing. To them, folk poetry was the only true poetry, expressing the eternal joys and sorrows, the hopes and fears of mankind.

Encouraged by Arnim, they published their collected tales as the *Kinder- und Hausmärchen,* implying in the title that the stories were meant for adults and children alike. In contrast to the extravagant fantasy of the Romantic school's poetical fairy tales, the 200 stories of this collection (mostly taken from oral sources, though a few were from printed sources) aimed at conveying the soul, imagination, and beliefs of people through the centuries—or at a genuine reproduction of the teller's words and ways. The great merit of Wilhelm Grimm is that he gave the fairy tales a readable form without changing their folkloric character. The results were threefold: the collection enjoyed wide distribution in Germany and eventually in all parts of the globe (there are now translations in 70 languages); it became and remains a model for the collecting of folktales everywhere; and the Grimms' notes to the tales, along with other investigations, formed the basis for the science of the folk narrative and even of folklore. To this day the tales remain the earliest "scientific" collection of folktales. The *Kinder- und Hausmärchen* was followed by a collection of historical and local legends of Germany, *Deutsche Sagen* (1816–18), which never gained wide popular appeal, though it influenced both literature and the study of the

folk narrative. The brothers then published (in 1826) a translation of Thomas Crofton Croker's *Fairy Legends and Traditions of the South of Ireland,* prefacing the edition with a lengthy introduction of their own on fairy lore. At the same time, the Grimms gave their attention to the written documents of early literature, bringing out new editions of ancient texts, from both the Germanic and other languages. Wilhelm's outstanding contribution was *Die deutsche Heldensage* ("The German Heroic Tale"), a collection of themes and names from heroic legends mentioned in literature and art from the 6th to the 16th centuries, together with essays on the art of the saga.

While collaborating on these subjects for two decades (1806–26), Jacob also turned to the study of philology with an extensive work on grammar, the *Deutsche Grammatik* (1819–37). The word *deutsch* in the title does not mean strictly "German," but it rather refers to the etymological meaning of "common," thus being used to apply to all of the Germanic languages, the historical development of which is traced for the first time. He represented the natural laws of sound change (both vowels and consonants) in various languages and thus created bases for a method of scientific etymology; *i.e.,* research into relationships between languages and development of meaning. In what was to become known as Grimm's law, Jacob demonstrated the principle of the regularity of correspondence among consonants in genetically related languages, a principle previously observed by the Dane Rasmus Rask. Jacob's work on grammar exercised an enormous influence on the contemporary study of linguistics, Germanic, Romance, and Slavic, and it remains of value and in use even now. In 1824 Jacob Grimm translated a Serbian grammar by his friend Vuk Stefanović Karadžić, writing an erudite introduction on Slavic languages and literature.

He extended his investigations into the Germanic folk-culture with a study of ancient law practices and beliefs published as *Deutsche Rechtsaltertümer* (1828), providing systematic source material but excluding actual laws. The work stimulated other publications in France, The Netherlands, Russia, and the southern Slavic countries and has not yet been superseded.

The Göttingen years. The quiet contentment of the years at Kassel ended in 1829, when the brothers suffered a snub—perhaps motivated politically—from the Elector of Hessen-Kassel: they were not given advancement following the death of a senior colleague. Consequently, they moved to the nearby University of Göttingen, where they were appointed librarians and professors. Jacob Grimm's *Deutsche Mythologie,* written during this period, was to be of far-reaching influence. From poetry, fairy tales, and folkloristic elements, he traced the pre-Christian faith and superstitions of the Germanic people, contrasting the beliefs to those of classical mythology and Christianity. The *Mythologie* had many successors all over Europe, but often disciples were not as careful in their judgments as Jacob had been. Wilhelm published here his outstanding edition of Freidank's epigrams. But again fate overtook them. When Ernest Augustus, duke of Cumberland, became king of Hanover, he high-handedly repealed the constitution of 1833, which he considered too liberal. Two weeks after the King's declaration, the Grimms, together with five other professors (the "Göttingen Seven"), sent a protest to the King, explaining that they felt themselves bound by oath to the old constitution. As a result they were dismissed, and three professors, including Jacob, were ordered to leave the kingdom of Hanover at once. Through their part in this protest directed against despotic authority, they clearly demonstrated the academic's sense of civil responsibilities, manifesting their own liberal convictions at the same time. During three years of exile in Kassel, institutions in Germany and beyond (Hamburg, Marburg, Rostock, Weimar, Belgium, France, The Netherlands, and Switzerland) tried to obtain the brothers' services.

The Berlin period. In 1840 they accepted an invitation from the king of Prussia, Frederick William IV, to go to Berlin, where as members of the Royal Academy of Sciences they lectured at the university. There they began their most ambitious enterprise, the *Deutsches Wörterbuch,* a large German dictionary intended as a guide for the user of the written and spoken word as well as a scholarly reference work. In the dictionary, all German words found in the literature of the three centuries "from Luther to Goethe" were given with their historical variants, their etymology, and their semantic development; their usage in specialized and everyday language was illustrated by quoting idioms and proverbs. Begun as a source of income in 1838 for the brothers after their dismissal from Göttingen, the work required generations of successors to bring the gigantic task to an end in our day. Jacob lived to see the work proceed to the letter *F,* while Wilhelm only finished the letter *D.* The dictionary became an example for similar publications in other countries: Britain, France, The Netherlands, Sweden, and Switzerland. Jacob's philological research later led to a history of the German language, *Geschichte der deutschen Sprache,* in which he attempted to combine the historical study of language with the study of early history. Research into names and dialects was stimulated by Jacob Grimm's work, as were ways of writing and spelling—for example, he used roman type and advocated spelling German nouns without capital letters.

For some 20 years they worked in Prussia's capital, respected and free from financial worries. Much of importance can be found in the brothers' lectures and essays, the prefaces and reviews (*Kleinere Schriften*) they wrote in this period. In Berlin they witnessed the Revolution of 1848 and took an active part in the political strife of the succeeding years. In spite of close and even emotional ties to their homeland, the Grimms were not nationalists in the narrow sense. They maintained genuine—even political—friendships with colleagues at home and abroad, among them the jurists Savigny and Eichhorn; the historians F.C. Dahlmann, G.G. Gervinus, and Jules Michelet; and the philologists Karl Lachmann, John Mitchell Kemble, Jan Frans Willems, Vuk Karadžić, and Pavel Josef Šafařik. Nearly all academies in Europe were proud to count Jacob and Wilhelm among their members. The more robust Jacob undertook many journeys for scientific investigations, visiting France, The Netherlands, Belgium, Switzerland, Austria, Italy, Denmark, and Sweden. Jacob remained a bachelor; Wilhelm married Dorothea Wild from Kassel, with whom he had three children: Herman (literary and art historian, 1828–1901), Rudolf (jurist, 1830–89), and Auguste (1832–1919). The graves of the brothers are in the Matthäikirchhof in Berlin. (L.De.)

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By Wilhelm. Altdänische Heldenlieder, Balladen und Märchen (1811); *Über deutsche Runen* (1821); *Grâve Ruodolf* (1828); *Die deutsche Heldensage* (1829); *Vrîdankes Bescheidenheit* (1834); *Kleinere Schriften,* 4 vol. (1881–87).

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Grimmelshausen, Hans Jacob Christoph von, Jacob Christoph also spelled JAKOB CHRISTOFFEL (b. 1621/22, Gelnhausen, near Frankfurt am Main—d. Aug. 17, 1676, Renchen, Strasbourg), German novelist, whose *Simplicissimus* series is one of the masterworks of his country's literature. Satirical and partially autobiographical, it is a matchless social picture of the often grotesque Thirty Years' War (1618–48).

Apparently the son of an innkeeper of noble descent, Grimmelshausen was orphaned at an early age. While still a child, he was drawn (or kidnapped) into the Thirty Years' War by Hessian and Croatian troops. He served as a musketeer, formally joined the imperial army, and in 1639 became secretary to Reinhard von Schauenburg, commandant at Offenburg.

After the war, as steward for the Schauenburg family, he collected taxes from peasants, dragged defaulters into court, and served as host at a Schauenburg tavern. To supplement his income, he sold horses. He left in 1660 when it was found that he had bought land with money belonging to the family.

Afterward he was successively steward for a wealthy physician and art lover, Johannes Rüffen of Strasbourg; a tavernkeeper at Gaisbach; and bailiff at Renchen, where he survived an invasion.

Grimmelshausen, who had begun writing in his army days, published two minor satires in

1658 and 1660; and then in 1669 the first part of *Simplicissimus* (full title, *Abenteuerlicher Simplicissimus* ["Adventurous Simplicissimus"]). Grimmelshausen's authorship, however, was not established until 1837 from the initials HJCVG, which he used in a sequel to identify himself merely as editor.

Modelled on the 16th-century Spanish picaresque novel, *Simplicissimus* traces the development of a human soul in a Germany riven by depopulation, depravity, fear, and superstition. Ribald humour abounds, as does realistic detail. Scenes of extreme cruelty, such as peasants being spitted like pigs, may well have been grounded in fact.

Continuations of *Simplicissimus* include *Die Lanstörtzerin Courage* (1669; *Courage, the Adventuress,* 1964), which inspired Bertolt Brecht's play *Mutter Courage und ihre Kinder* (1941; *Mother Courage and Her Children*); and *Das wunderbarliche Vogelnest* (1672; "The Magical Bird's Nest"). One part of the latter, translated as *The False Messiah* (1964), is about an adventurer whose pose as the Messiah enables him to steal a wealthy Jew's money and daughter; it is at once a satire on gullibility and avarice.

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Grimm's law, description of the regular correspondences in Indo-European languages formulated by Jacob Grimm in his *Deutsche Grammatik;* it pointed out prominent correlations between the Germanic and other Indo-European languages of Europe and western Asia. The law was a systematic and coherent formulation, well supported by examples, of patterns recognized as early as 1814 by the Danish philologist Rasmus Kristian Rask. It is important for historical linguistics because it clearly demonstrates the principle that sound change is a regular phenomenon and not a random process affecting only some words, as had been thought previously.

Grimm described two consonant shifts involving essentially nine consonants. One shift (probably a few centuries before the Christian era) affected the Indo-European consonants and is evident in English, Dutch, other Low German languages, and Old Norse. The other shift (about the 6th century AD) was less radical in scope and affected the Germanic consonants, resulting in the consonant system evident in Old High German and its descendants Middle High German and Modern High German (standard German). According to the law, the ancient unvoiced *p, t, k* became the English unvoiced *f, th, h* and the Old High German *f, d, h,* producing such correlations as that between the initial consonants of Greek *pod-*, English *fod,*" and Old High German *fuo.* The law further stated that the ancient voiced *b, d, g* became the English unvoiced *p, t, k* and the Old High German spirant stops *f, ts, kh;* hence, the correlation between Latin *duo,* English "two," and modern German *zwei* (pronounced "*ts*vai"). Also, the originally voiced *bh, dh, gh* became the English voiced *b, d, g* and the Old High German *p, t, k*; *compare* Sanskrit *bhárati,* English "bear," and the Upper German dialects of Old High German *ki-peran* (later standard German *gebären*). The Old High German examples show the second shift in addition to the first, which is seen in English.

Grimoald (d. 656, Paris), Carolingian mayor of the palace of Austrasia.

He succeeded his father, Pepin I of Landen, in 643 and for 13 years served under King Sigebert III; but, when the latter died in 656, Grimoald, rich and able, attracted sufficient partisans to consider that the time was ripe to supplant the Merovingians. He had Sigebert's son and heir, Dagobert II, shorn of hair and packed off to an Irish monastery and then proclaimed his own son, Childebert the Adopted, king of Austrasia. The Austrasian aristocracy, however, reacted violently against him and his king, who was not of the blood royal. Grimoald, his son, and his brother-in-law Ansegisel were finally seized and turned over to the king of Neustria, Clovis II, who had them killed. The family disappeared from politics for about 14 years, until the rise of Ansegisel's son, Pepin II of Herstal.

Grimoald, Nicholas: *see* Grimald, Nicholas.

Grimoard, Guillaume de (pope): *see* Urban V, Blessed.

Grimond, Jo, byname of JOSEPH GRIMOND (b. July 29, 1913, St. Andrews, Fife, Scot.), leader of the British Liberal Party during its resurgence after World War II.

Educated at Eton and Oxford, Grimond was called to the bar in 1937. After serving as an officer in the British Army from 1939 to 1947, he was appointed secretary of the Scottish National Trust, an organization concerned with the preservation of historic buildings. Elected to the House of Commons in 1950, he was soon chosen Liberal whip.

In 1956 Grimond was elected leader of the parliamentary Liberal Party and set out to revitalize the party. He attacked the 1957 Suez invasion by England, France, and Israel and set the Liberals in opposition to an independent British nuclear deterrent. The Liberals had been the first party to favour entry into the European Economic Community in 1955, and he was vigorous in promoting the policy. He offered proposals for greater social and educational expenditure and called for "co-partnership in industry" between management and labour. His innovative approach and telegenic personality brought early success in 1958 with a major upset by-election victory for himself and increased support for the Liberals in other by-elections. In 1959 the Liberals more than doubled their vote of 1955, though they won only six seats. They carried nine constituencies in 1964 and won a 1965 by-election.

Though the party won 12 seats in 1966, Grimond, dissatisfied with the rate of progress, relinquished the leadership in January 1967. Briefly, for two months in 1976, he assumed a caretaker's role until David Steel replaced Jeremy Thorpe as party leader. He wrote *The Liberal Future* (1959), *The Liberal Challenge* (1963), and *The Common Welfare* (1978). An autobiography, *Memoirs,* was published in 1979.

Grimsby (England): *see* Great Grimsby.

Grímsey (Icelandic: Gríms Island), island in the Greenland Sea 50 mi (80 km) north of the town of Akureyri on the northern coast of Iceland. The island, 3 mi long and 2 sq mi (5 sq km) in area, straddling the Arctic Circle, is the northernmost inhabited location in Iceland and the only part of the country within the Arctic Circle. Clustered around a tiny harbour on the southwestern coast, the island's population makes its living by fishing. Pop. (1982 est.) 103.

Grimshaw, Beatrice (Ethel) (b. 1871, County Antrim, Ire.—d. June 30, 1953, Bathurst, N.S.W., Australia), Irish-born writer and traveller whose many books deal with her travels and adventures in the South Seas.

Grimshaw was educated at Victoria College, Belfast; at Pension Retailaud, Caen, Fr.; at the University of Belfast; and at Bedford College, London. She was commissioned by the London *Daily Graphic* to travel around the world and report her experiences. But she was so attracted by the Pacific islands that the journey was never completed; she settled in Papua in 1907 and became the first white woman to grow tobacco there. She travelled extensively among the islands of the Pacific and the East Indies and made detailed studies of local legends and customs. She wrote more than 33 novels and travel books based on these experiences, of which the best known is the novel *The Red Gods Call* (1910). Another important novel is *The Victorian Family Robinson* (1934), and her travel books include *From the Fiji to the Cannibal Islands* (1907).

Consult the INDEX *first*

Grimthorpe (of Grimthorpe), Edmund Beckett, 1st baron, also called (until 1874) EDMUND BECKETT DENISON, or (1874–86) SIR EDMUND BECKETT, 5TH BARONET (b. May 12, 1816, Carlton Hall, near Newark-upon-Trent, Nottinghamshire, Eng.—d. April 29, 1905, St. Albans, Hertfordshire), English lawyer and horologist notorious in his day for his disputatious demeanour but now better remembered as the designer of the highly accurate regulator incorporated in the clock in the tower of the British Houses of Parliament.

Denison was educated at Trinity College, Cambridge, and was called to the bar in 1841. He practiced law for the succeeding four decades, amassing a considerable fortune and establishing a formidable reputation, more for his abrasive courtroom tactics than for his legal expertise. Throughout this period and later, he took part in acrimonious controversies on theological, architectural, and scientific topics. He contributed to, or meddled in, the construction or restoration of several public buildings.

His *Rudimentary Treatise on Clock and Watchmaking* (1850) demonstrated his competence in horology and passed through eight editions. Around 1851, in association with Sir George Airy (then astronomer royal) and the clockmaker Edward John Dent, Denison undertook the design of the clock for the tower of the Houses of Parliament; Denison's principal contribution was a novel gravity escapement that imparted unprecedented accuracy to the clock. This project, like many others, was the occasion of numerous polemics; one of these culminated in a suit for libel, successfully brought against Denison by the designer of the clock's great bell. During his career, Denison took part in the design of more than 40 big clocks, including that in St. Paul's Cathedral in London.

When he succeeded to his father's baronetcy in 1874, he dropped the surname Denison and styled himself Sir Edmund Beckett until, upon his elevation to the barony in 1886, he became Lord Grimthorpe.

Grin, Aleksandr Stepanovich, pseudonym of ALEKSANDR STEPANOVICH GRINEVSKY (b. Aug. 23 [Aug. 11, old style], 1880, Slobodskoy, Kirov *oblast,* Russia—d. July 8, 1932, Stary Krym, U.S.S.R.), Soviet prose writer notable for his romantic short stories of adventure and mystery.

The son of an exiled Pole, Grin spent a childhood of misery and poverty in a northern provincial town. Leaving home at 15, he travelled to Odessa, where he fell in love with the sea, an important element in many of his stories. He worked at a variety of jobs and then roamed across European Russia and the Urals. In the early 1900s he joined the Socialist Revolutionary Party and was shortly afterward arrested and exiled to Siberia. After his return he devoted himself to writing.

Grin's stories drew on his travels and adventures and reflect his extensive reading of Western writers. His tales are among the most

exotic of all Russian literature, fantastic and whimsical works full of mystery and adventure and with no relation to everyday life. Soviet critics have named their imaginary romantic and ideal setting "Grin-Land." His writing was so unusual and unclassifiable that the Soviet censors generally ignored him; during the late 1920s, however, some critics began to question his social significance. In 1950 his work was condemned as antisocial, bourgeois, and decadent. During the relaxation that followed Stalin's death, however, he was quietly reconsidered, and his works began to be published again.

Grin is now fully recognized as a master in the genre of the allegorical and symbolic tale and novel, and as the creator of a fantasy world expressive of a profound humanism and moral responsibility. Among his best known works are the novels *Blistayushchiy mir* (1923; "The Glittering World") and *Doroga nikuda* (1930; "The Road to Nowhere"); and the tales *Korabli v Lisse* (1918; "The Ships in Liss") and *Serdtse pustyni* (1923; "Heart of the Desert"). His story *Alyye parusa* (1923; *Scarlet Sails*, 1967) was the basis for a Soviet ballet and film. In 1930–31 Grin began working on his memoirs, which were left unfinished at his death.

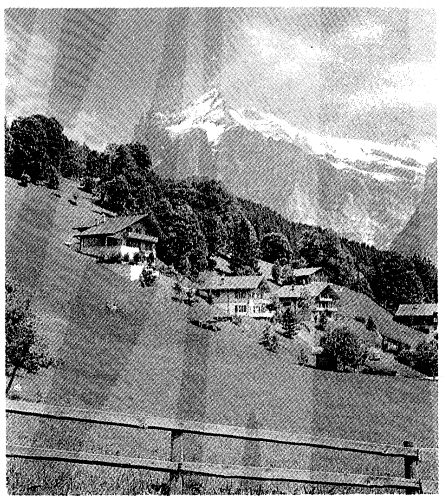
Grindal, Edmund (b. 1519?, St. Bees, Cumberland, Eng.—d. July 6, 1583, Croyden, Surrey), English archbishop of Canterbury whose Puritan sympathies brought him into serious conflict with Queen Elizabeth I.

Educated at Magdalene and Christ's colleges, Cambridge, he became a royal chaplain and prebendary of Westminster in 1551 and, during the reign of Mary I, went to the Continent on diplomatic missions relating to religious affairs. On the accession of Elizabeth I he returned home and the following year was nominated bishop of London, but he hesitated to accept because of his scruples about the "ornaments" rubric in the Elizabethan prayer book, the outdoor habit of the clergy, and the use of wafer bread for Holy Communion. He consulted Peter Martyr, who advised acceptance so that they might work from within for the removal of the remaining relics of popery. As bishop of London Grindal was a thorn in the side of Archbishop Matthew Parker, who wished to enforce the wearing of the surplice but enjoyed little support from Grindal.

In 1570 Grindal was made archbishop of York and he became a determined opponent of Thomas Cartwright and the Presbyterianizing party, which desired the abolition of the prayer book and of episcopacy. Accordingly he was nominated to the archbishopric of Canterbury in 1576 in the hope that he might drive a wedge between the moderate Puritans and the new party of revolution. He introduced a series of moderate reforms of abuses, which might have been effective 10 years earlier. Unfortunately he fell foul of Elizabeth in regard to "prophesyings," or meetings of clergy for mutual edification and study, since he wished to regulate and continue them, whereas she wished to prevent their meeting. Grindal thereupon addressed to the Queen a remonstrance, in which he pointed out to her the limits of her authority in ecclesiastical matters and exhorted her to respect that of the bishops, in terms as unaccustomed as unwelcome to Elizabeth. She retorted by suspending him from the exercise of his metropolitan functions, and the dispute dragged on until his death.

Grindel, Eugène: *see* Éluard, Paul.

Grindelwald, Alpine village and valley, Bern canton, south central Switzerland. The village is scattered on the slopes of the Lütschine Valley (Lütschental), part of the Grindelwald Valley in the Bernese Oberland (highland), southeast of Interlaken. The Grindelwald Valley is shut in on the south by the Wetterhorn, Mettenberg, and Eiger (peaks rising above 10,000 ft [3,050 m]), between which are two famous ice streams—the Upper and Lower Grindelwald glaciers. On the north it is sheltered by the Faulhorn range; on the east is the Grosse Scheidegg Pass, and on the southwest are the Kleine Scheidegg and Wengernalp (crossed by a railway), dividing it from Lauterbrunnen.



Grindelwald Valley, Switz., with the Wetterhorn in the background
Van Phillips—Shostal/EB Inc.

The Grindelwald Valley was originally used during the summer for pasturage by serfs of various great lords. Gradually, the Austin (Augustinian) canons of Interlaken bought out all the other landowners of the valley, but, when that order was suppressed in 1528 by Bern, the inhabitants gained their freedom.

One of Switzerland's chief mountaineering, summer, and winter resorts, Grindelwald village is the starting point for climbing the First (7,113 ft), which is reached by a chair lift 3,720 ft in length. The valley possesses excellent pastures and fruit trees. Pop. (1980) 3,555.

grinding machine, tool that employs a rotating abrasive wheel to change the shape or dimensions of a hard, usually metallic, body.

All of the many types of grinding machines use a grinding wheel made from one of the manufactured abrasives, silicon carbide or aluminum oxide. The wheel is manufactured by mixing selected sizes of abrasive granules with a bonding agent (such as clay, resin, rubber, shellac, or silicate of soda) and fusing them together by baking or firing. The grade (hardness) of a wheel is determined by the ratio of bond to abrasive. Properly, a grinding wheel is self-sharpening because as it is worked, the dull grains break off, exposing fresh, sharp grains. The harder the grade, the more slowly the wheel releases the grains.

The shapes that can be produced by machine grinding depend on the shapes that can be cut with a diamond or other "dresser" on the sides and edge of the grinding wheel and the manner in which the workpiece is moved relative to the wheel. To grind a cylindrical form in a workpiece, the piece is rotated as it is fed against the grinding wheel. To grind an internal surface, a small wheel is so mounted that it can move back and forth inside the hollow of the workpiece, which is gripped in a rotating chuck.

On a surface grinder, a flat magnetic plate or a vise holds the workpiece in place on a table that moves back and forth under the rotating abrasive wheel. At the end of each traverse the table is moved automatically a short distance at right angles to the direction of travel.

Many special guiding machines and devices are available for grinding tools.

grindle (fish): *see* bowfin.

Grinevsky, Aleksandr Stepanovich: *see* Grin, Aleksandr Stepanovich.

Gringore, Pierre, Gringore also spelled GRINGOIRE (b. *c.* 1475, Normandy, Fr.—d. *c.* 1538), French actor-manager and playwright, best known as a writer of *soties* (satirical farces) for *Les Enfants Sans Souci,* a famous medieval guild of comic actors of which Gringore was for a time the second dignitary, Mère Sotte (Mother Fool). As Mère Sotte he enjoyed the favour of Louis XII and took advantage of his fool's costume to launch scathing attacks against the King's enemy Pope Julius II. After the accession of Francis I, Gringore moved to Lorraine in 1518.

Grinius, Kazys (b. Dec. 17, 1866, Salema, near Marijampole, Lithuania, Russian Empire—d. June 4, 1950, Chicago), Lithuanian patriot and statesman who was active in the struggle for independence from Russia and served as prime minister (1920–23) and president (1926) of the republic during the period of liberal democracy.

Grinius studied medicine in Moscow and from 1894 practiced in several Lithuanian towns. He contributed articles to the clandestine patriotic and liberal publication *Varpas* (1889–1905; "The Bell") and was one of the founders of the Lithuanian Democrat (Liberal) Party in 1902. Before World War I his house at Marijampole was a gathering place for Lithuanian democrats, and he was persecuted by the tsarist Russian government.

After World War I, as a leader of the Lithuanian Peasant Populist Party, Grinius was a member of the Lithuanian constituent assembly. On June 8, 1920, he formed a Cabinet that on June 12 signed a peace treaty with the Soviet Union. He resigned as prime minister on Feb. 1, 1922. On June 7, 1926, he was elected president of Lithuania and served until the military coup d'etat in favour of a Nationalist government on December 17. He then resumed his medical practice in Kaunas.

When the Germans invaded Lithuania in 1941 he refused an invitation to take part in a German-controlled government, courageously condemning Nazi persecution of Lithuanian Jews. He escaped the Soviet occupation in 1944 by fleeing to Germany and went to the United States in 1947.

Grinnell, city, Poweshiek County, east central Iowa, U.S., 51 mi (82 km) east-northeast of Des Moines. It was founded by Josiah Bushnel Grinnell, a Congregational clergyman, Abolitionist, congressman, and railway promoter from New York City, to whom Horace Greeley, the American journalist, made his famous statement, "Go West, young man, go West, and grow up with the country!" Grinnell College originated in 1846 at Davenport as Iowa College, which moved to Grinnell in 1859 and merged with another (Grinnell) college (founded in 1855). The college plays a significant social and economic role in the life of the city; other economic factors are agriculture (grain and livestock) and light manufactures (playground and farm equipment, gloves). Grinnell Historical Museum displays memorabilia of J.B. Grinnell and Billy Robinson (an early aviator known locally as the "Bird Man"). J.B. Grinnell's Long Home (preserved) served as a station on the Underground Railroad, an escape route for runaway Negro slaves. Rock Creek State Park is nearby. Inc. town, 1865; city, 1882. Pop. (1980) 8,868.

Grinnell's axiom: *see* competitive exclusion, principle of.

Gripenberg, Bertel Johan Sebastian, Friherre (baron) (b. Sept. 10, 1878, St. Petersburg, Russia—d. May 6, 1947, Sävsjö, Swed.),

one of the foremost Finnish poets who wrote in Swedish.

He studied law at Helsinki University, became a free-lance writer, and spent the last years of his life on his estate at Sääksmäki in southwest Finland. Gripenberg's first collection, *Dikter* (1903; "Poems"), attracted attention for its richness of colour and sensualism. This and other early collections, of which the most important are *Gallergrinden* (1905; "The Iron Gate") and *Svarta sonetter* (1908; "Black Sonnets"), show his proud individualism, love of beauty, and skillful handling of the sonnet form in particular. He gradually found in the landscape of central Finland a solace for the feelings of loneliness and anger so apparent in *Svarta sonetter.* The collections *Drivsnö* (1909; "Loose Snow"), *Aftnar i Tavastland* (1911; "Evenings in Tavastland"), *Skuggspel* (1912; "A Play of Shadows"), and *Spillror* (1917; "Broken Bits") include more tranquil contemplative poetry, often dwelling on the idea of death. Later collections contain some fine patriotic poems (*e.g.,* on the 1918 war of independence). In some of his works, Gripenberg degenerates into theatrical attitudes and empty pathos. In his last collections, *Vid gränsen* (1930; "On the Border"), *Livets eko* (1932; "The Echo of Life"), and *Sista ronden* (1941; "The Last Rounds"), the tone is again calmer and more sombre. He also published some prose works, including his memoirs, *Det var de tiderna* (1943; "Those Were the Times"), and translated into Swedish the *Ballad of Reading Gaol* by Oscar Wilde, whose influence is apparent in his own works, and works by the British fiction writer Robert Louis Stevenson and by the U.S. poet Edgar Lee Masters.

Gripenstedt, Johan August, Friherre (Baron) (b. Aug. 11, 1813, Holstein—d. July 13, 1874, Stockholm), politician who initiated and guided Sweden's transition to a capitalist economy. He also played a decisive part in turning Sweden from a Pan-Scandinavian foreign policy in the 1860s.

After a career as an artillery officer in the Swedish Army, Gripenstedt entered the upper chamber of the Riksdag (estates assembly; after 1865, the modern Swedish Parliament), in which he became the country's leading advocate of economic liberalism. Serving as minister without portfolio from 1848 to 1850 and from 1852 to 1855 and as finance minister in 1851 and again from 1856 to 1866, he emphasized the need to adopt a free-trade policy. After bringing about partial tariff reductions in the 1850s, he negotiated a trade agreement with France in 1865 embodying the principle of free trade. After ratification by the Riksdag, the agreement initiated a national policy of minimal trade restrictions. In 1863 Gripenstedt played a major role in Sweden's foreign policy by dissuading the government from entering with Denmark a defense alliance that would have embroiled Sweden in Denmark's war against Prussia and Austria (1864). His action led to the decline of the Pan-Scandinavian movement.

grippe (disease): *see* influenza.

Griqua, 19th-century people, of mixed Khoikhoin and European ancestry, who occupied the region of central South Africa just north of the Orange River. In 1848 they were guaranteed some degree of autonomy by a treaty with the British governor of South Africa. Under the leadership of Adam Kok III, the Griqua sided with the British in a war against the Boers. Their tendency to favour the British over the Boers took on greater significance after the creation of the Orange Free State in 1854 and the discovery of diamonds in the region in 1867.

Kok, who ruled the eastern portion of the Griqua territory (around Philippolis), saw no hope of successfully resisting the Orange Free State. He ceded his land rights to the new state in 1861 and led his people on a great trek east-southeast, to the southern foothills of the Drakensberg. His new home became Griqualand East. Kok's rival, Nicholaas Waterboer, who ruled farther west around Kimberley, met no serious challenge to his land rights until diamonds were discovered there. Waterboer asserted his claim to the land (Griqualand West) and succeeded, with British aid, in resisting absorption into the Orange Free State. Great Britain recognized the Griqu.. as British subjects in 1871 and annexed Waterboer's land to the British crown. It eventually became a part of the Cape Colony.

Griqualand East, historic region of Cape Province, South Africa, now within interior southwest Natal and adjacent areas of interior Transkei. In 1861 Adam Kok III, the chief of the Griqua people (a mixed-race group of white and Khoikhoin ancestry), led his people from what had become the Orange Free State to Griqualand East after many had been forced to sell their lands to white trekkers. The British hoped the Griquas would be a buffer there between African tribes and white settlers. The influence of European law increased in the area until 1879, when Griqualand East was formally annexed to the Cape Colony and Griquas were once again forced to sell their land to white settlers. Many of the demoralized Griqua eventually resettled north of Cape Town.

In 1903 the district of Griqualand East was established as a black African council and was admitted into the Transkeian territories, which, although they contained many European farms in certain areas, were chiefly a black reserve.

The eastern portion of the former Griqualand East (around Umzimkulu) and the larger western portion (around Mt. Fletcher, Qumbu, Mt. Frere, and Mt. Ayliff) became part of the independent state of Transkei in 1976. The central portion (around Kokstad, Cedarville, and Franklin) remained an exclave of Cape Province until 1978, when it was transferred to Natal. Dairy farming and cheese processing are major economic activities.

Griqualand West, historic and contemporary region, northern Cape Province, South Africa, directly northwest of the juncture of the Vaal and Orange rivers. It is an arid plateau region settled in the late 18th century by the Griqua, a mixed-race group of white and Khoikhoin ancestry fleeing discrimination around Cape Town. Many were semi-nomadic, living by raiding and hunting, while others raised cattle near springs. Diamonds discovered in the area in 1867 led to disputed claims between the Boer republics, the Griqua, and the British Cape Colony. In 1871 the British formally annexed Griqualand West, incorporating it into the Cape Colony nine years later. Most Griqua were forced to sell their farms to whites. Very few remained in the area by the end of the 19th century. Diamonds continue to be mined in Griqualand West, and cattle and sheep are grazed. The rich deposits of the Finsch diamond pipe mine east of Postmasburg have been worked since 1963 by De Beers Consolidated Mines, Ltd. The main town is Kimberley.

Gris, Juan, original name JOSÉ VICTORIANO GONZÁLEZ (b. March 23, 1887, Madrid—d. May 11, 1927, Boulogne-sur-Seine, Fr.), Spanish artist whose somberly coloured still lifes pioneered the style of painting called Synthetic Cubism and formed a major force in the development of avant-garde art in France immediately after World War I.

A more theoretical painter than his fellow Cubists Pablo Picasso and Georges Braque, Gris systematized their discoveries, making their intuitions comprehensible and, consequently, helping to spread the Cubist style.

He was given a scientific education before he studied art. In 1906 Gris moved to Paris, where he made drawings for newspapers in the sensuously curvilinear Art Nouveau style. He settled in Montmartre in the Bateau-Lavoir,

Gris
Galerie Louise Leiris

an artists' dwelling where his compatriot Picasso lived. Gris was thus in touch with the evolution of Cubism. In 1913–14 he arrived at a personal and mature version of Synthetic Cubism in which the use of *papier collé* (paper collage) was all important. Gris envisaged the basis of every painting as "a sort of flat coloured architecture." He created synthetically an image of reality out of purely pictorial elements, and his greatness results from his having been able to temper intellectual and mathematical calculation with intuition and sensibility. Gris's version of Cubism was more severe and classical, less spontaneous and instinctive, than that of Braque and Picasso. Between 1921 and 1927 Gris transformed his Synthetic Cubist idiom so that his style became increasingly free and lyrical.

grisaille, painting technique by which an image is executed entirely in shades of gray and usually severely modelled to create the illusion of sculpture, especially relief. This aspect of grisaille was used particularly by the 15th-century Flemish painters (as in the outer wings of the van Eycks' "Ghent Altarpiece"; 1432, Cathedral of Saint-Bavon, Ghent) and in the late 18th century to imitate classical sculpture in wall and ceiling decoration. Among glass painters, grisaille is the name of a gray, vitreous pigment used in the art of colouring glass for stained glass. In French "grisaille" has also come to mean any painting technique in which translucent oil colours are laid over a monotone underpainting.

Grisaille stained glass, detail of the Five Sisters Window, 13th century, Cathedral of St. Peter, York, North Yorkshire, Eng.
Copyright Sonia Halliday and Laura Lushington

In the grisaille enamel painting technique, pulverized white vitreous enamel is made into a paste by mixing it with water, turpentine, oil of lavender, or petroleum oil and is then applied to a dark enamel ground, usually coloured black or blue. Lighter areas of the design are thickly painted, while the gray areas are obtained by painting with thinner coats to allow the dark background colour to tone the white enamel pigment. This technique achieves a dramatic effect of light and shade and a pronounced sense of three-dimensionality. Grisaille enamels were developed in the

"Temperance," enamel plaque with the figure of Temperance done in grisaille by Jean II Pénicaud, Limoges, Fr., c. 1540–45; in the Walters Art Gallery, Baltimore

By courtesy of the Walters Art Gallery, Baltimore; photograph, James Karmrodt Lightner

16th century in France by the Limoges school of enamelers. Among the most noted practitioners of this technique were members of the Pénicaud family. *See also* Limoges painted enamels; Pénicaud family.

Griselda, also spelled GRISILDA, GRISELDIS, GRISEL, or GRISSIL, also called PATIENT GRISELDA, character of romance in medieval and Renaissance Europe, noted for her enduring patience and wifely obedience. She was the heroine of the last tale in the *Decameron* by Giovanni Boccaccio, who derived the story from a French source. Petrarch translated Boccaccio's Italian version into Latin in *De Obidentia ac fide uxoria mythologia,* upon which Geoffrey Chaucer based his English version found in "The Clerk's Tale" of the *Canterbury Tales.* The English playwright Thomas Dekker collaborated on another version, *Patient Grissil* (1603).

The story relates how the Marquis of Saluzzo chooses Griselda for his wife from among the peasantry and, to test her fidelity, first pretends that their children are dead by his hand and then pretends to remarry out of boredom and cast her aside. Through these and other trials, Griselda maintains her patience and devotion, and finally he relents; Griselda is returned to her home and children, winning everyone's admiration.

Grishino (Ukraine): *see* Krasnoarmeysk.

Grishun (Switzerland): *see* Graubünden.

Grishun language: *see* Romansh language.

Grisi, Carlotta, original name CARONNE ADELE JOSEPHINE MARIE GRISI (b. June 28, 1819, Visinada, Istria, Austrian Empire [now Vizinada, Yugos.]—d. May 20, 1899, Geneva, Switz.), Italian ballerina who created the title role in the Romantic ballet *Giselle* in 1841 at the Paris Opéra.

Grisi studied at the ballet school of La Scala, Milan, and began her career at the age

Carlotta Grisi, engraving by Haquental

By courtesy of the Bibliotheque de l'Opera, Paris; photograph, Pic

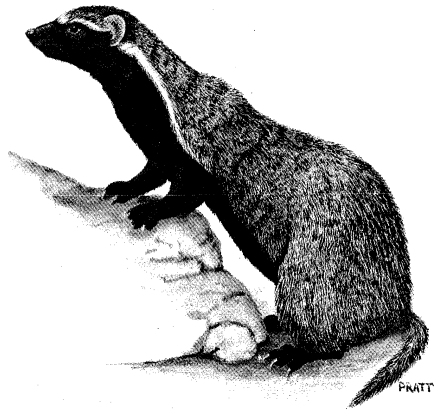
of eight. After dancing with Jules Perrot in Naples in 1834, she became his pupil and later his wife. Brilliant successes in Vienna and London were followed by an engagement at the Paris Opéra in 1841, where Grisi was spectacularly acclaimed.

Théophile Gautier, who adapted *Giselle* from legend, saw her as an ideal combination of Marie Taglioni's ethereal lightness and Fanny Elssler's robust warmth and fell in love with her. Eventually she left Perrot for Lucien Petipa, her partner. Grisi also created *La Péri* (1843), *Esmeralda* (1844), *Paquita* (1846), and one of the roles in Perrot's *Pas de quatre* (1845) in London with Taglioni, Fanny Cerrito, and Lucile Grahn. She appeared in Russia (1850) and retired to Geneva at the age of 35.

Grisi, Giulia (b. July 28, 1811, Milan, Italy—d. Nov. 29, 1869, Berlin, Prussia [Germany]), Italian soprano whose brilliant dramatic voice established her as an operatic prima donna for more than 30 years.

Grisi made her debut at the age of 17 in Gioacchino Rossini's *Zelmira,* and in 1830 Vincenzo Bellini wrote for her the part of Giulietta in *I Capuleti ed i Montecchi.* At 20 in Milan she created the part of Adalgisa in Bellini's *Norma,* then broke her Milan contract and went to Paris, where she appeared in the title role in Rossini's opera *Semiramide* (1832). She continued successful appearances in Paris until 1849. She also began a long career in London, first appearing as Ninetta in Rossini's *La gazza ladra* in 1834. In 1835 Bellini wrote *I puritani* for the great quartet of Grisi, the bass Luigi Lablache, the tenor Giovanni-Battista Rubini, and the baritone Antonio Tamburini. In 1839 the tenor Giovanni Mario (later Grisi's permanent companion) replaced Rubini, and for them Gaetano Donizetti wrote *Don Pasquale.* This quartet reigned supreme for about 25 years.

grison, also called HURON (Spanish: "ferret"), either of two weaselike carnivores of the genus *Galictis* (sometimes *Grison*), family Mustelidae, found in most regions of Central and South America; sometimes tamed when young. These animals have small, broad ears, short legs, and slender bodies 40–50 cm (16–22 inches) long, weighing 1–3 kg (2–6.5 pounds); the tail accounts for an additional 15–20 cm (6–8 inches). Their backs are grayish or brown and their limbs, lower parts, and faces are black; a white stripe runs across



Grison (*Galictis*)

Drawing by H. Douglas Pratt

the forehead and along the sides of the neck. Gregarious and generally diurnal, they climb, swim, and burrow adeptly and feed on small animals and fruit. Their litters contain two to four young.

Grisons (Switzerland): *see* Graubünden.

Grisons language: *see* Romansh language.

Grissom, Virgil I(van), byname GUS GRISSOM (b. April 3, 1926, Mitchell, Ind., U.S.—d. Jan. 27, 1967, Cape Kennedy, Fla.), second U.S. astronaut to travel in space and the command pilot of the ill-fated Apollo 1 crew. He and his fellow astronauts Edward H. White and Roger B. Chaffee were killed, becoming the first casualties of the U.S. space program, when a flash fire swept their space capsule during a simulation of the scheduled Feb. 21, 1967, launching of Apollo 1.

Commissioned in the U.S. Air Force in 1951, Grissom flew 100 missions in the Korean War, earning the Distinguished Flying Cross and the Air Medal with cluster. He was a test pilot and flying instructor until 1959, when he was selected as one of the original seven astronauts for Project Mercury. On July 21, 1961, Grissom became the second man to enter space.

On March 23, 1965, Grissom became the first man to return to space, as he (as command pilot) and Lieutenant Commander John W. Young made three orbits in the first manned Gemini flight, Gemini 3. During that flight Grissom demonstrated that men could maneuver a capsule manually.

Griswold, Alfred Whitney (b. Oct. 27, 1906, Morristown, N.J., U.S.—d. April 19, 1963, New Haven, Conn.), president of Yale University from 1950 to 1963 who greatly enhanced the school's endowment and expanded its educational facilities.

Educated at private schools and at Yale (B.A., 1929; Ph.D., 1933), Griswold taught English at Yale for a year and then changed his academic concentration to history, which he taught at Yale from 1933, becoming assistant professor in 1938, associate professor in 1942, and full professor of history in 1947.

He founded the Yale Political Union (1934) to spur student interest in and debate about world events. During World War II he headed special U.S. Army training programs in languages and civil affairs. After the war Griswold's efforts to bring Yale alumni into more active association with the university led to the creation (1948) of the Yale University Council, an advisory alumni organization.

In July 1950 Griswold became Yale's 16th president and presided over the trebling of Yale's endowment to $375,000,000, the construction of 26 new buildings, with greatly expanded facilities for engineering and the sciences, and the creation of two undergraduate residential colleges. His approach to faculty recruitment and retention more than doubled

faculty salaries during his tenure. Griswold was an ardent believer in the liberal arts as opposed to a vocationally oriented curriculum. He was deeply committed to teacher training, and in 1952 Yale established a new master of arts program in teaching, affiliated with the traditional liberal arts departments.

Griswold wrote a number of influential books on foreign policy and on education, including *The Far Eastern Policy of the United States* (1938), *Farming and Democracy* (1948), *Essays on Education* (1954), *In the University Tradition* (1957), and *Liberal Education and the Democratic Ideal* (1959).

Griswold, Rufus Wilmot (b. Feb. 15, 1815, Benson, Vt., U.S.—d. Aug. 27, 1857, New York, N.Y.), American journalist, critic, anthologist, and editor who worked with Edgar Allan Poe on *Graham's Magazine* and succeeded him as assistant editor (1842–43).

Griswold traveled extensively in his youth, worked in newspaper offices, was a Baptist clergyman for a time, and finally became a journalist in New York City, where he was successively a member of the staffs of *The Brother Jonathan, The New World* (1839–40), *The New Yorker* (1840), *Graham's Magazine* (1841–43), and *International Magazine* (1850–52), which in 1852 merged into *Harper's Magazine.*

Poe named Griswold his literary executor, a tribute that Griswold repaid by what proved to be numerous slanders and misrepresentations. Nevertheless, he did edit, with James R. Lowell and N.P. Willis, the works (1850) of Poe. He also edited the first U.S. edition of Milton's prose (1845) and compiled a number of anthologies of American writing. His best work is *The Republican Court, or American Society in the Days of Washington* (1855). His books were noted for personality sketches of contemporary writers.

grit, sedimentary rock that consists of angular grains of sand size (0.06–2 mm [0.0024–0.08 inch] in diameter) and small pebbles. The term is roughly equivalent to the term sandstone (*q.v.*).

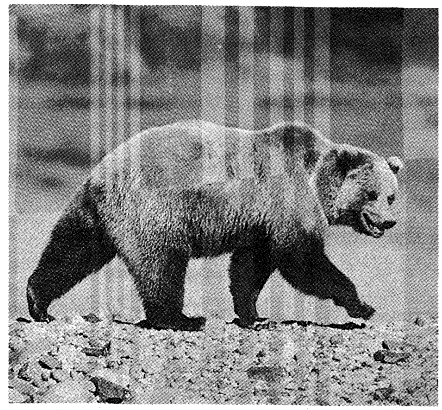
Grivas, Georgios (Theodoros), also called DIGHENIS (b. May 23, 1898, Trikomo, Cyprus—d. Jan. 27, 1974, Limassol), Cypriot patriot who helped to bring Cyprus independence in 1960. His goal was *énosis* (union) with Greece, and in this he failed; indeed, he was a fugitive at the time of his death.

Grivas organized EOKA (Ethnikí Orgánosis Kipriakoú Agónos, or National Organization of Cypriot Struggle) in about 1955, after leading a right-wing resistance group in the Athens area during the German occupation of World War II. With his friend, afterward his enemy, the Orthodox cleric Makarios, he conducted a guerrilla war against the British that led to the independence of Cyprus but not to the *énosis* that was always his objective. After a period of retirement in Greece, he returned to Cyprus in 1971 to revitalize the underground movement against Makarios (then president of Cyprus). On his death, his followers vowed to continue his terrorist campaign for *énosis.*

grivet, African monkey, a species of guenon (*q.v.*).

grizzly bear, also called SILVERTIP, large North American brown bear of the family Ursidae. Grizzly bears, including the Alaskan brown bears, are usually considered to be races of a single species, *Ursus arctos* (*see* brown bear).

More than 80 forms of grizzly bears have been described, most as distinct species but now generally treated as subspecies of *U. arctos*, or *U. horribilis* of some authors. Grizzlies once ranged over western North America from Mexico to Alaska. Their numbers are few in the United States and Mexico and are much reduced elsewhere. They are protected in national parks and in zoos; their natural habitat is northern, open regions. The 9 or 10 populations of Alaskan brown bears (sometimes separated as *U. middendorffi, U. gyas,* and others) are native to the coasts and offshore islands of Alaska.



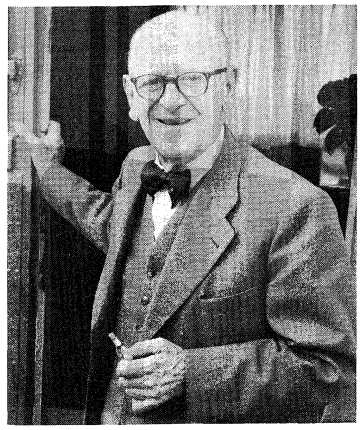
Grizzly bear (*Ursus arctos*)
Stephen J. Krasemann—Peter Arnold, Inc.

Both grizzly and Alaskan brown bears are massive animals with humped shoulders and an elevated forehead that contributes to a somewhat concave profile. The fur is brownish to buff, and the hairs are usually silver- or pale-tipped to give a grizzled effect. Large adult grizzlies may be about 2.5 m (8 feet) long and weigh about 410 kg (900 pounds). Adult Kodiak bears (*U. a. middendorffi*), the largest living land carnivore, may attain a length of more than 3 m (10 feet) and a weight of 780 kg (1,720 pounds).

Omnivorous animals, grizzly and Alaskan brown bears feed on game, fish, berries, and occasionally even grass. They often cache food in shallow holes and they dig readily and strongly in search of rodents. Methodical animals, they develop deeply rutted trails in which each passing bear treads in the footsteps of its predecessor. Bears living in the north retire to dens in winter. Cubs, usually twins, are born at this time of year after about 6–8 months' gestation; at birth, they weigh about 0.5–0.75 kg (1–1.5 pounds).

Because of their bulk and long, straight claws, these bears rarely climb even as cubs. They are, however, surprisingly agile and can run as fast as 48 km (30 miles) per hour. Grizzlies have been known to attack humans without evident provocation. They are highly prized as big game and have been the subject of many North American Indian legends.

Grock, original name CHARLES ADRIEN WETTACH (b. Jan. 10, 1880, Reconvilier, Switz.—d. July 14, 1959, Imperia, Italy), Swiss clown whose blunders with the piano and the violin became proverbial.



Grock
Ullstein

The son of a watchmaker, he became an amateur acrobat and was allowed to spend each summer with a circus, where he performed first as a tumbler and then as a violinist, pianist, and xylophonist. He became the partner of a clown named Brick and changed his name to Grock in 1903. Together they appeared in France, North Africa, and South America. When Brick married, Grock joined the celebrated Antonnet. At Berlin, appearing on a stage instead of in an arena, they failed at first; but, by mastering the stage technique, they obtained a London engagement in 1911. Two years later Grock perfected those adventures of a simpleton among musical instruments that made many a European audience laugh—at his wonder as to where the strings had gone when he held his fiddle the wrong side up. In 1924 he left England and remained on the Continent until his farewell at Hamburg in 1954. Grock wrote several books, among them his autobiography, *Die Memoiren des Königs der Clowns* (1956; *Grock, King of Clowns*).

Grocyn, William (b. *c.* 1446, Colerne, Wiltshire, Eng.—d. 1519, Maidstone, Kent), British scholar who helped prepare the ground for the rise of humanism in England. He was reputedly the first Englishman to teach Greek.

After studying and teaching at Oxford, Grocyn went in 1488 to Italy, where Grocyn was permitted by Lorenzo de' Medici to study Greek with the tutors of his children. On his return, he taught Greek for five years at Oxford and then became rector of St. Lawrence Jewry in London. There he became a member of a group of great English humanists associated with the Dutch scholar Desiderius Erasmus. In 1506 he became warden of All Hallows College, Maidstone.

His only published work is a letter to Aldus Manutius printed in Thomas Linacre's translation of Proclus' *Sphaera* (1499).

Grodno, *oblast* (province), Belorussian Soviet Socialist Republic, occupying an area of 9,650 square miles (25,000 square km) in the west of the republic. Most of the *oblast* consists of the level, often swampy plain of the Neman River, from which the land rises westward, southward, and eastward to a series of undulating morainic uplands. The lowland has sandy or alluvial soils, often acidic, with much mixed pine and oak forest. Most of the upland forest has been cleared for agriculture, causing serious soil erosion. Rye and oats are the main crops, but sugar beets, flax, and tobacco are important on the uplands. Cattle raising and dairying are well developed, especially in the lowland.

Long a predominantly rural *oblast* where towns were small and engaged mostly in timber and food processing, Grodno has been urbanizing steadily and was more than 50 percent urban in the late 1980s. Glass is made in Beryozovka and cement in Ross and Volkovysk. Pop. (1989 prelim.) 1,171,000.

Grodno, city and administrative centre, Grodno *oblast* (province), Belorussian Soviet Socialist Republic, on the Neman River. First mentioned in 1128 as the seat of a princedom, Grodno has had a stormy history, being sacked by the Tatars in 1241 and by the Teutonic Knights in 1284 and 1391. It passed to Lithuania in the 13th century and later to Poland, reverting to Russia in 1795; it was under Poland from 1921 to 1939. Among relics of its past are the ruins of the castle (1580) of the Polish king Stephen Báthory and of an 18th-century castle. Modern Grodno is a major industrial centre, especially for fertilizers, synthetic fibres, and numerous consumer goods. The town has medical, agricultural, and teacher-training institutes. Pop. (1989 prelim.) 270,000.

Groen van Prinsterer, Guillaume (b. Aug. 21, 1801, near The Hague—d. May 19, 1876, The Hague), Dutch Protestant political leader and religious thinker to whose influence can be traced one of the religious parties active in Dutch politics in the later 19th century.

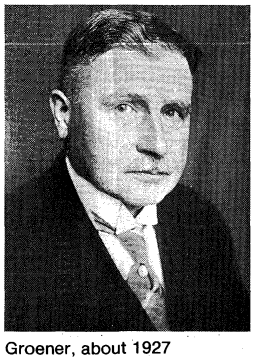
A liberal in his early years, he was converted about 1830 to strict Protestant orthodoxy, becoming one of the pillars of the Réveil, a religious revival and antimodernist movement. In politics Groen provided the theoretical basis for the Dutch denominational political party system. He prepared the way for the foundation of the Anti-Revolutionary Party formed in 1878 by Abraham Kuyper, who, unlike the aristocrat Groen, was capable of rallying the orthodox Protestant lower-middle classes. Although Groen was a member of the Second Chamber (1849–57 and 1862–65), his significance rests on his published works. His handbook of Dutch history (1846) gives his views on the providential genesis of the Protestant Dutch republic and kingdom. In *Ongeloof en Revolutie* (1847; "Unbelief and Revolution"), he identified disbelief in religion with the spirit of the French Revolution.

Groen van Prinsterer, lithograph by E. Spanier after a portrait by J.H. Hoffmeister

By courtesy of the Iconographisch Bureau, The Hague

Groenendael: *see* Belgian sheepdog.

Groener, (Karl Eduard) Wilhelm (b. Nov. 22, 1867, Ludwigsburg, Württemberg [Germany]—d. May 3, 1939, Bornstedt, near Potsdam, Ger.), German general and politician who helped prevent a communist revolution in Germany after World War I by throwing army support to the moderate Social Democratic government of Friedrich Ebert.



Groener, about 1927

Archiv fur Kunst und Geschichte, Berlin

Groener entered the army in 1884. By 1912 he had risen to become head of the railroad department of the German general staff; and, when World War I broke out, he was chiefly responsible for the rapid deployment of Germany's armed forces and their subsequent reinforcement and supply by rail in both the east and west. Later he became chief of several key departments of the War Office and was entrusted with tapping all production reserves for the war economy. In October 1918 Groener replaced Erich Ludendorff as first quartermaster general. Together with Field Marshal Paul von Hindenburg, he informed Emperor William II that he had lost the confidence of the army and advised him to abdicate, advice which the emperor soon took. After the Armistice Groener helped bring Germany's troops home from the front and cooperated with Ebert against the threat of a communist dictatorship by authorizing the formation of special army volunteer units to suppress the communist-inspired uprising.

Retiring from the army in 1919, Groener served as minister of communications (1920–23), minister of defense (1928–32), and minister of the interior (1931–32). He was one of the few top military figures who opposed the Nazis' infiltration of the armed services, and in 1932 he took measures to ban the SA, the Nazis' main paramilitary organization, an action that contributed to his fall from power that same year. After his retirement, he wrote several military histories.

Grolier de Servières, Jean, VICOMTE (viscount) D'AGIUSY (b. 1479, Lyon, Fr.—d. Oct. 22, 1565, Paris), French bibliophile and patron of bookbinders.

Grolier was educated in Paris and became the treasurer and receiver general of the French army in Italy at the age of 30. By 1547 he had become one of the four treasurers of France. Grolier became a patron of Aldus Manutius, who organized the Aldine Press, one of the world's first publishers. Grolier was particularly interested in fine, gold-tooled bindings. He was a patron of many artists, and with his help the growing French bookbinding trade improved to equal the already established and renowned Italian trade.

Grolier's splendid library of approximately 3,000 volumes was sold and dispersed in 1675. His books were richly bound in morocco or calf decorated with intricate designs in gold and colours. Some 400 of these Grolier bindings have survived, and each is marked distinctly with two Latin phrases. On the upper cover of all Grolier books is written *Io. Grolierii et amicorum* ("for Grolier and his friends"). On the lower cover of his books is written *Portio mea, Domine, sit in terra viventium* ("O Lord, may my portion be in the land of the living").

The Grolier Club of New York City was founded in the latter part of the 19th century in honour of Jean Grolier.

Gromyko, Andrey Andreyevich (b. July 18 [July 5, Old Style], 1909, Starye Gromyki, Russia—d. July 2, 1989), Soviet foreign minister (1957–85) and president (1985–88) of the Presidium of the Supreme Soviet of the U.S.S.R. Although never strongly identified with any particular policy or political faction, he served dependably as a skilled emissary and spokesman.

Gromyko was born in a Belorussian village, the son of a peasant, and attended an agricultural school in Minsk, studying agricultural economics. After completing postgraduate studies in 1936, he served as senior research associate at the Institute of Economics of the Academy of Sciences and as a university lecturer (1936–39). In the wake of Joseph Stalin's purges, which depleted the foreign service, Gromyko was appointed chief of the U.S. division of the People's Commissariat of Foreign Affairs in 1939. While yet learning English, he was appointed counselor at the Soviet Embassy in Washington, D.C. In 1943 he became ambassador to the United States (at the young age of 34) and in 1946 became a representative to the UN Security Council. He was promoted to deputy foreign minister in 1946 and further to first deputy foreign minister in 1949. In 1952 he became a candidate member of the Central Committee of the Communist Party and was appointed

Gromyko

Max Machol

ambassador to the United Kingdom. In 1953 he returned to Moscow as deputy foreign minister, resuming his post as first deputy foreign minister in 1954. In 1956 he attained full membership on the Central Committee.

In 1957 Gromyko began his long tenure as foreign minister. His exact influence in policy making is unclear. He became renowned for his extensive knowledge of international affairs and for his negotiating skills, and he was entrusted with major diplomatic missions and policy statements. He frequently accompanied other Soviet leaders, including Nikita S. Khrushchev, Leonid Brezhnev, and Aleksey Kosygin, on visits to foreign leaders. He became a member of the Politburo in 1973 and was named a first deputy chairman of the Council of Ministers in 1983.

After Mikhail S. Gorbachev became head of the Soviet Communist Party in 1985, a younger man, Eduard A. Shevardnadze, was appointed to head the foreign ministry, and Gromyko was promoted to the presidency, a position that carried great prestige but little power. Gromyko gave up his Politburo seat and the presidency of the Supreme Soviet on Sept. 30, 1988, in the midst of Gorbachev's shake up of the Politburo. A further party purge in April 1989 resulted in Gromyko's removal from the Central Committee as well. His autobiography was published in 1988 and translated into English in 1990.

Grönblad–Strandberg syndrome: *see* pseudoxanthoma elasticum.

Gronchi, Giovanni (b. Sept. 10, 1887, Pontedera, Italy—d. Oct. 17, 1978, Rome), Christian Democrat politician who served as president of Italy from 1955 to 1962.

Gronchi graduated from the University of Pisa and, after World War I, helped found the Popular Party, a Catholic party. Elected a deputy (1919), he was undersecretary of industry and commerce when he became a leader in the Aventine secession (1924), which opposed the Fascist leader Benito Mussolini and formed an opposition rump parliament. When this body was suppressed, Gronchi retired from political life.

After World War II he was again a deputy and served as minister of commerce and industry in four cabinets (1944–46). Later he was elected to the Constitutional Assembly (1946) and to the Chamber of Deputies (1948), of which he became the speaker.

In the presidency, primarily a figurehead position, he was much-criticized for interfering in diplomacy as well as domestic affairs. He made many state visits, including a trip to the Soviet Union (1960), which he visited in spite of church opposition.

Groningen, *provincie,* northern Netherlands, drained by numerous short rivers and canals, including the Ems (Eems), the Hoen, the Reit, and the Winschoten canals. The province occupies an area of 906 square miles (2,346 square km) between the Wadden Sea and the Ems Estuary (to the north and northeast), the German border (southeast), and the provinces of Drenthe and Friesland (south

and west) and includes the Frisian island of Rottumeroog.

The early history of the province is chiefly one of almost continuous conflict between the town of Groningen and the surrounding districts known as the Ommelanden. Although Groningen acquired a dominant position in the region, the disputes persisted; the Ommelanden subscribed to the Union of Utrecht (1579) and the revolt against Spain, while the town of Groningen remained loyal to the Spanish king. After 1594 the two were united into one republic, but until the French occupation the Ommelanden kept their own government and sometimes their own army. Only in 1795 were the two merged into one province.

The sandy ridge of the Hondsrug extends from the Drenthe Plateau to the town of Groningen. The northern part of the province is flat and consists of marine and sandy clay, particularly in the estuaries reclaimed in the Middle Ages and the polders reclaimed later along the northern coast. This rich agricultural region produces wheat, barley, oats, potatoes, sugar beets, oilseeds, and pastures for livestock (especially in the Ommelanden around the capital). Except for the sandy islands of the Westerwolde region, the southeastern part of the province was an extensive peat bog until the end of the 16th century. Reclamation and the transformation of the sandy subsoil by manuring and fertilizing created an agricultural region (Groninger Veenkolonien). The morass along the German border had long been considered a natural frontier and so was left in its impassable condition until the second half of the 19th century. Agriculture in this region has specialized in rye, oats, and potatoes for the starch industry; this type of agriculture has been adopted by the adjoining regions of Westerwolde and the Woldstreek. Intensive cultivation creates a large residue of straw, used in local strawboard factories. The southwest of the province (southern Westerkwartier) has mainly sandy soil that supports mixed farming and cattle raising. Horse breeding and equestrian sports are a favourite activity among the wealthy in many of the agricultural regions of the province.

Groningen, the capital and only large town, has varied industries. The largest natural gas field in The Netherlands underlies most of the north central part of the province. The Veenkolonien is the most industrialized district of the province, with potato flour mills; paper and cardboard factories; engineering, shipbuilding, chemical, and electrical industries; and textile and hosiery factories. There is sugar refining and dairy processing in the north, and Delfzijl, connected with Groningen by the Ems ship canal, is a busy port with chemical industries (salt). Winschoten is a marketing and shopping centre. Pop. (1983 est.) 560,700.

Groningen, *gemeente* (municipality) and capital, Groningen *provincie* (province), northern Netherlands, at the junction of the canalized Drentsche Aa and Hunze rivers and several canals. Although it probably existed in the 9th century, little is known before 1040, when it was given, along with the neighbouring districts then known as the Gorecht, to the bishops of Utrecht by the emperor Henry III. Originally an agricultural settlement, it developed into an important commercial centre on the Aa River, providing ships for the Crusades in the 12th century and joining the Hanseatic League *c.* 1282. By the 14th century, Groningen was a practically independent aristocratic republic that controlled the (Frisian) Ommelanden (Surrounding Regions) between the Ems (Eems) River and the Lauwerszee and maintained a tight monopoly of trade in the area. It passed to the Duke of Gelderland in 1515 and to the emperor Charles V in 1536 and suffered numerous sieges and occupations

Martinikerk (St. Martin's Church), Groningen, Neth.
Art Resource—EB Inc.

in the wars of the 16th century. Held by the Spanish from 1580, it was constantly at war with the surrounding Ommelanden until it was taken by Maurice of Nassau in 1594. It successfully resisted a siege by the Bishop of Münster in 1672, and its fortifications were improved in 1698 by Baron Menno van Coehoorn, the Dutch military engineer. The city was controlled by the French from 1795 to 1814 and by the Germans during World War II, when it suffered heavy damage.

Groningen has a university (1614) and several museums, including the provincial museum. Historic landmarks are the Martinikerk (St. Martin's Church; 1452), A-Kerk (a Gothic church; 1253), the old Ommelanderhuis (former extraterritorial venue of the representatives of the Ommelanden) in the *refugium* of an abbey, picturesque homes for old people, and 16th- and 17th-century houses. The painters Jozef Israëls and Hendrik Willem Mesdag were born in Groningen.

Now one of the most important cities in the northern Netherlands, it is a shopping and commercial centre with a considerable trade in cereals, oilseed, lumber, and cattle. Its industries include sugar refining, book printing, tobacco processing, and the manufacture of clothing, furniture, hosiery, machinery, and bicycles. Pop. (1983 est.) 166,942; metropolitan area, 205,659.

Grønland: *see* Greenland.

Grønlandshavet: *see* Greenland Sea.

Groombridge, Stephen (b. Jan. 7, 1755, Goudhurst, Kent, Eng.—d. March 30, 1832, London), English astronomer, compiler of a star catalog known by his name.

Groombridge began observations at Blackheath, London, in 1806 and retired from the West Indian trade in 1815 to devote full time to the project. *A Catalogue of Circumpolar Stars,* listing 4,243 stars situated within 50° of the North Pole and having apparent magnitudes greater than 9, was published in 1838 after having been edited by the Royal Astronomer Sir George Airy. Groombridge was elected a fellow of the Royal Society of London in 1812, and eight years later he was a founding member of the Astronomical Society of London (later the Royal Astronomical Society).

grooming (zoology): *see* cleaning behaviour.

Groot, Hugo de, Hugo also rendered HUIGH, or HUGEIANUS (jurist): *see* Grotius, Hugo.

Groot Karoo (South Africa): *see* Great Karoo.

Groot-Kei (South Africa): *see* Great Kei River.

Groot River (Afrikaans: Great River), any of a number of rivers in South Africa, especially the Orange River (*q.v.*).

Groot Vis (South Africa): *see* Great Fish River.

Groote, Geert, also called GERHARD GROOTE, GERARD GROOTE, or GERARDUS MAGNUS (b. October 1340, Deventer, Lordship of Overijssel—d. Aug. 20, 1384, Deventer), Dutch priest and educator whose establishment of a centre for manuscript copiers led to the formation of the Brethren of the Common Life, a teaching order that brought great educational change to northern Europe in the late Middle Ages.

The son of wealthy parents, Groote studied for the priesthood at Paris. He later received a generous share of the revenues gathered by the cathedral at Cologne as a reward for his successful mission to the Pope in residence at Avignon, Fr. On this income Groote lived a life of ease and irresponsibility until 1374, when he suddenly changed course and underwent a profound spriritual conversion. Groote renounced worldly goods, turned over his house as a haven for poor women who wished to serve God, and began a period of intense meditation. In 1380 he came out of isolation to preach and attack clerical excesses and abuses throughout Holland. He soon gained a large following and continued his efforts until he died of the plague.

Earlier, in 1371, Groote had joined Florentius Radewunius (of the Church of St. Lebunus in Deventer) in gathering together at one residence a number of impoverished scholars who wished to earn income by copying manuscripts. Out of this grew the Brethren of the Common Life, an order approved by Pope Gregory XI. The Brethren's houses spread rapidly throughout the Netherlands and Germany, and, as a teaching order, the Brethren deeply influenced patterns of elementary and secondary education throughout Europe, stressing Humanistic studies and Latin and establishing graded schooling and new textbooks. Erasmus was one of many northern European scholars who studied under the Brethren during the late Middle Ages. The Brethren of the Common Life declined after the invention of printing and the rise of new teaching orders and universities, their last house closing in 1811.

Groote Eylandt, island in the Gulf of Carpentaria, 25 mi (40 km) across Warwick Channel off the northeast coast of Northern Territory, Australia. It has an area of 950 sq mi (2,460 sq km) and rises to 520 ft (158 m) at its centre. A barren and rocky outlier of the sunken coast of the Arnhem Land plateau, it has deeply embayed north and east coasts. Sighted in 1623 by Dutch seamen, it was named Groote Eylandt (Big Island) by the Dutch navigator Abel Tasman in 1644. The English explorer Matthew Flinders made a circumnavigation in 1803. Now part of the Groote Eylandt Aboriginal Reserve, the island has an airfield and two Anglican mission stations. Alyangula, on the west coast, is the most important town. It produces some beef cattle and tropical fruit, and manganese deposits have been exploited on a large scale since 1966. There are numerous offshore reefs and islets, one of which, Chasm Island, has caves containing Aboriginal art. Pop. (1981) 1,961.

Groote Schuur, large estate—named for its original building, a "large barn"—established in 1657 on the slopes of Devil's Peak directly southeast of Cape Town, S.Af. After undergoing numerous subdivisions and changes of ownership, the estate was acquired in 1891 and enlarged by Cecil Rhodes, who bequeathed it to South Africa in 1902. It is the site of a zoo and game reserve, the Rhodes Memorial, and the campus of the University of Cape Town and its affiliated hospital (also named

Groote Schuur), where in 1967 the first human-heart transplant was performed. The restored Groote Schuur was formerly the official Cape Town residence of the prime minister of South Africa; Westbrooke, another mansion on the estate, is now the residence of the prime minister.

Grootfontein, town, northeastern Namibia. The town lies 36 miles (60 km) southeast of the copper- and lead-mining centre of Tsumeb and 210 air miles northeast of Windhoek, the national capital, in a semiarid region of varied grasses, shrubs, and large trees.

Grootfontein, at an elevation of 4,793 feet (1,461 m), is located at the site whence the area received its original Bergdama (Damara) or San (Bushman) name Gei-/ous (the / indicates a click sound). Later, Boer trekkers called the place Grootfontein ("Great Spring"). Various tribal groups (including the Herero and Owambo [Ovambo]) formerly sought control over the area because of its grazing potential and nearby copper-ore deposits. Wandering Boer trekkers from Angola (originally from western Transvaal) settled the Grootfontein area in the mid-1880s before returning to Angola when the German colonial administration refused them protection. A prospecting expedition financed by both British and German interests led to the establishment of copper mines and the sale of ranchlands in the area in the late 1890s and early 1900s.

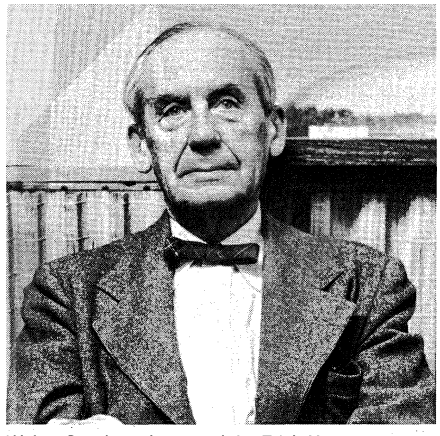
Grootfontein serves as a centre for cattle grazing and is also noted for its jacaranda and other flamboyant trees. As the railway terminus for northeastern Namibia, the town functions today as the shipping point for timber products arriving from Kavango-inhabited areas farther to the northeast. Copper and lead mined west of Grootfontein are smelted at Tsumeb. The former vanadium and lead mine at Berg Aukas north of Grootfontein closed in 1978. Local industries produce meat, dairy products, and leather goods. A 60-ton nickel-and-lead meteorite was discovered in the early 20th century on the Hoba West farm 12 miles (19 km) west of Grootfontein. Pop. (1988 est.) 9,000.

Gropius, Walter (Adolph) (b. May 18, 1883, Berlin, Ger.—d. July 5, 1969, Boston, Mass., U.S.), German architect and educator who, particularly as director of the Bauhaus (1919–28), exerted a major influence on the development of modern architecture. His works, many executed in collaboration with other architects, included the school building and faculty housing at the Bauhaus (1925–26), the Harvard University Graduate Center, and the United States Embassy in Athens.

Youth and early training. Gropius, the son of an architect father, studied architecture at the technical institutes in Munich (1903–04) and in Berlin-Charlottenburg (1905–07). He worked briefly in an architectural office in Berlin (1904) and saw military service (1904–05). Before completing school he built his first buildings, farm labourers' cottages in Pomerania (1906). For a year he traveled in Italy, Spain, and England, and in 1907 he joined the office of the architect Peter Behrens in Berlin.

Gropius acknowledged that his work with Behrens and the design problems he undertook for a German electricity company did much to shape his lifelong interest in progressive architecture and the interrelationship of the arts. From the time he left Behrens in 1910 until 1914, Gropius developed a clear commitment to and talent for organization and a dedication to promoting his ideas on the arts. In 1911 he became a member of the German Labour League (Deutscher Werkbund), which had been founded in 1907 to ally creative designers with machine production. Gropius argued for such building techniques as prefabrication of parts and assembly on the site. However much he accepted the inevitability and restrictions of mechanization, he felt it was up to the artistically trained designer to "breathe a soul into the dead product of the machine." He was against imitation, snobbery, and dogma in the arts and cautioned against such oversimplification as the notion that the function of a product should determine its appearance.

Gropius' growing intellectual leadership was complemented by his design of two significant buildings, both done in collaboration with Adolph Meyer: the Fagus Works at Alfeld-an-der-Leine (1911) and the model office and factory buildings in Cologne (1914) done for the Werkbund Exposition. The Fagus Works, bolder than any of Behrens' works, is marked by large areas of glass wall broken by visible steel supports, the whole done with little affectation. The Cologne buildings were more formal, some say influenced by the American architect Frank Lloyd Wright. Together these two buildings testify to Gropius' design maturity prior to World War I.



Walter Gropius, photograph by Erich Hartmann
Erich Hartmann—Magnum

During that war Gropius served as a cavalry officer on the Western Front, was wounded, and received the Iron Cross for bravery. In 1915 he married a widow, Alma (Schindler) Mahler, whom he had met in 1910 when she was still married to the Austrian composer Gustav Mahler. Their wartime marriage, dependent on furloughs, was complicated by her affair with the German author Franz Werfel, and they were divorced in 1919. Their only child, Alma Manon, died in 1935.

Bauhaus period. Even before the end of the war, the city of Weimar approached Gropius for his ideas on art education. In April 1919 he became director of the Grand Ducal Saxon School of Arts and Crafts, the Grand Ducal Saxon Academy of Arts, and the Grand Ducal Saxon School of Arts, which were immediately united as Staatliches Bauhaus Weimar ("Public Bauhaus Weimar"). Gropius' acceptance of this appointment was the most decisive step in his career. With his temperament for the practical world of art, politics, and administration, Gropius succeeded in establishing a viable new approach to design education, one that became an international prototype and eventually supplanted the 200-year-old supremacy of the French École des Beaux-Arts.

A key tenet of Gropius' Bauhaus teaching was the requirement that the architect and designer undergo a practical crafts training to acquaint himself with materials and processes. Although the program was to have been a comprehensive one, budget limitations permitted only a portion of the crafts shops to open. No formal study of architecture was offered at Weimar. Despite the early Werkbund principle of joining art with industry, much activity centred on handicrafts, such as ceramics, weaving, and stained-glass design. Many painters and sculptors joined the staff: Paul Klee, Lyonel Feininger, Wassily Kandinsky, Gerhard Marcks, and, later, László Moholy-Nagy and Josef Albers—altogether an astonishing roster of artists.

Somehow it did not seem incongruous for artists to be teaching applied design. As an introduction to design principles, a beginning course, *Vorkurs,* was developed by the Swiss painter and sculptor Johannes Itten, which itself became the most widely copied aspect of the Bauhaus curriculum. Students explored two- and three-dimensional design using a variety of simple materials, such as wire, wood, and paper. The psychological effects of form, colour, and texture were studied as well. Although his instructors were gifted, it was Gropius' own persistence that made this educational experiment work.

Historians disagree on the character of the early Bauhaus years. Certainly in 1919–22 Bauhaus students were allowed to express subjective feelings in their art; individuality and expressionism were not uncommon. The prewar Gropius belief that art must conform to and express the economic character and rational order of modern society seemed to be submerged in a new belief that the greatness of art stood above utilitarian considerations. A reverse shift came in 1922, not without controversy; Itten left, and a more rational and objective approach returned. The individually made products were intended as prototypes for machine production, and some designs were produced commercially. They emphasized geometrical forms, smooth surfaces, regular outlines, primary colours, and modern materials—all of which, to many eyes, epitomized impersonality in art. It is this last phase of Bauhaus output that is publicly accepted as characteristic of Bauhaus "style," although Gropius himself disdained the use of the word "concept."

Gropius saw architecture and design as ever changing, always related to the contemporary world. He spoke of the architect's duty to encompass the total visual environment. He himself designed furniture, a railroad car, and an automobile. He emphasized housing and city planning, the usefulness of sociology, and the necessity of using teams of specialists.

In 1925 the Bauhaus moved to Dessau with the promise of better financial support and an escape from the growing antagonism of the conservative Weimar community. In Dessau, Gropius designed the school building and faculty housing (1925–26). The school itself is a key monument of modern architecture and Gropius' best-known building. Its dynamic composition, asymmetrical plan, smooth white walls set with horizontal windows, and flat roof are features associated with the so-called International Style of the 1920s. Gropius resigned as director of the Bauhaus in 1928 to return to practice privately as an architect in Berlin. During 1929–30 he designed a portion of a housing colony in Berlin-Siemensstadt. Gropius' regular facades of enormous length, together with a rigid orientation, illustrate an excessively intellectual solution with a "curse of uniformity," which Gropius himself decried in later years.

Harvard years. Unsympathetic to the Nazi regime, he and his second wife, Ise Frank, whom he had married in 1923, left Germany secretly via Italy for exile in England in 1934. Hitler's government closed the Bauhaus in 1933. Gropius' brief time in England was marked by collaboration with the architect Maxwell Fry that resulted in their important work, Village College at Impington, Cambridgeshire (1936).

In February 1937 Gropius arrived in Cambridge, Mass., to become professor of architecture at Harvard University. The following year he was made chairman of the depart-

ment, a post he held until his retirement in 1952. He became a naturalized U.S. citizen in 1944. At Harvard he introduced the Bauhaus philosophy of design into the curriculum, although he was unable to implement workshop training. He was also unsuccessful in abolishing the history of architecture as a course. His crusade for modern design, however, was immediately popular among the students. His innovations at Harvard soon provoked similar educational reform in other architectural schools in the United States and marked the beginning of the end of a historically imitative architecture.

In addition to his teaching, Gropius collaborated with Marcel Breuer, a former Bauhaus pupil and later fellow teacher, from 1937 until 1940. Among their designs was Gropius' own house in Lincoln, Mass., which, with its use of white-painted wood and fieldstone, restated New England traditionalism in modern terms. This house and others designed by them were controversial, but the architects lived to see acceptance of their ideas. In 1942 Gropius renewed his interest in the production of architecture by industry when he became the vice president of General Panel Corporation, a company that made prefabricated housing. He retired in 1952.

In 1946, with six of his former Harvard pupils as partners, Gropius formed The Architects Collaborative (TAC), based in Cambridge. Among its varied U.S. and international commissions, TAC received one to do the Harvard University Graduate Center (1949–50), a grouping of dormitory buildings and dining commons. The design is reminiscent of but less forceful than the Dessau Bauhaus buildings. Other TAC designs include the United States Embassy in Athens (1960) and the University of Baghdad (design accepted 1960, still under construction). Gropius remained an active member of TAC until he died at the age of 86. In accord with his request made in 1933 that his funeral not be a mournful affair but marked in a festive manner, 70 friends in Cambridge drank champagne in his remembrance two days after his death.

Assessment. Most assessments of Gropius' career centre upon his achievements as educator and author rather than as architect. Dedicated to the reform of art and to administration, as a man of visionary zeal and practical ambition, Gropius can be said to have fully achieved his goal. In his own assignments he turned away from personal and subjective aspects in favour of reaching for intellectual solutions of larger and socially urgent problems. Among his most important ideas was his belief that all design—whether of a chair, a building, or a city—should be approached in essentially the same way: through a systematic study of needs and problems, taking into account modern construction materials and techniques, without reference to previous forms or styles.

His architecture does not have the aesthetic fascination of Wright's or Le Corbusier's but reflects a sober and programmatic concern that marked his whole life. Yet always, in conversation and criticism, he reminded his pupils of the vitality of the individual spirit, of the spontaneity of life itself. His habit of wearing a beret with a business suit was perhaps symbolic of the two worlds he hoped to bridge, "the gap between the rigid mentality of the businessman and technologist and the imagination of the creative artist."

(H.F.K.)

MAJOR WORKS. Fagus Works, Alfeld-an-der-Leine, Ger. (1911); with A. Meyer, Pavilion for Deutz Machinery Factory, Werkbund Exhibition, Cologne (1914); Bauhaus, Dessau, Ger. (1925–26); Toerten Housing Development, Dessau (1926–28); Municipal Employment Office, Dessau (1927–28); Siemensstadt Housing Estate, Berlin (1929–30); Gropius House, Lincoln, Mass. (1937); Housing Development, New Kensington, Pa. (1938–41); Harvard University Graduate Center, Cambridge, Mass. (1949–50); U.S. Embassy, Athens (commissioned 1960).

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Gros, Antoine-Jean, Baron (b. March 16, 1771, Paris—d. June 26, 1835, Paris), French Romantic painter principally remembered for his historical pictures depicting significant events in the late military career of Napoleon.

Gros received his first art training from his father, who was a painter of miniatures. In 1785 he entered the studio of his father's friend, J.-L. David, whom he revered but whose cerebral Neoclassical style was uncongenial to Gros's romantically passionate nature. As a student he was more influenced by the energetic brushwork and colour of Rubens and the Venetians than the hard linearism of his contemporary Neoclassicists.

In 1793, with David's help, Gros went to Italy where he met Joséphine de Beauharnais in Genoa and, through her, his hero, Napoleon. In 1796 he followed the French Army to Arcole and was present when Napoleon planted the flag on the bridge. This incident he immortalized in his first major work, "Napoleon on the Bridge at Arcole" (1796; Louvre, Paris). Napoleon bestowed on him the rank of *inspecteur aux revues.* He accompanied Napoleon on his campaigns and also served on the commission to select works of art from Italy for the Louvre.

"Napoleon Visiting the Pesthouse at Jaffa," oil on canvas by Gros, 1804; in the Louvre, Paris

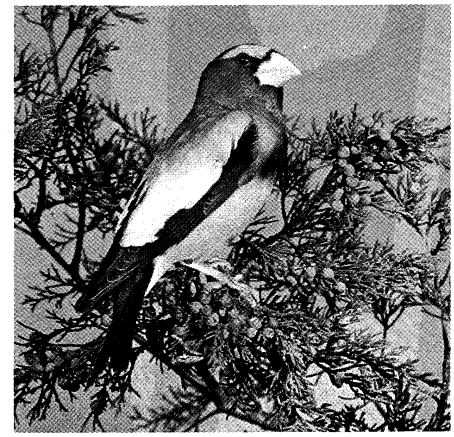
Garanger—EB Inc.

Of all the artists who contributed to the Napoleonic myth, Gros was probably the only true genius. The sense of Baroque elegance and dramatic power of his highly emotional compositions influenced Théodore Géricault and Eugène Delacroix.

After the fall of Napoleon and the restoration of the Bourbons (who gave Gros the title of baron), David was forced into exile and Gros became the head of his studio. As the heir of Neoclassicism, Gros tried to work in a style closer to that of David. He continued to paint large compositions—*e.g.*, the ceiling of the Egyptian room of the Louvre (*c.* 1824)—but these academically Neoclassical pictures lacked the Romantic vitality of his earlier historical paintings, such as "Napoleon Visiting the Pesthouse at Jaffa" (1804; Louvre) or "Napoleon at Eylau" (1808; Louvre). His best works after 1815 were portraits, some of which approached the quality of his Napoleonic pictures—*e.g.*, "Young Girl in a Necklace" (Magnin Museum, Dijon, Fr.). He was, however, continually plagued by David's criticism of his work, and he became increasingly dissatisfied with his own accomplishments. A sense of failure exacerbated his already melancholic nature, and he committed suicide by drowning himself in the Seine.

Gros Ventres (French: Big Bellies), name applied to two distinct North American Indian groups: (1) the Hidatsa (*q.v.*), or Gros Ventres of the Missouri; and (2) the Atsina (*q.v.*), or Gros Ventres of the Prairie (or Plains).

grosbeak, any of several finchlike birds belonging to the subfamilies Cardinalinae and Carduelinae of the family Fringillidae. Their most distinctive characteristic is an exceptionally large conical bill. Most grosbeaks are seedeaters.



Evening grosbeak (*Hesperiphona vespertina*)

Karl H. Maslowski

In the American subfamily Cardinalinae are the rose-breasted grosbeak (*Pheucticus ludovicianus*) and the black-headed grosbeak (*P. melanocephalus*), North American birds ranging east and west of the Rockies, respectively. Some authorities believe the two forms represent a single species, even though the coloration of the males' underparts differs: red and white in the rose-breasted and brownish-yellow in the black-headed grosbeak. In the blue grosbeak (*Guiraca caerula*) of the southern U.S. and Mexico, the male is dark blue, like males of the tropical grosbeak genus *Cyanocompsa.* For cardinal grosbeak, also of this subfamily, *see* cardinal.

In the subfamily Carduelinae are the pine grosbeak (*Pinicola enucleator*) of northern Eurasia and North America (south in mountains) and the evening grosbeak (*Hesperiphona vespertina*) of North America. The former is pinkish red; the latter is brown, yellow, black, and white. For scarlet grosbeak, also of this subfamily, *see* rosefinch.

Gross, Samuel David (b. July 8, 1805, Easton, Pa., U.S.—d. May 6, 1884, Philadelphia), U.S. surgeon, teacher of medicine, and author of an influential textbook on surgery and a widely read treatise on pathological anatomy.

Born and raised on a farm in Pennsylvania, Gross at first was apprenticed to a local country doctor. He continued his education at Wilkes-Barre Academy in Pennsylvania and graduated from Jefferson Medical College in Philadelphia in 1828. After setting up a practice in Philadelphia, Gross began translating medical treatises by foreign authors into English.

In 1830, he published a treatise on diseases of the bones and joints. Nine years later, he wrote his most celebrated work, *Elements of Pathological Anatomy* (1839), a pioneering

effort that organized and systematized knowledge on the subject in English. The book went through several editions. Gross is also remembered for his incisive treatises on diseases of the urinary bladder (1851) and the intestines (1843) and on foreign bodies in air passages (1854). His two-volume *A System of Surgery; Pathological, Diagnostic, Therapeutic and Operative* (1859), translated and read around the world, had a profound effect on surgical thought. His *Manual of Military Surgery* (1861) was written at the request of the U.S. government. He also invented many surgical tools.

Gross was appointed professor of surgery at the University of Louisville in 1840 and professor of surgery at Jefferson Medical College in 1856, where he taught until 1882. As a teacher he was considered remarkable for his ability to enliven the standard medical lecture using anecdote and humour.

gross national product (GNP), total market value of the final goods and services produced by a nation's economy during a specific period of time (usually a year), computed before allowance is made for the depreciation or consumption of capital used in the process of production. It is distinguished from net national product, which is computed after such an allowance is made. Gross national product is a convenient indicator of the level of a nation's economic activity. *See* national income accounting.

Gross-Rosen, small Nazi concentration camp established in August 1940 near the German town of Striegau (now Polish Strzegom) in Lower Silesia. Gas chambers (eventually employing the virulent Zyklon-B) were established there in late 1941 or 1942 and were used to exterminate the concentration camp inmates of all Germany. (The gas chambers of Dachau and Theresienstadt were never put into operation.) Beginning in January 1942 the camp was also the site of a laboratory for medical experiments, using inmates as test victims.

Grosse, Hans Werner (b. Nov. 28, 1922, Swinemünde, Ger.), West German glider pilot who on April 25, 1972, set the world record for straight-line distance soaring by flying 1,460.5 kilometres (907.7 miles) from the Baltic Sea to the Spanish border near Biarritz, Fr., more than 274 km farther than the old record. Grosse, an enthusiastic glider pilot since his teens, was a Luftwaffe pilot during World War II.

Grosse's record-breaking glider, an AS W-12, weighed 716 pounds and had a wingspan of 62.2 feet and a top speed of 137 miles per hour. On Jan. 4, 1981, he set a world record of 1,306.856 km for distance around a triangular course. Earlier, on Dec. 9, 1980, he set a world record for speed (133.242 kph) over a 1,250-km triangular course and, on Dec. 24, 1980, a record for speed (158.67 kph) over a 300-km triangular course. With H.H. Kohlmeier he also set multiplace records of 970.95 km for distance to a fixed point and return (Jan. 7, 1980), distance around a triangular course of 1,112.62 km (Dec. 12, 1979), speed over a 750-km triangular course of 131.84 kph (Jan. 14, 1980), and speed over a 1000-km triangular course of 129.54 kph (Dec. 12, 1979). All of these records were set at Alice Springs, Australia.

Grosse Pointe, name applied to five exclusive northeastern residential communities of Detroit, Wayne County, southeastern Michigan, U.S. On the southwestern shore of Lake St. Clair and known as the "Gold Coast," they comprise the cities of Grosse Pointe Park (incorporated village, 1907; city, 1950), Grosse Pointe (1879; 1934), Grosse Pointe Farms (1893; 1949), Grosse Pointe Woods (1927; 1950), and the Village of Grosse Pointe Shores (1911). The French, who defeated the Fox and Sauk Indians in the Grosse Pointe Park area (1712), established ribbon farms along the swampy shore that became part of Grosse Pointe Township (organized 1846 and named for a point of land projecting into the lake). The area was developed by wealthy Detroiters for summer homes. Later, notable Michigan industrialists, such as Edsel Ford, built large lakeshore estates there. The Alger Mansion, former home of Gov. Russell A. Alger, is now the War Memorial Center. Pop. (1982 est.) 50,816.

Grosses Schauspielhaus (German: "Great Playhouse"), theatre that is the former Zirkus Schumann in Berlin, as redesigned for Max Reinhardt in 1919 by architect Hans Poelzig. It combines a normal stage with a revolving stage and a cyclorama. The stage is connected through an adjustable forestage with an arena surrounded by a horseshoe of seating. In 1919–21 Reinhardt there presented a series of magnificent spectacles which included the *Oresteia, Danton's Death,* and *Julius Caesar.*

Grosses vollständiges Universal-Lexicon (German: "Great Complete Universal Lexicon"), large German encyclopaedia published from 1732 to 1750 by the Leipzig bookseller Johann Heinrich Zedler. It is noted for its accuracy and its biographical and bibliographical information; it was one of the first encyclopaedias to contain biographical information about living persons. The materials for the 64 volumes of the *Grosses vollständiges Universal-Lexicon* were prepared by nine editors.

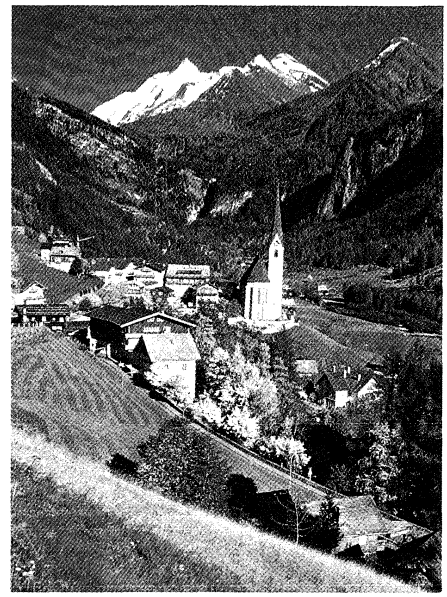
Grosseteste, Robert (b. *c.* 1175, Suffolk, Eng.—d. Oct. 9, 1253, Buckden, Buckinghamshire), English bishop of Lincoln from 1235 and influential scholar who introduced into the world of European Christendom Latin translations of Greek and Arab philosophical and scientific writings. His philosophical thinking—a somewhat eclectic blend of Aristotelian and Neoplatonic ideas—consistently searched for a rational scheme of things, both natural and divine.

Chancellor of Oxford University probably *c.* 1215–21, Grosseteste was given thereafter a number of ecclesiastical preferments and sinecures from which he resigned in 1232. From 1229 or 1230 to 1235 he was first lecturer in theology to the Franciscans, on whom his influence was profound. The works of this, his pre-episcopal career, include a commentary on Aristotle's *Posterior Analytics* and *Physics,* many independent treatises on scientific subjects, and several scriptural commentaries.

Grosseteste's public life as bishop of Lincoln (during which he translated, among other works, Aristotle's *Ethics* from the Greek) was remarkable for his ruthless pursuit of three abiding principles: a belief in the supreme importance of the cure of souls, a highly centralized and hierarchical conception of the church, and a conviction of the superiority of the church over the state. His challenge of the widespread practice of endowing officials in the service of the crown and papacy with ecclesiastical benefices intended for the cure of souls brought him into conflict with both. He attended the Council of Lyon (1245) and argued before the papal curia at Lyon (1250).

Grosseto, city, capital of Grosseto province, Toscana (Tuscany) region, central Italy, on a low-lying coastal plain near the Ombrone River southwest of Siena. The plain, the Maremma, was a malarial swamp until the 18th century. The old town is enclosed by a 16th-century hexagonal wall, a rampart of which bears the arms of the Florentine Medici family. The new town was much developed after 1930 in conjunction with a program of reclamation of the Maremma. Notable landmarks include the Romanesque cathedral (rebuilt 1294, much restored) and the archaeological museum with Etruscan and Roman antiquities. About 5 mi (8 km) northeast, near the warm mineral springs of Bagno Roselle, are the remains of the ancient Etruscan and Roman city and episcopal see of Rusellae. Grosseto is an important commercial and agricultural centre on the railway from Rome to Pisa. Pop. (1984 est.) mun., 69,760.

Grossglockner, also called GLOCKNER, highest peak (12,457 ft [3,797 m]) in Austria and in the Hohe Tauern (range of the Eastern Alps). It lies astride the border between *Bundesländer* (federal provinces) Tirol and Kärnten. The most magnificent of the glaciers on the mountain is the Pasterze Glacier (Pasterzen Kees), 5 mi (8 km) long and 3 mi wide. The Grossglockner-Hochalpenstrasse, a high-



Heiligenblut village with the Grossglockner in the background, Austria
N. Merrifield—Shostal/EB Inc.

way (opened 1935) connecting Dölfach to the north with Heiligenblut to the south lies to the east of the peak. The road has two tunnels (the Mitteltörl and Hochtor), and a branch road leads to the base of the Pasterze Glacier. Winter sports, mountain climbing, and beautiful scenery make the peak a noted tourist attraction. It was first climbed in 1800.

Grossmith, George (b. Dec. 9, 1847, London—d. March 1, 1912, Folkestone, Kent, Eng.), English comedian and singer who created many of the chief characters in the original productions of Gilbert and Sullivan light operas.

After several years of journalistic work, Grossmith started *c.* 1870 as a public entertainer, with songs, recitations, and sketches. His long connection with Gilbert and Sullivan began in 1877 at the Opera Comique, London, in the

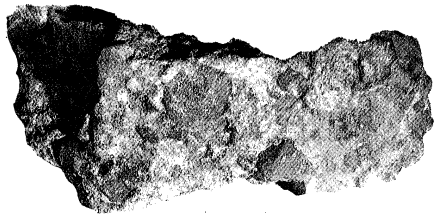
Grossmith, *c.* 1890
By courtesy of the Victoria and Albert Museum, London

comic opera *The Sorcerer*. Thereafter, he appeared regularly at the Opera Comique, being transferred, in 1881, with the Gilbert and Sullivan productions to the new Savoy Theatre, London.

In 1889 Grossmith left the Savoy and again set up as an entertainer, visiting all the major cities of Great Britain and the United States. He wrote an autobiography, *A Society Clown* (1888), and, with his brother Weedon Grossmith (1852–1919), an actor and playwright, wrote the amusing *Diary of a Nobody* (1892). His humorous songs and sketches exceeded 600. Both of his sons, George (1874–1935) and Lawrence Grossmith (1877–1944), were distinguished actors. George, Jr., became a well-known figure in musical comedies, entered the motion-picture industry in 1932, and wrote musical plays. Stanley Naylor's *Gaiety and George Grossmith* appeared in 1913.

Where the same name may denote a person, place, or thing, the articles will be found in that order

grossular, also called GROSSULARITE, or GOOSEBERRY GARNET (Latin *grossularia*, "gooseberry"), a calcium aluminum garnet



Grossular garnet from Jaloxtoc, Morelos, Mex.
John H. Gerard—EB Inc.

that sometimes resembles the translucent green gooseberry. It can be colourless (when pure), white, yellow, brown, red, or green. Massive greenish grossular, though only superficially resembling jade, is sometimes marketed under the name South African or Transvaal jade in an attempt to increase its selling price. Nearly all stone used for faceted gems is orange to reddish brown. The reddish-brown material is called cinnamon stone or hessonite. Grossular typically exhibits internal swirls, which help to distinguish it from spessartine, which is clear. It is ordinarily found in metamorphic rocks. For details of chemistry and occurrence, *see* garnet.

Grosswardein (Romania): *see* Oradea.

Grosvenor, Gilbert H(ovey) (b. Oct. 28, 1875, Constantinople—d. Feb. 4, 1966, Cape Breton Island, Nova Scotia, Can.), U.S. geographer, writer, and long-time editor of the *National Geographic* magazine.

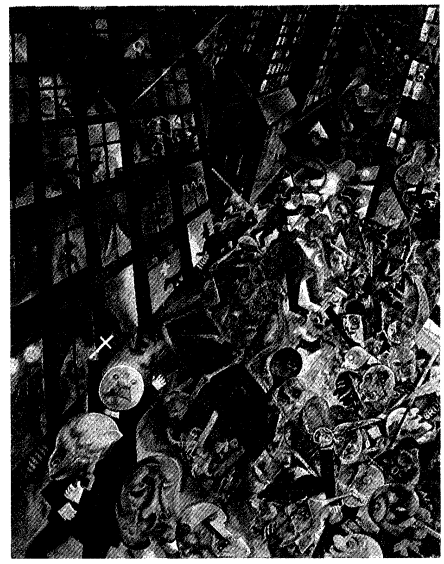
A graduate of Amherst College, he became director and president of the National Geographic Society in 1899 and editor of the *National Geographic* in 1900. Under his directorship the society membership and magazine circulation grew from 900 to over 1,900,000. He resigned as editor in 1954 and became board chairman.

Grosvenor
By courtesy of *National Geographic Magazine*, © National Geographic Society

During Grosvenor's administration the society sent out numerous expeditions to the North and South poles, into the stratosphere, and to the ocean depths; and it conducted a myriad of other investigations. In addition to his articles in the *National Geographic* he wrote a history of the society and chapters on exploration for the Smithsonian Institution report. Other books include *Young Russia* (1914) and *Discovery and Exploration* (1924). He was long a leader in the conservation and protection of wildlife.

Grosz, George (b. July 26, 1893, Berlin—d. July 6, 1959, Berlin), German artist whose caricatures and paintings provided some of the most vitriolic social criticism of his time. So expressive and famous were his depictions of war and depravity that the Nazis called him Cultural Bolshevist Number One. A French critic labelled his work "the most definitive catalog of man's depravity in all history."

After studying art in Dresden and Berlin, Grosz sold caricatures to magazines and made enough money to spend a half year in Paris, which influenced his development. Home in Germany when World War I broke out, he volunteered for the infantry, was invalided in 1916, and moved into a garret studio in Berlin. There he sketched prostitutes, veterans without noses or legs, and other personifications of war's ravages and dissipation. Ironically, he was recalled to the army as a trainer. Later he was arrested as a deserter and placed in a military asylum.



"To Oskar Panizza," oil on canvas by George Grosz, 1917–18; in the Staatsgalerie, Stuttgart, Ger.
By courtesy of the Staatsgalerie, Stuttgart, Ger.

Grosz's asylum experiences sharpened his pen. In such symbolic works as "Germany, A Winter's Tale" (1919) and his "Ecce Homo" series of the early 1920s, he epitomizes fat Junkers, smug bourgeoisie, sottish drinkers, lechers, hypocrites of his times—and Christ in a gas mask. Police destroyed the plates of some of his graphics, and his life was so often threatened that he hired a bodyguard.

At this time he belonged to the Dada art movement, which he described as "organized use of insanity to express contempt for a bankrupt world." Gradually, as in his "Café" (1925), he became associated with the Neue Sachlichkeit movement, which reflected the resignation and cynicism of post-World War I Germany.

After emigrating to the United States in 1932, Grosz drew magazine cartoons, nudes, and landscapes and began teaching at the Art Students League of New York, where his appointment aroused controversy. During World War II he showed his old pessimism in such sharply coloured, teeming canvases as "The Survivor" (1944). He became a U.S. citizen in 1938 but died in Berlin three weeks after returning for a visit.

Grote, George (b. Nov. 17, 1794, Clay Hill, near Beckenham, Kent, Eng.—d. June 18, 1871, London), English historian, noted for his works on ancient Greece.

Grote, detail of an oil painting by Sir John Everett Millais, 1870; in the Senate House, University of London
By courtesy of the Senate House, University of London

At the age of 16 he joined his father's bank in London and worked in it until 1843, using his spare time to perfect his command of Greek and to learn German, economics, and philosophy. From 1832 to 1841 Grote was a member of Parliament for the City of London.

Having already published works on contemporary politics and philosophy, he devoted himself entirely to the *History of Greece*, which was published in 12 volumes between 1846 and 1856; it ended with the events of 301 BC. It was quickly recognized (in the original or in translation) as the best Greek history in any language, and its authority remained unchallenged for almost half a century. Grote, it may be noted, never visited Greece.

In 1849 he reassumed an earlier active interest in University College, London. He became its treasurer in 1860 and its president in 1868. From 1862 until his death he was also vice-chancellor of the University of London. He became a trustee of the British Museum in 1859 but refused a peerage that Prime Minister William Gladstone offered him in 1869. Grote was buried in Westminster Abbey.

Grote Winkler Prins, Dutch encyclopaedia published in 1975, a thorough revision of the famous Winkler Prins Encyclopaedie (*q.v.*).

Grotefend, Georg Friedrich (b. June 9, 1775, Münden, Hanover—d. Dec. 15, 1853, Hannover, Hanover), German teacher and language scholar who made the first major breakthrough in the decipherment of ancient Persian cuneiform script.

When Grotefend began teaching at the Göttingen city school in 1797, Europe was already familiar with the wedge-shaped cuneiform writing from copies made in 1765 by the German traveller Carsten Niebuhr at the ruined Persian capital of Persepolis. Without any particular knowledge of Oriental languages, but adept in solving puzzles, Grotefend bet some drinking companions that he could find the key to deciphering cuneiform. Knowing that the inscriptions dated from about the 5th century BC and were associated with the sculptures of kings, he concluded that the recurrence of

certain symbols signified "king" and "king of kings." Eventually he was able to connect the names of Darius and Xerxes with the terms of royalty. A third name proved to be that of Hystaspes, the governor of Parthia and father

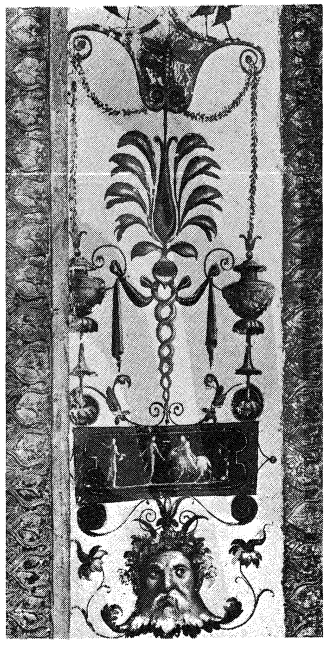
Grotefend, detail of a lithograph by C. Kiesel, *c.* 1830, after a portrait by J.F. Winkelmann

Archiv fur Kunst und Geschichte, West Berlin

of Darius I. Of the 13 symbols he deciphered, 9 were correct. His discovery was first reported on Sept. 2, 1802. He also published works on two ancient Italic dialects, Oscan and Umbrian. His lasting fame rests on *Neue Beiträge zur Erläuterung der persepolitanischen Keilschrift* . . . (1837; "New Contributions to a Commentary on the Persepolitan Cuneiform Writing . . ."). A detailed account of his work is to be found in C.W. Ceram (pseudonym of Kurt W. Marek), *Gods, Graves, and Scholars* (1967).

grotesque, in architecture and decorative art, fanciful mural or sculptural decoration involving mixed animal, human, and plant forms. The word is derived from the Italian *grotteschi,* referring to the grottoes in which these decorations were found *c.* 1500 during the excavation of Roman houses such as the Golden House of Nero.

First revived in the Renaissance by the school of Raphael in Rome, the grotesque quickly came into fashion in 16th-century Italy and became popular throughout Europe.



Grotesque, detail of a fresco by Giovanni da Udine (1487–1546); in the Loggia, Vatican

SCALA—Art Resource/EB Inc.

It remained so until the 19th century, being used most frequently in fresco decoration. Although the animal heads and other motifs sometimes have heraldic or symbolic significance, grotesque ornaments were, in general, purely decorative.

Groth, Klaus (b. April 24, 1819, Heide, Holstein—d. June 1, 1899, Kiel, Ger.), German regional poet whose book *Quickborn* (1853) first revealed the poetic possibilities of Plattdeutsch (Low German).

Groth was originally a schoolteacher, but his tireless self-education finally enabled him to win a chair at Kiel University (1866). Inspired by the Scots dialect poems of Robert Burns and the Swabian-Swiss writings of Johann Peter Hebel, he explored the potentials of his native Dithmarschen dialect as a vehicle of lyrical expression. His poems have the simplicity of folk songs and have been set to music by Brahms and other composers. His work influenced Fritz Reuter, whose novels elevated Plattdeutsch prose to a literary language.

Grotius, Hugo (Latin), Dutch HUGO, or HUIGH, or HUGEIANUS DE GROOT (b. April 10, 1583, Delft, Neth.—d. Aug. 28, 1645, Rostock, Mecklenburg-Schwerin), Dutch jurist and scholar, whose legal masterpiece, *De Jure*

Grotius, detail of a portrait by M.J. van Mierevelt; in the Rijksmuseum, Amsterdam

By courtesy of the Rijksmuseum, Amsterdam

Belli ac Pacis (1625; *On the Law of War and Peace*), was one of the first great contributions to modern international law.

Childhood and education. Grotius's father, a learned man, had been burgomaster of Delft and curator of Leiden University. After initial schooling in Delft, his father entrusted him to the Hague preacher and theologian Johannes Uyttenbogaert, who was to play a leading role in a crisis over Arminianism in 1618–19 that resulted in years of imprisonment for Grotius. An extremely gifted child, Grotius wrote Latin elegies at the age of eight and became a student in the faculty of letters at Leiden University at the age of 11. Very soon Grotius was the best pupil of the famed Latinist Joseph Scaliger, who undoubtedly contributed greatly to his development as a poet.

When at the age of 15 he accompanied the leading statesman Johan van Oldenbarnevelt on an embassy to Henry IV of France, he was received there with great honour and decided to remain to study law at Orléans. That same year his *Pontifex Romanus* appeared, six monologues offering a synthesis of the political situation in 1598. In later years he was to regret having chosen a career in law rather than letters. In 1599 he returned to Holland and settled as an advocate in The Hague, lodging for a time with his former teacher Uyttenbogaert. In 1600 his "Mirabilia" appeared, a poem about what had taken place on land and sea in the first half of that year. In 1601 the states of Holland appointed the able young lawyer their official Latin historiographer and specifically requested from him a description of the Dutch republic's revolt against Spain. Always interested in the history of his native country, Grotius began the same year, entitling his work *Annales et Historiae de Rebus Belgicis* in the manner of the Roman historian Tacitus. It consists of two parts: the "Annales," covering the period from 1559 to 1588, and the "Historiae" beginning in 1588 and concluding with the Twelve Years' Truce (1609–21).

Grotius was also very prolific in philology and poetry. He edited, with a commentary, Martianus Capella's handbook of the seven liberal arts (1598) and at about the same time the *Phaenomena,* a work on astronomy by the 3rd-century-BC Greek Aratus of Soli; he also published, in collaboration with the Humanist Daniel Heinsius, a Latin translation of the Greek bucolic poet Theocritus. In 1601 his *Sacra,* a volume of Latin poetry, appeared, made up of sacred poems, together with the drama *Adamus Exul* ("Adam in Exile"). The latter work, widely read and imitated, was greatly admired by the English poet John Milton. In 1614 he again edited a Roman author, Lucanus.

Involvement in politics. Increasingly, however, he became involved in Dutch politics. Although the republic was then at peace with the united kingdom of Spain and Portugal, the latter claimed a monopoly of trade with the East Indies. When a Dutch admiral seized the Portuguese vessel "Santa Catarina," the Dutch East India Company asked Grotius in 1604 to write a juridical treatise, "De Jure Praedae" ("On the Law of Prize and Booty"), defending the action on the ground that Spain–Portugal had deprived the Dutch of their trading rights. In 1609 one chapter of it, in which Grotius defends free access to the ocean for all nations, appeared under the title "Mare Liberum." The work circulated widely and was often reprinted.

In 1607 Grotius was appointed *advocaat fiscaal* (attorney general) of the province of Holland. In 1608 he married Maria van Reigersberch, the daughter of the burgomaster of Veere, an intelligent and courageous woman who stood by him unwaveringly in difficult years. They had seven children. In the same year he published *Christus Patiens,* a drama that was to be widely imitated.

In 1613 Grotius led an embassy to James I of England. Its official purpose was the settlement of trade differences, but he took advantage of the opportunity to discuss religious matters with the King as well, especially the reunion of all Christian churches, a problem that concerned him deeply. The same year he became deeply involved in the religious and political controversy that was dividing the republic. Originally this had been a theological argument about predestination between two Leiden professors, Jacobus Arminius and Franciscus Gomarus; it developed into a dispute between the province of Holland and the orthodox Calvinist majority of the States General of the Netherlands under the leadership of Prince Maurice. Grotius, though a gentle and moderate man who always strove for peace and unity among Christians, was profoundly influenced by Oldenbarnevelt and the provinces. Under orders from the estates (assembly) of Holland he published in 1613 the *Ordinum Hollandiae et Westfrisiae Pietas,* an ardent plea for the ecclesiastical policy of the estates.

In 1618 Prince Maurice ordered the arrest of the leaders of the opposition, including Grotius and the statesman Johan van Oldenbarnevelt. The latter was executed for high treason; Grotius was sentenced to life imprisonment and incarcerated in the castle of Loevestein. His wife and children were permitted to join him there. In prison he wrote a poem in behalf of Dutch sailors, whom he saw as peaceful propagators of the Christian faith,

"Bewijs van den waren Godsdienst." He later translated it into Latin prose as "De Veritate Religionis Christianae" (1627). It established Grotius' fame and was translated into 13 languages, including Arabic and Urdu. He also began an introduction to the jurisprudence of Holland, *Inleydinghe tot de Hollandsche Rechts-geleerdheyt,* a very important work published in 1631. In South Africa the *Inleydinghe* was law from 1859 to 1901.

Hidden in a chest of books, he made a celebrated escape from the castle of Loevestein on March 22, 1621. He fled to Antwerp and to Paris, where he was received with great honour by Louis XIII and numerous statesmen and scholars. His wife and children were permitted to join him, and the family lived precariously on what he was able to earn with his pen. Although Louis granted him a pension, it was paid irregularly; as a Calvinist he was unable to obtain a professorship.

Life in Paris. In 1625, still in exile, he published his legal masterpiece *De Jure Belli ac Pacis* (*On the Law of War and Peace*), in which he laid the foundations of international law. He defended the position taken by Holland and himself in the religious conflict in *Apologeticus eorum qui Hollandiae Westfrisiaeque et vicinis quibusdam nationibus ex legibus praefuerunt.* He also worked on a Latin translation of Euripides' *Phoenissae* (1630) and on a commentary on the Bible, *Annotationes in Libros Evangeliorum.*

In 1625 Prince Maurice died, and in 1631 Grotius returned to Holland. After hot debate in the assembly and despite the intervention of Prince Frederick Henry of Orange, he was again threatened with arrest. In 1632 he went to Hamburg, then the centre of Franco-Swedish diplomatic relations. So great was his international prestige that the Swedish chancellor, Count A.G. Oxenstierna, offered him in 1634 the important position of Swedish ambassador in Paris. Grotius accepted; he wrote in his benefactor's honour a drama, *Sophompaneas* (1635), in which he relates the fortunes of the biblical Joseph as minister at the Egyptian court, which to him was a reflection of his own situation. The great Dutch poet Joost van den Vondel translated this drama as *Joseph in't Hof* ("Joseph at the Court"). Grotius settled again in Paris but soon realized that he lacked the talents of a diplomat.

During the years 1636–37 he worked on the *Historia Gothorum, Vandalorum et Langobardom* ("History of the Goths, Vandals, and Lombards"). He also edited the works of Tacitus (1640). In 1644, when Queen Christina invited him to Sweden, he was received with great honour but nevertheless relieved of his post of ambassador. Although he was offered membership in the Swedish Council of State, he refused to settle in Sweden. On his way back to Paris he was shipwrecked on the coast of Pomerania and died of exhaustion at Rostock two days later.

Assessment. Grotius' enormous gifts were those of a scholar rather than of an original thinker or creative genius. His best poetry was written in Latin; it was complex in both structure and content. His Dutch poetry, of which he wrote a great deal, was didactic in nature. As an historian he worked in the style of Tacitus; his *Annales et Historiae* is a masterpiece of Humanistic historiography. As a theologian his ideal was the early Christian community, and Grotius was not only in close contact with Protestant theologians but also counted Catholic priests among his many friends. A considerable body of his correspondence with eminent contemporaries has survived.

His enduring fame stems from his *De Jure Praedae* and *De Jure Belli ac Pacis,* which form the basis of modern international law. Their principal merit lay in their synthesis of the ideas of older writers and thinkers. His chief innovation was his insistence that nations are bound by natural law, which he considered to be independent of God and based on man's own nature. (J.A.M.K.I.)

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A major work of scholarship on Grotius is the edition of his Latin poems, *De Dichtwerken van H.G.* (1970–), which includes the Latin text, a Dutch translation, and a thorough commentary.

Biographies of Grotius are: W.S.M. Knight, *The Life and Works of Hugo Grotius* (1925); and A. Lysen (ed.), *Hugo Grotius: Essays on His Life and Works,* 2 vol. (1925).

Groton, city and town (township), New London County, southeastern Connecticut, U.S., on the east bank of the Thames River, opposite New London. In 1649 a trading post was established in the area (then part of New London) by Jonathan Brewster, son of William, leader of the Plymouth Colony. The community was incorporated (1705) as a separate town and was named for Groton, Eng. (birthplace of John Winthrop, early governor of Connecticut). Shipbuilding has prevailed since the early 18th century. The first diesel-powered submarine (1912) and the first nuclear-powered submarine, "Nautilus" (1955), were constructed there. The Submarine Library and Museum displays models and traces the history of submarines. The town includes the industrial city of Groton (chartered 1964, successor to the borough, incorporated 1903) and the village of West Mystic. In Fort Griswold State Park a monument commemorates Revolutionary War militiamen killed on Sept. 6, 1781, by British troops led by Benedict Arnold. Pop. (1980) city, 10,086; town, 41,062.

Groton, town (township), Middlesex County, near the Nashua River, 35 mi (56 km) northwest of Boston. Settled and incorporated in 1655 and probably named for the ancestral home of John Winthrop in Suffolk, Eng., it was destroyed 20 years later in King Philip's (Indian) War against the colonists but was later rebuilt.

Groton is known primarily as the seat of two famous preparatory schools. Groton Preparatory School was founded in 1884 by the Rev. Endicott Peabody as a privately endowed boarding school (grades 8–12) for boys only and administered in the strict tradition of a Church of England "public school." In addition to a standard academic program, Peabody's original curriculum included subjects that were not commonly offered at preparatory schools of the day, such as woodworking and printing. The school also emphasizes participation in sports and offers a wide range of interscholastic and recreational sporting programs. Regarded as the spawning ground for New Deal politicians, its roster of distinguished alumni includes Pres. Franklin D. Roosevelt, Sumner Wells, Averell Harriman, Dean Acheson, Joseph C. Grew, and Francis and George Biddle. Peabody married Eleanor and Franklin D. Roosevelt in 1905. Lawrence Academy, founded as Groton Academy in 1793, was renamed in 1846 for Amos and William Lawrence, who endowed it. Both schools are now coeducational.

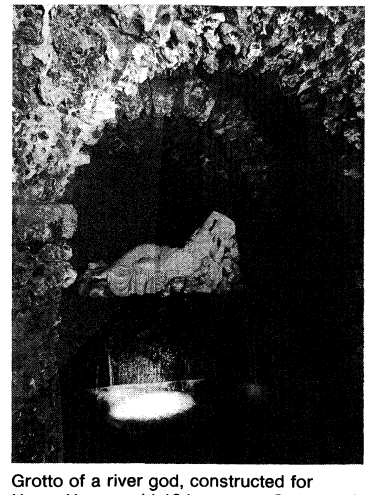
Several colonial buildings survive in the town, including First Parish Church Unitarian Meeting House (1755; restored 1916); a burial ground dates from 1678. Basically residential, the town has agricultural (apples, dairying, poultry) and lumber and paper interests. Pop. (1980) 6,154.

Grotowski, Jerzy (b. Aug. 11, 1933, Rzeszów, Pol.), international leader of the experimental theatre who became famous in the 1960s as the director of productions staged by the Polish Laboratory Theatre of Wrocław. A leading exponent of audience involvement, he sets up emotional confrontations between a limited group of spectators and the actors; the performers are disciplined masters of bodily and vocal contortions, violent but graceful action, and an almost unintelligible dialogue of howls and groans.

Grotowski studied at the National Theatrical Academy in Kraków (1951–59), then joined the Laboratory Theatre in 1959, the year it was founded. Grotowski's permanent company first appeared in western Europe in 1966. He became a guest lecturer and influential director in the avant-garde theatre of England, France, and the Scandinavian countries. His productions include *Faustus* (1963), *Hamlet* (1964), and *The Constant Prince* (1965). Grotowski's methods and pronouncements have influenced such U.S. experimental theatre movements as the Living Theatre, the Open Theatre, and the Performance Group. In 1969 the Laboratory Theatre made a successful U.S. debut in New York City with *Akropolis,* based on a 1904 play by Stanisław Wyspiański. Later productions include *Undertaking Mountain* (1977) and *Undertaking Earth* (1977–78).

Grottaglie, town, Taranto province, Puglia (Apulia) region, southern Italy. The town's castle dates from the 14th century; the church of the Matrice has a facade of the same period and a 16th-century stone relief of the Annunciation. Its chief industry is pottery manufacture, and there is a school of ceramics. Grottaglie is named for grottoes in the local rocks. Pop. (1981 prelim.) mun., 27,888.

grotto, natural or artificial cave used as a decorative feature in 18th-century European



Grotto of a river god, constructed for Henry Hoare, mid-18th century, Stourhead, Wiltshire, Eng.
Edwin Smith

gardens. Grottoes derived from natural caves were regarded in antiquity as dwelling places of divinities. Grottoes were often constructed from a fanciful arrangement of rocks, shells, bones, broken glass, and other strangely assorted objects and were commonly associated with water (*see* nymphaeum).

Well-known garden grottoes were the Grotto of Thetis at Versailles, Fr., Alexander Pope's grotto at Twickenham, Middlesex, Eng. (now part of Greater London), and the grotto at Stourhead, Wiltshire, Eng.

Groulx, Lionel-Adolphe (b. Jan. 13, 1878, Chenaux, near Vaudreuil, Que., Can.—d. May 23, 1967, Vaudreuil), Canadian priest and historian who for 50 years strongly influenced the Quebec nationalist movement.

The son of a lumberjack, Groulx became a seminarian at Sainte-Thérèse-de-Blaineville and Montreal and was ordained a Roman Catholic priest in 1903. After teaching at a seminary in Vallyfield, Que., he studied abroad, earning a Ph.D. at the University of Rome in 1907 and doctorate in theology in 1908. He taught again at Valleyfield until 1915, when he was appointed professor of Canadian history at the University of Montreal.

His early writings celebrated the faith and virtues of earlier days. Although his historical training was informal, his interpretation of French-Canadian history as a struggle for survival against the continuing dominance of British Canada had wide and prolonged influence. He published two novels (1922 and 1932) under the pseudonym Alonie de Lestres. His most important work was the four-volume *Histoire du Canada français depuis la découverte* (1950–52; "History of French Canada Since Its Discovery"). Other influential writings were the five-volume *Nos Luttes constitutionnelles* (1915–16; "Our Constitutional Struggles") and *La Confédération canadienne, ses origines* (1918; "The Canadian Confederation, Its Origins"). Groulx early founded an organization that grew into Catholic Action and later (1946) the Institute of History of French America. He was elected a fellow of the Royal Society of Canada, from which he resigned in 1952, just before his retirement from his chair of history. Not a separatist per se, Groulx nevertheless was a jealous conservator of the distinctive history and traditions of French Canada. He saw efforts to teach the same "objective" history to French- and English-Canadians as a "campaign to denaturalize French-Canadians."

ground, in electricity; electrical contact with the Earth, which remains essentially at a constant potential. A grounded wire on a lightning rod leads large electric charges from the atmosphere directly to Earth, preventing them from taking other paths that might result in damage to property or injury to persons. Since people are themselves often grounded (standing on a moist basement floor or leaning against, or otherwise in contact with, metallic plumbing), interior wiring systems have one wire connected to ground to minimize accidents to persons and fire damage in case of lightning, transformer failures, or insulation breakdown in wiring. Metallic boxes and other conductor enclosures are grounded, so that even in case of insulation breaks any parts that can be touched will be at ground potential and unable to give shock. Portable electrical appliances are frequently provided with a grounding connection to minimize danger of electric shock.

ground bass, also called BASSO OSTINATO, (Italian: "obstinate bass"), in music, a recurring melodic pattern in the lowest part of a composition, serving as the principal unifying factor of the composition. Early instances are found in 13th-century French motets as well as 15th-century cantus firmus dances where a skeletal melody served as a cantus firmus, or fixed theme. In the 16th century the practice of composing counterpoint (interwoven melodies) upon a repeated bass pattern became popular in Italy and Spain. Well-known "grounds," such as the *passamezzo antico, romanesca, folia* (all closely related), *ruggiero,* and *passamezzo moderno* took their names from popular dances spread throughout Europe. All such grounds involved unchanging harmonic patterns that provided ideal frameworks for improvisation.

Closely allied to the "harmonic" ground is the "melodic" ground favoured in the 17th century. Here, the harmony commonly varies with each repetition, and the upper parts may overlap the ground, which itself may be transposed to new pitch levels during the course of a piece.

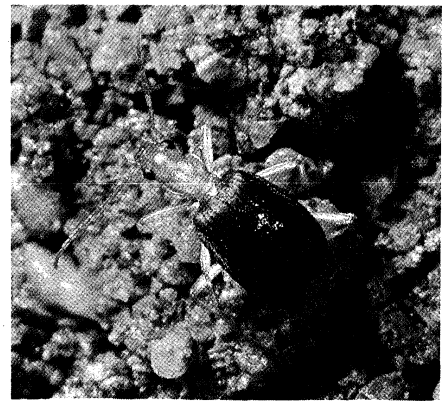
Although particularly characteristic of the Baroque era, the ground bass had a more or less continuous history from the 16th to the 20th century. Among composers who employed it with outstanding success are Claudio Monteverdi (1567–1643), Henry Purcell (*c.* 1659–95), J.S. Bach, Beethoven, Brahms, Alban Berg (1885–1935), and Benjamin Britten (1913–76). The improvisational potential of ground bass patterns has also been extensively exploited in American jazz.

ground beetle, any member of the more than 20,000 species of the insect family Carabidae, one of the largest families of the order Coleoptera. Ground beetles are recognized by their long legs and shiny black or brown elytra (wing covers), which are fused together along the midline and decorated with ridges. In many species the hindwings are reduced or absent. Ground beetles prefer moist cool areas and usually run rather than fly when disturbed. They emerge from under rocks, crevices, or litter at night in search of insects, worms, or snails. The long, slender larvae are mostly carnivorous, although those of a few species feed on seeds. They have sharp projecting mouthparts and a pair of bristly tail appendages. Many ground beetles secrete a foul-smelling liquid that discourages potential predators such as birds.

The searcher or caterpillar hunter (*Calosoma scrutator*) is a common, brightly coloured North American ground beetle about 35 millimetres (1½ inches) long. Its green or violet wings are edged in red, and its body has violet-blue, gold, and green markings. This and related species are known to climb trees in search of caterpillars. They secrete an acidic fluid that blisters human skin. The iridescent green-coloured *C. sycophanta* was introduced into North America from Europe to help control the gypsy and brown-tail moth caterpillars.

The snail hunters (*e.g., Scaphinotus*) are a specialized group of ground beetles. Elongated, hook-shaped mouthparts allow them to extract the snail from its shell. The bombardier beetle (*Brachinus* in North America and *Pherosophus* in Africa, Asia, and the East Indies) has little sacs at the posterior end of the abdomen containing a foul-smelling fluid used to deter enemies. Unlike the fluid of other ground beetles, that of the bombardier beetle vaporizes upon contact with air. The popping sound made when the bombardier beetle expels fluid surprises its predators, and the smoke cloud blinds them, giving the beetle time to escape. The vapour of some species smells like iodine and irritates human eyes. *Brachinus* species have dark-blue, black, or blue-green wings and reddish-yellow bodies and legs.

The beneficial *Lebia grandis,* which resembles the bombardier beetle, preys upon the Colorado potato beetle. The Malayan leaf beetle, or fiddle beetle (*Mormolyce*), about 100 mm (4 in.), resembles a violin with its slender head and thorax and wide elytra. This flat beetle uses its long head to probe into small openings in search of prey. It hides in crevices, under tree bark, and in porous fungi. The majority of ground beetles feed on insects harmful to humans and are therefore considered to be beneficial.



Bombardier beetle (*Brachinus*)
William E. Ferguson

ground cuckoo, any of about 15 species of birds constituting the subfamily Neomorphinae of the cuckoo family (Cuculidae), noted for terrestrial habits. Of the 11 New World species, three, the striped cuckoo (*Tapera naevia*), the pheasant cuckoo (*Dromococcyx phasianellus*), and the pavonine cuckoo (*D. pavoninus*), are brood parasites, laying their eggs in the nests of other birds.

Ground cuckoo (*Dromococcyx*)
Peter L. Ames—EB Inc.

Other neotropical ground cuckoos include the lesser ground cuckoo (*Morococcyx erythropygus*), a species 25 centimetres (10 inches) long, widespread in Central America; five species of *Neomorphus,* rather large (45 cm, or 18 in.) heavy-billed cuckoos with metallic bluish or bronze plumage, found from Costa Rica to Bolivia; and the two species known as roadrunners (*See* roadrunner). Two or three species of *Carpococcyx,* even larger (60 cm, or 24 in.), are found in Southeast Asia.

ground hemlock (shrub): *see* American yew.

ground laurel (plant): *see* trailing arbutus.

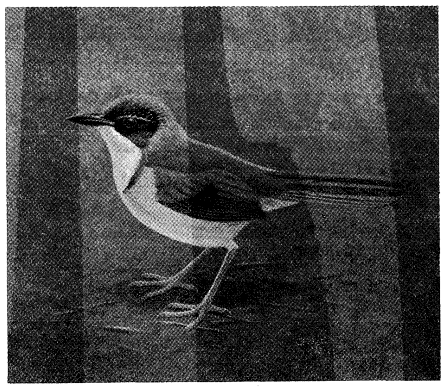
ground pearl, scale insect (order Homoptera) with iridescent globular body (two to four

millimetres in length) varying in colour from metallic bronze, red, or gold to cream or silver. They are worldwide in distribution, and are often found on the roots of plants or scattered in the soil. They can best be controlled by using sufficient amounts of water and fertilizer around susceptible plants.

In the tropics, the protective waxy coverings, secreted by the genus *Margarodes*, are used as beads and ornaments. Ground pearls are also a source of varnish.

ground pine: *see* club moss.

ground roller, any of five species of pigeon-sized birds that comprise the family Brachypteracidae (order Coraciiformes) known for their tumbling flight. They are found only in Madagascar. Four species inhabit deep forest; one, the long-tailed ground roller (*Uratelornis chimaera*), confined to a

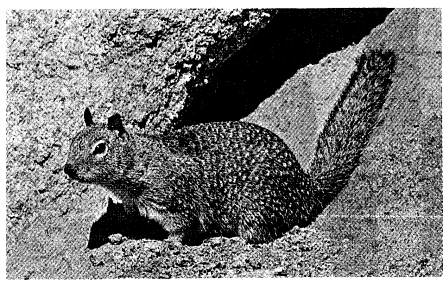


Ground roller (*Atelornis pittoides*)
Drawing by John P. O'Neill

small desert in southwestern Madagascar, is nearly extinct. Ground rollers range from 30 to 40 centimetres (12 to 16 inches) in length.

ground spider: *see* wolf spider.

ground squirrel, any of numerous relatively short-legged, terrestrial rodents of the squir-



California ground squirrel (*Spermophilus beecheyi*)
Kenneth W. Fink from Root Resources—EB Inc.

rel family, Sciuridae (order Rodentia). The name is applied to the antelope ground squirrels (*Ammospermophilus*), also African ground squirrels (*Xerus* and *Atlantoxerus*), the many species of the genus *Spermophilus,* and, often, to the chipmunks.

Ground squirrels are diurnal and live in burrows, often complex underground systems, that they excavate. They are primarily vegetarian, but some readily feed on insects, carrion, and small animals. Many species collect food, carrying it in their cheek pouches and storing it in their burrows. A number are more or less sociable and form colonies. Ground squirrels from cold areas may hibernate in winter; those from arid regions may become dormant in summer (aestivate).

The antelope ground squirrels comprise five species of white-striped animals found in dry plains and on low mountainsides of the southwestern United States and northern Mexico. They are 20 to 25 centimetres (8 to 10 inches) long, including a 5- to 10-cm tail, and range in colour from pale gray brown to light cinnamon brown. The tail is white on the underside and is generally carried up or over the back, rather in the manner of an antelope. In some areas, these ground squirrels may damage crops or the banks of irrigation ditches.

African ground squirrels of the genus *Xerus* are found from East to West Africa and in South and southwest Africa. There are about four species. They have coarse, scant fur and are 23 to 30 cm long excluding the 18- to 27-cm tail. They are brown, reddish brown, or grayish, and most have a white stripe on each side. African ground squirrels, like the others, have strong claws and short ears. They live in colonies, sometimes with other rodents or with meerkats (*Suricata*). In some areas, they are pests because they damage crops. The Barbary ground squirrel (*Atlantoxerus getulus*) is the only other terrestrial squirrel in Africa. It is white striped and is found north of the Sahara.

The genus *Spermophilus* (*Citellus* of some authors) includes about 40 species found in Europe, Asia, and North America. The members of this genus vary from 17 to 52 cm in length, including the 3- to 25-cm tail. They are basically gray, brown, reddish brown, or yellowish and may be solid coloured, dappled, spotted, or striped. There are two species in Europe, the European and spotted susliks (*S. citellus* and *S. suslicus*). Both are yellowish brown and are found primarily in the plains. The former, which ranges into Asia, is vaguely spotted or unspotted; the latter is clearly marked with small, pale spots.

Most of the species in this genus are native to North America, particularly the west. Some are well known, and some are of economic importance as pests or as consumers of harmful insects and weeds. The 13-lined ground squirrel, or gopher (*S. tridecemlineatus*), is a familiar rodent found westward from the Great Lakes region; it is readily identified by the 13 white stripes or lines of spots that alternate with brown along its back and sides. The California ground squirrel (*S. beecheyi*) is a white-flecked brown squirrel found from Oregon to Baja California. It is an agricultural pest and may also, as it did in San Francisco in 1900, carry the fleas that transmit bubonic plague. The Arctic ground squirrel (*S. undulatus*) is a large, white-flecked, reddish brown species attaining a length of about 50 cm. It is found in Asia, as well as in northern Canada and Alaska, and is used for food and clothing by the Eskimos. The golden-mantled ground squirrel (*S. lateralis*) is a chipmunk-like inhabitant of mountainous areas, often of parks and camping grounds. It is gray or brown with a black-bordered white stripe along each side, and it is characterized by a yellowish or reddish brown "mantle" that appears in summer on the head and shoulders.

The genus *Spermophilus* is sometimes divided into several subgenera: *Spermophilus* (various ground squirrels, susliks, gophers); *Callospermophilus* (golden-mantled ground squirrels); *Otospermophilus* (California ground squirrels and others); and *Spermophilopsis* (the thin-toed, or long-clawed, ground squirrels of Asia). *See also* marmot; prairie dog.

ground substance, an amorphous gel-like substance present in the composition of the various connective tissues. It is most clearly seen in cartilage, in the vitreous humour of the eye, and in the Wharton's jelly of the umbilical cord. It is transparent or translucent and viscous in composition; the main chemical components of ground substance are large carbohydrates and proteins known as acid mucopolysaccharides. *See also* collagen.

ground thrush, any of about 37 species of thrushes of the genus *Zoothera* (family Turdidae), including birds sometimes placed in the genera *Geokichla, Ixoreus, Oreocincla,* and *Ridgwayia* and some that have been assigned to *Turdus.* All are more than 20 centimetres (8 inches) long and have pale underwing stripes. They inhabit montane forest undergrowth. The largest (29 cm, or 11½ in.) and most widespread species is the golden mountain thrush (*Z. dauma*), also called White's, or tiger, thrush—a dark-flecked bird occurring over most of the Asian mainland and from Japan to Australia (where it is called ground-thrush). Southeastern Africa has the orange ground-thrush (*Z. gurneyi*). The two New World species are, in northwestern North America, the varied thrush (*Z. naevia*), which looks like an American robin with a black breast band, and, in Mexican highlands, the Aztec thrush (*Z. pinicola*), which is white-bellied. Several species share the varied, slow, organ-toned song pattern of other thrushes.

groundhog (rodent): *see* woodchuck.

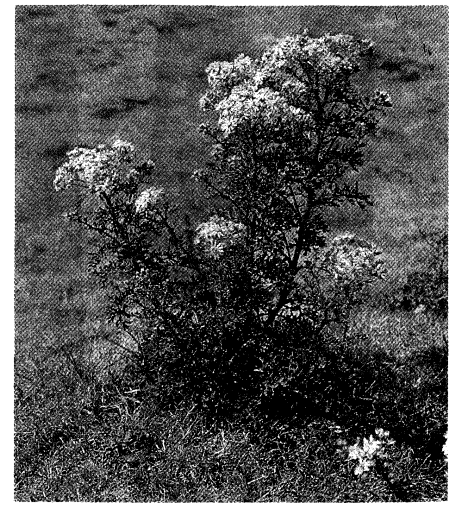
Groundhog Day (February 2), in U.S. popular tradition, the day that the groundhog, or woodchuck, comes out of his hole after a long winter sleep to look for his shadow. If he sees it, he regards it as an omen of six more weeks of bad weather and returns to his hole. If the day is cloudy and, hence, shadowless, he takes it as a sign of coming spring and stays above ground. Convincing statistical evidence does not support this tradition.

The tradition, which sometimes includes the bear or badger, stems from similar beliefs associated with Candlemas (also February 2) in England. According to an old English song:

> If Candlemas be fair and bright,
> Come, Winter, have another flight;
> If Candlemas bring clouds and rain,
> Go, Winter, and come not again.

groundnut, any of several plants that bear edible fruit or other nutlike parts. Three are members of the family Fabaceae (or Leguminosae): *Arachis hypogaea,* the peanut (*q.v.*), the fruit of which is a legume or pod rather than a true nut; *Apois americana,* also called wild bean and potato bean, the tubers of which are edible; and *Lathyrus tuberosa,* also called earth-nut pea. *Cyperus esculentus,* nut sedge or yellow nut grass, is a papyrus relative (family Cyperaceae) that also bears edible tubers, especially in the variety called chufa or earth almond.

groundsel, also called RAGWORT, any of about 1,200 species of annual, biennial, and perennial herbs, shrubs, trees, and climbers comprising the genus *Senecio* of the family



Tansy ragwort (*Senecio jacobaea*)
A to Z Botanical Collection—EB Inc.

Asteraceae, distributed throughout the world. Some species are cultivated as border plants or houseplants, and many species contain alkaloids that are poisonous to grazing animals.

Members of the genus have yellow flower heads that usually are composed of disk and ray flowers. Bracts (leaflike structures) are located below the yellow, red, purple, blue, or white flower heads. Ragwort, or tansy ragwort (*S. jacobaea*); cineraria, or dusty miller (*S. cineraria*); and golden ragwort (*S. aureus*) are cultivated as border plants. German ivy (*S. mikanoides*) and florists cineraria (*S. cruentus*) are popular houseplants.

groundwater, water that occurs below the surface of the Earth, where it occupies all or part of the void spaces in soils or geological strata. It is also called subsurface water to distinguish it from surface water which is found in large bodies like the oceans or lakes, or which flows overland in streams. Both surface and subsurface water are related through the hydrologic cycle (the continuous circulation of water in the Earth-atmosphere system).

A brief treatment of groundwater follows. For full treatment, *see* MACROPAEDIA: Hydrosphere.

Most groundwater comes from precipitation. Precipitation infiltrates below the ground surface into the soil zone. When the soil zone becomes saturated, water percolates downward. A zone of saturation occurs where all the interstices are filled with water. There is also a zone of aeration where the interstices are occupied partially by water and partially by air. Groundwater continues to descend until, at some depth, it merges into a zone of dense rock. Water is contained in the pores of such rocks, but the pores are not connected and water will not migrate. The process of precipitation replenishing the groundwater supply is known as recharge. In general, recharge occurs only during the rainy season in tropical climates or during winter in temperate climates. Typically, 10 to 20 percent of the precipitation that falls to the Earth enters water-bearing strata (aquifers).

Groundwater is constantly in motion. Compared to surface water, it moves very slowly, the actual rate dependent on the transmissivity and storage capacity of the aquifer. Natural outflows of groundwater take place through springs and river beds when the groundwater pressure is higher than atmospheric pressure in the vicinity of the ground surface. Internal circulation is not easily determined, but near the water table the average cycling time of water may be a year or less, while in deep aquifers it may be as long as thousands of years.

Groundwater plays a vital role in the development of arid and semi-arid zones, sometimes supporting vast agricultural and industrial enterprises that could not otherwise exist. It is particularly fortunate that aquifers antedating the formation of deserts remain unaffected by increases in aridity with the passage of time. Withdrawal, however, will deplete even the largest of groundwater basins so that development based on the existence of aquifers can be only temporary at best.

A vast amount of groundwater is distributed throughout the world, and a large number of groundwater reservoirs are still underdeveloped or uninvestigated. The most frequently investigated or exploited groundwater reservoirs are of the unconsolidated clastic (mainly sand and gravel) or carbonate hardrock type found in alluvial valleys and coastal plains under temperate or arid conditions.

Though some groundwater dissolves substances from rocks and may contain traces of old seawater, most groundwater is free of pathogenic organisms, and purification for domestic or industrial use is not necessary. Furthermore, groundwater supplies are not seriously affected by short droughts and are available in many areas that do not have dependable surface water supplies.

groundwater hydrology: *see* geohydrology.

group, in chemistry, a set of chemical elements in the same vertical column of the periodic table. The elements in a group have similarities in the electronic configuration of their atoms, and thus they exhibit somewhat related physical and chemical properties.

The periodic table has eight main groups (0, Ia, IIa, IIIa, IVa, Va, VIa, and VIIa). Each group consists of elements that have similar electronic structures characterized by completely filled inner electron shells and by a number of electrons in their outermost shells equal to the group number. Eight other groups (Ib, IIb, IIIb, IVb, Vb, VIb, VIIb, and VIII), found only in Periods 4 to 7 of the table, are composed of elements of the transition series. With these elements the number of outermost electrons does not necessarily correspond to the group number.

group, in mathematics, set that has a multiplication that is associative [$a(bc) = (ab)c$ for any a, b, c] and that has an identity element and inverses for all elements of the set.

group, social: *see* social group.

Group 47 (German writers association): *see* Gruppe 47.

Group *f*.64, loose association of photographers who introduced a style of sharply detailed photography to California and laid the foundation for the West Coast school of photography. The group, formed in 1932, constituted a revolt against soft-focussed, academic photography then prevalent on the West Coast of the United States. The principal members of Group *f*.64 were Ansel Adams, Imogen Cunningham, Edward Weston, and Willard Van Dyke. The name of the group is taken from a camera diaphragm aperture setting that gives particularly good resolution and depth of field.

In 1932 the M.H. de Young Memorial Museum in San Francisco presented an exhibit of works by Group *f*.64, arousing only mild public and critical interest. But by 1935, however, when the group disbanded, its ideas had begun to change the direction of photography.

Consult the INDEX *first*

group insurance, insurance provided to members of a formal group such as employees of a firm or members of an association. Group insurance is distinguished from individual insurance in which single policies are sold to one person at a time and from social insurance (*e.g.*, unemployment insurance, social security), which is sponsored by the government.

The concept of group insurance probably originated in ancient Rome with the Roman burial societies, but the first modern policies were written in the late 19th century. Group insurance is offered in every country in which private insurance companies operate and is growing in importance every year.

There are several different types of group insurance. Group life insurance is perhaps the most common form. It is usually offered as group term insurance which is in force only for a specified period of time and which does not build up any cash value. Sometimes group permanent life insurance is offered. This type builds up a cash value and stays in force until the policy reaches maturity and is cashed or until the death of the insured. Group health insurance includes group medical expense insurance, which pays part or all of the insured's hospital, surgical, and other medical bills, and group disability income insurance, which replaces part or all of the income lost due to illness or accident. Group accidental death and dismemberment and group travel accident insurance combine elements of both life and health insurance.

In recent years some companies have offered membership in a Health Maintenance Organization (HMO; *q.v.*) as an alternative to standard group health insurance. HMO's are associations of physicians and other health professionals who for a lump sum or periodic payments provide comprehensive health care, including hospitalization if necessary.

All group insurance plans share a number of characteristics. The insurer writes and sells only one contract per group and that contract is with the employer or organization rather than with the individual members of the group. Large economies in selling and administration are thus made possible. After a group policy has been in force long enough, the insurer can base premiums partly on the experience of that particular group, or in the case of very large groups, wholly on the experience of that particular group. Also, group insurance plans are usually of a continuing nature and seldom have to be resold or renegotiated. As some persons leave the group others join, and the group as a whole frequently increases in size.

These characteristics make group insurance plans attractive to insurers because of their lower cost, higher volume, and at least somewhat greater predictability than is the case with individual insurance. Group insurance is attractive to the insured because of its lower cost and the guaranteed availability of the insurance without the necessity of undergoing a medical examination or providing other evidence of insurability. Persons viewed as unacceptably high risks by insurance companies would be unable to obtain any life or health insurance whatsoever were it not for the group insurance concept. Another benefit under most group plans is that anyone who leaves the group may keep the insurance in force by switching to an individual policy.

In very rare instances group insurance has been written for as few as two people. In common practice, however, the minimum size is 10 members. Another requirement is that the group must have a purpose other than to acquire insurance. The nature of the groups covered varies widely, but groups composed of the employees of individual organizations (companies, non-profit institutions, governmental units) are the most common. Substantial amounts of group insurance are also written for multiple-employer groups, labour unions, professional associations, college alumni groups, veterans associations, and other common-interest organizations. The largest group insurance plan in the world is that covering U.S. federal employees.

group marriage, the marriage of several men with several women. As an institutionalized social practice, group marriage is extremely rare; nowhere does it appear to have existed as the prevailing form of marital arrangement. Of the 250 societies reported by the American anthropologist George P. Murdock (1949), only the Caingang of Brazil had chosen group marriage as an alternative form of union; even there the frequency was but 8 percent.

At the turn of the century, many anthropologists believed that in an early stage of human development group marriage was common. Much of the literature of that time attempted to demonstrate that marital unions had undergone several evolutionary stages, beginning with complete sexual license, through group marriage, polygyny, and polyandry, and culminating in monogamy. Group marriage was

erroneously ascribed to peoples in Australia, Siberia, and Africa, when in actuality the particular tribes contained groups of men who had privileged sexual access to women but did not bear the domestic and economic responsibilities that constitute a true marriage.

Such evolutionary theories were for the most part discarded by later anthropologists, and a more representative opinion regarded group marriage as a sporadic and rare phenomenon always appearing in conjunction with polyandry. It is possible that group marriage can only occur when polyandrous marriage is common and then combines with polygyny. One motive for group marriage seems to be enhanced economic security through mate recruitment. In the West, group marriage has been the object of occasional theoretical treatises and practical experiments by utopian movements.

Group Theatre, company of stage craftsmen founded in 1931 in New York City by a former Theatre Guild member, Harold Clurman, in association with the directors Cheryl Crawford and Lee Strasberg, for the purpose of presenting American plays of social significance. Embracing Konstantin Stanislavsky's method (an acting technique that stressed the introspective approach to artistic truth), the characteristic trend of the Group's productions was primarily in the staging of social protest plays with a point of view from the left. After its first trial production of Sergey Tretyakov's *Roar China* (1930–31), the Group staged Paul Green's *House of Connelly,* a play of the decadent Old South as reflected by the disintegrating gentry class. The play was favourably received by the critics and ran for 91 performances. The Group then followed with two anticapitalist plays, *1931* and *Success Story;* the former closed after only nine days, but the latter ran for more than 100 performances. Financial and artistic success came two years later with the production of Sidney Kingsley's *Men in White* (1933), a melodrama of hospital interns. Directed by Strasberg and with settings by Mordecai Gorelik, the play ran close to a year and was awarded the Pulitzer Prize for that season.

In 1935 the Group staged *Waiting for Lefty* by one of its actors, Clifford Odets. The play, suggested by a taxicab drivers' strike of the previous year, used flashback techniques and "plants" in the audience to create the illusion that the strikers' meeting was occurring spontaneously. The group also staged Odets' *Awake and Sing,* a look at Jewish life in the Bronx during the Depression, as well as his *Till the Day I Die* (1935), *Paradise Lost* (1935), and *Golden Boy* (1937). Other productions included Paul Green's *Johnny Johnson,* a satirical, anti-war play, partly in blank verse, with music by Kurt Weill; *Bury the Dead* (1936, by Irwin Shaw); *Thunder Rock* (1939, by Robert Ardrey); and *My Heart's in the Highlands* (1939, by William Saroyan).

The Group exercised a profound influence on the American theatre in three ways: (1) it stimulated the writing talent of such playwrights as Odets, and Saroyan; (2) many of its actors and directors, including Clurman, Elia Kazan, Lee J. Cobb, Stella Adler, and Strasberg, went on to prominent positions in theatre and film after the Group's dissolution; and (3) its presentations established a unified acting and working method that became virtually standard after the Group disbanded in 1941.

group therapy, the use of group discussion and other group activities in treatment of psychological disorders. Despite widespread recognition that the groups to which a person belongs may affect his attitudes and behaviour, the traditional medical emphasis on the privacy of the doctor–patient relationship slowed general acceptance of group psychotherapy. Only a few physicians practiced group therapy before World War II. The large numbers of soldiers requiring psychotherapy compelled psychiatrists to try to treat them in groups, and the use of group methods proved so effective that they developed rapidly in the postwar years. The practice of group therapy expanded to clinical and counselling psychologists as well as social workers.

Group therapeutic techniques are as varied as those of individual therapy and similarly tend to stress either alleviation of members' distress by direct measures or the creation of a group atmosphere conducive to increased self-understanding and personal maturation. Groups of the first type may have any number of members, sometimes up to 50 or more. Some are primarily inspirational in that their chief aim is to raise members' morale and combat feelings of isolation by cultivating a sense of group belongingness through slogans, rituals, testimonials, and public recognition of members' progress. Certain of these groups have developed into autonomous movements conducted solely by their members. An outstanding example is Alcoholics Anonymous, organized by chronic alcoholics to help themselves.

The other class of group methods, particularly those utilizing nondirective (client-centred) or psychoanalytic techniques, strives to foster free discussion and uninhibited self-revelation. Most use small face-to-face groups, typically composed of five to eight members with similar problems. Members are helped to self-understanding and more successful behaviour through mutual examination of their reactions to persons in their daily lives, to each other, and to the group leader in an emotionally supportive atmosphere.

Sensitivity training is a technique for improving human interactions in a non-therapeutic setting, and came into vogue (particularly in the United States) in the 1960s and 1970s. Deriving from group therapy methods, it utilizes intensive group discussion and interaction to increase individual awareness of self and others. It has been known under a variety of names, including T-group, encounter group, and human relations or group dynamics training. The methods of such training have been applied to a wide range of social problems (*e.g.,* in business and industry) to enhance trust and communication among individuals and groups throughout an organization.

The idea of treatment of the family as a group (family therapy or counselling) is based on the view that the destructive interrelations of family members may be made more positive by examining their behaviour patterns toward each other. Many family therapists adhere to the principle derived from group process theory that family members adopt various roles; families frequently designate one member to play the martyr role and that individual's behaviour is correspondingly shaped over time, sometimes to the point of emotional disturbance. Much of the distress of the psychiatric patient is thus viewed to be caused by self-perpetuating and self-defeating ways of relating to intimates. Family therapy is thus an attempt to analyze family roles and readjust them in order to create more balance.

The issues that threaten the stability of the family unit, such as incest, divorce, child abuse, drug or alcohol abuse, questions relating to child-rearing disagreements, finance, social and ethical values, are exposed in the presence of an experienced therapist and openly discussed. Through an understanding of the issues threatening the family and an appreciation of the individual assets of each family member, therapy often leads to an effective resolution of family problems.

The concept of family therapy developed during the early 20th century, largely through the efforts of Austrian psychiatrist Alfred Adler (1870–1937). The offshoot of marital (sometimes known as couple or relationship) therapy derived from the psychotherapy techniques of Swiss psychiatrist Carl Jung (1875–1961). William H. Masters and Virginia E. Johnson based the techniques of their sex therapy on extensive research in human sexual response.

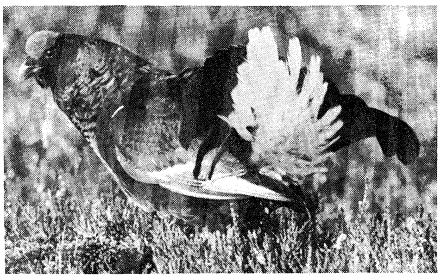
Social, or milieu, therapy for institutionalized patients represents an extension of group therapeutic principles to make the mental hospital a therapeutic community, all aspects of which will help to restore the patients' mental health. This involves the creation of a positive, supportive atmosphere and a full program of occupational, recreational, and educational activities. It also involves the development of a flexible, democratic social structure in which all members of the treatment staff work as a coordinated team and the patients participate responsibly, to the limits imposed by their disabilities, in all phases of hospital life. *See also* psychodrama.

grouper, any of numerous species of fishes of the family Serranidae (order Perciformes), many belonging to the genera *Epinephelus* and *Mycteroperca.* Groupers, widely distributed in warm seas, are characteristically large-mouthed, rather heavy-bodied fishes that tend to remain in discrete areas. Some are very large fishes, attaining a length and weight of about 2 metres (6 feet) and 225 kilograms (500 pounds)—in some instances reportedly much more. Groupers are often dully coloured in greens or browns, but a number are brighter, more boldly patterned fishes. Some, such as the Nassau grouper (*Epinephelus striatus*), are noted for their ability to change from one to any of a number of other colour patterns. Also, in many species, such as the blackfin and yellowfin groupers (*Mycteroperca bonaci* and *M. venenosa*), individuals inhabiting deeper waters are much redder than those living near shore. Groupers are prime food fishes and may also provide sport for anglers and spearfishermen. A few, however, may carry a toxic substance in their flesh and can cause ciguatera, a form of poisoning, when consumed.

One of the largest and best known of the groupers is the jewfish (*q.v.*). Other well-known species include the golden-striped grouper (*Grammistes sexlineatus*), an Indo-Pacific fish about 25 centimetres (10 inches) long, marked with rows of dashes when young but black or brown with lengthwise, yellow stripes as an adult; the Nassau grouper, an abundant Caribbean food fish about 90 centimetres long, varies in colour from white, with or without darker markings, to dark brown or gray brown; the red grouper (*Epinephelus morio*), another variable Caribbean food fish, usually reddish with pale blotches and about 90 centimetres long; and the rock hind (*E. adscensionis*), an Atlantic food species spotted with orange or red and about 60 centimetres long.

grouse, any of a number of game birds in the family Tetraonidae (order Galliformes). In addition to species called grouse, the group includes several birds known by particular names, such as the capercaillie and prairie chicken (see below) and the ptarmigan (*q.v.*). The order Columbiformes contains the sand grouse (*q.v.*). The most famous Old World member is the black grouse (*Lyrurus tetrix*), of Wales, Scotland, Scandinavia, and north central Europe; a related form (*L. mlokosiewiczi*) occurs in the Caucasus. The male, known as blackcock, may be 55 centimetres (22 inches) long and weigh almost 2 kilograms (about 4 pounds). He is iridescent blue-black, with white wing bars and undertail coverts; his tail curls outward like a lyre. The female, known as gray hen, is mottled brown, barred with

black; she is smaller than the male. Several cocks display together in what is called a lek: they inflate red combs over their eyes, spread their tails, and circle in a crouch, quivering.



Male grouse displaying
(Top) blackcock (*Lyrurus tetrix*) and (bottom) blue grouse (*Dendragapus obscurus*)
(Top) Ingmar Holmasen, (bottom) Hampson—Annan Photo Features

Of North American species the best known is the ruffed grouse (*Bonasa umbellus*), of local abundance but widespread. In New England it is generally called partridge, although it is not a true partridge. Ruffed grouse live mainly on berries, fruits, seeds, and buds, but also take much animal food. Both the male and female are 40–50 cm (15½–19¾ in.) long, with a black band on the fan-shaped tail. The male's ruff consists of erectile black feathers on the sides of the neck. He is famous for drumming—beating his wings rapidly against the air—to proclaim his territory. In courtship display, he struts, hissing, with tail cocked up, before the hen.

The spruce grouse (*Canachites canadensis*), found in northerly conifer country, is nearly as big as a ruffed grouse, the male darker. Its flesh usually has the resinous taste of conifer buds and needles, its chief food. Also of evergreen forests is the blue grouse (*Dendragapus obscurus*), a big, dark bird, plainer and longer tailed than the spruce grouse and heavier than the ruffed grouse.

Two species that display spectacularly are the sage grouse (*Centrocercus urophasianus*) and the sharp-tailed grouse (*Pedioecetes phasianellus*). The former is the largest New World grouse, exceeded in the family only by the capercaillie (see below). A male may be 75 cm (30 in.) long and weigh 3½ kg (about 7½ lb). This species inhabits sagebrush flats. The sharptail, a 45-cm (18-in.) bird weighing 1 kg (about 2 lb), is wild from Quebec and Michigan westward across Canada and southwestward to New Mexico.

The capercaillie or capercailzie (*Tetrao urogallus*), exclusively a European game bird, is the largest member of the grouse family. The male capercaillie, sometimes called cock of the woods, is about 85 cm (33½ in.) long, with black and brown plumage glossed with blue and green. The hen, about one-third smaller, is mottled brown, with rusty breast patch. Hybrids of capercaillie and black grouse are fertile, suggesting a very close relationship.

The prairie chickens, or pinnated grouse (*Tympanuchus*), are North American game birds also noted for lek displays. The greater prairie chicken (*T. cupido*) is a 45-cm (17½-in.) bird with brown plumage strongly barred below, and short rounded dark tail; a male may weigh almost 1 kg. It occurs locally from Michigan to Saskatchewan, south to Missouri, New Mexico, and coastal Texas and Louisiana; northernmost birds are somewhat migratory. One subspecies, Attwater's prairie chicken (*T. c. attwateri*), has become rare as its tall-grass habitat has come under cultivation. The lesser prairie chicken (*T. pallidicinctus*), smaller and paler, is limited to the arid west central Great Plains. The heath hen (*T. c. cupido*), extinct since 1932, was the eastern race of the greater prairie chicken. The sharp-tailed grouse is locally called prairie chicken.

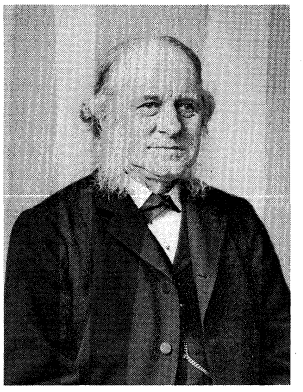
grouse locust: *see* pygmy grasshopper.

Grove, Frederick Philip (b. 1871, Russia—d. Aug. 19, 1948, Simcoe, Ont., Can.), Canadian novelist whose fame rests on sombre naturalistic works that deal frankly and realistically with pioneer life on the Canadian prairies.

Grove grew up in Sweden, travelled widely in Europe as a youth, and attended European universities. On a visit to Canada in 1892, he was left stranded there by his father's sudden death. He worked as an itinerant farm labourer (1892–1912), as a teacher in Manitoba (1912–24), and as an editor in Ottawa before retiring to a farm near Simcoe. Grove's series of prairie novels, *Our Daily Bread* (1928), *The Yoke of Life* (1930), and *Fruits of the Earth* (1933), were most successful. Though somewhat stiff in style and clumsy in construction, they live by virtue of the honesty of Grove's vision. Grove also wrote two books of essays on prairie life and an autobiography, *In Search of Myself* (1946).

Grove, Sir George (b. Aug. 13, 1820, London—d. May 28, 1900, London), English writer on music famous for his multivolume *Dictionary of Music and Musicians.*

Grove began his career as a civil engineer and became secretary to the Society of Arts in 1850 and to the Crystal Palace in 1852.



Sir George Grove
By courtesy of the Royal College of Music, London

He collaborated with William Smith in his *Dictionary of the Bible* and was largely responsible for organizing the Palestine Exploration Fund in 1865. From 1856 to 1896 he wrote analytical notes for the Crystal Palace concerts; marked by enthusiasm, insight, and thoroughness, these established a standard in program commentary. In 1867 he visited Vienna with the composer Sir Arthur Sullivan and discovered the manuscripts for Schubert's *Rosamunde.* He was editor of *Macmillan's Magazine* from 1868 to 1883. During the years 1879–89 his *Dictionary* was published; in addition to supervising its contents, he contributed several articles to it.

In 1882 Grove became first director of the Royal College of Music and was knighted. His book *Beethoven and His Nine Symphonies* was published in 1896.

Grove, Sir William Robert (b. July 11, 1811, Swansea, Glamorgan, Wales—d. Aug. 1, 1896, London), British physicist and a justice of Britain's high court (from 1880), who first offered proof of the thermal dissociation of atoms within a molecule. He showed that steam in contact with a strongly heated platinum wire is decomposed into hydrogen and oxygen in a reversible reaction. Grove also developed the two-fluid electric cell, consisting of amalgamated zinc in dilute sulfuric acid and a platinum cathode in concentrated nitric acid, the liquids being separated by a porous container.

Grove was educated by private tutors and then at Brasenose College, Oxford, and also studied law at Lincoln's Inn and was called to the bar in 1835. Ill health interrupted his law career, and he turned to science. At the London Institution, where he was professor of physics (1840–47), he used his platinum-zinc batteries to produce electric light for one of his lectures.

His classic *On the Correlation of Physical Forces* (1846) enunciated the principle of conservation of energy a year before the German physicist Hermann von Helmholtz did so in his famous paper *Über die Erhaltung der Kraft* ("On the Conservation of Force").

His scientific career led to the practice of patent and other law after 1853. He was appointed to the court of common pleas in 1871 and was knighted in 1872. After retirement from the bench in 1887, he resumed his scientific studies.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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growing season, also called FROST-FREE SEASON, period of the year during which growing conditions for indigenous vegetation and cultivated crops are most favourable. It usually becomes shorter as distance from the Equator increases. In equatorial and tropical regions the growing season ordinarily lasts all year, whereas in higher latitudes, *e.g.,* the tundra, it may last as little as two months or less. Growing season also varies according to elevation above sea level, with higher elevations tending to have shorter growing seasons.

Length of growing season is measured in two ways. One enumerates the days of the year when average temperature is above the threshold at which crops will germinate and continue to grow (along with native vegetation). This measure varies with kind of crop. For example, wheat and many other plants require an average temperature of at least 40° F (5° C) to germinate. Others, such as corn (maize) have a threshold of germination of 50° F (10° C); rice has an even higher threshold, about 68° F (20° C). Ordinarily in the temperate zones average temperatures exceed the threshold during most of the growing season—which begins when the threshold is reached in spring and ends when temperatures drop below it. Plants require average temperatures to exceed the threshold during most of the season in order to mature rapidly. Where latitude or elevation keeps average temperatures at or near the threshold all season long, plants ripen more slowly and do not develop as fully as they will do in more compatible temperatures.

The other mode of measurement for growing seasons is stated in terms of frost-free days, *i.e.* the average number of days between the last frost of spring and the first killing frost of fall or winter. Most agriculture requires a frost-free season of at least about 90 days. Some areas of temperate zone countries, such as mountainous areas, have fewer than 90-

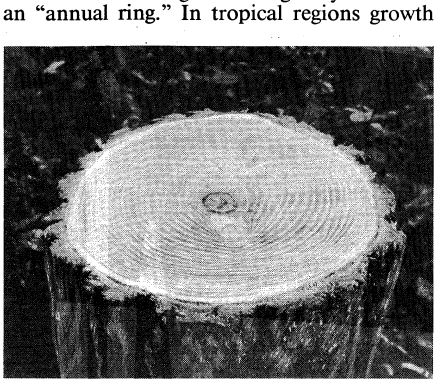
day frost-free seasons, and this is also true of subarctic regions. Such areas are restricted to crops that can germinate and mature within their shorter seasons. However, in these higher latitudes the greatly increased duration of daylight in summer compensates significantly for shorter frost-free seasons. Other areas within the temperate zones, where warm oceanic or air currents greatly prolong high average temperatures, may have 240 or more frost-free days each year.

growth hormone (GH), also called SOMATOTROPIN, or HUMAN GROWTH HORMONE, peptide hormone secreted by the anterior lobe of the pituitary gland. It stimulates growth of bone and essentially all tissues of the body by stimulating protein synthesis and breaking down fat to provide energy. GH stimulates the liver to produce somatomedins (secondary hormones) that have an insulinlike effect. The human somatomedin level rises progressively during childhood and reaches its peak during the growth spurt that occurs in puberty.

GH deficiency is one of many causes of dwarfism. When treated over a period of years with human GH, affected children responded dramatically. For decades, however, availability of the hormone was limited, because it was obtained solely from human cadaver pituitaries. In 1985 use of natural GH was halted in the United States and several other countries because of the possibility that the hormone transmitted a fatal slow-virus disease known as Creutzfeldt-Jakob disease. That same year, by means of recombinant-DNA techniques, scientists were able to produce a biosynthetic human growth hormone they called somatrem, thus assuring a virtually unlimited supply of this once-precious substance.

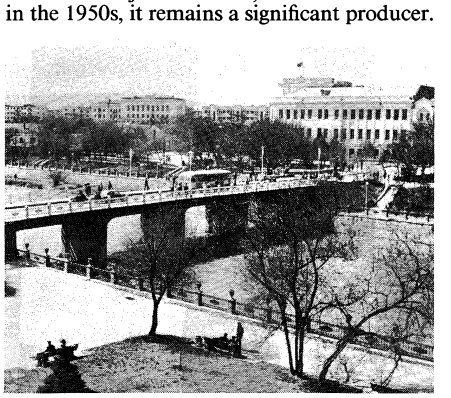
growth medium, also called CULTURE MEDIUM, or NUTRIENT BROTH, solution freed of all microorganisms by sterilization (usually in an autoclave, where it undergoes heating under pressure for a specific time) and containing the substances required for the growth of microorganisms such as bacteria, protozoans, algae, and fungi. The medium may be solidified by the addition of agar. Some media consist of complex ingredients such as extracts of plant or animal tissue (*e.g.,* peptone, meat extract, yeast extract); others contain exact quantities of known inorganic salts and one or more organic compounds (synthetic or chemically defined media). Various types of living cells, or tissue cultures, also may be used as media. Many special-purpose media are used in microbiology. These include enriched media, which contain nutrients in addition to those found in the usual growth medium, and selective media, which contain substances that prevent the growth of certain organisms but not others.

growth ring, in a cross section of the stem of a woody plant, the increment of wood added during a single growth period. In temperate regions the growth period is usually one year, in which case the growth ring may be called an "annual ring." In tropical regions growth rings may not be discernible or are not annual. Even in temperate regions growth rings are occasionally missing, or a second, or "false," ring may be deposited during a single year, for example, following insect defoliation. Growth rings are distinct if conducting cells produced early in the growth period are larger (spring, or early, wood) than those produced later (summer, or late, wood) or if growth is terminated by a layer of relatively thick-walled fibres or by parenchyma. In temperate or cold climates the age of a tree may be determined by counting the number of annual rings at the base of the trunk or, if the trunk is hollow, at the base of a large root. Annual rings have been used in dating ancient wooden structures, especially those of the American Indians in the dry southwestern regions of the United States; fluctuation in ring width is a source of information about ancient climates.



Annual rings in the trunk of a tree at its base
Grant Heilman—EB Inc.

Grozny, also spelled GROZNIJ, or GROZNYI, city and capital of Chechen-Ingush Autonomous Soviet Socialist Republic, Russian S.F.S.R., on the Sunzha River at the foot of the Sunzha Range of the Caucasus. Grozny was founded in 1818 as a fortress; the writers Leo Tolstoy and Mikhail Lermontov served there. The presence of local oil deposits was known from 1823, but large-scale production did not begin until 1893. Thereafter Grozny became a major oil centre; with new oil finds in the 1950s, it remains a significant producer.



Bridge across the Sunzha River at Grozny, Russian S.F.S.R.
Novosti Press Agency

Pipelines run to Makhachkala on the Caspian Sea, Tuapse on the Black Sea, and the Donets Basin. Aside from large-scale refining and gas processing, petrochemicals and machinery for the petroleum industry are manufactured. Grozny has the oldest petroleum institute of the U.S.S.R. (established in 1920) and also a teacher-training institute. Pop. (1987 est.) 404,000.

Grub Street, an epithet for literary hackwork, the term originating during the 18th century. According to Dr. Samuel Johnson's *Dictionary,* Grub Street was "originally the name of a street in Moorfields in London, much inhabited by writers of small histories, dictionaries, and temporary poems; whence any mean production is called grubstreet." The street was renamed Milton Street in 1830. The novelist Tobias Smollett, himself engaged much of his life in Grub Street hackwork, provided a memorable scene of a Grub Street dinner party in *Humphry Clinker.* George Gissing's novel *New Grub Street* (1891) also deals with London literary life.

Grubenmann, Hans Ulrich and Johannes (respectively b. March 23, 1709, Teufen, Switz.—d. Jan. 24, 1783, Teufen; b. 1707, Teufen?—d. 1771, Teufen?), Swiss carpenters and bridge builders whose bridge (1758) over the Limmat River at the town of Wettingen, near Zürich, is believed to be the first timber bridge to employ a true arch in its design; the brothers' ingenious combination of the arch and truss principles made it possible to construct longer and better timber bridges than ever before. More is known about Hans Ulrich than about Johannes; both were village carpenters in the hamlet of Teufen, and they constructed churches as well as bridges.

The first of three bridges for which the brothers are known was built by Hans Ulrich at Schaffhausen over the Rhine, in 1755, in two spans of 171 feet (52 m) and 193 feet (59 m) that met at an angle in midstream, resting on a central stone pier. Johannes later built a bridge at Reichenau, a single span 240 feet (73 m) long. In 1758 the brothers began work on the 200-foot (60-metre) Wettingen bridge, the design of which was an arch–truss combination, the arch of heavy oak beams joined by iron straps and rising 25 feet (7.5 m). Though these three bridges were later destroyed, the fame of the Grubenmanns influenced designers throughout Europe.

Grudziądz, German GRAUDENZ, city, Toruń *województwo* (province), north-central Poland, on the lower Vistula River. Founded in the 10th century as a Polish stronghold against Prussian attack, Grudziądz was fortified in the 13th century and granted municipal rights (1291) by the Teutonic Knights. Under various powers for centuries, it was attacked by Napoleon I in 1807.

The city developed economically when the rail line crossed the Vistula in 1879. It has an industrial economy based on foundries, lumber mills, breweries, and the manufacture of textiles, chemicals, rubber, and food products. Pop. (1987 est.) 96,800.

Gruen, David (Israeli statesman): *see* Ben-Gurion, David.

Gruen, Victor (b. July 18, 1903, Vienna—d. Feb. 14, 1980, Vienna), Austrian-born American architect and city planner best known as a pioneer of the regional shopping centre (Northland, Detroit, 1952) and of the renewal and revitalization of city core areas (Fort Worth, Texas, 1955.)

Gruen received his architectural training at the Technological Institute and Academy of Fine Arts, Vienna, and worked under Peter Behrens, a leading German architect and teacher, before opening his own architectural practice in 1933 in Vienna. In 1938, shortly after the German occupation of Vienna, he went to the United States, where he began designing projects in various cities, beginning with the Lederer Store (New York City, 1939). He became a naturalized U.S. citizen in 1943. In 1950 he established Victor Gruen Associates, a firm composed of professionals from all fields of engineering, architecture, and planning and turned his attention to solving problems of modern urban areas for mass population. Besides Northland, his significant shopping centres include Southdale (Minneapolis, Minn.), Randhurst (Mount Prospect, Ill.), and Midtown Plaza (Rochester, N.Y). From 1963 to 1967 his firm produced the general master plan for modern Tehrān. He served as planning consultant for cities throughout the world, including his native Vienna, where, in 1972, he received the City of Vienna award for architecture. After his retirement in 1968, Gruen devoted himself to the Victor Gruen Foundation for Environmental Planning.

He wrote *How to Live with Your Architect* (1949), *Heart of Our Cities* (1964), and *Centers for the Urban Environment* (1973).

Gruffydd, William John (b. Feb. 14, 1881, Bethel, Caernarvonshire, Wales—d. Sept. 29, 1954), Welsh-language poet and scholar whose works represented first a rebellion against Victorian standards of morality and literature and later a longing for the society he knew as a youth.

Educated at Oxford University, Gruffydd was appointed professor of Celtic at University College in Cardiff, Wales, a position he held until his retirement in 1946. He edited the Welsh quarterly review *Y Llenor* ("The Literary Man") from its inception in 1922 until 1951, when it was discontinued.

His earliest work, with R. Silyn Roberts, the book of poems *Telynegion* (1900; "Lyrics"), naturalized the romantic lyric in Wales. Other works include *Caneuon a Cherddi* (1906; "Songs and Poems"), *Llenyddiaeth Cymru o 1450 hyd 1600* (1922; "History of Welsh Literature, 1450–1600"), *Yns yr Hud* (1923; "The Enchanted Island"), *Caniadau* (1932; "Poems"), and *Antigone* (verse tragedy, 1950).

gruiform, order of birds (Gruiformes) containing 12 rather loosely related families. The most familiar members of the group are the cranes (family Gruidae), the 14 species being represented on all continents but South America, and the rails, gallinules, and coots (Rallidae), whose 132 species are found throughout the world. The 23 species of bustards (Otidae) are limited to the Old World, as are the button quails, or hemipodes (Turnicidae). The limpkins (Aramidae), trumpeters (Psophiidae), sun bitterns (Eurypygidae), and seriemas, or cariamas (Cariamidae), are found in Central and South America. The finfoots (Heliornithidae) are found in tropical areas of Asia, Africa, and South America. Families with more limited distributions are the mesites (Mesitornithidae) of Madagascar, the plains wanderers (Pedionomidae) of Australia, and the kagus (Rhynochetidae) of New Caledonia.

A brief treatment of gruiforms follows. For full treatment, *see* MACROPAEDIA: Birds.

The gruiforms have the most complete fossil record of any bird order, and 14 extinct families are known. The earliest fossil is the crane-sized *Laornis* from 90,000,000-year-old Upper Cretaceous beds in New Jersey. Though once a widespread and populous order, this bird order is now on the decline, with many species, even families, near extinction.

Gruiforms are adapted to a wide variety of environments, and this is mirrored in the diversity of forms in the group. Sizes range from the 6-inch (15-centimetre) button quail (*Turnix*) to the 5-foot (1.6-metre) high sarus crane (*Grus antigone*). The kori bustard (*Otis kori*) and the great bustard (*O. tarda*) are the heaviest flying birds in the world, reaching 40 pounds (18 kg) in weight.

The plumage is usually various shades of brown and gray with white, but there are exceptions, such as the purple gallinule (*Porphyrula martinica*) with its purple neck, bronze-green back, and light-blue shield. Bare skin on the face and neck of some species may be brightly coloured, as in the red faces of some cranes. Plumage is similar between the sexes except in the bustards, where males are more colourful, and the button quails, where the female is more highly coloured.

Except in certain flightless rails, such as the takahes (*Notornis mantelli*) of New Zealand, and the nearly flightless mesites, the rounded wings are generally long. The tail length varies from short in rails and trumpeters (*Psophia*) to quite long in finfoots, mesites, and sun bitterns (*Eurypyga helias*). A long slender bill is typical, especially of the cranes, many rails, and limpkins (*Aramus guarauna*), although that of the seriemas is noticeably hooked. The long legs are adapted for walking; a preference for this type of locomotion is found throughout the order. Bustards are even known to make local migrations on foot. The toes themselves show diverse adaptations; in coots (*Fulica*) and finfoots the toes are lobed to aid in swimming; in rails and limpkins the long, narrow toes help in walking across lily pads and other aquatic plants; and in seriemas and bustards the short, strong toes aid in running on land.

Gruiforms inhabit environments ranging from highly aquatic to arid. Finfoots and coots live along slow-moving streams with heavy overhanging vegetation, while rails and limpkins are marsh inhabitants. The cranes nest in marshes but feed in open plains the rest of the year. Trumpeters, mesites, and kagus inhabit dense forests, while the rest of the order—the bustards, seriemas, button quails, and plains wanderers—prefers open grassland or plains.

Most gruiforms are nonmigratory; only those from northern temperate areas—many cranes, some rails, and the Eurasian bustards—migrate. However, some species of cranes perform spectacular migrations; for example, the sandhill cranes (*Grus canadensis*) often travel 4,000 miles (6,440 km) between their breeding and wintering grounds.

Gruiforms are omnivorous but generally take a greater amount of animal food than vegetable food. However, the coots and gallinules take mostly aquatic vegetation. Finfoots live on mollusks, frogs, and fish, while the specialized limpkin eats mostly snails. The cranes take large amounts of animal food, including insects, crustaceans, amphibians, reptiles, and small mammals, and they will use their strong bills to dig into the ground after roots and bulbs.

As a group, the gruiforms are probably best known for their impressive and graceful courtship displays, the most famous of which are the dances of the cranes. Cranes are monogamous and mate for life; to begin and maintain this pair bond, the birds regularly dance to each other. The pair circles while facing each other and then bow or bob their heads, increasing in speed until one or both jump into the air and begin to dance, sometimes tossing twigs or grass into the air as they leap. They also perform "duets," wherein both birds let their wings droop, throw the bill upward, and call in unison. Rails maintain territories with various calls which also function to attract females; they may also perform courtship displays with the tail fanned and the wings raised.

Most gruiforms nest on the ground, pulling together a simple nest of vegetation or twigs; bustards hardly form any nest, usually laying their eggs on the ground. Finfoots, the sun bittern, some trumpeters, and the mesites build twig nests in low trees. Clutch size varies from 1 egg in the kagu to more than 10 in some species of rails. In most families both parents incubate the eggs and care for the young; in bustards and trumpeters the female does all the work, and in button quails the males incubate and care for the young. The young of most gruiforms leave the nest and follow their parents shortly after hatching.

Grumbach, Wilhelm von (b. June 1, 1503, Rimpar, near Würzburg [Germany]—d. April 18, 1567, Gotha, Saxony [Germany]), German knight and adventurer who led several attempts by German imperial knights to destroy the power of Germany's territorial princes. Chiefly known through his own quarrels, the so-called Grumbach feuds, he also tried to regain power for the Ernestine branch of the Saxon ruling house.

About 1540 Grumbach allied himself with Margrave Albert II Alcibiades of Brandenburg, whom he was to serve for more than a decade. His chief ambition, however, was to become owner of his lands, which he held in fief from the bishops of Würzburg. In 1547, at an imperial Diet at Augsburg, he had without success demanded independence from their princes for the Franconian knighthood; and in 1552 Albert and he began to plunder Franconia, until their defeat at Sievershausen the following year enabled the bishop of Würzburg to confiscate Grumbach's lands. Grumbach obtained an order of restitution from the imperial court of justice, but he was unable to execute it, and in 1558 some of his followers assassinated the bishop. Grumbach fled to France, and after returning to Germany he pleaded his case unsuccessfully before the Diet at Augsburg in 1559.

Grumbach, engraving by Matthias Zündt
By courtesy of the Staatliche Graphische Sammlung, Munich

In the meantime, Grumbach had found a new ally in Duke John Frederick II of Saxe-Weimar, whose father, John Frederick, had been obliged to surrender the electorate of Saxony to the Albertine branch of his family. Grumbach suggested to the duke a general rising of the German imperial knights as a way to recover the electorate. With the duke's support, Grumbach in 1563 captured Würzburg, plundered the city, and compelled the bishop to restore his lands. Grumbach was consequently outlawed by the Holy Roman emperor Ferdinand I, but John Frederick refused to withdraw his protection of him. Meanwhile, Grumbach planned the assassination of the Saxon elector, Augustus, and both sides made alliances throughout Germany in anticipation of conflict. In 1566 John Frederick was also outlawed by the emperor, and Augustus marched on John Frederick's capital, Gotha. A mutiny led to the capture of the city by Augustus' forces, and Grumbach was tortured and executed in the marketplace.

Grumiaux, Arthur, Baron (b. March 21, 1921, Villers-Perwin, Belg.—d. Oct. 16, 1986, Brussels), Belgian violinist noted for both his performing and his teaching.

Grumiaux studied at the Charleroi and Royal conservatories in Brussels and later with Georges Enescu in Paris. In 1939 he won the Vieuxtemps Prize, and a year later he became the first recipient of the Belgian government's *Prix de Virtuosité.* Shortly after his debut in Brussels in 1940, his career was halted by the occupation of Belgium. He began performing again in 1945, making his London debut that year, and rapidly became known in Europe and the United States. In 1949 he succeeded his former teacher, Alfred Dubois, at the Brussels Conservatory. Especially notable among his recordings are the unaccompanied Bach sonatas and the sets of Beethoven and Mozart sonatas (with Clara Haskil). His playing combined refined elegance with an accomplished technique. Belgium awarded him a barony in 1973.

Grumman, Leroy Randle (b. Jan. 4, 1895, Huntington, N.Y., U.S.—d. Oct. 4, 1982, Manhasset, N.Y.), American industrialist, founder of Grumman Aerospace Corp., and master designer of some of the most dependable and effective U.S. fighter planes used in World War II.

After graduating from Cornell University,

Grumman joined the U.S. Navy and served as a flight instructor and later as a test pilot. After World War I he worked for Loening Aeronautical Engineering Corp. but in 1929 founded his own company. During the 1930s Grumman's inventions earned him countless U.S. Navy contracts. He designed a retractable landing gear that converted Navy scout planes into amphibians; the XFF 1, a fighter plane that employed retractable landing gear; and a folding wing used on the Wildcat carrier fighter planes. His other airplanes included the Hellcat, the first plane built to pilot specifications, the first produced in mass before a test flight had been conducted, and an aircraft that set production records because it was built so quickly. Grumman later devised the Avenger torpedo bomber, when it was predicted that fighter planes would become obsolete.

Shortly before the end of World War II Grumman contracted pneumonia and was permanently blinded after he was given a shot of penicillin and suffered an allergic reaction. In 1946 he stepped down as president of his company, but he remained chairman of the board until 1966.

Grün, Anastasius, pseudonym of ANTON ALEXANDER, GRAF (count) VON AUERSPERG (b. April 11, 1806, Laibach, Austria [now Ljubljana, Yugos.]—d. Sept. 12, 1876, Graz), Austrian poet and statesman known for his spirited collections of political poetry.

As a member of the estates of Carniola in the Diet at Laibach, Grün was a critic of the Austrian government, and after 1848 he represented the district of Laibach briefly at the German national assembly at Frankfurt. Always an outspoken liberal reformer in both religious and political matters, he later became a staunch defender of the centralized Austrian Empire. In 1860 he was summoned to the remodeled Austrian Parliament by the emperor, who in 1861 named him a life member of the upper house (Herrenhaus).

Auersperg's early works include a nondescript collection of lyrics, *Blätter der Liebe* (1830), followed by a significant cycle of poems, *Der letzte Ritter* (1830; *The Last Knight*), celebrating the life and adventures of the Holy Roman emperor Maximilian I. His political poetry created a sensation because of its stylistic originality, humour, and bold liberalism, far outstripping in quality other political poetry of that time. The political poems were printed in two collections: *Spaziergänge eines Wiener Poeten* (1831; "Promenades of a Viennese Poet"), some of which were translated in K. Francke's *German Classics of the 19th and 20th Centuries* (1913); and *Schutt* (1836; "Rubbish"). His epics, *Die Nibelungen im Frack* (1843) and *Der Pfaff vom Kahlenberg* (1850), are characterized by a fine ironic humour. He also produced masterly translations of the popular Slovene songs current in Carniola in *Volkslieder aus Krain* (1850; "Folksongs from Carniola") and of the English poems on Robin Hood (1864).

Grünberg (Poland): *see* Zielona Góra.

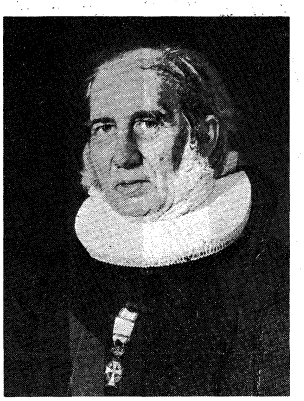
Grundschule, in Germany, the first four years of primary school (in certain cities of Germany, the first six years).

Before the 1920s, upper-class German children attended the *Vorschule,* a three-year course of preparation for secondary school (which usually began at age 9). Working-class children generally terminated their education at age 14 upon completing *Volksschule* (primary school). As a result of social reforms under the Weimar Republic, this dual-track system was abolished and the *Grundschule* system of common elementary schools, which prepares all children for secondary education, was established.

Currently, students who complete the *Grundschule* receive their secondary education in one of three different ways. They may attend a *Hauptschule* (a five-year upper elementary school that prepares students for vocational school or trade apprenticeship), *Realschule* (a six-year secondary course preparing students for higher business and technical schools), or *Gymnasium* (a nine-year university preparation school).

Consult the INDEX *first*

Grundtvig, N(ikolai) F(rederik) S(everin) (b. Sept. 8, 1783, Udby, Den.—d. Sept. 2, 1872, Copenhagen), Danish bishop and poet, founder of a theological movement (Grundtvigianism) that revitalized the Danish church. He was also outstanding as a hymn writer, historian, pioneer of studies on early Scandinavian literature, and educationalist.



Grundtvig, oil painting by C.A. Jensen, 1843; in the Kunsthistorisk Pladearkiv, Copenhagen

By courtesy of the Kunsthistorisk Pladearkiv, Copenhagen

After taking a degree in theology (1803) from the University of Copenhagen, Grundtvig studied the *Eddas* and Icelandic sagas. His *Nordens mythologi* (1808; "Northern Mythology") marks a turning point in this research: like his early poems, it was inspired by the Romantic movement.

In 1811, after a spiritual and emotional conflict that ended in a "Christian awakening," Grundtvig became his father's curate. His first attempt to write history from a Christian standpoint, *Verdens krønike* (1812; "World Chronicle"), attracted much attention. From 1813 until 1821, his criticism of the rationalist tendencies that were then predominant in Denmark's Lutheran state church made it impossible for him to find a pastorate, but in poems such as those in *Roskilde-riim* (1814) and other collections, and in *Bibelske prædikener* (1816; "Biblical Sermons"), he called for a renewal of the spirit of Martin Luther, and in his opposition to the Romantic philosophers he foreshadowed Søren Kierkegaard. During these years he also opened the way for research into Anglo-Saxon literature by his version of Beowulf (1820).

In 1825 he became the central figure in a church controversy when in his *Kirkens gienmæle* ("The Church's Reply") he accused the theologian H.N. Clausen of treating Christianity as merely a philosophical idea. Grundtvig maintained that Christianity was a historical revelation, handed down by the unbroken chain of a living sacramental tradition at baptism and communion. His writings were placed under censorship, and in 1826 he resigned his pastorate but continued to develop his view of the Christian church in theological writings and in *Christelige prædikener,* 3 vol. (1827–30). He expounded his philosophy in a new and inspired *Nordens mythologi* (1832) and in his *Haandbog i verdenshistorien,* 3 vol. (1833–43; "Handbook of World History"). As an educationalist—*e.g.,* in *Skolen for livet* (1838; "Schools for Life")—he stressed the need for a thorough knowledge of the Danish language and of Danish and biblical history, in opposition to those who favoured the study of the classics in Latin. His criticism of classical schools as elitist inspired the founding, after 1844, of voluntary residential folk high schools, in which young people of every class were encouraged to educate themselves and one another. These schools spread through Scandinavia and inspired adult education in several other countries.

In 1839 Grundtvig was allowed to receive the living of Vartov, Copenhagen, and in 1861 was given the rank of bishop. His liberal outlook found political expression in his active part in the movement leading to the introduction of parliamentary government in Denmark in 1849.

Particularly lasting is Grundtvig's position as the greatest Scandinavian hymn writer. His *Sang-værk til den danske kirke,* 5 vol. (1837–81), contains new versions of the hymns of the whole Christian church, as well as a wealth of original hymns, many of them well known in Norwegian, Swedish, German, and English translations.

N. F. Grundtvig: Selected Writings, in English translation, was published in 1976.

Grundy, Mrs., imaginary English character who typifies the censorship enacted in everyday life by conventional opinion. She first appears (but never onstage) in Thomas Morton's play *Speed the Plough* (produced 1798), in which one character, Dame Ashfield, continually worries about what her neighbour Mrs. Grundy will say of each development. Since then the term Mrs. Grundy has passed into everyday speech as a criterion of rigid respectability.

Grünewald, Matthias, original name MATHIS GOTHARDT (b. *c.* 1480, Würzburg, Bishopric of Würzburg [Germany]—d. August 1528, Halle, Archbishopric of Magdeburg), one of the greatest German painters of his age, whose works on religious themes achieve a visionary expressiveness through intense colour and agitated line. The wings of the altarpiece of the Antonite monastery at Isenheim, in southern Alsace (dated 1515), are considered to be his masterpiece.

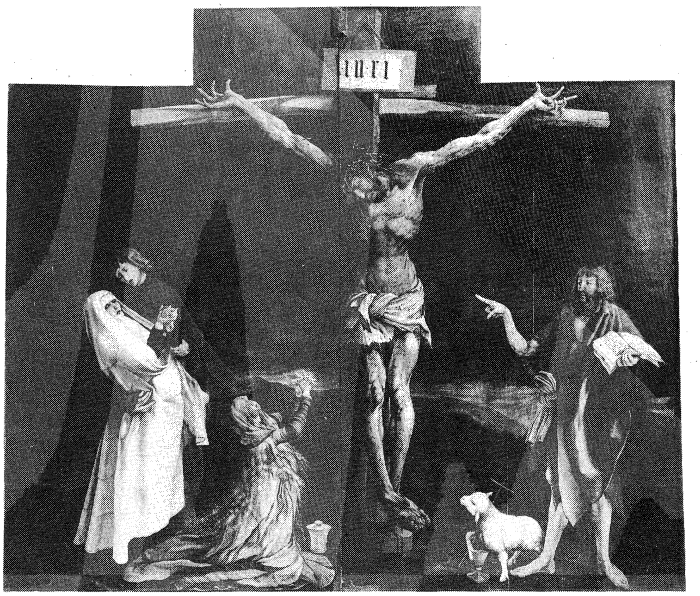
Although it is commonly agreed that "Master Mathis" was born in the German city of Würzburg, the date of his birth remains problematic. The first securely dated work by Grünewald (a name fabricated by a biographer in the 17th century; his actual surname was Gothardt), the "Mocking of Christ" of 1503 (Alte Pinakothek, Munich), seems to be that of a young man just become a master. Grünewald appears first in documents of about 1500 either in the town of Seligenstadt am Main or Aschaffenburg. By about 1509 Grünewald had become court painter and later the leading art official (his title was supervisor or clerk of the works) to the elector of Mainz, the archbishop Uriel von Gemmingen.

In about 1510 Grünewald received a commission from the Frankfurt merchant Jacob Heller to add two fixed wings to the altarpiece of the "Assumption of the Virgin" recently completed by the painter Albrecht Dürer. These wings depicting four saints are painted in grisaille (shades of gray) and already show the artist at the height of his powers. Like Grünewald's drawings, which are done primarily in black chalk with some yellow or white highlighting, the Heller wings convey colouristic effects without the use of colour. Expressive hands and active draperies help blur the boundaries between cold stone and living form.

In about 1515 Grünewald was entrusted with the largest and most important commission of his career. Guido Guersi, an Italian preceptor,

or knight, who led the religious community of the Antonite monastery at Isenheim (in southern Alsace), asked the artist to paint a series of wings for the shrine of the high altar that had been carved in about 1505 by Niclaus Hagnower of Strasbourg. The subject matter of the wings of the Isenheim Altarpiece provided Grünewald's genius with its fullest expression and was based largely on the text of the popular, mystical *Revelations* of St. Bridget of Sweden (written about 1370).

The Isenheim Altarpiece, which is now in the Unterlinden Museum in Colmar, Fr., consists of a carved wooden shrine with one pair of fixed and two pairs of movable wings flanking it. Grünewald's paintings on these large wing panels consist of the following. The first set of panels depicts the "Crucifixion," the "Lamentation," and portraits of "SS. Sebastian and Anthony." The second set focuses on the Virgin Mary, with scenes of the "Annunciation" and a "Concert of Angels," a "Nativity," and the "Resurrection." The third set of wings focuses on St. Anthony, with "St. Anthony and St. Paul in the Desert" and the "Temptation of St. Anthony."



"Crucifixion," central panel of the "Isenheim Altarpiece," oil on panel by Matthias Grünewald, 1515; in the Unterlinden Museum, Colmar, Fr.
Photo Bulloz

The altarpiece's figures are given uniquely determined gestures, their limbs are distended for expressive effect, and their draperies (a trademark of Grünewald's that expand and contract in accordion pleats) mirror the passions of the soul. The colours used are simultaneously biting and brooding. The Isenheim Altarpiece expresses deep spiritual mysteries. The "Concert of Angels," for instance, depicts an exotic angel choir housed within an elaborate baldachin. At one opening of the baldachin a small, glowing female form, the eternal and immaculate Virgin, kneels in adoration of her own earthly manifestation at the right. And at the far left of the same scene under the baldachin, a feathered creature, probably the evil archangel Lucifer, adds his demonic notes to the serenade. Other details in the altarpiece, including the horribly wounded body of Christ in the "Crucifixion," may refer to the role of the monastery as a hospital for victims of the plague and St. Anthony's fire. The colour red takes on unusual power and poignancy in the altarpiece, first in the "Crucifixion," then in the "Annunciation" and "Nativity," and finally on Christ's shroud in the "Resurrection," which is at first lifeless in the cold tomb but which then smolders and bursts into white-hot flame as Christ ascends, displaying his tiny purified red wounds. Such transformations of light and colour are perhaps the most spectacular found in German art until the late 19th century. And through all this drama, Grünewald never misses the telling picturesque detail: a botanical specimen, a string of prayer beads, or a crystal carafe.

Another important clerical commission came from a canon in Aschaffenburg, Heinrich Reitzmann. As early as 1513 he had asked Grünewald to paint an altar for the Mariaschnee Chapel in the Church of SS. Peter and Alexander in Aschaffenburg. The artist painted this work in the years 1517–19. Grünewald apparently married about 1519, but the marriage does not appear to have brought him much happiness (at least, that is the tradition recorded in the 17th century). Grunewald occasionally added his wife's surname, Neithardt, to his own, thereby accounting for several documentary references to him as Mathis Neithardt or Mathis Gothardt Neithardt.

In 1514 Uriel von Gemmingen had died, and Albrecht von Brandenburg had become the elector of Mainz. For Albrecht, Grünewald executed one of his most luxurious works, portraying "The Meeting of SS. Erasmus and Maurice" (Erasmus is actually a portrait of Albrecht) that is now in the Alte Pinakothek in Munich. This work exhibits the theme of religious discussion or debate, so important to this period of German art and history. In this painting, as well as in the late, two-sided panel known as the Tauberbischofsheim Altarpiece (Staatliche Kunsthalle, Karlsruhe), Grünewald's forms become more massive and compact, his colours restrained but still vivid.

Apparently because of his sympathy with the Peasants' Revolt of 1525, Grünewald left Albrecht's service in 1526. He spent the last two years of his life visiting in Frankfurt and Halle, cities sympathetic to the newly emerging Protestant cause. In Halle he was involved in supervising the town waterworks. Grünewald died in August 1528; among his effects were discovered several Lutheran pamphlets and documents.

Grünewald's painterly achievement remains one of the most striking in the history of northern European art. His 10 or so paintings (some of which are composed of several panels) and approximately 35 drawings that survive have been jealously guarded and carefully scrutinized in modern times. His dramatic and intensely expressive approach to subject matter can perhaps best be observed in his three other extant paintings of the Crucifixion, which echo the Isenheim Altarpiece in their depiction of the scarified and agonized body of Christ.

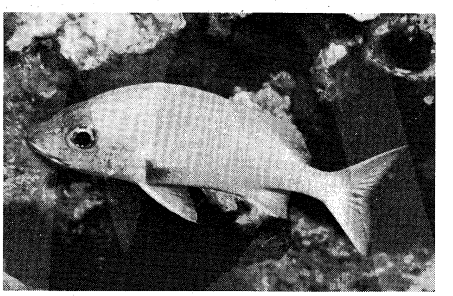
Despite his artistic genius, failure and confusion no doubt marked much of Grünewald's life. He seems not to have had a real pupil, and his avoidance of the graphic media also limited his influence and renown. Grünewald's works did continue to be highly prized, but the man himself was almost forgotten by the 17th century. The German painter Joachim von Sandrart, the artist's fervent admirer and first biographer (*Teutsche Akademie,* 1675), was responsible for preserving some of the scanty information that we have about the artist, as well as naming him, erroneously and from an obscure source, Grünewald. At the lowest ebb of his popularity, in the mid-19th century, Grünewald was labeled by German scholarship "a competent imitator of Dürer." However, the late 19th-century and early 20th-century artistic revolt against rationalism and naturalism, typified by the German Expressionists, led to a thorough and scholarly reevaluation of the artist's career. Grünewald's art is now recognized as an often painful and confused but always highly personal and inspired response to the turmoil of his times.

(C.S.Ha.)

BIBLIOGRAPHY. Arthur Burkhard, *Matthias Grünewald: Personality and Accomplishment* (1936, reprinted 1976), is the most important monograph in English, although it is limited. Illustrated studies of the artist's work include Guido Schoenberger (ed.), *The Drawings of Mathis Gothart Nithart, Called Grünewald* (1948), the first important work in English on Grünewald's drawings; Nikolaus Pevsner and Michael Meier, *Grünewald* (1958), in English; J.-K. Huysmans and Eberhard Ruhmer, *Grünewald: The Paintings* (1958); Eberhard Ruhmer, *Grünewald: Drawings* (1970); Ruth Mellinkoff, *The Devil at Isenheim: Reflections of Popular Belief in Grünewald's Altarpiece* (1988), brief, but stimulating; and Andrée Hayum, *The Isenheim Altarpiece: God's Medicine and the Painter's Vision* (1990), focusing on the hospital context.

grunion, also called CALIFORNIA GRUNION (species *Leuresthes tenuis*), small Pacific fish of the family Atherinidae (order Atheriniformes). The species is found in the Pacific Ocean along the western coast of the United States. A unique feature of the grunion's breeding biology results in its spawning on particular nights during the warm months when tides are highest. The eggs are actually laid in the sand on the beach during a full or new moon when the tide cycle is at its peak (spring tide). The young hatch out and enter the ocean following inundation during the subsequent spring tide, which occurs two weeks later. Grunion are small fish, attaining a length of about 20 cm (8 inches), and are highly edible.

grunt, any of about 75 species of marine fishes of the families Pomadasyidae and Banjosidae (order Perciformes). Grunts are found along shores in warm and tropical waters of the major oceans. They are snapperlike but with



Blue-striped grunt (*Haemulon sciurus*)
Carl Roessler

weaker teeth and are named for the piglike grunts they can produce with their pharyngeal (throat) teeth. Some (genus *Haemulon*) are further characterized by bright, reddish mouth linings. Grunts are edible and valued as food, though most species are small. Some are noted for a behavioral trait in which two individuals approach and "kiss." The purpose of this, whether sexual or aggressive, is not known.

The pomadasyids, although known collectively as grunts, are known individually by a number of names, among them porkfish, pigfish, sweetlips, margate, and tomtate. Among the better-known species are the blue-striped, or yellow, grunt (*Haemulon sciurus*), a striped, blue and yellow Atlantic fish up to 46 cm (18 inches) long; the French grunt (*H. flavolineatum*), a yellow-striped, silvery blue Atlantic species about 30 cm (12 inches) long; the margate (*H. album*), a usually pearl gray species of the western Atlantic; the pigfish (*Orthopristis chrysoptera*), a western Atlantic food fish, striped silvery and blue and about 38 cm (15 inches) long; the porkfish (*Anisotremus virginicus*), a western Atlantic reef fish that, when young, is marked with black and serves as a "cleaner," picking parasites off larger fishes; several species of sweetlips (*Plectorhynchus*), which are Indo-Pacific fishes, highly variable in colouring and sometimes kept in marine aquariums; and the tomtates (*Bathystoma rimator* and related species), grunts found off Florida and the West Indies.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Gruppe 47, English GROUP 47, informal association of German-speaking writers that was founded in 1947 (hence its name). Gruppe 47 originated with a group of war prisoners in the United States who were concerned with reestablishing the broken traditions of German literature. Feeling that Nazi propaganda had corrupted their language, they advocated a style of sparse, even cold, descriptive realism devoid of pompous or poetic verbiage.

Returning to Germany, they founded the weekly *Der Ruf* ("The Call"), which was suppressed in 1947 by the U.S. military government for political radicalism. The central figures of the group were the novelist Hans Werner Richter and the writer Alfred Andersch. As the group's political aims diminished, its literary prestige rose, and its yearly prize conferred high distinction. Günter Grass and Heinrich Böll were prizewinners. The last full conference of the group was in 1967.

Grusi, ethnolinguistic group among the inhabitants of northern Ghana and adjacent areas of Burkina Faso (formerly Upper Volta) and Togo. The linguistic groups and subgroups of the area are difficult to classify with certitude, but the Grusi languages make up a subbranch of the Gur (Voltaic) branch of the Niger-Congo language family. The difficulty in establishing distinct language boundaries is the result of a gradual and continuous migration of peoples that has produced a merging ethnic pattern.

Population movements have been brought about partly through invasion and conquest by other peoples, such as the More-Gurma (Mõõre-Gurma) speakers from the east. Ecological pressure has also contributed to population movements. The area is one of dry savanna and is subject to frequent droughts. Agriculture by shifting cultivation contributes to the depletion and erosion of the soil, necessitating periodic relocation of groups to more productive lands. Crops include yams, millet, corn (maize), and cotton. The cattle, sheep, and goats that are kept are used more for marriage payments and ritual sacrifices than as a source of food. Crafts practiced in the area are often connected with agriculture and include metalworking, basketry, leatherworking, and pottery.

Contacts between members of some Grusi-speaking ethnic groups demonstrate a certain social intimacy combined with a need to regulate interactions. Isala and Kasena, for example, are known to trade insulting remarks in a joking spirit so as to reduce tension from past conflicts. Institutional ties among the peoples of the area are sometimes formed in ritual and political activities and through intermarriage.

Because there are a number of particular cultural traditions, the social organization of Grusi-speaking peoples varies. Descent-group membership, succession, and property inheritance are often through males, but among the Tampolense and Vagala the female line is used. The heads of lineages of relatives oversee livestock, farmland, and ancestral shrines. Political functions are generally not centralized, and each group can contain a number of independent chiefs. In the case of one group, the Isala, centralized political authority under chiefs was little emphasized before the advent of British colonial administration.

Gruyère, hard cow's-milk cheese produced in the vicinity of La Gruyère in southern Switzerland and in the Alpine Comté and Savoie regions of eastern France.

Gruyère is formed in large wheels of 70 to 80 pounds (32 to 36 kg) with a brownish, wrinkled natural rind. The interior is pale gold with pea-sized, or slightly larger, holes and a rich, nutty flavour; it is similar to Emmentaler (*q.v.*) and other Swiss-type cheeses but firmer in texture, with fewer holes and a more assertive flavour. Most Gruyère is aged for three to six months, although some may be allowed to ripen for a year or more. It keeps well for many weeks if securely wrapped and refrigerated.

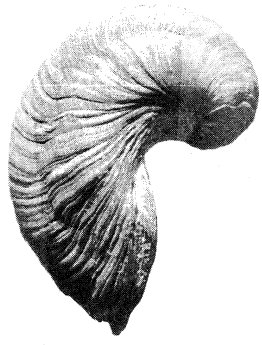
Gruyère, La (Switzerland): *see* La Gruyère.

Gruzija (Georgian S.S.R.): *see* Georgia.

Gruzinskaya Sovetskaya Sotsialisticheskaya Respublika: *see* Georgia.

Grynswth, Syr Meurig: *see* Hughes, John Ceiriog.

Gryphaea, extinct molluskan genus found as fossils in rocks from the Jurassic period to the Eocene epoch (between 208 million and



Gryphaea

Leslie Jackman—the Natural History Photographic Agency

36.6 million years ago). Related to the oysters, *Gryphaea* is characterized by its distinctively convoluted shape. The left valve, or shell, was much larger and more convoluted than the flattish right valve. Fine markings extended across the shell at right angles to the direction of growth. In some mature specimens, the coiling of the shell became so pronounced that it is unlikely that the shell could be opened at all, at which point the animal must have died.

Gryphius, Andreas (b. Oct. 2, 1616, Glogau, Silesia [now Głogów, Pol.]—d. July 16, 1664, Glogau), lyric poet and dramatist, one of Germany's leading writers in the 17th century.

Gryphius (the family name Greif was latinized after the fashion of the times) was orphaned early in life, and the horrors of the Thirty Years' War soon cast a shadow over his unsettled childhood. A refugee from his native town, he was educated in various places, revealing himself in the process as a brilliant scholar. Crowned *poeta laureatus* by Count Georg von Schönborn, whose sons he tutored, Gryphius went to Leiden and stayed there six years, as both student and teacher. After extensive travels in Holland, France, and Italy, he finally returned to Silesia in 1647 and, in 1650, took up the important administrative post of syndic in Glogau, a post he filled until his death.

Gryphius' literary reputation has increased enormously during the 20th century. His plays are distinguished by a deep sense of melancholy and pessimism and are threaded through with a fervent religious strain which, faced with the transitoriness of earthly things and the fight for survival in the ravaged Germany of the time, borders on despair. He wrote five tragedies: *Leo Armenius* (1646), *Catharina von Georgien, Carolus Stuardus,* and *Cardenio und Celinde* (all printed 1657), and *Papinianus* (1659). These plays deal with the themes of stoicism and religious constancy unto martyrdom, of the Christian ruler and the Machiavellian tyrant, and of illusion and reality, a theme that is used with telling effect in the middle-class background of *Cardenio und Celinde.* The theme of illusion and reality is a fundamental one in his three comedies, the best of which are *Die geliebte Dornrose* (1660; *The Beloved Hedgerose*) and *Herr Peter Squentz* (1663).

Gryphius' lyric poetry covers a wide range of verse forms and is characterized by a technical mastery and assurance and a portrayal of human emotions in adversity, the sincerity and compulsive power of which stamp him, particularly in his sonnets, as a great poet.

gryphon (mythology): *see* griffin.

Gstaad, Alpine village and resort, Bern *canton,* west-central Switzerland, lying in the valley of the Saane River. Situated on the northwest side of the Bernese Alps, the village is a summer resort (with golf and tennis tournaments) and is also a fashionable winter-sports centre. Winter events in Gstaad include an annual horse show, skijoring (a sport in which a horse or vehicle pulls a skier over snow or ice), ice hockey matches, ski meetings, curling competitions, and toboggan races. Chalets in and around Gstaad are owned or rented by celebrities, royalty, and other socially prominent persons. Forests, hills, glaciers, and mountain lakes are found in the surrounding area. The chapel of St. Nikolaus in Gstaad dates from 1402. A road and railway link the village with Lausanne and Thun. Pop. (1980 est.) 2,500.

gsung-'bum (Tibetan: "collected works"), the collected writings of each of several great Tibetan and Mongolian lamas. These series of works represent an indigenous contribution to Buddhist thought, as distinguished from the numerous texts originating in India and collected in the canonical *Bka'-'gyur* and the supplementary *Bstan-'gyur.*

The writings of the lamas include expositions of the *Vinaya* ("Monastic Discipline"), the *Prajñāpāramitā* ("Perfection of Wisdom") literature, the *Tantras,* and other canonical works, together with essays on such topics as epistemology, ritual, and meditation.

A particular class of such writings, known as *Lam-rim* ("Stages on the Path"), presents the

spiritual life as a journey through the varied doctrines and practices of the different forms of Buddhism, arranged on a scale from lowest to highest. Historically, the most influential of these is the lengthy *Lam-rim chen-mo* ("Great Account of the Stages on the Path"), written around 1400 by the founder of the Dge-lugs-pa, the dominant order of Tibetan monks.

GTE Corporation, formerly (1959–82) GENERAL TELEPHONE AND ELECTRONICS CORPORATION, U.S. holding company for several U.S. and international telephone companies. It provides telephone service primarily to rural areas. It also manufactures electronic consumer and industrial equipment. It is headquartered in Stamford, Conn.

General Telephone was founded in 1926 as Associated Telephone Utilities by Sigurd Odegard, a Wisconsin phone-company owner who wanted to acquire small independent phone companies. The company went bankrupt during the Great Depression and, in 1934, was reorganized as General Telephone. Growth was modest until the accession of Donald C. Power as president in 1950. He immediately bought the Automatic Electric Company, a telephone-equipment manufacturer, and in 1958 merged with Sylvania Electronics. The two acquisitions gave GTE the capability to manufacture the electronic switching systems needed by a phone company.

Phone service is provided primarily to rural areas not served by American Telephone and Telegraph Corporation; the major exceptions are in California suburbs and the Tampa, Fla., metropolitan area. Through Sylvania, the company markets television and stereo sets, flash bulbs, and light bulbs. It also manufactures sophisticated electronics equipment for the U.S military. It entered the data-processing field in 1979 with the purchase of Telenet, operator of a nationwide computer data switching network.

gtor-ma, sacrificial cakes used in Tibetan Buddhist ceremonies as offerings to deities. The unbaked cakes are prepared by kneading parched barley flour and butter into the shapes of cones, decorated with pats of butter. The cakes form part of the *phyi-mchod*, or eight offerings of external worship, as well as part of the offerings of the five senses, which are considered internal worship. For presentation to the wrathful Tantric deities (*dharmapālas*), the *gtor-ma* are realistically coloured and modelled to resemble parts of the human body.

Larger and more elaborate cakes as much as 10 feet (3 metres) high differ in shape, colour, and size according to the deity they honour.

The offerings are arranged for a ceremony on a side table in tiers, with those honouring the chief divinities on the top tier; the cakes of the "defenders of the faith" and lesser divinities below; the offerings of the five senses next; and the offerings of external worship on the bottom tier. Worshippers lay their informal gifts of fruit or cooked food below the table. After the ceremony, all the offerings are distributed among those present.

Gtsang DYNASTY, also spelled GTSANG (*c.* 1565–1642), Chinese royal dynasty whose rule was centred in the province of Gtsang, or gTsang. The Gtsang was the last secular native ruling house in Tibet. After overthrowing the previous Rin-spung rulers of the country around 1565, the Gtsang kings allied themselves with the powerful Karma-pa, or Red Hat, order of Buddhists and opposed the new reformed Dge-lugs-pa, or Yellow Hat, Buddhists, who in the 15th and 16th centuries had begun to gain power among those envious of the wealth of the ruling group. The Yellow Hats, however, gained the support of the powerful Mongol chieftain Altan Khan, from whom their leader received the title Dalai Lama, and they established themselves in the Tibetan city of Lhasa.

The Gtsang rulers attacked Lhasa at the beginning of the 17th century, but the Dalai Lama called in Mongol aid. The city changed hands several times, but in 1642 the last Gtsang monarch was finally dethroned, and the Dalai Lama was given temporal authority over Tibet, which he continued to exercise, although real power remained in Mongol and later Manchu hands, until the Communist Chinese occupation of the country in the 20th century.

gu (Chinese vessel): *see* ku.

Gu Kaizhi: *see* Ku K'ai-chih.

Gu Yanwu (Chinese scholar): *see* Ku Yen-wu.

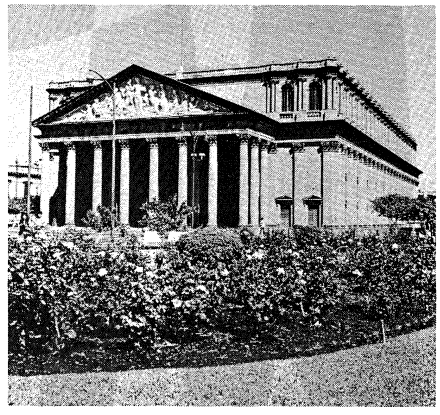
Guacanayabo, Gulf of, Spanish GOLFO DE GUACANAYABO, inlet of the Caribbean Sea, southeastern Cuba. The gulf stretches in a broad horseshoe shape from the southern coast of Camagüey province approximately 70 mi (110 km) to the southwestern shore of Granma province, north of Cabo (cape) Cruz. It is shallow and dotted with coral reefs, and the Gran Banco de Buena Esperanza surfaces in the central portion of the gulf, at the head of which, near the swampy mouth of the Río Cauto, is the port city of Manzanillo.

Guachalla (Paraguay): *see* Pedro P. Peña.

guácharo: *see* oilbird.

Guadalajara, metropolitan area and capital, Jalisco state, west central Mexico, in the Atemajac Valley, near the Río Grande de Santiago, at 5,141 ft (1,567 m) above sea level. Except for the rainy season, which extends from July 1 to September 15, its climate is dry and mild.

Guadalajara was founded in 1531 and was relocated several times in the following decade, under pressure from Indians. During the 16th century the city was the centre for Indian slave hunting. In 1810 it was occupied briefly by Miguel Hidalgo y Costilla, who initiated the independence movement and decreed the abolition of slavery in Mexico.



The Teatro Degollado, Guadalajara, Mex.
Art Resource—EB Inc.

Since 1940 Guadalajara has become a major industrial producer, in addition to its traditional functions as political capital and commercial entrepôt for an extensive agricultural region (devoted primarily to corn [maize] growing and livestock raising). It produces textiles, shoes, chemicals, building materials, tobacco products, and soft drinks. Handicraft industries are also important. There are many ultramodern industrial and commercial buildings, and modern residential suburbs have attracted members of the upper classes and of the rapidly expanding middle classes from the older parts of the city.

Guadalajara was made the seat of a bishopric in 1549, and the cathedral, completed in 1618, is richly decorated. Many of the city's more than 50 churches also date from the colonial period. The governor's palace, begun in 1743, is one of the finest examples of Spanish architecture in Mexico. The city has two universities: the University of Guadalajara (1792) and the Autonomous University of Guadalajara (1935). The Teatro Degollado is one of the largest and most ornate in Latin America. Guadalajara was the home of the painter José Clemente Orozco (1883–1949) and houses many of his finest works.

Guadalajara is connected by railroad and highway with Nogales, Ariz., on the United States border, to the northwest, and with Mexico City, to the east-southeast. Roads also lead to communities on the central and Pan-American highways. National and international airlines serve Guadalajara. Lake Chapala, a popular resort and retirement centre for U.S. citizens (some 5,000 in the late 1970s), is 23 mi (37 km) south of the city. Guadalajara experienced substantial growth after the 1930s, and by 1970 it was Mexico's second largest city. Pop. (1980) metropolitan area, 2,178,000.

Guadalajara, province, in the autonomous community (region) of Castile-La Mancha, central Spain, occupying part of the uptilted northeastern edge of the Meseta Central (plateau), with an area of 4,707 sq mi (12,190 sq km). In the north are highlands that reach their greatest elevations in Cerro de San Felipe (7,214 ft [2,199 m]), and other spurs of the Sierra de Guadarrama. In the south, the land slopes into the plateau basin of New Castile. In the extreme southeast, the land rises again to form the Sierra de Albarracín. Guadalajara is crossed by several tributaries of the Tagus River, including the Henares, Jarama, and Tajuña, which have been utilized for hydroelectric power and irrigation through the dams of Entrepeñas, Buendía, and Bolarque. There is a nuclear power plant at Zorita, opened in 1968; a second was under construction at Trillo.

The provincial capital, Guadalajara (*q.v.*) city, and the towns of Hita, Sigüenza, and Atienza were important as economic and cultural centres in medieval times, but only Guadalajara is now a major population centre. Molina in the northeast is considered to be Spain's coldest city. About half the province is unproductive, but sheep raising on the pastures provides the biggest contribution to the economy. Tourism, based on hunting and fishing, is also important. Cereals are widely grown; olives and vines are cultivated. The Alcarria plain in the southwest is noted for its honey. Pop. (1981) 143,124.

Guadalajara, city, capital of Guadalajara province, in the autonomous community (region) of Castile-La Mancha, central Spain, northeast of Madrid, situated on the Río Henares. The city, the ancient Arriaca, is Iberian in origin and was for a time held by the Romans, but its name is derived from Arabic (Wādī al-Ḥijārah, River of Stones). Taken by Christian forces in 1085, the city from the 15th to the 17th century was the seat of the Mendoza family, duques del Infantado, who were munificent patrons of Spanish artists and writers. The facade of their palace (begun 1461), now an orphanage, is the city's chief artistic monument; the churches of Santa María de la Fuente (13th century), San Ginés, once part of a Dominican monastery, and San Nicolás (1691) are also notable.

A commercial centre (woollens) in the Middle Ages, modern Guadalajara has only agricultural industries. It is the site of a military airfield. Pop. (1981) 56,922.

Guadalajara, University of, Spanish UNIVERSIDAD DE GUADALAJARA, coeducational

state-supported autonomous institution of higher learning at Guadalajara, Mex., founded in 1792 and restructured in 1925. Dissident students and professors from the university formed a private Autonomous University of Guadalajara (1935), which continues to exist independently. The original university includes faculties covering a wide range of academic and professional disciplines and schools of architecture, art, nursing, music, technology, social work, agriculture, and veterinary medicine, among others. There are also institutes of astronomy and meteorology, botany, experimental pathology, library science, geography and statistics, and psychiatry.

Guadalcanal, largest island of the Solomon Islands, southwestern Pacific Ocean. With an area of some 2,047 square miles (5,302 square km), it is of volcanic origin with a mountainous spine (Kavo Range) that culminates in Mount Makarakomburu (8,028 feet [2,447 m]), the highest point in the country. Many short, rapid streams, including the Mataniko, Lunga, and Tenaru, tumble from the wooded mountains to the coast, which in some places is lined with mangrove swamps. The economy is based mainly on fishing, coconuts, timber, cocoa, and fruit; there are occasional workings in alluvial gold and silver.

Guadalcanal was so named by the Spaniards, after Álvaro de Mendaña de Neira visited it in 1568. The English navigator Lieutenant John Shortland explored the sheltered anchorages along the northern coast in 1788. English traders followed, and the island was annexed (1893) by the British as part of the Solomon Islands Protectorate. During World War II it was the scene of bitter land and sea fighting between U.S. and Japanese forces. Honiara (*q.v.*), the national capital, is on the north coast. Pop. (1986 prelim.) 80,826.

Guadalcanal, Battle of (August 1942–February 1943), series of World War II land and sea clashes between Allied and Japanese forces on and around Guadalcanal, one of the southern Solomon Islands, in the South Pacific. Japanese troops had landed on Guadalcanal on July 6, 1942, and had begun constructing an airfield there. On August 7, in the Allies' first major offensive in the Pacific, 6,000 U.S. Marines landed on Guadalcanal and seized the airfield, surprising the island's 2,000 Japanese defenders. Both sides then began landing reinforcements by sea, and bitter fighting ensued in the island's jungles. The Japanese forces on the island reached a peak strength of 36,000 troops by October, but they were unable to overwhelm the Americans' defensive perimeter and retake the airfield. Six separate naval battles were also fought in the area as the navies of both sides sought to land reinforcements. By November, the U.S. Navy was able to land reinforcements on Guadalcanal faster than were the Japanese, and by January 44,000 U.S. troops were on the island. By February 1943 the Japanese, badly outnumbered, were forced to evacuate 12,000 of their remaining troops from Guadalcanal.

U.S. Marines landing on Guadalcanal, August 1942
UPI—EB Inc.

The Japanese lost a total of 24,000 men killed in the Battle of Guadalcanal, while the Americans sustained 1,600 killed, 4,200 wounded, and several thousand dead from malaria and other tropical diseases. The various naval battles cost each side 24 warships: the Japanese lost 2 battleships, 4 cruisers, 1 light carrier, 11 destroyers, and 6 submarines, while the Americans lost 8 cruisers, 2 heavy carriers, and 14 destroyers.

Guadalquivir River, Spanish RÍO GUADALQUIVIR, Arabic WĀDĪ AL-KABĪR ("Great River"), major watercourse of southern Spain. Rising in the mountains of Jaén province, it flows in a generally westward direction for 408 miles (657 km), emptying into the Atlantic Ocean at Sanlúcar de Barrameda, on the Gulf of Cádiz. It drains an area of 22,160 square miles (57,390 square km).

The Guadalquivir is the second longest river of Spain (after the Ebro), and it has several distinctive characteristics. Its natural environment is one of the richest and most varied areas of plant and animal life in Europe. Its irrigative capacity, particularly in its wide and fertile plain, supports the rich vineyards and olive groves of Andalusia, and engineering improvements have aided the industrialization of towns along its course.

The Guadalquivir rises almost 5,250 feet (1,600 m) above sea level, in southern Jaén province, to the north of the Sierra Nevada fronting the Mediterranean Sea. It then flows northward for about 30 miles (48 km), running through a narrow valley. After emerging from the reservoir of El Tranco de Beas, it follows a westerly and southwesterly trend for the remainder of its course. Between the cities of Andújar and Montoro, the river cuts a widening plain. After passing the city of Córdoba, the Guadalquivir irrigates the fruitful regions of Posadas and Lora del Río before reaching Seville, the capital of Andalusia. From here the river meanders lazily across a hot coastal plain, traversing the swamps of the Marshes, the largest in Spain, before reaching its mouth at the eastern end of the Gulf of Cádiz.

The drainage basin of the Guadalquivir encompasses one of the greatest floral resources of Europe, containing representatives of half of the continent's species of plant life, together with nearly all those of the North African region. The surrounding mountains are covered largely by forests of pine and oak, but more than a third of the total surface is in olive groves. In addition, cereals (wheat, rye, and barley) and viticulture support the regional agriculture.

Fauna is as varied as the plant life, with animals representing a great variety of European and North African species. In the mountains wild boar, goat, fallow deer, stag, chamois, partridge, and many other animals are found, making the area one of the great European hunting regions. Fish, notably trout and barbels, are found throughout the Guadalquivir, its reservoirs, and its approximately 800 tributaries.

Guadalupe, city, central Nuevo León *estado* ("state"), northeastern Mexico. It lies 672 feet (205 m) above sea level on the Santa Catarina River, about 3 miles (5 km) east of Monterrey, the state capital. Guadalupe is primarily an agricultural centre. Corn (maize) is the principal crop in the environs, but chick-peas are also important. Cattle and sheep are also raised in the vicinity. By virtue of its proximity to Monterrey, Guadalupe is easily accessible by highway, railroad, or air. Pop. (1980) 370,524.

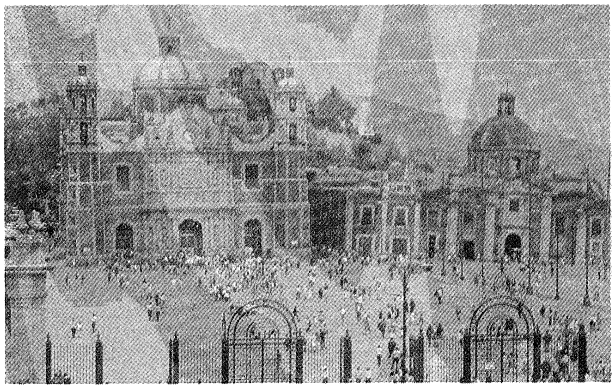
Guadalupe, town, Cáceres province, in the Extremadura *comunidad autónoma* ("autonomous community"), southwestern Spain. It lies on the southeastern slopes of the Guadalupe Mountains near the Guadalupejo River east of Cáceres city. The town is famous for its monastery, which had its origins as a small hermitage built in the early 14th century on the spot where a shepherd had found an image of the Virgin. This shrine became known as Our Lady of Guadalupe and became a centre of pilgrimage. Alfonso XI of Castile visited the shrine in 1337, and in 1340 he founded a monastery there. In 1389 the Hieronymites (Hermit Order of St. Jerome) took over the monastery, and their first prior built the church with its Moorish-style cloisters and hospices; later, Henry IV of Castile and his mother, María of Aragon, were entombed there. The Flamboyant Gothic chapel of Santa Ana, the Gothic cloister, the chapter hall, and the library were added to the monastery later.

The Monastery of Guadalupe became one of the richest and most important in Spain and achieved great renown for its architectural splendour and its artworks and other treasures. The monks of Guadalupe were skillful miniaturists, ironworkers, and silversmiths, and their surviving works are on display along with some notable paintings by Francisco de Zurbarán and Luca Giordano. The monastery was abandoned after the secularization of monasteries in 1835 but was occupied by the Franciscans in 1908. The modern town retains its function as a pilgrimage centre and serves as an agricultural market for vegetable oils, chestnuts, and cork. Pop. (1981) 2,765.

Guadalupe, Basilica of, officially BASILICA OF OUR LADY OF GUADALUPE, Spanish BASÍLICA DE GUADALUPE, or BASÍLICA DE NUESTRA SEÑORA DE GUADALUPE, Roman Catholic church that is the chief religious centre of Mexico, located in Villa de Guadalupe Hidalgo, a northern neighbourhood of Mexico City. The church was erected near the spot where two apparitions of the Virgin are said to have appeared to an Indian convert named Juan Diego in December 1531 and commanded that a church be built. The second apparition resulted in a painted image that became known as the Virgin of Guadalupe, and the entire incident did much to hasten the conversion of the Indians of Mexico to Christianity. In 1754 a papal bull made the Virgin of Guadalupe the patroness and protector of New Spain, and in 1810 she became the symbol of the Mexican independence movement when the patriot-priest Miguel Hidalgo y Costilla raised her picture to his banner.

Each year, hundreds of thousands of pilgrims from all over the world come to the church, the holiest in Mexico, which was given the status of a basilica by Pope Pius X in 1904. The present church, or Old Basilica, was constructed on the site of an earlier 16th-century church and was finished in 1709. When this basilica became dangerous owing to the sinking of its foundations, a modern structure called the New Basilica was built nearby; the original image of the Virgin of Guadalupe is now housed in the New Basilica.

Villa de Guadalupe Hidalgo itself was the site, on Feb. 2, 1848, of the signing of the



Old Basilica of Our Lady of Guadalupe in Villa de Guadalupe Hidalgo, Mex.

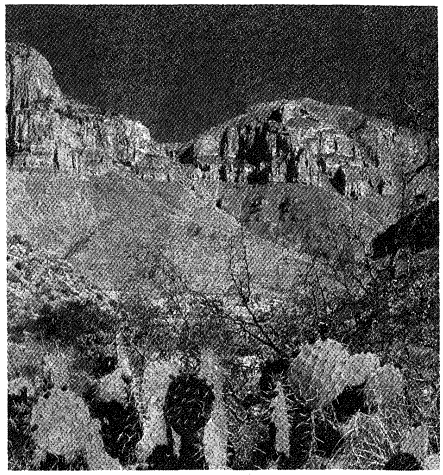
Shostal—EB Inc.

treaty between the United States and Mexico that ended the Mexican War.

Guadalupe Hidalgo, Treaty of (Feb. 2, 1848), treaty between the United States and Mexico that ended the Mexican War. It was signed at Villa de Guadalupe Hidalgo, which is a northern neighbourhood of Mexico City. The treaty drew the boundary between the United States and Mexico at the Rio Grande and the Gila River; for a payment of $15,000,000 the United States received more than 525,000 square miles (1,360,000 square km) of land (now Arizona, California, western Colorado, Nevada, New Mexico, Texas, and Utah) from Mexico and in return agreed to settle the more than $3,000,000 in claims made by U.S. citizens against Mexico. With this annexation, the continental expansion of the United States was completed except for the land added in the Gadsden Purchase (1853).

The treaty helped precipitate civil war in both Mexico and the United States. In Mexico it left many citizens unsure of their country's future as an independent state; political extremism followed, and civil war broke out at the end of 1857. The expansion of slavery in the United States had been settled by the Missouri Compromise (1820), but addition of the vast Mexican tract as new U.S. territory reopened the question. Attempts to settle it led to the uneasy Compromise of 1850 and the Kansas–Nebraska Act (1854).

Guadalupe Peak, highest point (8,751 feet [2,667 m]) in Texas, U.S. The peak is situated in Culberson county, 100 miles (160 km) to the east of the city of El Paso. Guadalupe Peak is part of the Guadalupe Mountains (a division of the Sacramento Mountains), and together with its twin, El Capitan (8,078 feet [2,462 m]), it forms the focus of Guadalupe Mountains National Park.



Guadalupe Peak (right) in the Guadalupe Mountains, western Texas

Josef Muench

Guadalupian stage, lowest stage of the Late Permian Series of rock strata in the United States, defined on the basis of a prominent reef complex in the Guadalupe Mountains of Texas (the Permian period began about 286 million years ago and ended about 245 million years ago). The Guadalupian stage also serves as the world standard for the lower part of the Late Permian.

In Guadalupian time the conditions in the Delaware Basin of southwestern Texas became favourable for the development of a rich benthonic (bottom-dwelling) fauna. Similarly, reef-forming organisms flourished, and a great calcareous reef, known as the Capitan Reef, developed about the margins of the basin. The Guadalupian is characterized by an upper zone of the fusulinid genus *Parafusulina* and a succeeding zone of *Polydiexodina.* Ammonoid zones include the *Waagenoceras* and the following *Timorites.*

Guadeloupe, officially DEPARTMENT OF GUADELOUPE, French DÉPARTEMENT DE LA GUADELOUPE, overseas *département* of France, consisting of the twin islands of Basse-Terre to the west and Grande-Terre to the east and several smaller islands, all in the Lesser Antilles island chain. Guadeloupe is situated some 4,300 miles (6,900 km) from France in the eastern Caribbean Sea and covers a total land area of 687 square miles (1,780 square km). The capital is Basse-Terre. Basse-Terre and Grande-Terre form a shape like a butterfly; together their maximum length north to south is 26 miles (42 km), and maximum width east to west is 38 miles (61 km). Saint-Barthélemy and the northern two-thirds of Saint Martin (Saint-Martin) are island dependencies of Guadeloupe, lying 150 miles (240 km) northwest of it. The population in 1990 was estimated at 344,000.

For information about regional aspects of Guadeloupe, *see* MACROPAEDIA: West Indies.

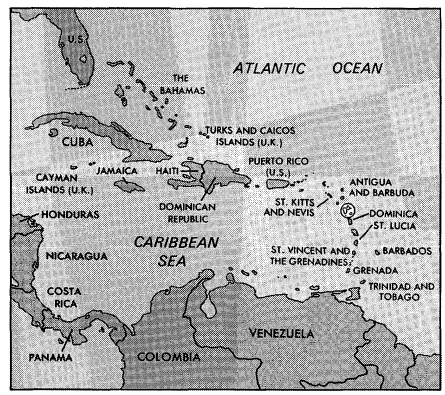
For current history and for statistics on society and economy, *see* BRITANNICA WORLD DATA ANNUAL.

The land. Basse-Terre (27 miles [43 km] long and 15 miles [24 km] wide) is a thickly forested mountainous island of volcanic origin. Its extremely rugged terrain culminates in the volcanic summit of Mount Soufrière (4,813 feet [1,467 m] above sea level). The Goyaves is the longest (15 miles) and principal river. The coastline is indented with bays and fringed with beaches. Grande-Terre (21 miles [34 km] long and 20 miles [32 km] wide) is a limestone island of coral origin with low hills rising to 490 feet (150 m) and extending through the central and southern part of the island. Grande-Terre has an indented coast encircled by coral reefs; it has only a few seasonal streams, since water rapidly seeps into the coarse limestone soils. The Rivière Salée, a narrow channel (4 miles [6 km] long and 16 feet [5 m] deep) lined with mangrove swamps, separates the two islands.

Guadeloupe's tropical climate is greatly influenced by the surrounding waters. The mean annual temperature is about 80° F (27° C) on the coasts and varies little from month to month; annual precipitation ranges from about 50 inches (1,300 mm) on the coasts to more than 300 inches (8,000 mm) at the summit of Mount Soufrière. Dense tropical forests of mahogany and ironwood and other tree crops such as coffee, cacao, and vanilla abound on the mountains of Basse-Terre, and mangroves and coconut palms flourish along the coasts. Banana plantations are concentrated on the southern part of Basse-Terre island, and sugarcane cultivation is widespread on the plains of Grande-Terre island.

The people. Most of the population of Guadeloupe is black or mulatto (mixed European and black), except on the Îles des Saintes, where the inhabitants are mostly white descendants of the French. French is the official language, but a creole dialect is widely spoken. More than three-fourths of the people are Roman Catholics.

The population was growing at a slower rate than that of most other island groups of the West Indies in the late 20th century. The birth



Guadeloupe

rate was well below average for the region, and the death rate was also comparatively low. Nearly one-third of the population was younger than 15 years of age, and almost half lived in urban areas.

The economy. Guadeloupe's economy is heavily dependent on subsidies from the French government, which account for as much as one-half of the islands' gross national product (GNP). The GNP is growing at about the same rate as the population; the GNP per capita is one of the highest in the West Indies.

Agriculture accounts for approximately one-tenth of the GNP and employs a similar proportion of the work force. Production of most foodstuffs does not meet domestic demand. Bananas are the major export followed by sugar. Cattle are raised mostly on small farms.

Manufacturing industries are underdeveloped and centre on the processing of domestic raw materials. Manufactures include refined sugar, liquors, chemicals, textiles, furniture, and plastics. Electricity is generated entirely from imported fuels. Most of the tourists who visit Guadeloupe each year come from France, though a growing number of cruise-ship visitors from North America began coming to the islands in the 1980s. France is Guadeloupe's principal trading partner and usually supplies more than 70 percent of the islands' imports. Imports vastly exceed exports.

Government and social conditions. Guadeloupe is a French overseas *département,* or administrative district. It is represented in the French National Assembly by four deputies and in the French Senate by two senators. Executive authority is vested in the commissioner, appointed by the central government of France. The General Council, composed of 43 members directly elected to six-year terms, votes on the departmental budget and has legislative jurisdiction over local matters.

The same social-welfare programs are in effect as in metropolitan France and provide a wide range of benefits, including old-age and disability pensions, family allowances, unemployment relief, and health insurance. Health conditions are good. Life expectancy is about 72 years, and the infant mortality rate is one of the lowest in the West Indies. Most serious infectious diseases have been controlled or eradicated. Approximately 90 percent of the population is literate, and education is compulsory between the ages of 6 and 16.

History. Several Spanish attempts to colonize the islands in the 16th century were repulsed by the Carib Indians, who had displaced the original Arawak inhabitants in the 15th century. Finally, in 1626, the Spanish established a settlement on the coast but were driven away by the French, who had also established a trading post. A French colony was founded in 1635, and, after a few years of fighting with the Carib, the colony began to prosper. In 1674 Guadeloupe became part of the domain of France.

Jean-Baptiste Labat was influential in the development of Guadeloupe in the early 18th century. He was the effective founder of the Basse-Terre colony, establishing the first sugar refinery on the island and arming black slaves to fight against the English. In 1759 and again in 1794 the island was occupied by the British. During the latter occupation the island was recaptured by the French under the leadership of Victor Hugues. Hugues abolished slavery, and several hundred white planters were massacred as a result. Slavery was reestablished in 1802. French forces attempted to restore order, but the island was once again captured by the British in 1810. After Napoleonic France's final defeat in 1815, the island was returned to France.

Between 1816 and 1825 Guadeloupe's legal code was introduced. In 1837 municipal institutions were established, and in 1848 slavery was abolished, 93,000 slaves being freed. During World War II Guadeloupe supported the resistance movement of General Charles de Gaulle and in 1946 became an integral part of France as a *département.* From the 1950s through the 1970s, Guadeloupe suffered from high unemployment, underdevelopment, and overpopulation, and the French government encouraged residents to migrate to metropolitan France. Beginning in the 1960s, local leftists, communists, and labour unions on Guadeloupe advocated independence and instigated numerous strikes and demonstrations. In the early 1980s the French government reiterated its intention to maintain the island's *département* status while working toward its economic self-sufficiency.

Guadet, Marguerite-Élie (b. July 20, 1758, Saint-Émilion, Fr.—d. June 17, 1794, Bordeaux), a leader of the Girondin faction of moderate bourgeois Revolutionaries during the French Revolution.

At the time of the outbreak of the revolution (1789), Guadet was a leading lawyer in Bordeaux. In 1790 he became administrator of the Gironde *département,* and in 1791 he was made president of the *département*'s criminal tribunal. Later that year he was elected to the Revolutionary Legislative Assembly, which convened at Paris on October 1, by which time the revolution had already abolished France's feudal institutions and restricted the authority of King Louis XVI. Guadet bitterly attacked the ministers of the king and was largely instrumental in forcing the latter to appoint a predominantly Girondin ministry in March 1792.

After Louis dismissed the Girondin ministry in June, Guadet attempted, without success, to come to terms with the king. Although he opposed the popular insurrection that overthrew the monarchy on Aug. 10, 1792, he was elected a deputy to the National Convention, which succeeded the Legislative Assembly in September. At the trial of the king he voted for the death sentence, but with a respite pending appeal. Guadet vigorously opposed the radical democrats of the Jacobin Club and was one of the deputies expelled from the Convention in the Jacobin coup d'état of June 2, 1793. He fled from Paris to escape arrest but was captured at Saint-Émilion and guillotined.

Guadiana River, Arabic WĀDĪ ANA, Portuguese RIO GUADIANA, Spanish RÍO GUADIANA, one of the longest streams of the Iberian Peninsula, flowing generally westward through south-central Spain and southeastern Portugal to the Gulf of Cádiz in the Atlantic Ocean. The river has a drainage area of 23,455 square miles (60,748 square km), a length of 483 miles (778 km), and approximately 30 major tributaries. The Guadiana River's flow is relatively meagre—only about half that of the Tagus or the Douro—because its basin drains the low-rainfall areas of the Montes de Toledo, the Sierra Morena, and the plains of La Mancha.

The Záncara (the true source of the upper Guadiana) and Gigüela rivers rise in the wetter mountains of Cuenca province of Spain. To the west of Daimiel these rivers form marshy lakes, known as Ojos del Guadiana ("Eyes of the Guadiana"), a noted wildfowl sanctuary. By contrast, the porous limestones found in other parts of the river's basin form a shallow water table, producing intermittent streams such as the Guadiana Alto, Azuer, and Cárcoles that disappear underground, though eventually feeding the Guadiana.

The Guadiana's waters are used for what is perhaps the most successful irrigation project in Spain. As it flows westward the Guadiana cuts a series of defiles through the ridges of the Toledo Mountains, and these defiles are now the sites of several dams that provide hydroelectric power and irrigation waters for Badajoz province. The four major dams have each created reservoirs more than 20 miles (32 km) long in the eastern part of the province. The Badajoz Plan, as this project was called, was launched in 1952 to develop one of the poorest and most arid regions of Spain. Upon the project's completion in the late 1960s, several hundred thousand acres of land had been put under irrigation, most of the towns and villages of Badajoz were provided with electricity, and dozens of new industrial enterprises had been established in the growing urban centres of the province.

Between Badajoz city, Spain, and Monsaraz, Port., and again downstream from Pomarão, Port., the Guadiana forms parts of the Spanish-Portuguese frontier. The rocky defiles and the sandbars at its mouth make the river suited to the navigation of small boats for only 42 miles (68 km) upstream to Mértola, Port. Larger vessels ply only between Pomarão and the coastal ports of Ayamonte, Spain, and Vila Real de Santo António, Port.

Guadix, town, Granada *provincia,* in the *comunidad autónoma* ("autonomous community") of Andalusia, southern Spain, east of Granada city. The town originated as the Acci of the Romans; its present name was corrupted from the Arabic Wādī-Ash ("River of Life"). Outstanding landmarks include the Moorish Alcazaba (fortress); the 18th-century Renaissance and Baroque cathedral built on the site of an old mosque; and the Barrio de Santiago, an adjacent locality famous for its inhabited caves excavated in the mountainsides. The economy is agricultural, based chiefly on wheat, olives, flax, and hemp. Pop. (1981) 19,860.

Guahibo and Chiricoa, two South American Indian groups inhabiting the savannas along the Orinoco River in eastern Colombia; some Guahibo also live east of the Orinoco in Venezuela. They speak closely related languages or dialects of Guahiboan and are otherwise culturally indistinguishable.

Traditionally, the Guahibo and Chiricoa were nomadic hunters, gatherers, and fishermen; their most important food animal was the armadillo. Constantly on the move, they rarely spent more than two or three days in one camp. Their largest unit of organization was the band, under a hereditary leader. They were estimated to number about 20,000 in the late 20th century.

Throughout the historic period there has been a fairly extensive trade between the nomads of the savanna and the sedentary farming peoples in the forests to the south. At one time the nomads supplied them with slaves captured in their warfare with other tribes. They had a rather complex technology for a nomadic people and made painted pottery, hammocks, and many kinds of baskets.

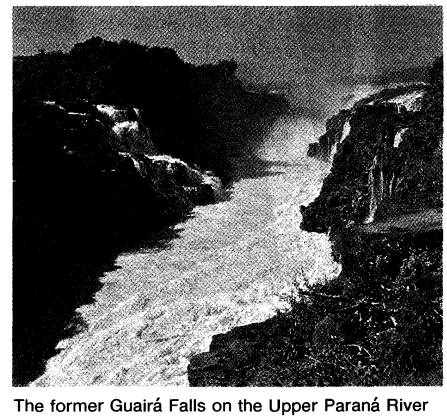
Guaicuruan languages (South America): *see* Guaycuruan languages.

Guainía, *comisaría* ("commissariat"), eastern Colombia, bounded by the Guaviare River to the north, Venezuela to the east, and Brazil to the south. Its 27,891 square miles (72,238 square km) lie between the Amazon River basin to the south and the llanos (plains) to the north and consist of savannas and tropical rain forest.

The commissariat was created in 1963. It is drained by numerous navigable tributaries of the Negro and Orinoco rivers, including the Guaviare, Inírida, and Guainía. Principal economic activities are subsistence agriculture, fishing, and hunting and gathering. About a third of the sparse population lives in and around San Felipe, the capital. No good roads penetrate Guainía; travel is almost entirely by river or air. Pop. (1985) 9,214.

Guainía River, Spanish RÍO GUAINÍA, in northwest South America, one of the headstreams of the Negro River (*q.v.*). It rises in the rain forest of eastern Colombia and flows east, then northeast and southeast, forming the Colombia–Venezuela border. After 400 miles (640 km), the Guainía joins the Casiquiare River near San Carlos de Río Negro and becomes the Negro.

Guairá Falls, Portuguese SALTO DAS SETE QUEDAS, Spanish SALTO DEL GUAIRÁ, former waterfalls on the Upper Paraná River at the



The former Guairá Falls on the Upper Paraná River
E. Manewal—Shostal/EB Inc.

Brazil–Paraguay border, just west of Guaíra, Brazil. Visited by Jesuit missionaries in the 16th century, the falls were supposedly named for a Guaraní Indian chief. Although the Brazilian name referred only to seven (*sete*) falls, meaning the seven principal cataracts, there were actually 18.

The falls, which had a total drop of about 375 feet (114 m), were formed when the Paraná River, after crossing the red sandstone Maracaju (Mbaracayú) Mountains, was forced through canyon walls and narrows abruptly from a width of 1,250 feet (381 m) to 200 feet (61 m). The churning water created a deafening noise that could be heard for a distance of 20 miles (32 km). A constant rainbow hovered over the site. The falls, which were a tourist attraction for many years, probably represented the greatest volume of falling water in the world. Paraguay and Brazil together undertook the building of the 12,600-megawatt Itaipu hydroelectric plant nearby, which was completed in 1982 and totally submerged the falls, thus creating a new reservoir covering an area of 521 square miles (1,350 square km). The Itaipu complex of dams and spillway curves almost 5 miles (8 km) across the Paraná River and is one of the world's largest hydroelectric plants.

Guajará-Mirim, city, western Rondônia *estado* ("state"), western Brazil. It lies along the Mamoré River. Primarily a transportation centre, Guajará-Mirim handles traffic in rubber, lumber, babassu palm oil, and other forest products taken in the surrounding area. It has a small port for shallow-draft vessels and is the southern terminus of a railroad built in 1913 to carry products out of Bolivia and Mato Grosso state. The city has two airports. Pop. (1980 prelim.) 19,992.

Guajira, La, *departamento,* northern Colombia. It is bounded on the north and west by the Caribbean Sea and on the east by Venezuela. Its 8,049-square-mile (20,848-square-kilometre) area stretches northward from the Sierra Nevada de Santa Marta onto the semiarid La Guajira Peninsula (Venezuela, La Goajira), which it shares with Venezuela. The territory has little rainfall, owing to prevailing easterly winds and the lack of mountains. La Guajira was raised from the status of a commissariat to that of a territory in 1911 and was made a *departamento* in 1965. The raising of sheep and goats is widespread in the north; in the south, cotton, rice, and livestock are the principal products. The *departamento* also produces salt and coal, the latter from the El Cerrejon field, which contains one-third of Colombia's total coal reserves. Approximately one-fourth of La Guajira's inhabitants are Indians. Ríohacha (*q.v.*), the *departamento*'s capital, is linked to Santa Marta, Valledupar, and Maracaibo, Venezuela, by highway. Pop. (1985) 255,310.

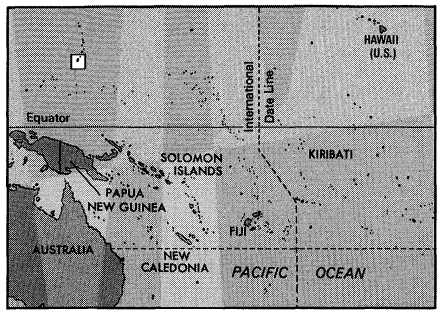
Guajira Peninsula, La, Spanish PENÍNSULA DE LA GUAJIRA, Guajira also spelled GOAJIRA, peninsula on the northwestern coast of South America. It is bounded by the Caribbean Sea on the north and west, the Gulf of Venezuela on the southeast, and the Sierra Nevada de Santa Marta and Sierra de Perijá on the south. Much of the peninsula lies in La Guajira *departamento,* Colombia; the rest is in Zulia state, Venezuela, where it is known as La Goajira Peninsula.

The climate of the peninsula is generally hot and arid or semiarid; goat raising by Indians is widespread, and there is some pearl fishing and saltworking on the coast. Divi-divi (a small shrub whose pods are used for tanning and dyeing) is an important product of the area, and there are some mineral deposits. Ríohacha, Colom., is the principal town on the peninsula and the focus of a limited highway network. Natural gas fields near Ríohacha are connected by pipeline with Barranquilla, Colom., to the southwest.

Guam, island, largest and southernmost of the Mariana Islands and an organized unincorporated territory of the United States, located in the Pacific Ocean some 3,000 miles (5,000 km) west of the Hawaiian Islands.

A brief treatment of Guam follows. For full treatment, *see* MACROPAEDIA: Pacific Islands.

With an area of 209 square miles (541 square km), the island is sharply divided into a northern coralline limestone plateau, which has a



Guam

general elevation of 500 feet (150 m) and lacks surface streams, and a southern chain of volcanic hills.

The climate is tropical, with temperatures ranging from 70° to 90° F (21° to 32° C) throughout the year. Average annual rainfall is about 95 inches (2,400 mm), most of which falls from July to September. Vegetation varies from coconut palms along the shore to sword grass on the hills and jungle shrub on the plateau.

Guam was probably visited (1521) by the Portuguese navigator Ferdinand Magellan (sailing for the Spanish), who is also credited with naming the island Ladrones ("Thieves") because of the behaviour of the inhabitants. Guam was formally claimed by Spain in 1565, and its people were forced into submission and conversion to Roman Catholicism, beginning in 1668. For the next two centuries Guam remained an outpost of Spain.

The island was ceded to the United States as a prize of the Spanish–American War (1898). In the mid-1930s, it served as a stop for transpacific air flights. In 1941 the Japanese occupied the island, which was retaken by U.S. forces in 1944 and turned into a major air and naval base. Under the jurisdiction of the U.S. Navy, it was made a territory (1950) that was administered by the U.S. Department of the Interior (from 1973, by the Office of Territorial Affairs, within that department), and the Guamanians, previously "nationals" of the United States, were made U.S. citizens, although they cannot vote in U.S. national elections. Guam is now self-governing, with a civilian governor (first elected in 1970) and a popularly elected unicameral 21-member legislature. Each of the island's villages is headed by a popularly elected commissioner. In 1972 a new law gave Guam one delegate (elected for a term of two years) to the U.S. House of Representatives. The delegate can vote in committees but not in the House. Guam also has a federal district court.

Guam remains the site of major U.S. naval and air bases, which are its economic mainstay; about one-third of the land in Guam is owned by the U.S. armed forces. Facilities include a nuclear submarine base and a large ship-repair yard located at Apra Harbor. From Andersen Air Force Base on the northeastern corner of the island, U.S. planes carried out bombing raids over Indochina during the Vietnam War in the late 1960s and early '70s. In 1975 thousands of South Vietnamese refugees were flown to Guam before being transferred to the United States.

The limited amount of agriculture on Guam principally supplies the local market. Products include truck (market) crops, bananas, sweet potatoes, corn (maize), and sugarcane. There is also commercial poultry farming, supplying both meat and eggs. For several years the only significant industry was the assembly of watches from Swiss-made components. In the early 1970s a brewery and textile industries were established. Guam is a stop for airlines serving the U.S. west coast, Hawaii, the Philippines, various Micronesian islands, Australia, and the Far East. A growing tourist trade, second only to the U.S. military establishments in economic importance, is based on this air traffic and on several shipping lines, most of the tourists coming from Japan. Facilities for the handling of containerized cargo were opened in Apra Harbor in 1969. Major imports are petroleum, machinery and transport equipment, food and live animals, and manufactured goods; exports include clothing, beverages and tobacco, and machinery and transport equipment.

Education is compulsory between the ages of 6 and 16. There are numerous elementary and high schools and one community college. The University of Guam, opened in 1952, provides a four-year degree program. Health facilities on the island include public, private, and military hospitals and local clinics.

The native Guamanians, the Chamorro, are basically of Malayo-Indonesian stock with a considerable admixture of Spanish, Filipino, Mexican, and other strains. In addition to the official language, English, they speak a distinct language, Chamorro. About four-fifths of the population is Roman Catholic, and most of the rest is Protestant. Agana is the capital of the territory. Tamuning, Apra Harbor, and Mangilao are the other larger settlements on the island. There is a good highway network, and an international airport is located near Agana. Pop. (1988 est.) 126,000.

Guan (people): *see* Guang.

guan, any of several small birds of the curassow family. *See* curassow.

Guan Di (in Chinese mythology): *see* Kuan Ti.

Guan Hanqing (Chinese dramatist): *see* Kuan Han-ch'ing.

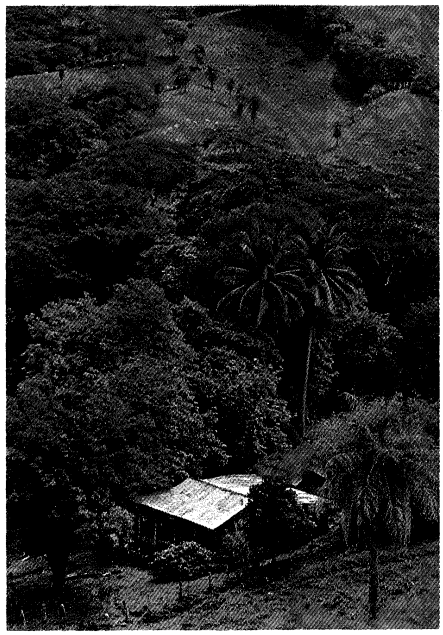
Guanabacoa, city, Ciudad de la Habana *provincia,* west-central Cuba. Nestled among hills outside Havana, it is essentially a residential suburb, although a number of industries have been established there. Guanabacoa was founded by the Spanish at the site of an old Indian village; its medicinal springs made it a summer resort for affluent families during the colonial period. It retains a colonial atmosphere, with the parish church, San Francisco and Santo Domingo monasteries, and several old mansions still standing. The city is linked to Havana, 3 miles (5 km) to the west, by highway, railway, and ferry. Pop. (1986 est.) 94,700.

guanabana (tree): *see* soursop.

Guanabara Bay, Portuguese BAÍA DE GUANABARA, bay of the Atlantic Ocean, southeastern Brazil, with Rio de Janeiro on its southwest shore and Niterói on its southeast. Discovered around 1502, it was originally named Rio de Janeiro Bay. About 19 miles (31 km) long with a maximum width of 18 miles, it has a mile-wide entrance that is flanked on the east by Papagaio Peak and Santa Cruz fortress and on the west by Sugar Loaf Mountain and São João fortress. In the entrance is the island-fort of Laje, temporary site of a Huguenot settlement in 1555. Numerous islands dot Guanabara Bay, including Villegagnon, Governador, and Cobras (with fortifi-

cations, naval storehouses, a hospital, and dry docks).

Guanacaste, province, northwestern Costa Rica, bounded on the north by Nicaragua, on the east by Alajuela province, and on the west and south by the Pacific Ocean. Occupying one-fifth of the national territory, Guanacaste's 4,000 sq mi (10,400 sq km) were formerly open deciduous forest, which have been turned into savanna grasslands, with dry forests in the north. It rises into the Guanacaste Cordillera in the east. Shortly after independence from Spain, the province separated itself from Nicaragua, and in 1825 it



Forest and grassland in Guanacaste province, Costa Rica
Carl Purcell

officially became part of Costa Rica. It was the source of ill feeling between the two nations during the 19th century, and it was also the centre of much of the warfare between the Central Americans and the U.S. filibuster William Walker in the 1850s. Although the volcanic soil is fertile, the lack of water, inaccessibility, and sparse settlement have hindered agriculture. An irrigation project has allowed some expansion. The chief income of Guanacaste is from cattle; about one-half of the beef, corn (maize), and rice consumed in Costa Rica comes from the province. The Pan-American Highway traverses Guanacaste, passing through Liberia (*q.v.*), the provincial capital. Nicoya, on the Nicoya Peninsula, is also large and important. Pop. (1983 est.) 228,249.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Guanacaste, Cordillera de, range and a section of the Continental Divide in northwestern Costa Rica. It extends 70 mi (113 km) northwest–southeast and reaches a high point in the dormant Volcán Miravalles (6,627 ft [2,020 m]). The Arenal Volcano erupted in 1968, covering the area with hot ash, destroying pasture, and forcing the slaughter of 100,000 head of cattle.

guanaco (*Lama guanacoe*), South American member of the camel family, Camelidae (order Artiodactyla), closely related to the alpaca, llama, and vicuña, which are known collectively as lamoids. Unlike camels, lamoids do not have the characteristic camel humps; they are slender-bodied animals with long legs and necks, short tails, small heads, and large, pointed ears. They graze on grass and other plants. When annoyed, they spit. Lamoids are able to interbreed and to produce fertile offspring.

The guanaco, like the vicuña, is a wild lamoid that lives in small bands of females, usually led by a male. The guanaco ranges from the snow line to sea level throughout the Andes from Peru and Bolivia southward to Tierra del Fuego and other islands. The adult stands about 110 centimetres (43 inches) at the shoulder; it is pale brown above and white below, with a grayish head.

The soft, downy fibre covering of the young, or guanaquito, comprises about 10 to 20 percent of the fleece and belongs to the group of textile fibres called speciality hair fibres (*q.v.*). Guanaco fibre, introduced for textile use in the mid-1900s, is valued for its rarity and soft texture and is used for luxury fabrics; it is considered to be finer than alpaca but coarser than vicuña. The pelts, especially of the guanaquito, resemble those of the red fox and are used by the fur industry, which provides the textile industry with waste fibre remaining after processing.

Depending on the authority, the llama, alpaca, and guanaco may be classified as distinct species or as races of llama (*Lama glama*). Because of certain structural features, the vicuña is sometimes separated from the other lamoids as *Vicugna vicugna.*

Guanajuato, state, central Mexico. It lies on the interior plateau at an average elevation of about 6,000 ft (1,800 m) above sea level and has an area totalling 11,773 sq mi (30,491 sq km). The north is mountainous, while the south, consisting of fertile plains, is largely devoted to agriculture (corn [maize], beans, barley, and wheat). The state is drained by the Río Lerma and its tributaries, the Río Turbio, and the Río de la Laja.

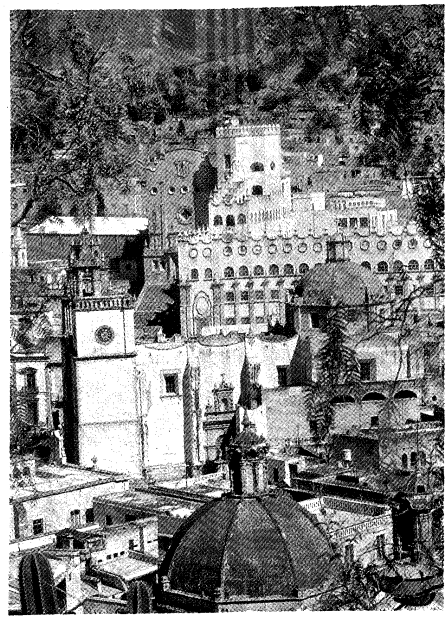
The first Spanish settlement in Guanajuato was that of San Miguel de Allende in 1542. During colonial times it was an important silver-mining area. In 1810 Miguel Hidalgo y Costilla began the Mexican war for independence in the village of Dolores Hidalgo and took Guanajuato, now the state capital, in the same year. Other important cities are León and Celaya. The region became a state in 1824.

The principal industry is mining (gold, tin, lead, mercury, copper, and opals, in addition to silver). Other industries include flour mills, tanneries and leather factories, cotton and woollen mills, distilleries, and foundries. The state is traversed by railroads and highways. Pop. (1980 prelim.) 3,044,402.

Guanajuato, city, capital of Guanajuato state, central Mexico; it is spread over steep hillsides at the junction of three ravines, 6,726 ft (2,050 m) above sea level.

Guanajuato, an outstanding example of the Spanish colonial city, was founded in 1554 and was given city status in 1741. Along with Zacatecas, to the north, and Potosí, Bolivia, the town became one of the three greatest silver-mining centres of the 16th century. Its celebrated Veta Madre (Mother Lode) was described as the richest in the world. The fabulous wealth was most manifest in the elaborate and richly endowed churches, notably La Valenciana, San Francisco (1671), and San Diego (1663).

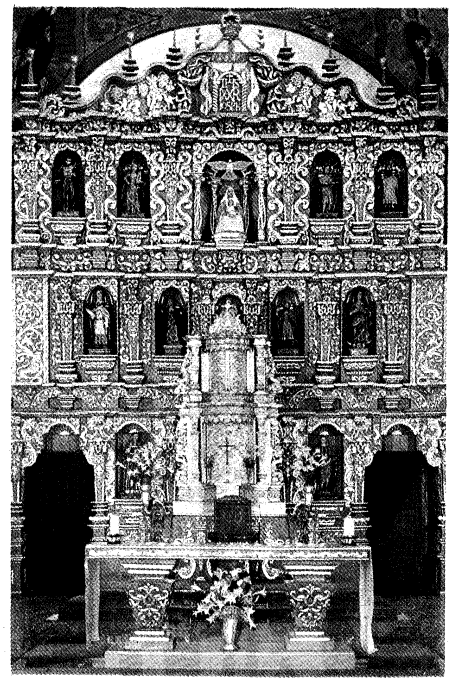
Guanajuato was the first major city to fall to the independence leader Miguel Hidalgo y Costilla in 1810. The plundering and destruction that accompanied the overrunning of the Alhóndiga de Granaditas (a granary used as a fortress) were followed by struggles for control of the city; by 1822, flooding and the exodus of many wealthy families had resulted in greatly reduced output from the mines. Guanajuato entered a period of decline that continued until the 1930s, when increased tourist trade and federal support of mining and agriculture in



Guanajuato, Mex.
Carl Frank—Photo Researchers

the state resulted in slow but steady recovery. The University of Guanajuato was established there in 1945. The city is accessible by highway, railroad, and air. Pop. (1980) 48,000.

Guanare, city, capital of Portuguesa state, northwestern Venezuela. A centre of pilgrimage, Guanare contains the national shrine to Our Lady of Coromoto, the patron saint of Venezuela. The city, which was founded in 1593, is also a commercial and manufacturing centre in the northern portion of the western Llanos (plains). Cattle, cotton, coffee, cacao, sugarcane, and corn (maize) are the principal products of the area. Iron deposits are located in the vicinity. Guanare lies on the highway



Main altar of the shrine of Our Lady of Coromoto, Guanare, Venezuela
Georges de Steinheil

running along the southeastern flank of the Cordillera de Mérida, 50 mi (80 km) southwest of Acarigua, the former state capital, and 50 mi northeast of Barinas, capital of Barinas state. The city also has an airfield and is accessible by river vessel via its port, Guerrilandia, on the Río Guanare. Pop. (1981 est.) 47,000.

Guanche and Canario, any of the aboriginal peoples inhabiting, respectively, the western and eastern groups of the Canary Islands when first encountered by the conquering Spaniards at the beginning of the 15th century. Both populations are thought to have been of Cro-Magnon origin and may possibly have come from central and southern Europe via northern Africa in some distant age. Both aboriginal groups had brown complexion, blue or gray eyes, and blondish hair, and these characteristics still persist in a large number of present inhabitants of the islands, but otherwise they are scarcely distinguishable in appearance or culture from the people of Spain.

Neither original group now exists as a separate race, but the name Canarios is now applied to all present residents.

When discovered by the Spaniards, the aborigines belonged to a Neolithic culture, though they were advanced enough to have pottery. Their food staples consisted mainly of milk, butter, goat flesh, pork, and some fruits; and their clothing comprised leather tunics or vests made of plaited rushes. They left alphabet-like engravings and characters whose meanings are obscure; but they are known to have been monotheists.

Guang, also spelled GUAN, also called GONJA, or NGBANYA, people of northern Ghana speaking Gur (or Voltaic) and Guang languages of the Niger-Congo family. They are descendants of a trading nation (usually called Gonja) founded in the 16th century, and they now constitute a chiefdom in the Northern Region of Ghana, in the area above the confluence of the Black and White Volta rivers.

The Gonja state was founded between 1550 and 1575 by the Mandingo cavalrymen of Askia Dāwūd, emperor of Songhai (1549–82). In the 17th century, a Mande chief called Jakpa (*see* Jakpa, Sumalia Ndewura) established a ruling dynasty and expanded the state's territory. Gonja was incorporated into the Ashanti Empire during the 18th century.

The contemporary Guang, or Gonja, chiefdom is composed of rulers and people who differ from one another culturally and linguistically. The ruling dynasty claims descent from the Mande invaders who were accompanied by Muslims of Mande origin, commoners, and slaves. The commoners speak various Gur and Guang languages; the rulers and Muslims speak Gbanyito, a Guang language. All the languages belong to the Niger-Congo family.

Most Guang occupy small, compact villages of up to 300 persons. Some larger towns, such as Salaga, were formerly important trade centres. The Guang practice shifting cultivation, the major crops being yams, cassava, millet, sorghum, and corn (maize).

There is a single, ruling descent group. The territorial divisions are ruled by chiefs, who claim descent in the male line from Jakpa. Each divisional chief is selected in rotation from among two or three local segments of the ruling group. The paramount chief, the *yagbumwura,* is also selected in rotation from the chiefs of the five eligible divisions.

Major state ceremonies are generally Muslim. Most Muslim priests attached to the main divisions are traditionally associated with the rulers. The commoners include indigenous peoples, followers of the invaders, refugees, and recent immigrant farmers from elsewhere.

guang (Chinese vessel): *see* kuang.

Guang Wu Di (Chinese emperor): *see* Kuang-wu Ti.

Guanghua (China): *see* Kuang-hua.

Guangxu (Chinese emperor): *see* Kuang-hsü.

Guangzhou (China): *see* Canton.

Guaniguanico, Cordillera de, low range of hills in Pinar del Río province, western Cuba. It extends about 40 mi (64 km) northeast from Mantua and comprises the Sierra de los Órganos and the Sierra del Rosario, which rises 2,293 ft (699 m) at El Pan de Guajaibón. The Sierra del Rosario exhibits a multitude of knolls formed of different rock materials, whereas steep limestone cones tower in the Sierra de los Órganos. Extensive pine and oak forests cover the cordillera, and mineral springs occur along fault lines.

guanine, an organic compound belonging to the purine group, a class of compounds with a characteristic two-ringed structure, composed of carbon and nitrogen atoms, and occurring free or combined in such diverse natural sources as guano (the accumulated excrement and dead bodies of birds, bats, and seals), sugar beets, yeast, and fish scales. It is a component of nucleic acids, the cell constituents that store and transmit hereditary traits.

Guanine was first discovered in guano in 1846 and was isolated in 1891 from nucleic acids from which it is readily prepared.

More complex compounds obtainable from nucleic acids include the nucleosides guanosine and deoxyguanosine, in which guanine is combined with the sugars ribose and deoxyribose and the nucleotides guanylic acid and deoxyguanylic acid, which are phosphoric acid esters of guanosine and deoxyguanosine. Nucleotides are molecules that constitute the fundamental structural units of nucleic acids; nucleosides are smaller subunits lacking in phosphoric acid.

Guanosine triphosphate (GTP) is used by the body to form the guanylic acid units in ribonucleic acids (RNA's).

guano, accumulated excrement and remains of birds, bats, and seals, valued as fertilizer. Bird guano comes mainly from islands off the coasts of Peru, Baja (Lower) California, and Africa heavily populated by cormorants, pelicans, and gannets. Bat guano is found in caves throughout the world. Seal guano has accumulated to great depths on the Isla Lobos de Tierra and Islas Lobos de Afuera (Lobos Islands), off northwestern Peru. Bat and seal guano are lower in fertilizer value than bird guano, which contains about 11 to 16 percent nitrogen, 8 to 12 percent phosphoric acid, and 2 to 3 percent potash.

Guantánamo, province, southeastern Cuba, bounded on the northeast by the Atlantic Ocean, on the southeast by the Windward Passage, on the west by Santiago de Cuba province, and on the northwest by Holguín province. Part of former Oriente province until 1976, its area of 2,459 sq mi (6,369 sq km) is mostly mountainous, including the Sierra de Purial and the Cuchillas de Toa. The northern slopes are covered with tropical rain forest, whereas the southern coast on the leeward side of the mountains is arid. The Sierra Maestra at the western boundary of the province terminates in the fertile basin of Bahía (bay) de Guantánamo, representing the continuation of the Central Valley to the east, the site of a U.S. naval base. Coffee, cacao, and bananas are grown on the mountain slopes around Guantánamo (*q.v.*) city, the provincial capital, and the port of Baracoa. Sugarcane, corn (maize), cassava, and coconuts are also raised, mainly in the Toa River Valley and the Guantánamo basin. Baracoa, the most isolated urban centre on the island, is important for the nickel, cobalt, and chromium deposits in the vicinity; a chromite-processing plant is located at Cayoguán. Guantánamo city, known as the coffee capital of Cuba, is connected by highway and railroad to Santiago de Cuba and other urban centres. Pop. (1983 est.) 469,685.

Guantánamo, city, capital of Guantánamo province, eastern Cuba, lying in the mountains, 21 mi (34 km) north of strategic Guantánamo Bay. Founded in 1819, the settlement was called Santa Catalina del Saltadero del Guaso until 1843. French refugees from Haiti aided in the colonization of the area, and many cultural characteristics, such as the architecture, show their influence. Catalans were also among the early settlers.

Guantánamo is the centre of an agricultural region producing mainly sugarcane and coffee. The city's chief industrial activities are coffee roasting, sugar milling, and the processing of chocolate, liqueurs, and salt. Railroads and highways link it with Santiago de Cuba and with Caimanera, a port on Guantánamo Bay. Because of the difficulty of land communications in the mountainous region, air traffic in Guantánamo is heavy. Pop. (1981 prelim.) 178,129.

Guantánamo Bay, Spanish BAHÍA DE GUANTÁNAMO, inlet of the Caribbean Sea, indenting southeastern Cuba. One of the largest and best sheltered bays in the world, it has a narrow entrance to a harbour approximately 6 mi (9 km) wide and 12 mi long and capable of accommodating large vessels.

The strategic importance of the bay—close to the Windward Passage between Cuba and Haiti that links the Atlantic Ocean to the Caribbean Sea and Panama—was recognized during the Spanish–American War, in 1898, when U.S. marines landed there. A large, 45-sq-mi (116-sq-km) U.S. naval base, which now includes fortifications and airfields, was established by treaty in 1903. Since the 1959 Revolution, the Cuban government has protested the U.S. presence and periodically has threatened to seize the base. Often called "Gitmo" by naval personnel assigned there, it is used primarily as a U.S. fleet training base in the Caribbean Sea. Guantánamo Bay is served by the ports of Caimanera and Boquerón, which are linked by railroad and highway to the city of Guantánamo, 21 mi to the north.

Guanxiu: *see* Kuan-hsiu.

Guap (Caroline Islands): *see* Yap.

Guaporé River, Portuguese RIO GUAPORÉ, Spanish RÍO ITÉNEZ, river flowing through northeastern Bolivia and west central Brazil. The river rises in the Serra (mountains) dos Parecis in Mato Grosso state, Brazil, and loops southward, westward, and then north-northwestward past Mato Grosso city. After receiving the Rio Verde, it continues northwestward, forming the border between Bolivia and Brazil and emptying into the Mamoré River (*q.v.*) above the town of Guajará-Mirim. The Guaporé is the largest affluent of the Mamoré and is navigable along its 1,087-mi (1,749-km) course at any season of the year. It flows through a region of tropical rain forest that is almost uninhabited except for occasional settlements of Indians and mestizos along the banks. In contrast with the brown, silt-laden Mamoré, the Guaporé has unusually clear water. For several miles below their juncture, the identity of the two streams can still be readily perceived. Historically, the region was witness to numerous frontier conflicts between the Spanish and the Portuguese and the struggles of both with hostile Indians. Forte Príncipe da Beira, constructed near the confluence of the Guaporé and the Mamoré in the late 18th century, is a reminder of this era.

Guaragna, Salvatore (composer): *see* Warren, Harry.

guarana (*Paullinia cupana*), woody, climbing plant, of the soapberry family (Sapindaceae), native to the Amazon Basin. It has a smooth, erect stem; large leaves with five oblong-oval leaflets; clusters of short-stalked flowers; and fruit about the size of a grape and usually containing one seed shaped like a tiny horse chestnut.

The seeds are roasted and used to make a stimulant drink popular in South America, which has a bitter, astringent taste and a faint, coffee-like odour. Its caffeine content is about three times greater than an equivalent amount of coffee; the astringent action is caused by tannin. Guarana also yields saponin (a carbohydrate), starch, gum, several volatile oils, and an acrid green fixed oil.

Guaranda, capital of Bolívar province, central highland Ecuador, on a headstream of the Río Chimbo in the Cordillera (mountains) de Guaranda of the Andes. It is about 15 mi (24 km) southwest of Mt. Chimborazo. As an agricultural centre for the surrounding area, the city trades in cinchona (a source of quinine), wheat, corn (maize), and timber. Its slight industrial development includes a tannery. Guaranda is connected by highway with Riobamba and Quito; before the opening of the Guayaquil–Quito railway (1908), it was an important transshipment point between the two cities. Guaranda was made a Roman Catholic episcopal see in 1957. Pop. (1983 est.) 14,155.

Guaraní, South American Indian group speaking a Tupian language (*see* Tupians). The aboriginal Guaraní inhabited eastern Paraguay and adjacent areas in Brazil and Argentina. In the 14th and 15th centuries some Tupian speakers migrated inland to the Río de la Plata, where they became the Guaraní of Paraguay. Modern Paraguay still claims a strong Guaraní heritage; most of the 1,000,000 peasants who live along the Paraguay River around Asunción speak a language called Guaraní.

The aboriginal Guaraní were typical Indians of the tropical forest. The women maintained fields of corn (maize), cassava, and sweet potatoes while the men hunted and fished. The practice of slash-and-burn agriculture required movement of their thatched house settlements every five or six years. As many as 60 patrilineally related families lived in each of the four to six large houses that composed a village. The Guaraní were warlike and took captives to be sacrificed and, it is alleged, to be eaten. A few scattered communities of true Guaraní Indians still survive marginally in the forests of northeastern Paraguay, but these were rapidly dwindling in the late 20th century. The best known of them were the Apapocuva.

Spanish contact with the Guaraní of Paraguay was initiated by the search for gold and silver. The Spaniards founded small ranches around Asunción, notorious for their "harems" of Guaraní women. Their racially mixed descendants became the rural population of modern Paraguay. In the 17th century the Jesuits established missions (*reducciones*) in eastern Paraguay among the Guaraní of the Paraná River. Eventually, about 30 large and successful mission towns constituted the famous "Jesuit Utopia," the Doctrinas de Guaranies. In 1767, however, the expulsion of the Jesuits was followed by the scattering of mission Indians, often taken into slavery, and the confiscation of Indian land.

Modern Paraguay's cultural nationalism emphasizes the continuity of Guaraní customs, language, and habits of mind. Actually, a Spanish colonial way of life was established among the people very early in their history, and no truly aboriginal customs have survived except the now much altered language.

guaranteed minimum income, income maintenance program administered through the taxation system for which eligibility is determined by income as related to family size. In such programs the provision of a minimum standard of living to every citizen is considered part of the government's general responsibility to provide for the welfare of its citizens. A system of income guarantees has existed in Great Britain since the passage in 1966 of the Supplementary Benefits Act. Similar programs have been proposed in the United States as possible solutions to the gaps in current welfare programs. The systems may follow two broad patterns: social-dividend taxation or negative-rate taxation.

In a social-dividend system, each family is entitled by right to certain income payments, which it receives either at specified intervals throughout the year or by subtraction from its tax liability at the end of the year.

Under the so-called negative income tax system, there is a critical level of income for each family size at which no taxes are paid and no benefits received. Families with incomes under this established minimum receive income supplements (or negative taxes) equal to part or all of the difference between the minimum standard and their earned income, depending on the particular version of the program.

The negative income tax is less costly than the social dividend because it provides payments only to those identified by their income level as poor. Though some supporters view the negative income tax as a replacement for present welfare programs, others see it as complementary to existing programs.

The advantages of effecting income transfers through the taxation system include the fact that eligibility is determined on the basis of income, without judgment of the reasons for an individual's poverty, and that the working poor are not excluded because they are employed. Payment in cash, which imposes no particular consumption patterns on the recipient, is generally cited as a major advantage, though commodity payment has been judged preferable in some situations.

guaranteed wage plan, system by which an employer assures a minimum annual amount of employment or wages or both to employees who have been with the firm for a minimum required period of time. The United States has had more experience than other countries with such plans, which have as their purpose the elimination of the adverse effects of fluctuating employment on living standards. Many plans have been short-lived; they seem to have been most successful in consumer goods industries, which are affected less by fluctuations in the economy.

When such plans were introduced in the late 19th century, they were usually undertaken unilaterally by employers. They were extended on an informal basis to a few selected employees to whom they guaranteed a minimum amount of employment. The plans received some support during the 1930s, when governments tried to encourage them indirectly through labour legislation.

In the postwar years, guaranteed wage plans reemerged as elements in labour's collective bargaining proposals. Trade unions viewed them as a means of shifting the risk of unemployment from the worker to the firm. During the 1950s, such plans were favoured not only as a protection against seasonal fluctuations in employment but also as a means of moderating the introduction of automated equipment. Later plans provided for the integration of payments by private employers with public unemployment-compensation benefits.

Guarantees, Law of, Italian LEGGE DELLE GUARENTIGIE (May 13, 1871), attempt by the Italian government to settle the question of its relationship with the pope, who had been deprived of his lands in central Italy in the process of national unification. The first section of the law sought to ensure the freedom of the pope to fulfill his spiritual functions despite the loss of his temporal power. It gave the pope special status as a sovereign person, assured him the right to receive ambassadors and to communicate freely with Roman Catholic bishops throughout the world, granted him a substantial annual income, and allowed him perpetual use of the Lateran and Vatican palaces in Rome and of the villa of Castel Gandolfo. The second section, dealing with church–state relations, was a compromise between Count Cavour's principle of a "free church in a free state" and the demands of the more radical left. Thus the state retained the power to prevent bishops from taking full control of their sees until their appointments had been approved by royal decree.

The Law of Guarantees was one of the main issues that split the Right and the Left in the Chamber of Deputies (lower house of the legislature). The Right generally favoured the law as a way to reach a genuine reconciliation with the pope and to placate world public opinion. The liberal, anticlerical Left, however, opposed the concessions to the papacy and favoured the state's retaining a greater degree of control over ecclesiastical affairs in Italy.

Pius IX (pope 1846–78) adamantly refused to accept the loss of his temporal power and rejected the Law of Guarantees, although he and his successors continued, in fact, to enjoy many of the privileges it granted. The popes were formally reconciled with Italy only with the Lateran Treaty of 1929, which specifically abrogated the Law of Guarantees.

guaranty and suretyship, in law, assumption of liability for the obligations of another. In modern usage the term guaranty has largely superseded suretyship.

Legal historians identify suretyship with situations that are quite outside the modern connotations of the term. For example, they use the term when describing how the family and other social groups have been made to assume collective responsibility for the offenses of their members. Another ancient example is more consistent with the modern concept: the situation in which the surety (person) was delivered over as a hostage to the custody of the claimant and to imprisonment and servitude upon the default of the principal.

In modern times suretyship—or guaranty—has come to be undertaken by business corporations organized for that purpose. These firms usually sell bonds wherein they undertake to pay money for embezzlement by public and private officers and employees, bonds relating to criminal prosecutions, and bonds to secure the faithful performance of contracts. In this respect they resemble insurance companies.

The beneficial rights of these companies are about the same in civil- and common-law jurisdictions. Unless specifically stipulated away, they arise even in the absence of an express contract provision. They include the right of reimbursement, or the right to recover any loss from the one who defaulted on the obligation; the right of subrogation, or the right to the benefit of all securities that the creditor received from the debtor; and the remedy of exoneration, or the right to require the debtor to pay his creditor or to fulfill his promises. *See also* guarantee.

Guaratinguetá, city, southeastern São Paulo state, Brazil, 40 mi (65 km) from the Atlantic coast at the confluence of two streams, the Ribeirão (stream) de Guaratinguetá and the Rio Paraíba do Sul; it lies in the Serra da Mantiqueira at 1,785 ft (544 m) above sea level. Formerly called Freguesia de Santo Antônio de Guaratinguetá, the settlement was given

town status in 1651 and was made the seat of a municipality in 1844. Guaratinguetá's industries process the crops (principally sugarcane, rice, corn [maize], *feijão* [beans], coffee, and fruits [mangoes, papayas, passion fruit, oranges]) grown in the region and also manufacture textiles, explosives, soft drinks, and soaps. Situated midway between the cities of São Paulo and Rio de Janeiro, Guaratinguetá is easily accessible by railroad and highway. It also has an airfield. Pop. (1980 prelim.) 68,-370.

Guarauno: *see* Warrau.

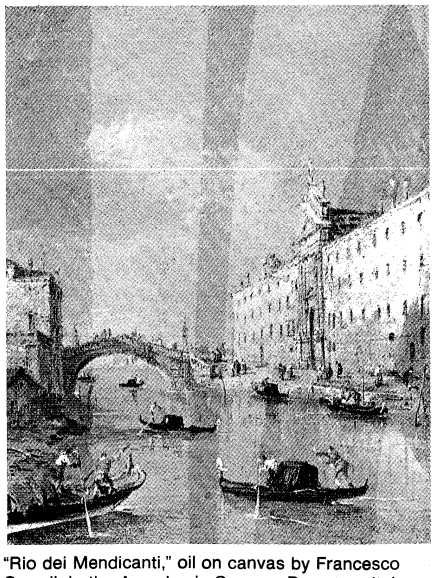
Guarda, capital, Guarda district, north central Portugal. Lying on the northeast side of the Serra da Estrela at an elevation of 3,465 ft (1,056 m), it is Portugal's highest city.

Founded in 1197, Guarda was given a royal charter by Sancho I and was to be a guard (whence its name) against the Moorish invaders. The Gothic cathedral (built 1390–1540) contrasts with the austere granite houses of the city. Other landmarks include the Blacksmith's Tower and two gates (12th–13th centuries), the Mileu Chapel (11th–12th centuries), and a 12th-century castle. Because of its brisk and supposedly healthy air, Guarda has an extensive sanatorium. Its industries include leatherwork, metallurgy, and distilling. The east–west highway and railroad from Coimbra to Spain run through Guarda. Another railroad and paved road extend south from the city.

Guarda district (area 2,130 sq mi [5,518 sq km]) is largely rural. The chief occupation is sheep raising, and vines are cultivated in the Douro, Mondego, and Côa river valleys. Tin, zinc, and titanium are mined in the area. Pop. (1981) city, 14,040; district, 205,631.

Guardi, Francesco (b. 1712, Venice—d. 1793, Venice), one of the outstanding Venetian landscape painters of the Rococo period.

Francesco and his brother Nicolò (1715–86) were trained under their elder brother, Giovanni Antonio Guardi (*q.v.*). Their sister Cecilia married Giovanni Battista Tiepolo. By 1731 the brothers are recorded as collaborating in a *bottega,* half-studio and half-shop.



"Rio dei Mendicanti," oil on canvas by Francesco Guardi; in the Accademia Carrara, Bergamo, Italy
SCALA—Art Resource/EB Inc.

Francesco does not appear to have adopted the practice of *veduta* (*q.v.*) view painting, on which his fame rests, before the mid-1750s or later. Perhaps he was impelled by the approaching death of his brother Giovanni and the absence of competition in this profitable field except from the aging and then unproductive Canaletto. His earliest views are almost always signed or initialed, as though to draw attention to his new artistic aims, and they seem inspired by Canaletto's own works of 30 years before.

In 1782 he depicted the official celebrations in honour of the grand duke Paul's visit to Venice, basing at least one of the compositions on commonplace contemporary engravings. Later in the year he was commissioned by the republic to make similar records of Pius VI's visit, the contract specifically forbidding such copying. He enjoyed considerable favour with the English and other foreigners and was elected to the Venetian Academy in 1784. He was an exceedingly prolific artist whose scintillating and romantic impressions of the declining city are in marked contrast to Canaletto's limpid photographic records of its architecture.

Guardi, Giovanni Antonio, also called GIANNANTONIO GUARDI (b. May 1699, Vienna—d. Jan. 23, 1760, Venice), painter of the 18th-century Venetian school.

He was trained by his father Domenico Guardi (1678–1716). After his father's death, Giovanni Antonio worked for a time under the internationally known religious painter of the Venetian school G.B. Pittoni before opening his own studio. Here, he and his two brothers, Francesco and Niccolò, specialized in paintings of religious and genre subjects, as well as copies of earlier masters.

There is still much dispute about the precise part played by each of the three brothers in these and other works, such as the altarpieces in the parish churches at Belvedere di Aquileia and Cerete Basso (*c.* 1755). Some scholars have recently accepted Giovanni Antonio as the author of the famous paintings of the story of Tobit on the organ loft of the church of the Angelo Raffaele at Venice (before 1750). If that series is by his hand, he must be counted as one of the most important painters of the Venetian Rococo.

Guardia Civil (Spain): *see* Civil Guard.

guardian, person legally entrusted with supervision of another who is ineligible to manage his own affairs—usually a child. Guardians fulfill the state's role as substitute parent. Those for whom guardianships are established are called wards. Guardianships for others than children are usually established by courts for the property or persons of the insane or those otherwise incapable of handling their own affairs.

Guardianships appeared in ancient Rome under the inheritance laws. English law first codified organized guardianship practices in the 13th century. On the European continent, guardianships appeared at the end of the Middle Ages and followed the Roman model. Modern French and German civil codes have tied guardianships closely to family considerations, giving relatives strong preferential rights of appointment. Most European countries have public agencies for the administration of guardianships, while in the United States that task belongs to the courts.

The guardian's powers and responsibilities are created by statutes and the courts. He is an officer of the court appointing him. The guardian may be given authority over some particular aspect of the ward's affairs or, more commonly, over all of his affairs generally.

Once a court decides that a child needs a guardian (usually when the parents have died or disappeared), it carefully screens potential appointees. The court considers the financial status and character of the potential guardian; possible conflicts of interest; the ward's wishes; and the religious affiliations of the deceased parents. The paramount consideration is the welfare of the child. Thus, the court can revoke a guardian's authority if he appears to be acting against the ward's best interests.

Guardian, The, influential daily newspaper published in London and Manchester, generally accounted, with *The Times* and *The Daily Telegraph,* as one of the United Kingdom's "big three" quality newspapers.

Founded in 1821 as the weekly *Manchester Guardian,* the paper became a daily after the British government lifted its Stamp Tax on newspapers in 1855; 100 years later "Manchester" was dropped from the name, as the paper had become a national daily with an international reputation. The paper's high standards of writing and the quality and style of its presentation of news and opinion won for it worldwide respect far beyond the usual lot of a provincial newspaper.

The Guardian is distinguished by its cosmopolitan views, its literary and artistic coverage and criticism, and its foreign correspondence. Owned by a trust and financially secure, the paper has always taken an independent liberal stance and was once called "Britain's non-conformist conscience." Its editorial excellence is generally credited to the 57-year tenure of Charles Prestwich Scott, which began in 1871, when the paper covered both the Prussian and the French sides in the Franco-German War. From time to time the paper has lost readers because it espoused unpopular causes, but it has always maintained an independent editorial policy and great breadth and depth of news coverage.

guardian spirit, supernatural teacher, frequently depicted in animal form, who guides an individual in every important activity through advice and songs; the belief in guardian spirits is widely diffused among the North American Indians.

In some traditions the guardian manifests itself in a dream or by other portents. In other traditions it is the individual who sets out to discover his guardian by undertaking a vision quest (*q.v.*). Any Indian can and is expected to obtain a guardian spirit. Among the South American Indians, however, possession of a guardian spirit is limited only to shamans.

Guárico, state, north central Venezuela, bounded north by the central highlands and south by the Orinoco River. It has an area of 25,091 sq mi (64,986 sq km). Until the 1960s life in the Llanos (plains) state was dominated by cattle raising. With the completion of the Guárico River Reclamation Project near Calabozo, however, more than 50,000 ac (20,000 ha) of the plains were brought under irrigation. Rice is a major crop, and Guárico ranks first among Venezuela's states in its cultivation. Cotton, corn (maize), coffee, tobacco, and feed crops are also grown. Petroleum production was formerly important but decreased in the 1970s. Highways traverse the state, linking the capital, San Juan de los Morros (*q.v.*), with the major urban centres of northern Venezuela. Pop. (1983 est.) 441,617.

Guarine (people): *see* Palenque.

Guarini, (Giovanni) Battista (b. Dec. 10, 1538, Ferrara—d. Oct. 7, 1612, Venice), Renaissance court poet who, with Torquato Tasso, is credited with establishing the form of a new literary genre, the pastoral drama.

Guarini, having studied, perhaps at Padua, before he was 20 became professor of rhetoric in Ferrara. In 1567 he entered the service of Alfonso II, duke of Ferrara as courtier and diplomat. He became the friend of Tasso, who was also in the Duke's service, and, in 1579, replaced Tasso as court poet when he was imprisoned by the Duke for erratic behaviour caused by mental disturbance. Guarini found the position uncongenial and retired in 1582 to his ancestral farm, the Villa Guarini, where he wrote his celebrated dramatic pastoral, *Il pastor fido* ("The Faithful Shepherd"). Writ-

Battista Guarini, engraving by T. Cross, 1647, frontispiece to *Il pastor fido* by Guarini

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

ten and revised over a period of many years, this pastoral tragicomedy, set in Arcadia, was published in 1590 and first performed at the carnival at Crema in 1595. Although it lacked the lyrical simplicity of Tasso's earlier work in this genre, *Aminta* (1573), it had a more immediate success, becoming one of the most famous and most widely translated and imitated works of the age. For nearly two centuries *Il pastor fido* was regarded as a code of gallantry and a guide to manners. An English adaptation is John Fletcher's *The Faithfull Shepheardesse* (1609?). Sir Richard Fanshawe's translation (1647) was critically edited in 1964 and 1976.

Guarini reentered public service in Ferrara in 1585, but his reconciliation with the court was short-lived. After service in Rome and Florence, he returned again to Ferrara, passing his last years in study, lawsuits, and polemical disputes with his critics. In *Compendio della poesia tragicomica* (1602), he ably defended *Il pastor fido* against the criticism that it departed from Aristotelian rules of dramatic structure.

Guarini, Guarino, also called CAMILLO GUARINI (b. Jan. 17, 1624, Modena, Duchy of Modena—d. March 6, 1683, Milan), Italian architect, priest, mathematician, and theologian whose designs and books on architecture made him a major source for later Baroque architects in Central Europe and North Italy.

Guarini was in Rome during 1639–47 when Borromini was most active. Later he taught in Modena, Messina, and Paris and finally, in 1666, went to Turin, where he stayed for the greater part of the remainder of his life.

While in Turin in the service of the dukes of Savoy, Guarini built (or furnished designs for) at least six churches and chapels, five palaces, and a city gate; published six books, two on architecture and four on mathematics and astronomy; and sent palace designs to the Duke of Bavaria and the Margrave of Baden. In S. Lorenzo (1668–87) and SS. Sindone (1667–90) in Turin, Guarini, working on a centralized plan, converted domes to an open lacework of interwoven masonry arches. His longitudinal churches—of which the most spectacular was Sta. Maria della Divina Providenza, in Lisbon, destroyed by earthquake in 1755—with their veiled light sources and interwoven spaces served as models for much of the church development in Central Europe. The Palazzo Carignano, Turin (1679), is Guarini's masterpiece of palace design. With its billowing facade, its magnificent curved double stair, and its astonishing double dome in the main salon, it well deserves to be acclaimed the finest urban palace of the second half of the 17th century in Italy. Guarini's principal architectural treatise, *Architettura Civile,* was published posthumously in Turin in 1737.

Guarino VERONESE, also called GUARINO DA VERONA (b. 1370/74, Verona, March of Verona—d. Dec. 14, 1460, Ferrara, Duchy of Ferrara), Italian Humanist and classical scholar, one of the pioneers of Greek studies in Renaissance western Europe.

Guarino studied at Constantinople, where he was a pupil of Manuel Chrysoloras, and brought back to Italy a valuable collection of Greek manuscripts. After teaching Greek at Florence (1402) and Venice (1415), he became tutor to Leonello, son of Nicolò d'Este, lord of Ferrara, in 1436. Guarino prepared new editions of various Latin authors and translated works of Strabo and Plutarch. His linguistic talents were employed by Greek and Latin churchmen at the Council of Ferrara–Florence (1438–45).

Guarino, Battista (b. 1434, Ferrara, Duchy of Ferrara—d. 1513), Italian Renaissance scholar who left an account of contemporary goals and techniques of proper education.

He was the son of Guarino Veronese (*q.v.*). Appointed professor of rhetoric at Bologna at the age of 21, Battista succeeded his father at the school in Ferrara upon his father's death in 1460.

In 1459 Battista Guarino wrote an account of his father's educational methods and ideals, *De ordine docendi et studendi* ("Concerning the Order and the Method to be Observed in Teaching and in Reading the Classical Authors"). He defined an educated gentleman as one familiar with Greek and Latin literature, and he recommended that Greek and Latin be taught simultaneously. Teachers should be well-bred scholars who avoid using corporal punishment on pupils; students are best motivated by rivalry and therefore should be paired off to enhance competition.

Guarino put great emphasis on enunciation and style, and he recommended reading aloud and keeping commonplace books as aids to improvement. While not opposed to reading nonclassical works for their content, he valued books dealing with history, geography, philosophy, and ethics primarily for their references to classical literature.

Guarneri FAMILY, Latin GUARNERIUS, celebrated family of violin makers of Cremona. The first was Andrea (*c.* 1626–98), who worked with Stradivari in the workshop of Nicolò Amati (son of Girolamo). Violins of a model original to him are dated from the sign of St. Theresa in Cremona. His son Giuseppe (1666–*c.* 1739) at first made instruments like his father's but later made them in a style of his own, with a narrow waist; his son Pietro of Venice (1695–1762) was also a fine maker. Another son of Andrea, Pietro Giovanni (1655–*c.* 1728), moved from Cremona to Mantua, where he too worked "sub signo Sanctae Teresae." His violins varied considerably from those of the other Guarneris. George Hart (1839–91) of the firm of London violin makers Hart & Sons pointed out that the breadth between the sound holes in Pietro Giovanni's violins is increased, that the sound hole is rounder and more perpendicular while the middle bouts are more contracted, and that the model is more raised.

The greatest of all the Guarneris, however, was a nephew of Andrea, Giuseppe, known as "Giuseppe del Gesù" (1687–1745), whose title originates in the "I.H.S." inscribed on his labels. He was much influenced by the works of the earlier Brescian school, particularly those of G.P. Maggini, whom he followed in the boldness of outline and the massive construction that aim at the production of tone, rather than visual perfection of form. The great variety of his work in size, model, and related features represents his experiments in tonal production. A stain or sap mark running parallel with the fingerboard on both sides appears on the bellies of many of his instruments. Since the mid-18th century, instruments falsely ascribed to him have been abundant. The robust tone of the Guarneri attracted Paganini, whose instrument is preserved in the Palazzo Municipale of Genoa.

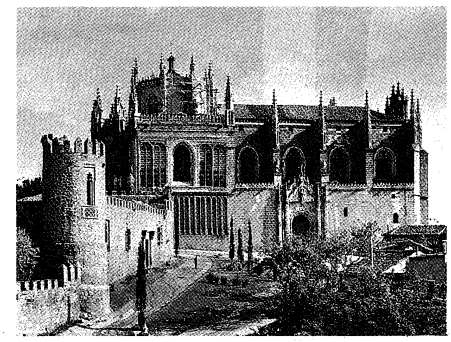
Guarnerius (Italian scholar): *see* Irnerius.

Guarujá, city, southeastern São Paulo state, Brazil, on the Atlantic coast of the Ilha (island) de Santo Amaro. Although it contains shipyards, Guarujá is known primarily as a beach resort. The casino, hotels, and other attractions there and at adjacent Praia Pernambuco cater to visitors from inland Brazil. The city is a suburb of Santos, 5 mi (8 km) to the northwest, with which it is linked by highway and railroad. Pop. (1980 prelim.) 67,730.

Guarulhos, city, southeastern São Paulo state, Brazil, on the Rio Tietê at 2,493 ft (760 m) above sea level; it forms part of the northeastern São Paulo metropolitan area. Founded in 1560 and formerly called Nossa Senhora da Conceição dos Guarulhos, it was made the seat of a municipality in 1880. Although much of its labour force is employed in industry, cultivation of potatoes, tomatoes, corn (maize), and *feijão* (beans) is carried on in the locality. Manufactures include steel, motorcycles, cotton and silk textiles, foodstuffs, ceramics, and chinaware. The city, site of a large bird park, lies on the main rail and road routes to Rio de Janeiro and has an airfield. Pop. (1980 prelim.) 395,117.

Guas, Juan, Guas also spelled WAS (b. Lyon—d. *c.* 1496, Toledo, Spain), architect, the central figure of the group of Spanish architects who developed the Isabelline (*q.v.*) style, a combination of medieval structure, Mudéjar (Spanish Muslim) ornament, and Italian spatial design. Considered the finest architect of late 15th-century Spain, he originated designs for churches and residences that set the pattern for generations of later Spanish architects.

After training in Brussels, Guas settled in Toledo, accompanied by his Flemish assistants. From 1459 to 1469 he assisted Annequin de Egas on the Puerta de los Leones of Toledo cathedral, and in 1494 he was appointed official architect of the cathedral. His major works were San Juan de los Reyes in Toledo (begun around 1478), the Infantado Palace in Guadalajara (1480–83), and the chapel of San Gregorio in Valladolid (1488).



Church of San Juan de los Reyes, Toledo, by Juan Guas

Archivo Mas, Barcelona

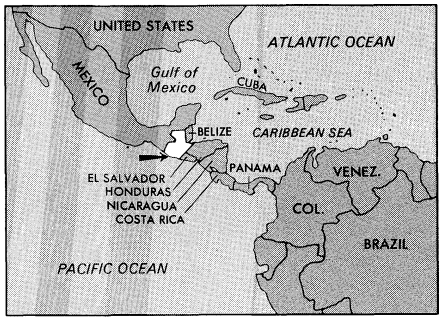
Guaspre, Le (landscape painter): *see* Dughet, Gaspard.

Guastalla, town, Reggio nell'Emilia province, Emilia-Romagna region, northern Italy, in the Po Valley, northeast of Parma. It was probably founded in the 7th century by the Lombards. In the 15th century it became the seat of a county that was granted to a branch of the Gonzaga family in 1539 and made a duchy in 1621. In 1746 Guastalla fell under Austrian domination and was incorporated with the Duchy of Parma. Detached from Parma and included in the Duchy of Modena in 1847, it joined the Kingdom of Italy in 1859.

Principal historical monuments are a bronze statue of Ferrante I Gonzaga, the Gonzaga Palace, the Romanesque churches of the Pieve and S. Giorgio, and the Maldotti library.

Guastalla is an episcopal see and an agricultural centre and manufactures machinery. Pop. (1984 est.) mun., 13,442.

Guatemala, officially REPUBLIC OF GUATEMALA, Spanish REPÚBLICA DE GUATEMALA, third largest country of Central America, covering 42,042 sq mi (108,889 sq km) in the extreme northwestern corner of the isthmus. It is bordered on the north and west by Mexico; on the east by Belize, the Caribbean Sea (at the Gulf of Honduras), Honduras, and El



Guatemala

Salvador; and on the south, along its 150-mi (240-km) coastline, by the Pacific Ocean. The population in 1985 was estimated to be 7,675,000.

A brief treatment of Guatemala follows. For full treatment, *see* Central America; Latin America, The History of. For current history and statistics on society and economy, *see* BRITANNICA WORLD DATA ANNUAL.

The land. Guatemala's lowlands are comprised of two northern regions, the Petén and the Atlantic littoral, and one southern region, a narrow Pacific coastal plain stretching the length of the country. The highlands comprise about half of the total area and cut across the midsection generally southeast to northwest. The Petén is a nearly level limestone (karst) tableland covered mostly with rain forests. The Atlantic littoral, funneling much of Guatemala's eastward drainage into the Gulf of Honduras, contains Lake Izabal, the country's largest lake (more than 200 sq mi). The Pacific coastal plain, averaging 30 mi in width, is a relatively wet region, containing the numerous short rivers of the country's southward drainage system. The highland region branches into two broad ranges. The northern and larger Altos Cuchumatanes trend eastward and are characterized by older well-worn mountains. The southern Sierra Madres trend southeastward and are dominated by 33 volcanic peaks, including Tajumulco, the country's highest mountain (13,845 ft [4,220 m]).

Guatemala is located in the tropic zone, but temperate seas and an irregular terrain provide a diversity of climates. At sea level average annual temperatures range between 77° and 86° F (25° and 30° C). At elevations greater than 6,000 ft, temperatures may be as low as 55° F (13° C). There is a marked dry season from November to May. On the Atlantic coast, where the winds that rise from warm Caribbean waters blow throughout the year, there is hardly any dry season. In the central region the annual rainfall varies from 80 in. (2,000 mm) in the high plateaus to less than 40 in. in the arid section of the eastern part.

The northern tropical forests of the Petén are rich in fine woods, rubber, and a variety of palms. Vegetation is similar in the Caribbean littoral region, and mangroves are found on the coast. At higher elevations the lowland species give way to pines, firs, willows, and oaks. Wild animals such as deer and monkeys are common. Guatemala has deposits of nickel ore, copper, lead, zinc, iron ore, antimony, tungsten, and barite; petroleum reserves are located in the northwest of the country near its border with Mexico.

The people. The population is divided into two principal groups: Mayan Indians and Ladinos. The Maya compose about 55 percent of the population. Ladinos, comprising about 42 percent of the total, are mostly of mixed Hispanic-Indian origin. There are a few whites and blacks. Slavery was abolished in 1824, and the freed black slaves soon mixed with the Indian and Spanish population. The official language is Spanish, but approximately 20 Indian dialects are also spoken. There is no established church, but the prevailing form of religion is Roman Catholicism. There are a few Protestants and some Jews.

Population density is about 182 persons per sq mi (70 per sq km), and about two-thirds of the total population is rural. The most densely populated areas are Guatemala City and its environs in the highland plain and the western part of the south coast. In the early 1980s the country's birthrate was 43 per 1,000 and the death rate was 11 per 1,000. The annual rate of growth was about 2.9 percent.

Economy. Guatemala has a developing market economy largely based on agriculture. Strong economic growth in the 1970s was interrupted when world prices for agricultural products declined in the early 1980s. The gross national product (GNP) amounted in 1983 to about U.S. $8,890,000,000, or $1,120 per capita.

Agriculture accounts for one-fourth of the GNP, employs more than one-half of the work force, and generates more than three-fifths of all exports. Guatemala is Central America's leading producer of coffee, which is the country's largest export commodity. Other major agricultural exports are sugar (from cane), cotton, bananas, cardamom, beans and legumes, and fresh meat. Although production of basic grain crops (principally corn [maize]) has increased, it is not sufficient to meet the needs of the population. Cattle, pigs, and sheep are the principal livestock.

Forests cover about two-fifths of the country's area and provide lumber and chicle (a gum used in the manufacture of chewing gum). Fish and shellfish are exported on a small scale. Mining is not well developed; its small share in the GNP is accounted for by the development of a petroleum industry and the extraction of copper, zinc, iron ore, feldspar, and silver.

Industry accounts for approximately one-sixth of the GNP and employs about one-seventh of the population. Construction activity, which increased rapidly with reconstruction efforts after the earthquake of 1976, has since declined. Manufacturing, although highly developed with respect to manufacturing in other Central American countries, has been adversely affected by decreasing investment. Attempts to attract foreign capital have failed, largely because of recurring political violence, which also has discouraged tourism. The main industries are food processing and the manufacture of rubber, textiles, building materials, paper, and pharmaceuticals.

Electricity is largely generated by wood and imported petroleum; hydroelectric plants provide only about one-fifth of the total.

Services account for about one-half of the GNP and employ one-fourth of the work force.

Expenditures on development and social services outweigh revenues, and Guatemala has a large budget deficit. Imports of raw materials and intermediate goods outweigh exports of agricultural commodities and petroleum, producing a balance-of-payments deficit. Remittances from workers abroad alleviate the situation somewhat. Major trade partners include the United States, El Salvador, Costa Rica, Mexico, and Germany.

Government and social conditions. Guatemala is a republic governed under a constitution that was approved in 1985, effective in 1986. Executive power rests with the president, who appoints the cabinet and commands the armed forces. The president is elected by an absolute majority of the people for a nonrenewable five-year term. Legislative power is vested in the Congress, which is composed of deputies elected by the people, also for five-year terms. The government faces armed opposition from the left-wing Guatemalan National Revolutionary Unity, a military command uniting four guerrilla organizations. Right-wing terrorist groups have employed violence against both guerrillas and non-violent leftists, creating a crisis in human rights. The constitution of 1986, however, provides for an ombudsman's office to act against human rights violations.

The country's social welfare system provides benefits to employed persons for work injury, sickness, maternity, disability, widowhood, and hospitalization.

Health conditions in Guatemala are generally poor outside the capital. Many people suffer from such health problems as enteritis, acute respiratory infections, avitaminoses and other nutritional deficiencies, skin infections, and anemia. It is estimated that up to 2,000,000 people either have no access to medical care or are not covered by health insurance. Overall, the country's infant mortality rate is about 64 per 1,000 live births, but it may be as high as 100 in the Indian communities. Life expectancy at birth is 60 years for Ladinos and less than 50 years for Indians.

Primary education is free and, in urban areas, compulsory for children between the ages of 7 and 14. Only about half of Guatemala's children in this age group, however, attend school. The country's high illiteracy rate of 50 percent (70 percent in rural areas) prompted the government in the early 1980s to embark on a national crusade to increase literacy.

Most of the nation's news media are owned by economic interests that have strongly supported Guatemala's succession of right-wing governments. Journalists who criticize the government are targets for right-wing terrorist groups.

Cultural life. Guatemala belongs culturally to the Hispanic-American world, but the presence of the Indian has given the country's culture a distinct accent of its own. Two of the country's greatest writers, Mario Monteforte Toledo and Nobel Prize winner Miguel Ángel Asturias, addressed the place of the Indian in national life. Guatemala has excellent painters and sculptors, many of whom have been influenced by the Mexican school of Indian mural art. Indian art—in particular, handwoven textiles, pottery, clay, and wood carvings—is of high quality. Traditional dances, music, religious rites, and games have survived in the Indian regions.

History. From simple farming villages dating to 2500 BC, the Maya of Guatemala and the Yucatán Peninsula developed an impressive civilization that flourished until the 10th century AD. The heart of the Mayan civilization was the northern Petén, in northern Guatemala, where the oldest Mayan stelae (carved pillars or stone slabs) and the great ceremonial centre of Tikal are found.

The Mayan civilization declined after 900, however, and the Spanish conquistador Pedro de Alvarado began the subjugation of their descendants in 1523.

Antigua Guatemala was Guatemala's first capital, but its virtual destruction by an earthquake in 1773 forced the removal of the capital to Guatemala City. The colony's commerce was never extensive, and agricultural

staples such as cacao and indigo were grown only with the help of Indian and black labour.

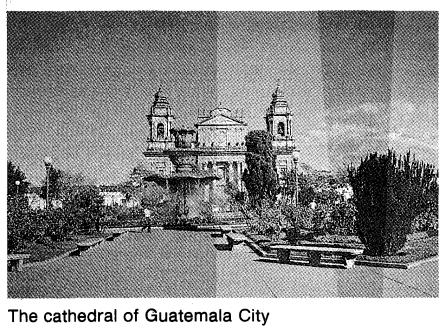
Independence was declared by the Central American colonies in Guatemala City in 1821, but Guatemala was incorporated into the Mexican Empire until its collapse in 1823, when the United Provinces of Central America was formed. Guatemalan opposition to the federation, which lasted until 1839, was led by Rafael Carrera, whose authoritarian rule in Guatemala continued until 1865.

A revolution in 1871 brought Justo Rufino Barrios to power. He instituted a number of reforms that brought the Roman Catholic Church under civil control and encouraged economic development of the country. His successors continued to implement developmental policies, but presidencies became increasingly dictatorial and political liberties dwindled.

A general strike in 1944 led to rule by a revolutionary junta. Organized labour became an important political force, and for the first time the Communist Party enjoyed a period of unhampered growth. This sparked another coup in 1954, and a pattern of political instability was set. Violence accelerated in the 1970s as the government attempted to rid the country of both right- and left-wing extremists. The purges resulted in a short-lived tranquility that was shattered by the discovery that the government had falsified election returns in 1974; this precipitated new violence as volcanic eruptions in 1974 and an earthquake in 1976 devastated the country. Political terrorism continued, and further coups took place in the early 1980s. Civilian rule was reestablished in 1986.

Guatemala, department, south central Guatemala. A volcanic highland region with an area of 821 sq mi (2,126 sq km), the department extends northward to the Río Motagua Valley. In the southern part, amid volcanoes, lies Lake Amatitlán, which is economically significant as a resort area and is also Guatemala's chief coffee-growing region. Other crops cultivated in the department include corn (maize), beans, and sugarcane; much land is used as pasture for beef cattle. The earthquake of 1976 destroyed nearly 90,000 houses, left 450,000 homeless, and closed the highway to the Atlantic coast for six weeks. Most structures have been rebuilt, some employing modern shock-resistant techniques and materials. Guatemala City (*q.v.*), which is the capital of the department and of the country, is the hub of the national highway and railroad networks leading to neighbouring Mexico to the west and El Salvador to the east and to Pacific and Caribbean ports. Pop. (1984 est.) 1,510,492.

Guatemala City, Spanish CIUDAD DE GUATEMALA, capital of Guatemala and of Guatemala department, the largest city in Central America, and the political, social, cultural, and economic centre of Guatemala. Lying in a valley of the central highlands at an elevation of 4,897 ft (1,493 m) above sea level, it has a temperate and invigorating mountain climate.



The cathedral of Guatemala City
Ewing Galloway

Guatemala City was founded in 1776 to replace Antigua Guatemala, which had been virtually destroyed by an earthquake in 1773, as the capital of the captaincy general of Guatemala. After independence from Spain was declared in 1821, Guatemala City served successively as the capital of the province of Central America under the Mexican Empire of Agustín de Iturbide (1822–23), the Central American Federation (1823–33), the state, and, finally, the independent Republic of Guatemala. Distrust of the city in other areas of Central America and the prevalence of open fighting in the city's streets and public buildings was a factor in the demise of the federation and in the failure of subsequent attempts to revive it. When Quezaltenango, which had become the capital of Guatemala in all but name, was destroyed by an earthquake in 1902, many of the leading families moved to Guatemala City.

The modern city was largely rebuilt after the disastrous earthquakes of 1917–18, which shook the city almost continuously for six weeks. The characteristic appearance created by low, massive structures has been modified somewhat by the erection of steel and concrete multistoried hotels and office and apartment buildings of modern design. Elegant residential districts have grown up on the borders of the old city, particularly toward the south, and low-cost housing units have been constructed in various parts of the urban area.

In addition to the governmental offices and services concentrated there, Guatemala City handles nearly half of the capital invested in the country and accounts for more than half of the industrial establishments and production of the republic. It is the focus of highway, rail, and air transport and is the commercial and banking centre of the country.

Guatemala City also dominates the cultural life of the country. It is the seat of the principal faculties of the San Carlos University of Guatemala (established 1676); the major institutions for artistic, commercial, vocational, and military education; the Society of Geography and History; and several important museums. Public buildings of note include the National Palace, the post office, police headquarters, the National Archives, the National Archeological Museum (with its rare collection of Mayan artifacts), the National Library, and the modern cluster of buildings around the new city hall. Among the major religious structures are the cathedral (1815) and the churches of San Francisco, Santo Domingo (famous throughout Central America for its Holy Week procession), and La Merced (colonial but rebuilt after 1917).

Other points of interest include the remarkable concrete relief map of the nation in Minerva Park, the archaeological and historical museums, the colonial aqueduct, the central market, and Olympic City, built for the Central American Olympic Games of 1950.

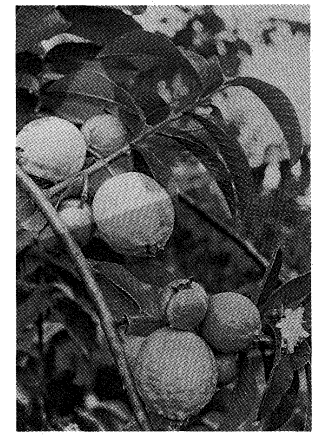
In the environs of Guatemala City are the villages of Chinautla, famous for hand-formed pottery, Mixco, which supplies the capital with fruits and vegetables, and the Indian towns of San Pedro and San Juan Sacatepéquez, all of which suffered extensive damage in the earthquake of 1976. Pop. (1981) mun., 754,243; (1982 est.) metropolitan area, 1,700,000.

Guatimozin (Aztec emperor): *see* Cuauhtémoc.

Guató, extinct Indians of the lowlands and marshes of the upper Paraguay River. Riverine nomads, they spent much of their lives in dugout canoes. Subsistence was based on fishing, hunting aquatic mammals, and collecting wild foods (especially, in the flood season, wild rice); they also practiced some cultivation. The nuclear family was an independent social and economic unit. The Guató were divided into three local subtribes, each under a headman, which occasionally met together in council. They became extinct during the first half of the 20th century.

guava, any of numerous tropical American trees and shrubs of the genus *Psidium* (family Myrtaceae).

The two important species are the common guava (*Psidium guajava*) and the cattley, or strawberry, guava (*P. cattleianum*), occurring in two forms, one with maroon-red fruits and the other with bright yellow ones. The latter is sometimes listed botanically as *P. lucidum.* Other guavas include the cás of Costa Rica



Guava (*Psidium guajava*)
Donald P. Watson—EB Inc.

(*P. friedrichsthalianum*) and the guisaro (*P. molle*), both with highly acidic fruits, and the Brazilian guava (*P. guineense*). The so-called pineapple guava is the feijoa (*q.v.*).

The common guava is a large shrub or small tree with quadrangular branchlets, oval to oblong leaves about 7.6 centimetres (3 inches) in length, and four-petaled white flowers about 2.5 cm broad. The fruits are round to pear-shaped and measure up to 7.6 cm in diameter; the white to salmon-red pulp contains many small, hard seeds (more abundant in wild forms than in cultivated varieties). The musky, and at times pungent, odour of the sweet pulp is not always appreciated. The Brazilian guava has similar but smaller fruit.

Guavas are processed into jams, jellies, and preserves. Fresh guavas are rich in vitamins A, B, and C; they are eaten raw or sliced and served with sugar and cream as a dessert.

The common guava is not frost-resistant but is successfully grown throughout southern Florida; in several tropical regions it grows so abundantly in a half-wild state as to have become a pest.

The cattley, or strawberry, guava is considerably more frost-resistant. It is a large shrub with thick, glossy-green oval leaves and white flowers. The fruits are round, up to 5 cm in diameter, and contain many hard seeds. The soft, whitish pulp has a strawberry-like flavour. This species is frequently planted in gardens throughout southern California and other subtropical regions but is not commercially important.

Propagation of the common guava is usually by seeds, but improved varieties must be perpetuated by plant parts. The hard, dry wood and thin bark prevent cutting and conventional methods of grafting. Veneer grafting, using as rootstocks young plants in vigorous growth, gives excellent results.

Guaviare, *comisaría* (commissariat), southeastern Colombia, in an area of tropical, semi-deciduous rainforest merging into Llanos, grassland plains, on the north. It is bounded on the north by the Río Guaviare; on the east by the highlands of the *mesas*

(tablelands) Cubiyú and Carurú; on the south by the intendency of Vaupés and the department of Caquetá; and on the north and west by Meta department. Guaviare was formed by presidential order in December 1977. Its 16,342 sq mi (42,327 sq km) area incorporated the majority of Vaupés' inhabitants when it was formed. Guaviare has one principal settlement, the frontier *cabecera* (administrative seat) San José del Guaviare, located on the right bank of the Río Guaviare in the north. Land transportation is provided by an unimproved road from Bogotá, to the northwest, through Villavicencio, capital of Meta department, to San José del Guaviare. Difficult river transport on the Guayabero and Guaviare rivers exists for light cargo transport. Air service, however, is the primary form of access to San José del Guaviare from northern and western Colombia. Many inhabitants are indigenous Indians. Pop. (1981 est.) 11,243.

Guaviare River, Spanish RÍO GUAVIARE, river, central and eastern Colombia, a major tributary of the Orinoco. Initially known as the Río Guayabero, it is formed in southwestern Meta department by the junction of the Tagua and the Duda, which descend from the Andean Cordillera (mountains) Oriental. As it flows eastward between Meta department to the north and Guaviare and Vaupés commissariats to the south, the river takes the name Guaviare. It meanders eastnortheastward between Vichada (north) and Guainía (south) commissariats until it joins the Orinoco River, across from San Fernando de Atabapo, Venezuela. The river is about 930 mi (1,497 km) long, but frequent rapids obstruct navigation.

Guayaki, nomadic South American Indian people living in eastern Paraguay. The Guayaki speak a Tupian dialect of the Tupi-Guaranian language family. They live in the densely forested, hilly region between the Paraguay and Paraná rivers. In pre-Spanish times, the Guayaki lived a more settled, agricultural life in a less harsh environment, but the activities of the Spanish and of the other tribes in the area pushed them into the hill country.The Guayaki probably numbered fewer than 1,000 individuals in the late 20th century.

During and after the Spanish period, the Guayaki lived in bands of about 20 people, moving daily in search of forest game, which they hunted with bows and arrows, spears, traps, and pits. They fished in the rivers with bows and arrows, dams, and nets and harvested wild fruits and other plants, as well as grubs.

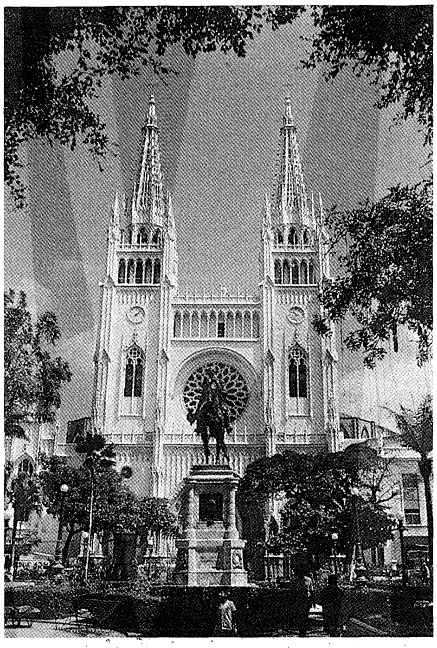
Always an elusive people, the Guayaki were poorly known until the latter half of the 20th century, when the Paraguayan government's pacification program encouraged them to settle in permanent villages or camps. It was not until this time that social scientists were able to investigate and confirm scattered but persistent reports that some Guayaki groups had practiced cannibalism well into the second half of the 20th century.

To make the best use of the Britannica, consult the INDEX *first*

Guayama, town and municipality, southeastern Puerto Rico, on the divide between the Sierra de Cayey and the dry southern coastal plain. The town was founded in 1736 as San Antonio de Padua de Guayama. It has sugar refineries and distilleries and produces clothing, furniture, and lenses.

The municipality, with an area of 65 sq mi (168 sq km), has both rural and urban or partly urban barrios (wards). It is principally a sugarcane-growing district; tobacco, coffee, corn (maize), and fruits also are grown. Pop. (1980) town, 21,097; (1984 est.) mun., 40,300.

Guayaquil, in full SANTIAGO DE GUAYAQUIL, largest city and chief port of Ecuador and the capital of Guayas province, situated on the west bank of the Río Guayas, 45 mi (72 km) upstream from the Gulf of Guayaquil. The original settlement was founded in the 1530s at the mouth of the Río Babahoyo, just east of the present site, by Sebastián de Belalcázar, a lieutenant of the Spanish conquistador Francisco Pizarro, but Indians destroyed it twice. In 1537 the Spanish explorer Francisco de Orellana established the town at its present location, naming it Santiago de Guayaquil in honour of Santiago (St. James), on whose day it was founded, and also of the local Indian chief Guaya and his wife Quila. During the colonial era, the city was frequently attacked by buccaneers. In 1822 it was the scene of the conference between Simón Bolívar and José de San Martín, after which Bolívar emerged as sole leader of the South American liberation movement.



Cathedral at Guayaquil, Ecuador
Charles May—Shostal/EB Inc.

The low-lying city with a hot and humid climate, slightly more than 2° south of the Equator, was long regarded as a plague spot; but since 1920, engineering and hygienic works carried out by the government in cooperation with the Rockefeller Foundation have made great progress in reducing health hazards.

In modern times Guayaquil has become a major South American Pacific port; as the focus of Ecuador's international trade and domestic commerce, it is economically the nation's most important city. There are sugar refineries, iron foundries, machine shops, tanneries, and sawmills, as well as fabricating and processing plants for a variety of light consumer goods. Shrimp fishing is of growing economic importance. Guayaquil is linked by oil pipeline via Quito with the Trans-Ecuadorian Pipeline from the oil fields in Napo province. In 1962 the modern outport of Puerto Marítimo, with complete dock and customs facilities, was opened 6 mi downstream from the boundaries of the city proper. It is the terminus of Guayaquil's overseas ocean traffic. Bananas, coffee, and cacao from the Guayas Basin to the north are major exports.

Industrial development has resulted in population growth greater than that of Quito (with which a distinct rivalry exists), primarily the immigration of rural workers, and the city is faced with the problem of growing slum areas. Guayaquil is the seat of national (1867) and Catholic (1962) universities, of Vicente Rocafuerte University (founded 1847, university status 1966), and of a polytechnic school (1958). Notable landmarks include the city's first church, Santo Domingo (built 1548), and the colonial cathedral of San Francisco. Created a Roman Catholic diocese in 1838, Guayaquil was elevated to an archdiocese in 1956. Since the earthquake of 1942, much of the city has been rebuilt. It is the terminus of the railway to Quito, is connected by road to the Pan-American Highway, and has an international airport. Pop. (1983 est.) 1,278,908.

Guayaquil Conference (July 26–27, 1822), meeting between Simón Bolívar and José de San Martín, leaders of the South American movement for independence from Spain. Late in 1821, when San Martín's campaign for the liberation of Peru was faltering, he wrote to Bolívar, whose army was then in possession of Ecuador, that the two of them must join forces if the struggle for independence was to succeed. Bolívar agreed enthusiastically, and the two met at Guayaquil, Ecuador, but they failed to agree. Both men had eagerly anticipated their first encounter, but their mutual respect and common cause did not obscure their rivalry. The flamboyant and self-assertive Bolívar stood in sharp contrast to the reflective and self-effacing San Martín.

Bolívar wished to accomplish the liberation of Peru himself in spite of San Martín's previous efforts there, and as a republican he rejected San Martín's contention that the disruptive political factions in Peru would be best contained for the national good by a monarch. No record of the Guayaquil conversations was kept, save for a few details given in later correspondence between the two men. Apparently, San Martín offered to serve under Bolívar's command, but Bolívar seemed unwilling to share the task of liberation.

The result was that San Martín retired from active service in the wars of liberation and from the political imbroglio in Peru, and Bolívar's forces delivered the final blow to the Spanish colonial regime in South America at the Battle of Ayacucho two years later.

Guayas, province of coastal Ecuador, bounded by the Pacific Ocean and the Gulf of Guayaquil on the west. Its area of 8,256 sq mi (21,382 sq km) consists mostly of lowland surrounding the Gulf of Guayaquil; there are tropical rain forests in the north and part of the south.

The province is one of the most important agricultural areas of Ecuador. Above the floodplain of the Río Guayas system (from which the province takes its name), plantations produce bananas, cacao, rice, cotton, coffee, and fruit. Beef cattle are pastured; the province's ports engage in commercial fishing, and forest products (tagua nuts [vegetable ivory], balsa wood) are extracted. Industry is concentrated in the provincial capital, Guayaquil (*q.v.*), chief port and commercial city of Ecuador. At the western end of the Península de Santa Elena are oil fields, but they are becoming depleted rapidly. Two oil refineries are located at La Libertad on the peninsula. Natural-gas deposits have been discovered in the Gulf of Guayaquil. Other provincial towns of note are Salinas, a seaside resort where salt is extracted; the river ports of Yaguachi, Daule, Balzar, Milagro, Santa Elena; and, above all, Puerto Marítimo, the modern outport of Guayaquil. Pop. (1983 est.) 2,304,565.

Guayas River, Spanish RÍO GUAYAS, river system of the coastal lowlands of Ecuador. Its eastern tributaries rise on the western slopes of the Andes and descend to drain the wet lowlands. Official usage as to how much of the system should be called the Río Guayas differs; the name is certainly applied to the

Rice plantation in the Guayas River lowlands, Ecuador

Eric Carle—Shostal/EB Inc.

unified stream formed just above the city of Guayaquil by the two principal tributaries, the Río Daule, flowing north–south through the coastal lowlands, and the Río Babahoyo, the origin of which is on the western flank of the Andes. Occasionally, however, some of the farthest headstreams are referred to as the Río Guayas in authoritative place-name literature. Ecuadorian usage seems to prefer separate names for each of the branches and subbranches of the system. Below Guayaquil the braided river flows through a low-lying delta crowded with islets for about 34 mi (55 km) and enters the Gulf of Guayaquil through channels on either side of Isla Puná.

The whole length to the end of the longest tributary is about 200 mi. Steamers drawing 22 ft (7 m) can ascend to Guayaquil even in the dry season; there the river is about 2 mi wide. Smaller riverboats can reach Babahoyo the year around, and in the rainy season small steamers can navigate to Zapotal, only 100 mi southwest of Quito.

The Guayas floodplain is the most fertile region of Ecuador and the source of almost all of the country's banana crop (a chief export). Double cropping of rice is practiced, and there are extensive plantations of coffee, cacao, and tropical fruits.

Guaycuruan languages, also spelled GUAICURUAN, group of Guaycurú-Charruan languages spoken in Brazil, Argentina, and Paraguay. Of the Guaycuruan tribes, formerly inhabiting the Gran Chaco, the best known include the Abipón (Callaga), Caduveo (also called Mbayá and Guaycurú), Mocoví (Mocobí), Payaguá (Lengua), Pilagá, and Toba. Many Guaycuruan-speaking groups acquired the horse from the Spaniards and became famous in the 17th and 18th centuries for their highly stratified, warlike societies. The Caduveo, for example, developed definite classes of nobles, serfs, and slaves. Such Guaycuruan tribes campaigned eastward across the Paraná River and northward into the southern Mato Grosso. Constant warfare and epidemics eventually reduced their numbers, and in the second half of the 20th century these tribes were either extinct or were being assimilated, primarily in Argentina.

Guaymallén (Argentina): *see* Villa Nueva.

Guaymas, city and port, southwestern Sonora state, northwestern Mexico. On a bay of the Gulf of California, at an elevation of 13 ft (4 m) above sea level, it is surrounded by colourful mountains. In addition to its port and customs functions, it is also a commercial and manufacturing centre. Wheat, cotton, and various fruits and vegetables are grown in the hinterland, which is also used for cattle raising. The gulf yields cabrilla (a sea bass), sole, and shrimp; seafood-processing plants are located in the city. The city is known for its sport fishing (sailfish, marlin, and others) and hunting, as well as for its bathing and resort facilities. Major railroads and highways linking Mexicali and Nogales with Mexico City pass through Guaymas, which also possesses an airport. Pop. (1980) 54,826.

Guaymí, Central American Indians of western Panama, divisible into two main groups, the Northern Guaymí and the Southern Guaymí. The Guaymí language is one of the Chibchan group. The Northern Guaymí live in a tropical forest environment in which hunting and gathering of wild foods are nearly as important as agriculture. The Southern Guaymí also gather wild plants but are more heavily dependent on agriculture. Staple crops are corn (maize), beans, sweet manioc (cassava), papaya, plantain, banana, pigeon peas, and occasionally rice. Slash-and-burn agriculture is common, with men doing the clearing of fields and women the planting, using digging sticks. Hunting is done with guns if available, otherwise with bow and arrow or blowgun. Traps and snares are also used. Fishing is important, particularly to the Southern Guaymí.

Houses may be round, square, or rectangular, with thatched roofs and generally with walls of upright poles. The Guaymí commonly wear traditional clothing, consisting of a breechclout, a short poncho or full cotton shirt, and sometimes sandals and a straw hat for men, and a breechclout and a long, full-skirted dress for women. Beads, feathers, and necklaces are worn as jewelry. Men also paint their faces. Among their crafts are basket weaving, net making, and pottery; textile weaving has almost died out.

Guaynabo, town and municipality, northeastern Puerto Rico, part of the metropolitan area of San Juan, lying south-southwest of the city. The town, which was founded in 1769, is primarily a commercial centre.

The municipality of Guaynabo, with an area of 27 sq mi (70 sq km), has eight barrios (wards), seven of them rural. Fruits are the principal agricultural product. Pop. (1980) town, 65,075; mun., 80,742.

guayule (*Parthenium argentatum*), rubber-containing desert shrub of the family Asteraceae, native to the north central plateau of Mexico and the Big Bend area of Texas. It has small white flowers and narrow silvery leaves that alternate along the stem. Prehistoric Indians are believed to have obtained rubber by chewing the bark of the plant. The modern method is to macerate the shrub mechanically.

Rubber was extracted in Mexico from wild plants during the early part of the 20th century, and vigorous efforts were made to cultivate guayule in the southwestern United States during World War II. Commercial production of guayule rubber ceased soon after the end of the war, but Mexico kept working on its development, and research plantings have been continued in Spain, Turkey, and the United States.

Guban, coastal plain, northwestern Somalia, East Africa, running parallel to the Gulf of Aden for about 150 mi (240 km) between Seylac (Zeila) in the west and Berbera in the east. The Guban ("burned") plain narrows gradually from 35 mi in the west to about 4 mi in the east. Sandy and low-lying (less than 330 ft [100 m] above sea level), it is characterized by high temperatures and humidity, little rainfall (about 2 in. [50 mm] annually), and sparse steppe vegetation. The plain is traversed by broad and shallow seasonal streams, and gives way to the Ogo highlands (rising to about 6,500 ft) on the south. The population is mostly of the Dir and Ishaak ethnic groups, who generally raise their camels and goats outside of the Guban near permanent wells in the Ogo highlands. Seylac and Barbera are the chief towns. A broad definition of the Guban includes the narrow coastal "burnt land" extending eastward to the easternmost tip of the northern Somalia coast.

Gubbio, town, Perugia province, Umbria region of central Italy, lying at the foot of Monte Ingino, just northeast of Perugia. Gubbio (medieval Eugubium) grew up on the ruins of Iguvium, an ancient Umbrian town that later became an ally of Rome and a Roman municipium; the Roman theatre is the chief relic of the ancient town. Although sacked by the Goths, it was mentioned as a bishopric in AD 413 and remained a powerful independent commune until it was surrendered to the Montefeltro dukes of Urbino in 1384. It was ceded to the papacy in 1624 and was united with the Kingdom of Italy in 1860.

Gubbio retains much of its medieval appearance. Principal monuments include the Palazzo dei Consoli (1332–46), housing a museum containing the famous Iguvine Tables (*q.v.*) and an art gallery; the 15th-century Palazzo Ducale; the 13th-century cathedral; and other old churches. Gubbio has two traditional medieval festivals in May. Cereals, wine, olive oil, tobacco products, cement, and brick are produced. The craft of ceramics is highly developed (Gubbio was noted for majolica in the 16th century), as are the crafts of embroidery, lace making, and wrought iron. Pop. (1981 prelim.) mun., 31,986.

Gubkin, city, Belgorod *oblast* (region), Russian Soviet Federated Socialist Republic. It was founded in the 1930s in connection with the development of the Kursk Magnetic Anomaly (KMA), one of the Soviet Union's largest iron-ore mining basins. Gubkin is still an important iron-ore mining centre, with most of its ore mined by open-pit methods. It achieved city status in 1955. Pop. (1983 est.) 69,000.

Guchkov, Aleksandr Ivanovich (b. Oct. 26 [Oct. 14, old style], 1862, Moscow—d. Feb. 14, 1936, Paris), statesman and leader of the moderate liberal political movement in Russia between 1905 and 1917.

The son of a wealthy Moscow merchant, Guchkov studied at the universities of Moscow and Berlin, travelled extensively, fought against the British in the Boer War (1899–1902), and headed the Russian Red Cross during the Russo-Japanese War (1904–05).

After the Revolution of 1905 compelled Nicholas II to issue the October Manifesto, creating a constitutional monarchy, Guchkov helped found the Octobrist Party, which supported the Emperor's manifesto and attempted to work with the government to enact more reforms; in 1910–11 he also served as president of the State Duma (the elected chamber of the legislative body). Guchkov became increasingly critical of the imperial government, however, particularly for its misconduct of military affairs, for its disdain for the constitution and parliamentary methods of legislation, and for the growing influence of the monk Grigory Rasputin.

When World War I broke out, Guchkov again served as head of the Red Cross and in 1915 became chairman of the Central War Industries Committee, which, almost independently of the government, assumed responsibility for producing supplies and transporting them to the front. In late 1916 he is said to have become involved in a plot to overthrow Nicholas, but before the alleged conspirators could put their plans into effect, the February Revolution broke out. Guchkov was sent by the provisional government to Pskov, where he formally received Nicholas' abdication (March 15 [March 2, old style], 1917).

Although he regretted Russia's transformation from a constitutional monarchy into a republic, he accepted the post of minister of war and the navy (March 15) and tried briefly but unsuccessfully to restore discipline in the army. He resigned a few months later when a major political controversy developed over aspects of the provisional government's foreign policy.

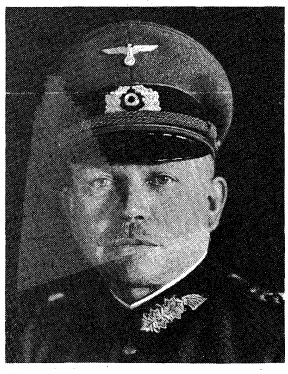
After the Bolsheviks seized power in November (October, Old Style) 1917, Guchkov emigrated to Paris.

Gudbrands Valley, Norwegian GUDBRANDSDALEN, valley, Oppland *fylke* (county), south-central Norway. Comprising the valley of the Lågen (river), it extends for about 100 miles (160 km) from the famed Dovre Mountains and Lake Lesjaskogen on the north to Lake Mjøsa on the south and is flanked on the west by the Jotunheim Mountains and on the east by the Rondane Mountains. Lillehammer, at the southern end, is a thriving town; other communities, such as Tretten, Fåvang, Ringebu, Otta, and Dombås, are small. Stock raising, lumbering, and dairying are the chief occupations, and some slate is quarried. Like other Norwegian valleys, Gudbrands Valley has developed its own culture and dialect. A historic trade route and site of ancient graves, it is associated with several sagas and legends, including that of Peer Gynt. A local folk museum is at Maihaugen near Lillehammer. The Oslo–Trondheim railroad passes through the valley.

Gudbrandsdalslågen (river, Norway): *see* Lågen.

Guderian, Heinz (Wilhelm) (b. June 17, 1888, Kulm, Ger.—d. May 14, 1954, Schwangau bei Füssen, W.Ger.), German general and tank expert who became one of the principal architects of armoured warfare and the blitzkrieg between World Wars I and II, and who contributed decisively to Germany's victories in Poland, France, and the Soviet Union early in World War II.

After serving mainly as a staff officer in World War I, Guderian remained in the army and became interested in armoured warfare. Attracting Adolf Hitler's attention in 1935, he rose rapidly and was able to put many of his revolutionary ideas into practice. His *Achtung! Panzer!* (1937; *Attention! Tanks!*) incorporated many of the theories of the British general J.F.C. Fuller and General Charles de Gaulle, who advocated the creation of independent armoured formations with strong air and motorized infantry support, intended to increase mobility on the battlefield by quick penetrations of enemy lines and by trapping vast bodies of men and weapons in encircling movements. Unlike most of his reform-minded contemporaries in other armies, Guderian found a sympathetic supporter in his commander in chief, Hitler. Consequently the German army, despite opposition from conservative elements, developed a tactical superiority at the outbreak of World War II that repeatedly ensured victory.

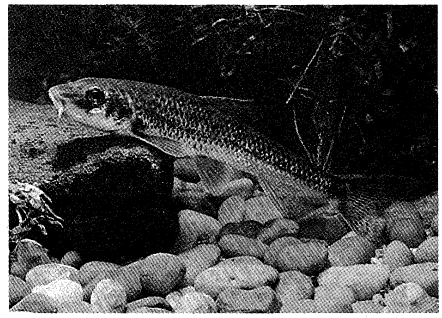


Guderian
Ullstein Bilderdienst

Designated chief of Germany's mobile troops in November 1938, Guderian proved the soundness of his theories in the Polish campaign of September 1939 and spearheaded the drive to the French coast of the English Channel (May 1940) that eliminated France from the war. In the Russian campaign he reached the outskirts of Moscow before being driven back in October 1941. Incurring Hitler's disfavour for withdrawing his troops in the face of a Russian counteroffensive during the winter of 1941–42, he was dismissed, but he returned in March 1943 as inspector general of armoured troops, with authority to establish priorities in the production of armoured vehicles as well as to direct their employment. He simplified and accelerated tank production and, after the July 20, 1944, attempt on Hitler's life, became acting chief of staff. Hitler's interference nullified most of Guderian's actions, however, and he resigned on March 5, 1945. He wrote *Erinnerungen eines Soldaten* (1951; "Reminiscences of a Soldier"; Eng. trans. *Panzer Leader*).

Gudfred (Danish king): *see* Godfrey.

gudgeon (species *Gobio gobio*), common small fish of the carp family, Cyprinidae, found in clear, fresh waters of Europe and northern Asia. A grayish or greenish fish, the gudgeon has a barbel at each corner of its mouth and a row of blackish spots along each side. Rarely exceeding a length of 20 cm (8 inches), it lives in schools and feeds mainly on small animals. It is edible and is used as fish bait.



Gudgeon (*Gobio gobio*)
Jane Burton—Bruce Coleman Ltd.

Gudmundsson, Kristmann (b. Oct. 23, 1901, Thverfell, Ice.—d. Nov. 20, 1983, Reykjavík), Icelandic novelist who gained an international reputation with his many works of romantic fiction, several written in Norwegian.

Gudmundsson was the illegitimate son of a country girl who left him in the care of her impoverished family. At 13 he ran away and turned his hand to all kinds of menial work but, at the same time, managed to learn several languages.

In 1924 he went to Norway and two years later published in Norwegian a collection of stories, *Islandsk kjærlighet* ("Icelandic Loves"). It was a literary success and astonished the critics by its mastery of Norwegian idiom and style. He followed that success with the publication of several novels, among them the autobiographical *Hvite netter* (1934; "White Nights"). Gudmundsson's fiction can be loosely classed as romances, family sagas, and historical novels. He drew a great deal on his Icelandic background and on Icelandic literature and social history, but the constant theme in his work is love (both physical and spiritual) between men and women. He was married seven times.

In 1939 he returned to Iceland and began writing in Icelandic. His works have been translated into most of the major languages of the Western world.

Gudmundsson, Tómas (b. Jan. 6, 1901, Efri-Brú, Ice.—d. Nov. 14, 1983, Reykjavík), poet best known for introducing the city as a subject in Icelandic poetry.

Gudmundsson, who was born in the countryside, graduated in law from the University of Iceland in Reykjavík and subsequently became a civil servant in 1928. His first work, *Vid sundin blá* (1924; "Beside the Blue Waters"), caused no great stir but revealed his control of poetic form and an intelligent, thoughtful, slightly nostalgic voice. His next publication, *Fagra veröld* (1933; "The Fair World"), established him as an outstanding poet; it won immediate attention for its appreciation of the city and urban life. Gudmundsson was adopted as poet laureate of the city.

Travel in the Mediterranean gave him a new stimulus, apparent in *Stjörnur vorsins* (1940; "Stars of Spring"). After 1943 he devoted himself to writing. From 1942 to 1955 he edited a literary magazine, *Helgafell,* and from 1956 to 1959 *Nýtt Helgafell.* During this period *Fljótid helga* (1950; "The Holy River") was published. It addressed many of the social issues that were brought to light by World War II and revealed Gudmundsson as a mature philosopher, though his light touch and humour remained. An edition of his collected poems was published in 1953. His later works include *Heim til thín, Ísland* (1977; "Home to You, Iceland"), containing personal reflections on life and death, as well as several poems written for specific occasions. In addition to writing poetry, Gudmundsson translated works in German and Italian into Icelandic. Many of his own poems are in translation in the Scandinavian languages, French, German, and English.

Gudmundur Gíslason Hagalin (Icelandic writer): *see* Hagalín, Gudmundur Gíslason.

Gudrun, heroine of several Old Norse legends whose principal theme is revenge. She is the sister of Gunnar and wife of Sigurd (Siegfried) and, after Sigurd's death, of Atli. Her sufferings as a wife, sister, and mother are the unifying elements of several poems. The counterpart of Kriemhild in the *Nibelungenlied,* she sometimes is erroneously confused with the heroine of the Middle High German romance *Gudrun Lied,* an independent Baltic-coast legend of an abduction that ends happily with a rescue and the lovers' reunion. *See also* Atli, Lay of; Kriemhild.

Guecho, town, suburb of Bilbao, Vizcaya (Biscay) *provincia,* in the autonomous Basque Country, northern Spain. It is located near where the Nervión River empties into the Bay of Biscay and includes four barrios (city districts): Algorta, Las Arenas, Neguri, and Santa María de Guecho (from which the municipality derives its name). Its founding is linked to the noble families of Martiartu and Guecho. Although primarily residential, the city's 6 miles (10 km) of coastline and four beaches afford ample fishing and swimming. Las Arenas is connected to Portugalete across the Nervión by the Vizcaya Bridge, a lofty suspension bridge. Pop. (1981) 67,321.

Guéckédou, town, southern Guinea, at the intersection of roads from Kailahun (Sierra Leone), Kissidougou, and Macenta. It is the chief trading centre for rice, coffee, kola nuts, and palm oil and kernels. The town is located in a forested area of the Guinea Highlands mainly inhabited by the Kissi people. Guéckédou is the site of a government hospital, a palm oil and soap factory, and a Roman Catholic mission (1951). Pop. (1983 prelim.) 31,641.

Guelders (The Netherlands): *see* Gelderland.

Guelf DYNASTY: *see* Welf dynasty.

Guelf and Ghibelline, of the two opposing factions in Italian politics during the Middle Ages. The split between the Guelfs, sympathetic to the papacy, and the Ghibellines, sympathetic to the German (Holy Roman) emperors, contributed to the chronic strife within the Italian cities. The name Guelf was derived from the German Welf, the name of a family competing for the imperial throne through the 12th and early 13th centuries; the name Ghibelline, from Waiblingen, the name of a castle of the Welf's opponents, the Hohenstaufen family. These names were extended to the supporters and opponents of the Hohenstaufen emperor Frederick II in Italy.

The attempts of the emperors to gain control over Italy split the peninsula into two camps. Beginning with the reign of Frederick I Barbarossa (emperor, 1155–90), Italy was divided between those who sought to enhance their powers and prerogatives by siding with the emperor and those (including the pope) who opposed any imperial interference. During the struggles between Frederick II (emperor, 1220–50) and the popes, the Italian parties took on their characteristic names of Guelf and Ghibelline (beginning in Florence) and contributed to intensifying antagonisms within and among the Italian cities. Most often, previously existing factions in the cities (usually among the nobility) adopted a pro-papal or pro-imperial attitude, thus drawing themselves into the wider international struggle but without losing their local character.

Through the 13th century, the Guelfs and Ghibellines engaged in continual fighting for control of the communes, a fight that often ended with the exile of the losing party from the city. The Guelf and Ghibelline conflict also figured in the rivalry among the city-states. In Tuscany the antagonism among the cities was aggravated as they took sides on the papal–imperial issue. A series of wars was fought from the mid-13th century through the early 14th century between the Guelf city of Florence and its allies—Montepulciano, Bologna, and Orvieto—and its Ghibelline opponents—Pisa, Siena, Pistoia, and Arezzo.

After the Hohenstaufen loss of southern Italy (1266) and the final extinction of their line (1268), the Guelf and Ghibelline conflict changed in meaning. In the international sphere, Guelfism constituted a system of alliances among those who supported the Angevin presence in southern Italy—including the Angevin rulers of Sicily themselves, the popes, and Florence with her Tuscan allies. Within the many cities where the Guelfs triumphed, the party became a conservative force, a property-owning group interested in maintaining the exile of the Ghibellines whose holdings had been confiscated. Ghibellinism became associated with a nostalgia for the empire (a waning force in Italy after 1268), and briefly revived during the Italian expeditions of the emperors Henry VII in 1310–13 and Louis IV in 1327–30.

During the course of the 14th century, the importance of both parties rapidly declined. They lost international significance because the emperors no longer interfered in Italy and the popes moved from Rome to France. "Guelf" and "Ghibelline" implied only local factions.

The terms were revived during the movement for Italian unification of the 19th century. The Neo-Guelfs were those who urged the pope to lead a federation of Italian states. (Vincenzo Gioberti's *Del primato morale e civile degli italiani* published in 1843 was the classic expression of this attitude.) Their opponents, the Neo-Ghibellines, saw the pope as a barrier to the development of Italian unity.

Guelma, *wilāyah* (province, or *département*), northeastern Algeria, located inland from the Mediterranean Sea in the Tell (Mountains) Atlas. The *wilāyah* was created from portions of Annaba and Constantine *wilāyāt* in 1974. With an area of 3,330 sq mi (8,624 sq km), it occupies a mountainous, cork oak forested region in the wetter north, a central valley region where olives are cultivated and there is semi-nomadic cattle herding, and a drier wheat and barley subsistence farming area in the high plains of the south. Guelma is bounded by Tunisia on the east, and by the *wilāyāt* (provinces) of Annaba (north), Skikda and Constantine (west), and Oum el-Bouaghi and Tébessa (south). Guelma town, the provincial capital, has light industry and a cadet school for military training. Other major towns include Souk Ahras (Souq Ahras), Sedrata, and Oued Zenati (Wad Zenati). Souk Ahras, the second largest town in the *wilāyah,* was the birthplace of Saint Augustine of Hippo. Near Sedrata are the ruins of Thubursicu Numidarum, a 2nd century AD Roman town. Pop. (1980 est.) 603,591.

Guelma, town, capital of Guelma *wilāyah* (province, or *département*), northeastern Algeria, on the right bank of the Oued (stream) el-Rabate just above its confluence with the Oued Seybouse. Originally settled as pre-Roman Calama, it became a proconsular province and the bishopric of St. Possidius, biographer and student of St. Augustine. Among Roman ruins are baths and a theatre, and 5 mi (8 km) west, at el-Announa, are the remains of Thibilis. Parts of the Byzantine walls still encircle the town, and the museum and the public gardens contain Roman relics and epigraphy. The modern town was founded by Marshal B. Clauzel in 1836 as a French military base.

Enclosed by mountains rising to nearly 2,000 ft (610 m) and covered by olive groves, the town is laid out in the French style of wide, tree-shaded streets, with the Casbah and military quarters to the south and the Arab quarter to the west. Although it has some light manufacturing (chinaware, bicycles, motorcycles, and small motors), Guelma is mainly an agricultural centre with a large cattle market, giving its name to an Algerian breed. The noted spa of Hammam Meskhoutine (Bath of the Damned), 12 mi west, has the hottest waters known (208° F [98° C]) after the Iceland geysers. Pop. (1977 prelim.) mun., 60,059.

Guelmim, also spelled GOULIMINE, or GUELMIN, town, provincial capital, and province (established 1979), Sud region, southwestern Morocco. Situated in the southern Anti-Atlas mountains near the northwestern edge of the Sahara, Guelmim is a walled town with houses built out of sun-dried red clay and is encircled by date palm groves. Historically it was a caravan centre linked (especially in he 19th century) to Timbuktu (now in Mali) and remains a commercial gateway to Mauritania. The town is the site of an important annual camel-trading fair attended by the colourfully blue-clothed Regeibat nomads, and by the Shluh, a Berber nomadic tribe.

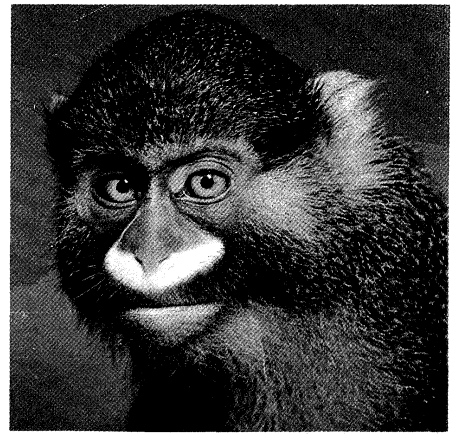
Guelmim province is bounded by the countries of Algeria and Mauritania (east), and by the provinces of Tiznit (north), Tata (northeast), and Tan-Tan (southwest); the Moroccan-administered province of es-Semara in the Western Sahara disputed (since 1976) territory forms the southeastern boundary. Guelmim province has an area of 11,100 sq mi (28,750 sq km). Beginning at the southern extremities of the Anti-Atlas mountains, it consists of arid sandy plains and the Jbel (mountains) Bani in the north and flat stony plateaus (*hamadas*) almost devoid of vegetation in the southeast. Palm groves are found in the *khangas* (canyons) emerging from more elevated areas in the north. Nomadic herding of camels is commonplace throughout the province and jewelry is created by artisans in Guelmim town.

The eastern and central portions of the province comprise part of the former Spanish zone of Tarfaya (ceded to Morocco) in 1958; part of the Western Sahara disputed territory is included within the province in the southeast. A 400 mi (650 km) long earth and concrete wall (completed in 1981) extending from El Aaiun on the Atlantic coast in the Western Sahara to Zag, a military outpost in eastern Guelmim province, was built to keep the Western Saharan-Polisario Front guerillas out of the economically important areas of Moroccan administered Western Sahara. The Mahbès area of southeastern Guelmim province was controlled in the early 1980s by Polisario guerrillas fighting for the independence of Western Sahara. Pop. (1971) town, 15,758; (1981 est.) province, 97,500.

Guelph, city, seat (1838) of Wellington County, southeastern Ontario, Canada, on the Speed River, 60 mi (100 km) west-southwest of Toronto. Founded in 1827 alongside the falls on the river by John Galt, a Scottish novelist and colonizer, it was named after the Guelphs (Welfs), a Hanoverian branch of the British royal family. Guelph is now a major manufacturing, agricultural, and educational centre in one of Canada's most densely populated areas. Varied manufactures include clothing, cigarettes, electric transformers, glass yarn, and saw chains. The Ontario Agricultural College (established in 1874) and Ontario Veterinary College (1862), now both part of the University of Guelph (1964), contribute to the city's importance as a centre for research and training in scientific agriculture. Inc. village, 1851; town, 1856; city, 1879. Pop. (1981) 71,207.

Guennakin (people): *see* Puelche.

guenon, any of about 20 species of widely distributed African monkeys of the genus *Cercopithecus,* family Cercopithecidae. Guenons are slim, graceful, quadrupedal monkeys with long arms and legs, short faces, and nonprehensile tails that are longer than the combined head and body length of about 30–65 centimetres (12–26 inches). Guenons are known for the beauty of their soft, dense fur, which in many species has a speckled effect produced by the alternation of bands of two colours along the hair shaft. Guenons are commonly grayish, reddish, brown, green, or yellow; as a group, they are characterized by bold markings of white or bright colours.



Guenon (*Cercopithecus cephus*)
Toni Angermayer—Photo Researchers

In general, these monkeys are arboreal forest dwellers. The basic social unit is the family; several families may mingle during the day but separate and return to favourite sleeping areas at night. Sometimes guenons associate with other monkeys. Guenons forage for leaves, fruit, and other vegetation and possibly for insects and other small animals; several species, such as the grivet (*C. aethiops*), L'Hoest's

monkey (*C. lhoesti*), and the blue, or diadem, monkey (*C. mitis*), raid crops. Guenons seem to breed at any time of year; they have single young after a gestation period of about seven months. Many species are tamable and are among the finest zoo monkeys because of their hardiness, activity, good nature, and habit of grimacing at observers. With good care, their life span may exceed 20–30 years.

The grivet, vervet (*C. pygerythrus*), and green monkey (*C. sabaeus*) are ground-dwelling guenons sometimes known collectively as savanna monkeys. They are found on or near the savanna and all are greenish with pale yellow or white underparts and black faces. The grivet has a white tuft on the tail tip and a thin, white browband that continues into backswept, white whiskers. The vervet has shorter whiskers and black hands, feet, and tail tip. The green monkey has yellow whiskers, grayish hands and feet, and a yellow and black tail.

Several species of guenons have patches of short, contrastingly coloured fur on the nose. The spot-nosed guenon, or putty-nosed monkey (*C. nictitans*) is a common West African form with gray-flecked black fur and an oval, yellowish nose spot. Among other species with nose patches are the lesser spot-nosed guenon (*C. petaurista*) and the redtail (*C. ascanius*), both with heart-shaped, white nose spots.

Some guenons are generally known by other names, among these the diana monkey (including roloway), owl-faced monkey (or Hamlyn's monkey), mona monkey, and DeBrazza's monkey (*qq.v.*). The patas monkey (*q.v.*) is sometimes known as the red guenon.

The small, green talapoin, or mangrove monkey (*Miopithecus*) and the robustly built Allen's swamp monkey (*Allenopithecus*) are sometimes considered with the guenons as subgenera.

Guéranger, Prosper-Louis-Pascal (b. April 4, 1805, Sablé-sur-Sarthe, Fr.—d. Jan. 30, 1875, Solesmes), monk who restored Benedictine monasticism in France and pioneered the modern liturgical revival.

Guéranger, ordained a priest in 1827, was an Ultramontanist (pro-papist) who reacted against Gallicanism, a movement advocating the administrative independence of the French hierarchy from papal control. Devoted to the Roman liturgy, he campaigned for the abolition of the various local liturgies then flourishing in France. Subsequently, he was inspired to restore Benedictine monasticism, which had been eradicated by the Revolution. In December 1832 he acquired the monastic buildings and lands of Solesmes, founded in the 11th century.

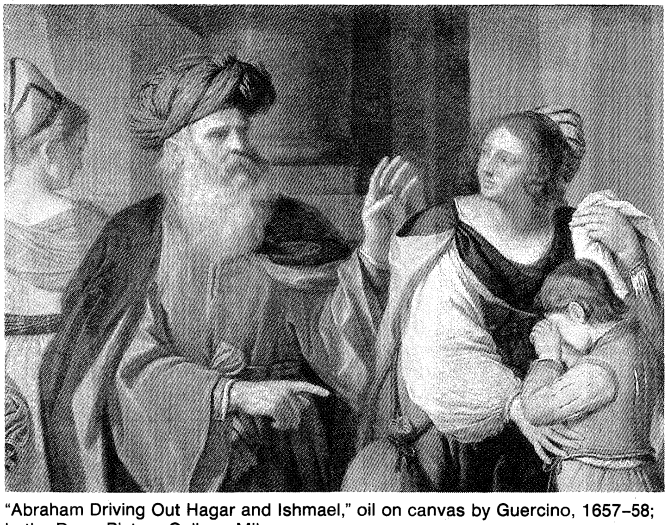
Despite numerous difficulties, by 1837 Solesmes had become a confirmed abbey with Guéranger installed as abbot and head of the Benedictine Congregation of France. There he aimed to renew the tradition of learning pursued by the Maurists, his scholarly Benedictine predecessors, and to revive a rich liturgical life. The first volume of his *Institutions liturgiques*—an ambitious, uncompleted project—appeared in 1840; it was effective in restoring the Roman liturgy in France. The second volume (1841) is an important history of the liturgy in France from the 17th to the 19th century; the third volume appeared in 1851. The *Institutions* was re-edited posthumously, and a fourth volume was added (1885), containing several controversial letters written in reply to criticisms of the *Institutions*.

Guercino, Il, original name GIOVANNI FRANCESCO BARBIERI (b. Feb. 8, 1591, Cento, near Ferrara, Papal States—d. Dec. 22, 1666, Bologna), Italian painter whose frescoes freshly exploited the illusionistic ceiling, making a profound impact on 17th-century Baroque decoration. His nickname Il Guercino ("the squinting one") was derived from a physical defect.

Guercino received his earliest training locally, but the formative influence on his style came from Bologna, especially from the naturalistic paintings of Lodovico Carracci. Such early works as "Madonna in Glory with Saints and a Donor" (1616; Musées Royaux des Beaux-Arts, Brussels) have large forms, strong colour, and broad, vigorous brushwork. His method of using light and shadow was unrelated to the discoveries of Caravaggio and was derived from Bologna and Venice, which Guercino visited in 1618.

In 1621 Guercino went to Rome, where he played an important role in the evolution of Roman High Baroque art. Among many other commissions, he decorated the Casino Ludovisi. The main fresco, "Aurora," on the ceiling of the Grand Hall, is a spirited romantic work, painted to appear as though there were no ceiling, so that the viewer could see Aurora's chariot moving directly over the building. Yet it already reveals something of the crucial experience of his stay in Rome, his contact with Pope Gregory XV's private secretary, Monsignor Agucchi, a propagandist for the classicism of Annibale Carracci's balanced and restrained Roman style. Guercino seems to have tried to make his own style conform with Carraccesque principles, an effort reflected in his "Sta. Petronilla" (1621; Capitoline Museum, Rome). On the death of Gregory XV in 1623, Guercino opened a studio in Cento. Then, upon the death of Guido Reni, whose position in Bologna as heir to Annibale Carracci had been unassailable, he moved to that city, where he was the leading painter until his death.

Some of Guercino's late works, such as "Abraham Driving Out Hagar and Ishmael" (1657–58; Brera Gallery, Milan), are impressive achievements, but other paintings seem weak or sentimental.



"Abraham Driving Out Hagar and Ishmael," oil on canvas by Guercino, 1657–58; in the Brera Picture Gallery, Milan

SCALA/Art Resource, NY

guereza, any of several species of colobus monkeys distinguished by their black and white pelts. *See* colobus.

Articles are alphabetized word by word, not letter by letter

Guericke, Otto von (b. Nov. 20, 1602, Magdeburg, Prussian Saxony—d. May 11, 1686, Hamburg), German physicist, engineer, and natural philosopher who invented the first air pump and used it to study the phenomenon of vacuum and the role of air in combustion and respiration.

Guericke was educated at the University of Leipzig and studied law at the University of

Guericke, engraving by C. Galle, 1649, after a portrait by Anselmus von Hulle

Historia-Photo

Jena in 1621 and mathematics and mechanics at the University of Leyden in 1623. In 1631 he became an engineer in the army of Gustavus II Adolphus of Sweden, and from 1646 to 1681 he was *bürgermeister* (mayor) of Magdeburg and magistrate for Brandenburg.

In 1650 Guericke invented the air pump, which he used to create a partial vacuum. His studies revealed that light travels through a vacuum but sound does not. In 1654, in a famous series of experiments that were performed before Emperor Ferdinand III at Regensburg, Guericke placed two copper bowls (Magdeburg hemispheres) together to form a hollow sphere about 14 inches (35.5 centimetres) in diameter. After he had removed the air from the sphere, horses were unable to pull the bowls apart, even though they were held together only by the air around them. Thus the tremendous force that air pressure exerts was first demonstrated.

In 1663 he invented the first electric generator, which produced static electricity by applying friction against a revolving ball of sulfur. In 1672 he discovered that the electricity thus produced could cause the surface of the sulfur ball to glow; hence he became the first man to view electroluminescence. Guericke also studied astronomy and predicted that comets would return regularly from outer space.

gueridon, small stand or table designed to support a candelabrum. It was introduced into France and Italy in the second half of the 17th century in the form of a carved Negro figure, known as a blackamoor, holding a tray above his or her head.

Some of the finest examples of gueridons were carved by Andrea Brustolon and survive in the Ca' Rezzonico in Venice. The name was also given to small 18th-century

Carved boxwood gueridon by Andrea Brustolon, *c.* 1690–99; in the Ca' Rezzonico, Venice
Alinari—Art Resource/EB Inc.

and early 19th-century French tables of various designs, particularly Neoclassical. *See also* candlestand.

guerilla: *see* guerrilla.

Guérin, Camille (b. Dec. 22, 1872, Poitiers, Fr.—d. June 9, 1961, Paris), French co-developer, with Albert Calmette, of Bacillus Calmette-Guérin, or BCG, a vaccine that was widely used in Europe and America in combatting tuberculosis.

After preparing for a career in veterinary medicine, Guérin joined Calmette at the Pasteur Institute in Lille in 1897; from that time on he devoted his life to vaccination research. As early as 1906 he demonstrated that resistance to tuberculosis was related to the presence in the body of living bacilli. For a period of 13 years Calmette and Guérin produced increasingly less virulent subcultures of a bovine strain of the tubercle bacillus. In 1921 the two researchers believed the bacillus they had produced was harmless to humans but retained its power to stimulate antibody formation. In 1922 they first used it to vaccinate newborn infants at the Charité Hospital in Paris.

From the 1930s, after all questions about its use were resolved, mass vaccination programs were carried out in Japan, Russia, China, England, Canada, France, and other countries. In 1950 the University of Illinois and the Research Foundation were licensed to prepare, distribute, and sell the vaccine in the United States. At the time of his death, Guérin was honorary director of the Pasteur Institute.

Guérin, (Georges-)Maurice de (b. Aug. 4/5, 1810, Château du Cayla, near Andillac, Fr.—d. July 19?, 1839, Château du Cayla), French Romantic poet who achieved cultish admiration after his death.

Reared in a strictly Roman Catholic, Royalist family by his possessive sister, Eugénie, Guérin prepared for a clerical career at the Collège Stanislas in Paris. There he met the young novelist and critic Barbey d'Aurevilly, who became his lifelong friend.

By 1831 Guérin had decided against a religious life, and he soon went to Brittany to live in a radical community led by the brilliant Roman Catholic rebel Abbé Félicité-Robert de Lamennais. In his journal *Le Cahier vert* (1861; "The Green Notebook"), Guérin recorded some of the studies and discussions there, which were major influences in his life. Within a year Lamennais was condemned by the Pope, the community dissolved, and Guérin moved into the social life of Paris, where he wrote his two major prose poems, *La Bacchante* and *Le Centaure*. Both works are remarkable for the richness and depth of their pantheistic descriptions of nature. In 1837 he fell ill and returned to his native Cayla, where he recovered sufficiently to marry a rich young woman, Caroline Gervain; but he soon died of tuberculosis.

Recognition came to Guérin in 1840, when some of his works were published posthumously through the efforts of his sister and friends. Later, in 1861, a collection of works, *Reliquiae* (2 vol.), appeared. A Guérin cult arose, causing the publication of every scrap of writing by Maurice and Eugénie, including their most intimate correspondence. The *Journal et lettres* (1862) of Eugénie de Guérin (1805–1848) show that she possessed gifts as rare as her brother's, but her mysticism had assumed a more strictly religious form.

Guérin, Pierre-Narcisse, Baron (b. March 13, 1774, Paris—d. July 16, 1833, Rome), French painter and the teacher of both Eugène Delacroix and Théodore Géricault. He won the Prix de Rome in 1797 and had an early success with his topical "Return of Marcus Sextus" (1799; Louvre, Paris).

"Phèdre et Hippolyte" (1802; Louvre) and "Andromaque et Pyrrhus" (1810; Louvre) are melodramatic, highly calculated pieces. His best painting, the only one to show feeling for colour and atmosphere, is "Enée racontant à Didon les malheurs de la ville de Troie" (1817; Louvre). He was director of the Académie de France in Rome from 1822 to 1828.

"Phèdre et Hippolyte," by Pierre-Narcisse Guérin, 1802; in the Louvre, Paris
Cliche Musees Nationaux

Guernes DE PONT-SAINTE-MAXENCE (fl. 12th century), wandering scholar from the Île-de-France, author of the first vernacular life of St. Thomas Becket, which reveals passionate devotion to the saint and shows considerable literary merit. Guernes wrote his *Vie de saint Thomas Becket* (composed in verse *c.* 1174, edited by E. Walberg, 1936) from Latin sources; in order to check some conflicting facts, he visited Canterbury, where, it was said, he would often read his work to the companies of pilgrims visiting the martyr's tomb.

Guernica, in full GUERNICA Y LUNO, city, just northeast of Bilbao, province of Vizcaya (Biscay), in the autonomous Basque Country, northern Spain. The city, on the Río de Plencia (Butrón) near the inlet of the Bay of Biscay, is the statutory capital of the former Lordship of Vizcaya, sacred to the Basques. It is symbolized by a venerable oak, the tree of Guernica (Guernikako arbola), under the branches of which the councils (*batzarraks*) of Vizcaya met to determine defense policies and to receive royal assurances of *fueros* (charters of privileges), which were retained from the Middle Ages through the 19th century. In 1366 Count Tello organized Guernica as an enclave, autonomous from the surrounding district of Luno, a status that endured until 1882, when Guernica and Luno were united as a municipality.

After surviving the Carlist Wars of the 19th century, Guernica led the futile agitation for an independent Basque state in 1932. In 1937 it was heavily bombed, supposedly by German planes, an incident that inspired Pablo Picasso's famous painting "Guernica" (1937; Prado, Madrid). The city's architectural highlights include the Council or Parliament House (1824–33), the Tribunales (law courts), and the church of Santa María la Antigua (1418).

Industries include food processing, furniture making, metalworking, and ammunition manufacture. Tourism is an added source of income. Pop. (1981) 17,836.

Guernsey, second largest of the Channel Islands (*q.v.*). It is 30 mi (48 km) west of Normandy, Fr., roughly triangular, and has an area of 24 sq mi (62 sq km). With Alderney and Sark (*qq.v.*), Herm, Jethou, and associated islets, it forms the Bailiwick of Guernsey (area 30 sq mi). Its capital is St. Peter Port (*q.v.*).

In the south, Guernsey rises in a plateau to about 300 ft (90 m), with ragged coastal cliffs. It descends in steps and is drained mainly by streams flowing northward in deeply incised valleys. Northern Guernsey is low-lying, although small outcrops of resistant rock form hills (hougues). The soil on lower ground is of blown sand, raised beach deposits, and the fills of old lagoons. The climate is maritime; snow and severe frost are rare, and the annual temperature range is only about 17° F (9° C). Annual rainfall varies from 30 to 35 in. (750–900 mm). The somewhat scanty water supplies are supplemented by seawater distillation.

The island was known as Sarnia to the Romans. Early documents (11th century) show that the chief landowners were the lords of Saint-Sauveur (hereditary vicomtes of the Cotentin), the vicomtes of the Bessin, the abbey of Le Mont-Saint-Michel, and the Duke of Normandy.

After separation from Normandy in 1204, the Channel Islands were put in charge of a warden and sometimes granted to a lord. From the end of the 15th century, however, Guernsey (with Alderney and Sark) was put under a captain, later governor, an office abolished in 1835. The duties devolved upon a lieutenant governor. Because the warden could not conduct sessions of the king's

courts regularly on all four of the main Channel Islands, his judicial responsibilities on Guernsey fell to a bailiff. This bailiff came to preside over the Royal Court of Guernsey, in which judgment was given and the law declared by 12 jurats (or permanent jurors). The Royal Court has survived substantially in this medieval form, administering the law of Guernsey founded on the custom of Normandy and local usage.

From the bailiffs' practice of referring difficult points of law to local notables, Guernsey's deliberative and legislative assembly, the States of Deliberation, ultimately grew. In the 19th century the States of Deliberation emerged as a legislative assembly administering the island through executive committees. The assembly is presided over by the bailiff of Guernsey. The lieutenant governor is the personal representative of the British sovereign. Governmental and judicial proceedings on Guernsey are conducted in English, even though many of the island's inhabitants speak Norman French as their first language.

Guernsey was never dominated by any one great landowning family, and the early growth of commerce in St. Peter Port, with later smuggling and privateering and 19th-century industrial development, weakened what remained of the feudal landlords' power. During World War II many of Guernsey's inhabitants were evacuated to England before the Germans occupied the island (July 1940–May 1945).

The population is mainly of Norman descent with an admixture of Breton. St. Peter Port and St. Sampson are the main towns. Dairy farming with the famous Guernsey breed of cattle is largely confined to the high land in the south. Market gardening is concentrated chiefly in the north, where greenhouses produce tomatoes, flowers, and grapes, mostly exported to England. Tourism has become an important part of Guernsey's economy in the 20th century. The house in St. Peter Port in which the French author Victor Hugo resided from 1855 to 1870 is now a museum. The island relies increasingly on airline services and is served by an airport at La Villaize. There are shipping links with Jersey, Alderney, and Sark; London and Weymouth, Eng.; and Saint-Malo, Fr. Pop. (1986) 55,482.

Guernsey, breed of dairy cattle originating on Guernsey, one of the Channel Islands. Like the Jersey, this breed is thought to have descended from the cattle of nearby Normandy and Brittany. All the cattle of the Channel Islands were at one time known as Alderneys. After laws had been enacted prohibiting the importation of cattle to the islands except for slaughter, the Jersey and the Guernsey breeds came to be recognized. Guernsey cattle are fawn-coloured, marked with white, and are larger than the Jerseys. Guernseys are noted for the production of milk of a pronounced yellow colour. Like Jerseys, they are not desirable producers of beef.

The first Guernseys were exported to the United States in 1830, but it was not until 1880 that the export business became extensive. Numbers of Guernsey cattle are to be found also in England, Australia, and Canada.

Guerrero, state, southwestern Mexico. It is bounded by the Pacific Ocean on the south and west and by the states of Michoacán on the northwest, México and Morelos on the north, and Puebla and Oaxaca on the northeast and east, respectively. Except for the narrow coastal plain, the state's 24,819-square-mile (64,281-square-kilometre) territory lies entirely within the Sierra Madre del Sur, the valleys of which are usually narrow, fertile, and heavily forested but difficult of access. The principal river in the state is the Balsas. The coast and lower river courses are tropical; the mountain region is celebrated for its temperate climate. Named after Vicente Guerrero, a leader of Mexico's wars for independence, the region became a state in 1849. Chilpancingo is the state capital, but the state's best-known cities are Acapulco, once a colonial port but now a fashionable oceanside resort, and Taxco, a beautifully preserved colonial town that has likewise become a tourist centre.

Guerrero derives its income from agriculture (cotton, coffee, tobacco, and cereals), forest products, mining (including silver, gold, mercury, lead, and iron), and tourism. Railroads do not penetrate far into the state, but the highway network is good, and there is an excellent port at Acapulco. The population is mainly Indian and mestizo. Pop. (1988 est.) 2,559,800.

Guerrero, Francisco (b. May, 1527, Seville, Spain—d. Nov. 8, 1599, Seville), one of the leading Spanish composers of the 16th century.

Guerrero was a choirboy in Seville and at the age of 18 became chapelmaster at Jaén Cathedral in Andalusia. In 1548 he was appointed cantor at Seville Cathedral, assuming effective musical directorship in 1551 and becoming chapelmaster in 1574. Except for a trip to Rome and one to Jerusalem, he spent most of his working life in Seville. Guerrero's music is considered eminently vocal, strongly Spanish in character, and evocative of a vivid and serene spirituality. His compositions include 18 masses, two requiems, settings of the Passions of St. Matthew and St. John, Latin motets, and sacred songs in Spanish.

Guerrero, Vicente (b. Aug. 10, 1782, Tixtla, Mex.—d. Feb. 14, 1831, Chilapa), hero of the Mexican efforts to secure independence.

Guerrero began his military career in 1810, and soon the early Mexican independence leader José Maria Morelos commissioned him to promote the revolutionary movement in the highlands of southwestern Mexico. After Morelos' execution by the Spanish in 1815, Guerrero continued to lead his guerrilla forces against the Spanish until 1821, when he joined forces with Agustín de Iturbide and with him issued the Plan of Iguala, which became the political platform for the conservative wing of the Mexican independence movement. The Mexican forces triumphed over the Spaniards and achieved independence for Mexico in August 1821.

Guerrero continued to participate in the military and political struggles that followed independence, and in March 1829 he attained the presidency of Mexico as the result of a successful liberal revolt against the conservative candidate who had been chosen president in the election of 1828. But the aged Guerrero proved to be less adept at political administration than at military command, and that same year he was unseated by General Antonio López de Santa Anna, who replaced him in the presidency with Anastasio Bustamante. Guerrero was subsequently tried and executed.

guerrilla, also spelled GUERILLA, member of an irregular military force fighting small-scale, limited actions, in concert with an overall political-military strategy, against conventional military forces. Guerrilla tactics involve constantly shifting attack operations and include the use of sabotage and terrorism.

A brief treatment of guerrilla warfare follows. For full treatment, *see* MACROPAEDIA: War, The Theory and Conduct of.

The word guerrilla (the diminutive of Spanish *guerra,* "war") was first used to describe the Spanish-Portuguese irregulars, or *guerrilleros* (also called partisans and insurgents), who helped the Duke of Wellington drive the French from the Iberian Peninsula during the campaigns of 1809–13. Traditionally, guerrilla warfare has been a weapon of protest against alleged wrongs imposed on a people by a foreign invader or ruling government. Guerrillas may operate independently or complement orthodox military operations.

The underlying strategy in guerrilla warfare is to harass the enemy until sufficient military strength is built up to defeat him in battle or until enough political and military pressure is applied to cause him to seek peace. The Chinese general Sun-tzu (*c.* 350 BC) laid down the essential rules of guerrilla tactics in *The Art of War,* advocating deception and surprise. In the Napoleonic era the Prussian officer and scholar Carl von Clausewitz argued that the erosion of the enemy's will to fight was of prime importance and that partisan warfare could aid in destroying that will.

Most of the revolutionary wars fought since World War II have utilized, at least partially, the teachings of the Chinese Communist leader Mao Zedong. Though a devoted student of Marx and Lenin, Mao was guided by his own experience as a guerrilla leader trying to overthrow the Nationalist government of Chiang Kai-shek, which led him to conclude that the Communist revolution in China would come not from the urban proletariat but from the rural peasants.

A political goal is essential to guerrilla warfare, and revolutionary writings stress the guerrillas' affiliation with the people who support them and provide them with sanctuary, supplies, and information. When guerrillas resort to terrorist tactics, however, the people's loyalty may waver, and, if the defending forces reply in kind, the populace fears both sides and may cooperate with whatever side is currently in control.

Guerrilla warfare demands extraordinary leadership at all levels. Successful guerrilla leaders—among them T.E. Lawrence, Mao, Josip Broz Tito, Ho Chi Minh, and Fidel Castro, who generally came from civilian backgrounds—are able to attract, organize, and inspire their followers while instilling in them a military discipline.

It is essential in counterguerrilla warfare for a ruling government to acknowledge the political and socioeconomic conditions that gave rise to the guerrilla movement. Though a government's first priority is to reestablish law and order, it must take civil as well as military action—including social and economic reform—in order to effectively suppress a guerrilla insurgency.

Guerze (people): *see* Kpelle.

Guesclin, Bertrand du (b. *c.* 1320, La Motte, near Dinan, Fr.—d. July 13, 1380, Châteauneuf-de-Randon), national French hero, an outstanding military leader during the early part of the Hundred Years' War

Bertrand du Guesclin, head of a funerary statue by T. Pirvé and R. Loisel; in the abbey church of Saint-Denis, France

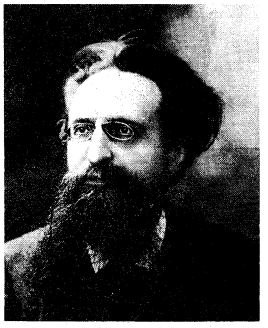
Giraudon—Art Resource/EB Inc.

(1377–1453). After attaining the highest military position, as constable of France, in 1370, he brilliantly used the strategy of avoiding set battles with the English until the French had sufficient advantage to defeat them soundly.

After fighting a duel with Sir Thomas Canterbury at the successful defense of the city of Rennes against an English siege in 1356–57, du Guesclin was awarded a pension by the Dauphin (the future king Charles V) in December 1357. Appointed captain of Pontorson, he remained in the service of the French royal house of Valois. He fought in many battles (1359–63), being twice taken prisoner, and won a major victory at Cocherel in May 1364, defeating the troops of Charles II the Bad, king of Navarre, and taking prisoner Jean de Grailly, captal de Buch, an ally of the English. He suffered a severe loss at Auray in September 1364, being taken prisoner after Charles, duc de Blois, whom he was supporting in the War of the Breton Succession, was killed. He was ransomed for 40,000 gold francs. In 1366 and in 1369 he led the *compagnies* (bands of mercenaries) into Spain to aid Henry of Trastámara, bastard half brother of Peter I the Cruel, king of Castile, in his attempt to overthrow Peter. In 1370 Charles V recalled him from Spain to fight the English at Limoges. By 1373 he had given the French several major victories. He spent his remaining years on smaller expeditions against scattered English forces and mercenary bands and died besieging an enemy fortress.

Guesde, Jules, pseudonym of MATHIEU BASILE (b. Nov. 12, 1845, Paris—d. July 28, 1922, Saint-Mandé, Fr.), organizer and early leader of the Marxist wing of the French labour movement.

Guesde began his career as a radical journalist and in 1877 founded one of the first modern Socialist weeklies, *L'Égalité.* He consulted with Karl Marx and Paul Lafargue (a son-in-law of Marx) in 1880 on a socialist program for the French labour movement. Adopted by a national labour congress in 1880, the program called on workers to elect representatives sworn to "conduct the class struggle in the halls of parliament"; *i.e.,* to stand uncompromisingly for the establishment of a socialist state. Guesde was opposed by members of the labour movement who were known as possibilists and who sought to win labour gains by economic and political pressure-group action. The possibilists advocated aggressive collective bargaining and strikes and argued that workingmen should vote for progressive political candidates regardless of their party affiliations.



Guesde, 1906
BBC Hulton Picture Library

A prolific author and powerful orator, Guesde served in the Chamber of Deputies beginning in 1893 and as minister without portfolio in 1914 and 1915.

Guess, George: *see* Sequoyah.

Guest, Edgar A(lbert) (b. Aug. 20, 1881, Birmingham, Warwickshire, Eng.—d. Aug. 5, 1959, Detroit), British-born U.S. writer whose sentimental verses were widely read.

Guest's family moved to the United States in 1891. Four years later he went to work for the *Detroit Free Press* as a police reporter and then as a writer of daily rhymes, which became so popular that they were eventually syndicated to newspapers throughout the country and made his name a household word. His first book, *A Heap o' Livin'* (1916), named for his famous lines "It takes a heap o' livin' in a house t' make it home," became a best-seller and was followed by similar collections of his optimistic rhymes on such subjects as home, mother, and the virtue of hard work. Guest also appeared on radio and television.

Guest
By courtesy of the Library of Congress, Washington, D.C.

Guest, Keen & Nettlefolds, PLC, major British group of engineering companies. The group has a variety of manufacturing interests, with an emphasis on the production of components for the automotive field. Headquarters are in Warley, Eng.

The company was established in 1900 as Guest, Keen and Company by the merger of two older manufacturing companies. It assumed the name Guest, Keen & Nettlefolds, Ltd., in 1902 with the acquisition of a screw- and wire-manufacturing business founded by John Sutton Nettlefold. With steady growth into an increasing number of product areas, the company expanded into a worldwide conglomerate. In 1982 it reregistered as a public limited company.

The company emphasizes the production and sale of primary metal products, automotive components, and general engineering products. The automotive components unit manufactures transmissions, power takeoff equipment, gearings, shafts, and suspension systems. The company also manufactures various types of basic steel products and is a major distributor of such products. It also is a leading producer of fasteners and other types of hardware. Other interests range from agricultural ventures to the manufacture of beer kegs. In the early 1980s the company became involved in a series of joint ventures, including an arrangement with British Steel Corporation in 1981 to manufacture together steel wire, rods, and bars for consumer products.

The company operates throughout the world, with emphasis on the European, North American, and Australian markets.

Guettard, Jean-Étienne (b. Sept. 22, 1715, Étampes, Fr.—d. Jan. 6, 1786, Paris), French geologist and mineralogist who was the first to survey and geologically map France and to observe the exposed bedrock of the Paris Basin.

The keeper of the Duc d'Orléans's natural history collection, Guettard was the first to identify several fossil species from the Paris area and to suspect the volcanic origin of mountains in central France. He wrote *Mémoire et carte minéralogique sur la nature et la situation des terrains qui traversent la France et l'Angleterre* (1746; "Mineralogical Memoir and Map on the Nature and Location of the Terrains That Traverse France and England") and *Atlas et description minéralogiques de la France* (1780).

Gueux (Calvinist Dutch guerrillas): *see* Geuzen.

Guevara, Antonio de (b. *c.* 1480, Treceño, Spain—d. April 3, 1545, Mondoñedo), Spanish court preacher and man of letters whose didactic work *Reloj de príncipes o libro aureo del emperador Marco Aurelio* (1529; Eng. trans. by Lord Berners, *The Golden Boke of Marcus Aurelius,* 1535, and by Sir Thomas North, *The Diall of Princes,* 1557, frequently reprinted through the 20th century), an attempt to invent a model for rulers, became one of the most influential books of the 16th century. Well received outside Spain, the book was widely translated, even though much annoyance was voiced over Guevara's false attribution of parts of the work to Emperor Marcus Aurelius, whose *Meditations* did not come to light until later (1558).

Guevara grew up at the court of Ferdinand and Isabella, serving as page to the prince Don Juan until his death in 1497. Guevara became a Franciscan in 1504, was court preacher in 1521, and was appointed royal chronicler in 1526. He was bishop of Guadix from 1528 to 1537 and thereafter of Mondoñedo. A rhetorician, more concerned with developing a golden prose than with content, Guevara wrote mostly about trite subjects, which enabled him to display his wit and euphuistic diction. His other major works—*Epístolas familiares* (1539–42; "Familiar Letters"), *Menosprecio de corte y alabanza de aldea* (1539; "Scorn of Court Life and Praise of Village Life"), and *La década de Césares* (1539; "The Ten Caesars"), a rather shallow historical work—also managed to achieve popularity during his lifetime. His work is now considered of little more than historical interest, clearly reflecting the prevailing tastes of the court of Charles V.

Guevara, Che, byname of ERNESTO GUEVARA DE LA SERNA (b. June 14, 1928, Rosario, Arg.—d. October 1967, Bolivia), theoretician and tactician of guerilla warfare, prominent Communist figure in the Cuban Revolution (1956–59), and later guerrilla leader in South America.

Guevara was the eldest of five children in a middle-class family of Spanish-Irish descent and leftist leanings. Though suffering from asthma, he excelled as an athlete and a scholar, completing his medical studies in 1953. He spent many of his holidays travelling in Latin America, and his observations of the great poverty of the masses convinced him that the only solution lay in violent revolution. He came to look upon Latin America not as a collection of separate nations but as a cultural and economic entity, the liberation of which would require an intercontinental strategy.

In 1953 Guevara went to Guatemala, where Jacobo Arbenz headed a progressive regime that was attempting to bring about a social revolution. (Around this time Guevara acquired his nickname, from a verbal manner-

Che Guevara
Lee Lockwood—Black Star

ism of Argentines who punctuate their speech with the interjection *che.*)

The overthrow of the Arbenz regime in 1954 in a coup supported by the U.S. Central Intelligence Agency persuaded Guevara that the United States would always oppose progressive leftist governments. This conviction became the cornerstone of his plans to bring about Socialism by means of a worldwide revolution.

He left Guatemala for Mexico, where he met the Cuban brothers, Fidel and Raúl Castro, political exiles who were preparing an attempt to overthrow the dictatorship of Fulgencio Batista in Cuba. Guevara joined Castro's force, which landed in the Cuban province of Oriente late in November 1956. Immediately detected by Batista's army, they were almost wiped out; the few survivors, including the wounded Guevara, reached the Sierra Maestra, where they became the nucleus of a guerrilla army. The rebels slowly gained in strength, seizing weapons from Batista's forces and winning support and new recruits. Guevara became one of Castro's most trusted aides and recorded the two years spent in overthrowing Batista's government in *Pasajes de la guerra revolucionaria* (1963; *Reminiscences of the Cuban Revolutionary War,* 1968).

After Castro's victorious troops entered Havana on Jan. 2, 1959, and established a Marxist government, Guevara became a Cuban citizen, as prominent in the new government as he had been in the revolutionary army, representing Cuba on many commercial missions. He also became well known in the West for his opposition to all forms of imperialism and neocolonialism and for his attacks on U.S. foreign policy. He served as chief of the Industrial Department of the National Institute of Agrarian Reform, president of the National Bank of Cuba, and minister of industry.

During the early 1960s, he defined Cuba's policies and his own views in many speeches and writings, notably "El socialismo y el hombre en Cuba" (1965; "Man and Socialism in Cuba," 1967)—an examination of Cuba's new brand of Communism—and a highly influential manual, *La guerra de guerrillas* (1960; *Guerrilla Warfare,* 1961). After April 1965 Guevara dropped out of public life. His movements and whereabouts for the next two years remained secret; it was later learned that he had spent some time in the Congo with other Cuban guerrilla fighters, helping to organize the Patrice Lumumba Battalion, which fought in the civil war there.

In the autumn of 1966, Guevara went to Bolivia, incognito, to create and lead a guerrilla group in the region of Santa Cruz. On Oct. 8, 1967, the group was almost annihilated by a special detachment of the Bolivian Army. Guevara was captured after being wounded and shot soon afterward. (A.A.Si./Ed.)

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Guevara, Luis Vélez de: *see* Vélez de Guevara, Luis.

Guèvremont, Germaine, *née* GRIGNON (b. *c.*1900, Saint-Jérôme, Que., Can.—d. Aug. 21, 1968, Montreal), French-Canadian novelist who skillfully recreated the enclosed world of the Quebec peasant family.

Grignon, educated in Quebec and at Loretto Abbey, Toronto, married Hyacinthe Guèvremont, a Sorel, Que., druggist; they had a son and three daughters. In Sorel, Guèvremont wrote about the life around her. She worked on *Le Courrier de Sorel* and as correspondent for the Montreal *Gazette* before moving to Montreal in 1935. *En Plein Terre* (1942), a collection of her realistic stories of rural French Canada, was followed by the related novels *Le Survenant* (1945), which inspired a French-Canadian television series, and its sequel, *Marie-Didace* (1947). The two novels show a family crushed, never to rise again, after a season of hope. The two novels were translated and combined as *The Outlander* (1950) in the United States and Canada and as *Monk's Reach* (1950) in the United Kingdom.

Guèye, Lamine (b. 1891, Médine, French Sudan—d. June 10, 1968, Dakar, Senegal), one of the most important Senegalese politicians before that country gained independence.

As early as World War I, Guèye made radical demands for genuine assimilation of Africans into French culture and institutions. In the early 1920s he became the first African lawyer from French West Africa to study in Paris. After serving as mayor of Saint-Louis, Senegal, for a brief time in the mid-1920s, he was sent by the French to the Indian Ocean island of Réunion as a judge and remained there until 1933. In 1934 and 1936 he ran (and was defeated) for deputy to the French National Assembly. Also in 1936 he became political director of the new Senegalese branch of the French Socialist Party.

After World War II Guèye and his protégé Léopold Senghor were elected to the French National Assembly (1945) and reelected the following year. Guèye also became mayor of Dakar, a post he held until 1961. Senghor, however, turned to the rural masses for a broader base of support and left the Socialists in 1948 to form his own party, which rapidly became dominant in Senegalese politics. Guèye, appealing mainly to a limited electorate of urban professional bourgeoisie, lost his National Assembly seat in the 1951 elections and was never again a threat to Senghor's leadership. Finally in 1958 he joined Senghor's new party, the Union Progressiste Sénégalaise, and in 1959 was elected president of the Senegalese Legislative (later National) Assembly, where he remained until his death.

Guggenheim, Meyer and Daniel (respectively, b. Feb. 1, 1828, Langnau, Switz.—d. March 15, 1905, Palm Beach, Fla., U.S.; b. July 9, 1856, Philadelphia—d. Sept. 28, 1930, Port Washington, N.Y.), American industrialists, father and son, who developed worldwide mining interests that, when merged with the American Smelting and Refining Company in 1901, dominated the industry for the next three decades and laid the foundation for the present U.S. mining industry.

After emigrating to the United States from Switzerland in 1847, Meyer Guggenheim built an import firm in Philadelphia, which specialized in Swiss embroideries. In the early 1880s he acquired interests in two Colorado copper mines. Realizing their potential value, he eventually invested his entire fortune in the mines; his seven sons, especially Daniel, supervised the acquisition and operation of smelters. In 1891 the Guggenheims formed a trust, consolidating about a dozen of their refining operations under the name Colorado Smelting and Refining Company. In 1901 they assumed leadership of the U.S. mining industry by gaining control of the American Smelting and Refining Company, a trust composed of the country's largest metal-processing plants. Directing the trust until 1919 and exercising a dominant influence on it in the 1920s, Daniel Guggenheim expanded the family interests to include mines producing tin in Bolivia, gold in Alaska, copper in Utah, and diamonds in Africa, as well as nitrate fields in Chile and rubber plantations in the Congo. His most notable philanthropies were the Daniel and Florence Guggenheim Foundation and the Daniel Guggenheim Foundation for the Promotion of Aeronautics.

In 1925 the sixth son of Meyer Guggenheim, Simon Guggenheim (1867–1941), established in memory of his son the John Simon Guggenheim Memorial Foundation to award fellowships to aid artists and scholars studying abroad.

Solomon Guggenheim (1861–1949), the fourth son of Meyer Guggenheim, founded in 1937 the Solomon R. Guggenheim Foundation for the advancement of art, which now operates the Guggenheim Museum in New York City and directs the Guggenheim Collection in Venice.

Guggenheim, Peggy, byname of MARGUERITE GUGGENHEIM (b. Aug. 26, 1898, New York City—d. Dec. 23, 1979, near Venice), art collector and major patron of the New York school of artists. Among the artists whose work she collected were Jackson Pollock, Robert Motherwell, Mark Rothko, and Hans Hofmann.

Guggenheim was born to wealthy parents and came into her fortune in 1919. Unhappy with her bourgeois life, she married Lawrence Vail in 1922 (divorced 1930) and adopted a less conventional lifestyle. She moved to Paris in 1930, but returned to the United States in 1941 and married painter Max Ernst (divorced 1946). In 1942 she opened her second gallery, Art of This Century, in New York City, at which many of the artists she supported were exhibited for the first time. (Her first gallery, Guggenheim Jeune, in London, had not been successful.) After World War II Guggenheim moved to Venice. She settled in the unfinished, 18th-century Palazzo Venier dei Leoni on the Grand Canal, where she displayed part of her art collection to the public. Her memoirs—*Out of This Century* (1946) and *Confessions of an Art Addict* (1960)—were published in a combined, updated edition under the latter title in 1980.

Guggenheim Collection, in full PEGGY GUGGENHEIM COLLECTION, in Venice, private collection of post-1910 paintings and sculpture formed by the American art collector Peggy Guggenheim and housed in the Palazzo Venier dei Leoni on the Grand Canal, her former home. It is considered to be one of the best collections of post-1910 modern art in Europe.

The entry hall contains a mobile by Alexander Calder. The dining room displays early Cubist works by artists such as Pablo Picasso and Georges Braque. Modern sculpture is displayed on the terrace toward the Grand Canal, and the collection includes works by Henry Moore, Alberto Giacometti, and Marino Marini. Examples of postwar American and European art include works by Jackson Pollock, Francis Bacon, and Mark Rothko. A separate wing in the garden, the "Barchesa," contains Surrealist works by Max Ernst, Salvador Dali, René Magritte, Giorgio De Chirico, and others. The collection is directed by the Solomon R. Guggenheim Foundation of New York City.

Guggenheim Museum, in full SOLOMON R. GUGGENHEIM MUSEUM, museum in New York City housing the Solomon R. Guggenheim collection of modern art. The building, designed by Frank Lloyd Wright and completed in 1959, represents a radical departure from traditional museum design, spiralling upward and outward in smoothly sculptured coils of massive, unadorned white concrete.

The exhibition space of the interior consists of a spiral ramp of six "stories" encircling an open centre space lighted by a dome of glass supported by stainless steel. Many of the paintings are "floated" from the inclined outer wall on concealed metal arms.

Guglielmo (Italian personal name): *see under* William.

Guglielmus DE CAMPELLIS: *see* William of Champeaux.

Guhyasamāja-tantra (Sanskrit: "Treatise on the Sum Total of Mysteries"), also called TATHĀGATAGUHYAKA ("The Mystery of Tathāgatahood [Buddhahood]"), oldest and one of the most important of all Buddhist *Tantras*. These are the basic texts of the Tantric—an esoteric and highly symbolic—form of Buddhism, which developed in India and became dominant in Tibet. The Tantric form stands, along with the Mahāyāna and Theravāda, as one of the main branches of Buddhism.

The *Guhyasamāja Tantra* is ascribed by tradition to the sage Asaṅga. Much of its symbolism, appearing at the beginning of the Vajrayāna tradition, exercised a normative influence over that tradition's development. The first of 18 chapters presents the text's mandala (literally, "circle"), a visual image used in ritual and meditation and understood as the symbolic embodiment of a Tantric text. In the centre of the mandala of this text stands Akṣobhya, the Imperturbable Buddha, the central celestial figure in Tantric Buddhist symbolism. Surrounding him are Vairocana, the Illuminator Buddha, in the east; Amitābha, the Buddha of Infinite Light, who dwells in the Western Paradise, the Pure Land; and the celestial Buddhas, Amoghasiddhi in the north and Ratnasambhava in the south. Other chapters present sexual and horrific symbolism, spiritual techniques, the nature of enlightened consciousness, and other central Tantric concerns.

Gui (French personal name): *see under* Guy.

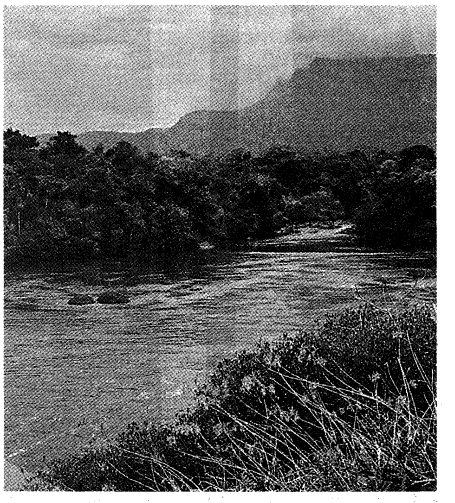
gui (Chinese vessel): *see* kuei.

gui (Chinese religion): *see* kuei.

Guiana Current, surface oceanic current, a northwest-flowing branch of the Atlantic South Equatorial Current along the northern coast of South America. North of the Equator, the Atlantic North Equatorial Current and Amazon and Orinoco rivers contribute to the Guiana Current. As a result of river drainage, its salinities are at times relatively low, varying between 35 and 36.5 parts per thousand. The shallow Guiana Current has an annual range in surface temperature of 79° to 82° F (26° to 28° C).

Guiana Highlands, plateau and low-mountain region located predominantly in the Guiana (Guyana) regions of South America, north of the Amazon and south of the Orinoco River. Comprising a heavily forested plateau, they cover the southern half of Venezuela, all of the Guianas except for the low Atlantic coastal plain, the northern part of Brazil, and a portion of southeastern Colombia. They are geologically similar to the Brazilian Highlands, from which they are separated by the narrow eastern part of the Amazon lowland. The terrain comprises a mixture of three ascending elements: a basement of rolling hilly upland, standing mostly less than 1,000 feet (300 m) above sea level; low mountains, near stream divides, ranging from 2,000 to 3,000 feet (600 to 900 m) above sea level; and tabular plateaus, capped with resistant sandstone. The highest elevations are formed by the tabular plateaus, such as Mount Roraima (9,094 feet [2,772 m]), where the boundaries of Brazil, Venezuela, and Guyana meet. The Guiana Highlands extend westward across the Upper Orinoco, and in southeastern Colombia they reach the eastern front of the Andes.

The whole region receives an abundance of rainfall, and no season is really dry. The vegetation is mostly tropical rain forest, but parts of southern Venezuela are savanna. From the forests come valuable cabinet woods, balata, chicle, vanilla, insecticides, and medicinal plants. The crystalline rocks carry a wealth of minerals, but exploration is limited by the heavy plant cover. Gold and diamonds are mined, and the Serranía Imataca of Venezuela is a major source of iron ore.



Rain forests of the Guiana Highlands along the Cuao River in Venezuela

Jacques Jangoux

The most notable natural landmark in the highlands is Angel Falls, the world's highest waterfall (3,212 feet [979 m], with a base of 500 feet [150 m]), on an affluent of the Caroní River in Venezuela.

Guianas, The, region of South America located on the continent's north-central coast and covering an area of about 181,000 square miles (468,800 square km). It includes the independent nations of Guyana and Suriname (*qq.v.*) and French Guiana (*q.v.*), an overseas *département* of France. The region is bounded on the north by the Atlantic Ocean and Caribbean Sea, on the east and south by Brazil, and on the west by Venezuela. In the late 20th century, boundary disputes remained unsettled between Venezuela and Guyana, Guyana and Suriname, and Suriname and French Guiana.

The Guianas are subdivided into three principal zones from south to north: the Precambrian Guiana Shield, a region of low mountains that lies along the southern borders of the three states and rises to the region's highest point, Mount Roraima, 9,094 feet (2,772 m); a lower region of hilly country covered by a tropical hardwood forest and occasional savanna grasslands; and the low-lying, narrow alluvial plain along the Atlantic coast. The region's name derives from an Indian word for such lowlands: *guiana* ("land of water"). Major rivers drain the highlands north-northeastward toward the sea. The region has a year-round humid tropical climate that is tempered along the coast by offshore sea breezes. About 80–90 percent of the region is covered by dense tropical forests containing many valuable species of wood. Settlement and commercial agriculture are largely confined to the coastal areas and the lower, navigable river valleys. The region's rich and diverse wildlife includes jaguar, puma, ocelot, tapir, deer, sloth, great anteater, armadillo, caiman, and iguana. The Guiana Shield is rich in minerals, but only bauxite is exploited on a large scale by Guyana and Suriname. The rivers have rich and partly developed potential for hydroelectric power.

The Guianas' population ranges from indigenous American Indians to descendants of European colonizers, African slaves, East Indian, Chinese, and Indonesian indentured servants, Southeast Asian refugees, and Haitians. The languages of The Guianas are also varied and set the region apart from the rest of Spanish- and Portuguese-speaking South America. French, Dutch, and English are the official languages, respectively, of French Guiana, Suriname, and Guyana, but there are also many speakers of a creole language combining the three with African and Asian dialects.

Mining, agriculture, forestry, and fishing are major components of the region's economy. Agriculture is divided between commercial plantation crops, which are important regional exports, and domestic crops, largely grown on small individual farms in the interior. Cattle, pigs, and chickens are raised on small farms, and fishing is a growing industry in the region. Forestry likewise is a growing industry, and the region's timber resources are plentiful. Guyana and Suriname rank among the world's largest bauxite and alumina producers. Manufacturing is only partly developed in the region, and it concentrates largely on processing domestic raw materials for export. The region's principal exports include bauxite, aluminum, alumina, shrimp and fish, rice, and lumber.

The earliest-known American Indians of the Guianas called the land *Surinen,* whence the name Suriname originated. The earliest European explorers were Spaniards under Amerigo Vespucci in the early 1500s. Despite Spain's claim to the area in 1593, the Dutch began in 1602 to settle along the Essequibo, Courantyne, and Cayenne rivers and were followed by the Dutch West India Company (1621), which received what is now Guyana, and later Suriname. The company introduced African slaves to work its tobacco, cotton, and coffee plantations. Part of Suriname in the meantime was colonized by the English sent from Barbados in 1651. The French settled first in a trading post at Sinnamary in 1624 and later established Cayenne (1643).

Under the Treaty of Breda (1667), the Dutch received Suriname from England in exchange for Nieuw Amsterdam (New York), and the French were awarded French Guiana, setting the stage for the expulsion of Dutch settlers from Cayenne. Following these political settlements, sugar became the major plantation crop, and between 1742 and 1786 numerous British planters from the West Indies transferred to the Dutch-ruled Guianas, particularly the western one, and the use of slaves rose sharply.

With the outbreak of the French Revolution and the subsequent Napoleonic conquest of Europe, the British temporarily occupied the Dutch Guianas. Following Napoleon's final defeat (1815), the British purchased the Demerara, Berbice, and Essequibo colonies and consolidated their colonies into British Guiana (1831). The Abolition movement that had developed in England resulted in a cessation of the slave trade in 1807, followed by emancipation in 1834–38. French Guiana abolished slavery in 1848, and Dutch-ruled Suriname did the same in 1863. The majority of the freed slaves refused to return to plantation labour, and the colonists therefore brought in indentured servants from India, China, and Southeast Asia.

In British Guiana settlers discovered gold in 1879, thereby inaugurating the exploitation of mineral resources that have since become the dominant industries of Guyana and Suriname. Bauxite was first discovered (1915) in Suriname and subsequently in British Guiana. French Guiana in 1946 became a French overseas *département,* while Suriname underwent constitutional reform (1948–51) and was granted self-government by The Netherlands in 1954 and independence in 1975. British Guiana was granted its own constitution in 1953 and achieved independence as Guyana in 1966.

Guibert OF RAVENNA, Italian GUIBERTO DI RAVENNA (antipope): *see* Clement (III).

Guicciardini, Francesco (b. March 6, 1483, Florence—d. May 22, 1540, Santa Margherita a Montici, near Florence), Florentine statesman, diplomat, and historian, author of the most important contemporary history of Italy, *Storia d'Italia.*

Guicciardini was born of an aristocratic Florentine family that played a prominent role under Lorenzo de' Medici (the Magnificent). From 1498 to 1505 Guicciardini studied civil law at Florence, Ferrara, and Padua and subsequently set up legal practice at Florence. In 1508 he married Maria, daughter of Alamanno Salviati. In the same year, he began to write his family memoirs and his *Storie fiorentine* (*History of Florence*) from 1378 to 1509. The latter constitutes one of the major sources for the history of the republican regime after 1494 and reveals Guicciardini's gifts for historical analysis and narrative. Elected in 1511 as Florentine ambassador to King Ferdinand of Aragon, he was at the Spanish court when in 1512 the Florentines, under the pressure of Spanish troops, restored the Medici, who had been exiled in 1494. On his return to Florence in 1514, he resumed his legal practice; in 1514 he was a member of the Otto di Balìa, who were in charge of internal security, and in 1515 of the Signoria, the highest magistracy. In 1513 Cardinal Giovanni de' Medici became Pope Leo X; in 1516 he appointed Guicciardini governor of Modena and in 1517 also of Reggio. Until 1534 Guicciardini served the papacy almost continuously.

As governor of an exposed and recently acquired part of the Papal States, in which he had to face internal disorders as well as external dangers, Guicciardini showed outstanding administrative gifts. His severe and sometimes ruthless measures were effective in restoring order but also caused him unpopularity. The outbreak of the war in northern Italy between King Francis I of France and the Holy Roman emperor Charles V, with whom Leo had concluded an alliance, turned Reggio into a military outpost of the Papal States, and in July 1521 Guicciardini was appointed commissioner general of the papal army.

During this time, Guicciardini became also a prolific political writer, composing numerous memorandums and treatises, mostly in the form of discourses on political problems of the day, often in connection with his official duties. A number of them deal with the government of Florence, on which he also wrote, between 1521 and 1525, the *Dialogo del reggimento di Firenze* (*Dialogue on the government of Florence*). In this he advocates an aristocratic regime on the Venetian model as the ideal constitution for his city. In his capacity as commissioner general, he prevented, by his courage and determination, Parma from falling into French hands in December 1521. But the death of Leo X in the same month jeopardized his career temporarily; after the election of Pope Adrian VI, he was at first deprived of the governorships of Modena and Reggio but recovered them at the end of 1522. In 1523, after Adrian's death, he had to defend both cities against their original ruler, the duke of Ferrara. Reggio capitulated, but Modena was held by Guicciardini against superior odds. After the election of Cardinal Giulio de' Medici as Clement VII, Guicciardini earned his reward by being appointed, in 1524, president of the Romagna, the northernmost papal province. In the critical situation after the Battle of Pavia, when the army of Charles V was preparing to advance south, Guicciardini conveyed to the pope much advice, and in January 1526 he was called to Rome. There he played a prominent role in the papal counsels, advocating an alliance with France against Charles V. The resulting League of Cognac, concluded in May 1526, was to no small extent his work, and in June he was appointed papal lieutenant general with the army of the league. The failure of the league to prevent the imperial army under the duke of Bourbon from advancing on Florence and Rome involved him once more in the fate of his native city.

Guicciardini, oil painting; in the Uffizi, Florence

By courtesy of the Galleria degli Uffizi, Florence

The danger in which Florence found itself as a result of Clement's policy had increased the opposition to the Medici regime. When, on the arrival of the duke of Urbino with his army near Florence, the Medici left the city to welcome him (April 26, 1527), a revolt broke out. Guicciardini, who had arrived shortly before to help protect the city, succeeded in preventing the duke from assaulting the palace of the Signoria by negotiating a free pardon in return for surrender. A few days later, Bourbon's army captured Rome, and this was followed by the expulsion of the Medici from Florence and the restoration of republican government in that city.

The collapse of Pope Clement's authority in Rome rendered Guicciardini's position as his lieutenant general untenable, while his long association with the Medici made him suspect in republican Florence. The victory of the intransigent republican faction in Florence and the fall of the gonfalonier Niccolò Capponi, who had been trying to come to terms with the pope (April 1529), followed by the advance of the imperial army on the city, endangered Guicciardini's position, and in September 1529 he left Florentine territory for the papal court. Thereafter he fully supported Clement's bid for a Medicean restoration in Florence, while seeking to obtain favourable conditions for the Florentines. In March 1530 he was condemned as a rebel at Florence. Between 1528 and 1530 Guicciardini worked on his second history of Florence and compiled the most concise and varied expression of his views on society and politics in his collection of maxims and observations, the *Ricordi.* His political thought is frequently akin to, and sometimes more radical than, that of his friend Niccolò Machiavelli, with whom he shared, despite his long service with the papacy, a criticism of the contemporary church. He disagreed, however, in his *Considerazioni intorno ai "Discorsi" del Machiavelli* ("Considerations on the 'Discourses' of Machiavelli," *c.* 1530), with Machiavelli's interpretation of Roman history as evidence for a political science. After the city's surrender, he returned as papal representative and took a leading part in the persecution of the republicans. In 1531 Clement appointed him governor of Bologna, but he lost this post after the accession of Paul III in 1534. Back in Florence, he acted as legal adviser to Duke Alessandro de' Medici and began work on a history of Italy during his lieutenantship that, redrafted during the following years, became the nucleus of his far more ambitious *Storia d'Italia* (*History of Italy*), which covers Italian history in the period 1494 to 1534. He began the work probably in 1536; the final revision was not completed when he died. Written by a statesman closely associated with many of the events he described, and by a historian who in his critical use of evidence followed and surpassed his humanist predecessors, the *History of Italy* is the most important contemporary history of Italy during the period of upheaval and invasion in the early 16th century.

After the murder of Alessandro in 1537, he helped secure the succession for Cosimo, probably hoping to limit the ducal powers which he considered excessive. Disappointed in his hopes and personal ambitions, although still holding high office under the new ruler, he devoted the last years of his life, in his villa at Santa Margherita a Montici, to the composition of his *Storia d'Italia,* the crowning achievement of his life. (N.Ru.)

BIBLIOGRAPHY. Translations of Guicciardini's works include an abridged edition of *The History of Italy,* trans. and ed. by Sidney Alexander (1968, reissued 1984); and *The History of Florence,* trans. by Mario Domandi (1970). The definitive biography is Roberto Ridolfi, *The Life of Francesco Guicciardini* (1968; originally published in Italian, 1960). Felix Gilbert, *Machiavelli and Guicciardini: Politics and History in Sixteenth-Century Florence* (1965, reprinted 1984), portrays Guicciardini as historian and political thinker.

guidance: *see* counselling.

guide dog, also called SEEING EYE DOG (after Seeing Eye, Inc., of Morristown, N.J.), dog that is professionally trained to guide and protect its blind master. Systematic training of guide dogs originated in Germany during World War I to aid blinded veterans.

At the age of approximately one year, the dog is trained for three to four months to mold the animal's behaviour to its owner's handicap. The dog learns to adjust to a harness, stop at curbs, gauge its owner's height when traveling in low or obstructed places, and disobey a command when obedience will endanger its master. Although several breeds, including Doberman pinschers and retrievers, have been educated as guide dogs, German shepherds are the most widely used.

guided missile, projectile provided with means for altering its direction after leaving its launching device. *See* missile.

Guidi FAMILY, an Italian family that originated in the Romagna in the 10th century and came to dominate by the mid-12th century the Florentine *contado* (district), with possessions in its eastern region and in Tuscan Romagna, the *contadi* of Bologna, Faenza, Forlì, and Ravenna, and in the hilly Casentino country of the Upper Arno. In the 13th century they lost ground to the expanding communes and were involved in conflicts between cities and between Guelfs and Ghibellines. They were further weakened by being divided into several, sometimes opposing branches. The Casentino branch of the counts of Poppi preserved their independence until 1440.

Guidi, Tommaso di Giovanni di Simone (painter): *see* Masaccio.

Guido (Italian personal name): *see under* Guy, except as below.

Guido DA CREMA (antipope): *see* Paschal (III).

Guido DA SIENA (fl. 13th century, Siena, Republic of Siena [Italy]), one of the first Italian painters to break with the centuries-old conventions of Byzantine painting, such as rigid compositional balance and frontality. Although the precise dating of his work has not been established, it is clear that he introduced more spontaneous gestures and scenes of human tenderness to 13th-century Italian painting, helping to make possible the later

acceptance in Italy of emotive Gothic painting.

The only work attributed to Guido by all authorities is a large painting of the "Virgin and Child Enthroned," once in the Church of San Domenico at Siena and later moved to the Palazzo Pubblico. It bears a rhymed Latin inscription, giving the painter's name as "Gu . . . o de Senis," with the date 1221. Certain critics argue on stylistic grounds that it must have been painted between 1262 and 1286 and that the date found on the altarpiece was forged when it was overpainted at the turn of the 14th century. Most agree, however, that the early date is original, making Guido far in advance of other Italian painters of his time. A "St. Dominic" (Fogg Art Museum, Cambridge, Mass.), "St. Peter Enthroned," and "Madonna and Four Saints" (both in the Pinacoteca Nazionale, Siena) have also been attributed to him.

Guido DE CASTELLIS (pope): *see* Celestine II.

Guido DELLE COLONNE (b. *c.* 1215, Sicily?—d. *c.* 1290, Sicily?), jurist, poet, and Latin prose writer whose poetry was praised by Dante and whose Latin version of the Troy legend was important in bringing the story to Italians and, through various translations, into English literature.

Guido delle Colonne apparently was a learned man, a judge, and the author of several Latin chronicles and histories. He was a poet of the Sicilian school, a group of early Italian vernacular poets who were associated with the courts of the Holy Roman emperor Frederick II and his son Manfred, and was strongly influenced by the poetry of France and Provence. Guido's poetry, though slender in inspiration, was intricate in thought and excellent in form. Dante praised two of Guido's canzoni in *De vulgari eloquentia,* and in the 19th century the English poet Dante Gabriel Rossetti became one of his translators.

Probably more important than Guido's poetry, however, is his *Historia destructionis Troiae* ("History of the Destruction of Troy"), which he completed about 1287. Thought to be a condensed version of the French *Roman de Troie* by Benoît de Sainte-Maure, Guido's work was widely translated throughout Europe. William Caxton, the first English printer, translated it from a French source and published it in Bruges about 1474 as *The Recuyell of the Historyes of Troye,* the first book Caxton printed and the first book printed in the English language.

Guido DI CITTÀ DI CASTELLO (pope): *see* Celestine II.

Guido DI PIETRO (painter): *see* Angelico, Fra.

Guido OF AREZZO, Italian GUIDO D'AREZZO (b. *c.* 990, Arezzo?, Italy—d. 1050, Avellana?), medieval music theorist whose principles served as a foundation for modern Western musical notation.

Educated at the Benedictine abbey at Pomposa, Guido evidently made use of the music treatise of Odo of Saint-Maur-des-Fossés and apparently developed his principles of staff notation there. He left Pomposa in about 1025 because his fellow monks resisted his musical innovations, and he was appointed by Theobald, bishop of Arezzo, as a teacher in the cathedral school and commissioned to write the *Micrologus de disciplina artis musicae.* The bishop also arranged for Guido to give (*c.* 1028) to Pope John XIX an antiphonary he had begun in Pomposa.

Guido seems to have gone to the Camaldolese monastery at Avellana in 1029, and his fame developed from there. Many of the 11th-century manuscripts notated in the new manner came from Camaldolese houses.

The fundamentals of the new method consisted in the construction by thirds of a system of four lines, or staff, and the use of letters as clefs. The red F-line and the yellow C-line were already in use, but Guido added a black line between the F and the C and another black line above the C. The neumes could now be placed on the lines and spaces between and a definite pitch relationship established. No longer was it necessary to learn melodies by rote, and Guido declared that his system reduced the 10 years normally required to become an ecclesiastical singer to a year.

Guido was also developing his technique of solmization, described in his *Epistola de ignoto cantu.* There is no evidence that the Guidonian hand, a mnemonic device associated with his name and widely used in the Middle Ages, had any connection with Guido of Arezzo.

Guido is also credited with the composition of a hymn to St. John the Baptist, *Ut queant laxis,* in which the first syllable of each line falls on a different tone of the hexachord (the first six tones of the major scale); these syllables, *ut, re, mi, fa, sol,* and *la,* are used in Latin countries as the names of the notes from *c* to *a* (*ut* was eventually replaced by *do*). His device was of immense practical value in teaching sight-reading of music and in learning melodies. Singers associated the syllables with certain intervals; *mi-fa,* in particular, always represented a half step.

Before Guido an alphabetical notation using the letters from *a* to *p* was used in France as early as 996. Guido's system used a series of capital letters, small letters, and double small letters from *a* to *g*. Guido's system also came to be associated with the teaching of the gamut—the whole hexachord range (the range of notes available to the singer).

In addition to his innovations Guido also described a variety of organum (adding to a plainchant melody a second voice singing different pitches) that moved largely, but not completely, in parallel fourths. Guido's work is known through his treatise the *Micrologus.*

Guido OF BURGUNDY (pope): *see* Calixtus II.

Guienne (historical region, France): *see* Guyenne.

Guiers, Lake, French LAC DE GUIERS, lake, northwestern Senegal. It is situated 40 miles (64 km) east of the city of Saint-Louis. Lake Guiers is fed by the Bounoum (Ferlo) tributary from the south and empties into the Sénégal River to the north. Its water is fresh, and a dam, built in 1916, prevents salt from entering the lake from the Taoué River and the Sénégal River delta. There are, nevertheless, salt licks used by the pastoral population of the vicinity. Since 1931, Lake Guiers' water has been used for irrigation.

Guiglo, town, western Côte d'Ivoire (Ivory Coast). It lies along the Nzo River, which is a tributary of the Sassandra. The major trade centre (in rice, cassava, and livestock) of the Guere, Yacouba, and increasing numbers of Mossi people, it is also a collecting point for a forest region that sends coffee and timber to the coast for export. Guiglo is the site of a sawmill and a research station for coffee and cocoa. Pop. (1975) town, 10,441.

Guignol, most prominent puppet character in France, where his name became synonymous with puppet theatre. The hand puppet was created by the puppeteer Laurent Mourguet of Lyons in the early 19th century and was supposedly named for an actual *canut,* or Lyonnais silk worker. Guignol was performed with regional dialect and mannerisms and in the traditional garb of the peasant. Short-nosed, round-eyed, and perpetually surprised, he was easily duped but quick to extricate himself from trouble and to help his friends and drinking companions. Though sometimes approximating a Lyonnais version of the Punch-and-Judy show, Guignol usually appeared in his own plays featuring his wife, Madelon, and his companion, Gnafron.

Guignol puppet shows, now staged mainly for children, demand a vigorous participation. Audiences actively respond and react to questions voiced by the puppets. Guignol remains a popular figure in France, where permanent Guignol theatre may be seen in the streets of Paris.

Guilbert OF SEMPRINGHAM, SAINT: *see* Gilbert of Sempringham, Saint.

Guilbert, Yvette (b. Jan. 20, 1867, Paris—d. Feb. 4, 1944, Aix-en-Provence, Fr.), French singer, reciter, and stage and film actress, who had an immense vogue as a singer of songs drawn from Parisian lower-class life. Her ingenuous delivery of songs charged with risqué meaning made her famous.

Yvette Guilbert, 1898
Harlingue—H. Roger-Viollet

As a child Guilbert attended recitation school and was unsuccessful in small comic parts; however, she succeeded as a cabaret singer from 1896 (the Moulin Rouge and the Ambassadeurs, seven years; the Folies-Bergère, nine years). She was a popular recording artist from the mid-1920s as well. Notable among her films are *Les Misérables* (1933) and *Pêcheurs d'Islande* (1934). She was also successful on tour (from 1895) in Italy, the United States, and England.

Guilbert owed much of her success to Xanrof (Léon Fourneau) and to Aristide Bruant, who wrote songs for her. She is also remembered for a famous poster of her, showing her in her characteristic yellow dress and long black gloves, by Henri de Toulouse-Lautrec. She wrote *How to Sing a Song* (1918; *L'Arte de chanter une chanson*), two novels, *La Vedette* and *Les Demi-Vieilles* (both 1920), and an autobiography, *La Chanson de ma vie* (1929; *Song of My Life: My Memories*).

Consult the INDEX *first*

guild, also spelled GILD, an association of craftsmen or merchants formed for mutual aid and protection and for the furtherance of their professional interests. Guilds flourished in Europe between the 11th and 16th centuries and formed an important part of the economic and social fabric in that era.

The medieval guilds were generally one of two types: merchant guilds or craft guilds. Merchant guilds were associations of all or most of the merchants in a particular town or city; these men might be local or long-distance traders, wholesale or retail sellers, and might deal in various categories of goods. Craft guilds, on the other hand, were occupational associations that usually comprised all the artisans and craftsmen in a particular branch of industry or commerce. There were, for instance, guilds of weavers, dyers, and fullers in the wool trade and of masons and architects

in the building trade; and there were guilds of painters, metalsmiths, blacksmiths, bakers, butchers, leatherworkers, soapmakers, and so on.

Guilds performed a variety of important functions in the local economy. They established a monopoly of trade in their locality or within a particular branch of industry or commerce; they set and maintained standards for the quality of goods and the integrity of trading practices in that industry; they worked to maintain stable prices for their goods and commodities; and they sought to control town or city governments in order to further the interests of the guild members and achieve their economic objectives.

There is no direct evidence for the existence of permanent associations of traders or craftsmen in ancient Mesopotamia or Egypt, and little more evidence exists about such societies in pre-Hellenistic Greece. Such associations are known to have existed in ancient Rome, however, where they were called *collegia*. These craft guilds seem to have emerged in the later years of the Roman Republic. They were sanctioned by the central government and were subject to the authority of the magistrates. From the reign of the emperor Diocletian onward, the imperial government deliberately exploited these guilds in the interests of public authority and social order. The government tried to restrict the membership of the guilds to a hereditary caste of skilled artisans, but the increasing financial demands made upon the guilds by the government in the waning days of the Roman Empire had reduced most guilds to a precarious position by the 4th century AD. With the fall of the western Roman Empire, guilds disappeared from European society for more than six centuries. The *collegia* did survive in the Byzantine Empire, however, and particularly in the city of Byzantium (Constantinople, now Istanbul). The famous *Book of the Prefect*, a manual of government probably drawn up by the Byzantine emperor Leo VI in the year 900, provides a picture of an elaborate guild organization whose primary function was the imposition of rigid controls, especially for financial and tax-raising purposes, on every craft and trade in the city.

Some historians have contended that the guilds of medieval Europe derived from the *collegia* of the Byzantine Empire, but no direct connections have been established between these different institutions, and the origins of the medieval guilds can be found in the changing economies of western and northern Europe as they emerged from the Dark Ages.

Guilds became possible in Europe only with the appearance and growth of towns in the 10th and 11th centuries following the chronic dislocation and agrarian backwardness of the Dark Ages. Until this time, merchants had been merely itinerant peddlers who executed all of their own trading transactions, personally traveling from market to market and from town to town. Such merchants tended to band together in order to protect themselves from bandits or predatory feudal lords as they made their business rounds. Gradually, merchants expanded their activities and delegated such tasks as the transportation of goods to others, while the merchants based themselves and their operations in a particular town. The merchants' associations soon became more tightly organized and were legalized and recognized by town governments. These merchant associations, or guilds, became intimately involved in regulating and protecting their members' commerce, both in long-distance trade and in those activities which catered to the needs of the town's inhabitants. Guilds came to control the distribution and sale of food, cloth, and other staple goods and thereby achieved a monopoly over the local commerce. Such guilds compelled foreign merchants or traders to pay a fee if they wanted to participate in the local trade, and some outside merchants were prohibited altogether from participating in that trade.

By the 13th century, merchant guilds in western Europe comprised the wealthiest and most influential citizens in many towns and cities, and, as many urban localities became self-governing in the 12th and 13th centuries, the guilds came to dominate their town councils. The guilds were thus able to pass legislative measures regulating all economic activity in many towns.

Craft guilds arose soon after merchant guilds did. They originated in expanding towns in which an extensive division of labour was emerging. The body of craftsmen in a town usually consisted of a number of family workshops in the same neighbourhood, with the masters or owners of such workshops related to each other by kinship, acquaintance, or the sharing of apprentices. These craftsmen tended to band together in order to regulate competition among themselves, thus promoting their own and the town's prosperity in general. The craftsmen would agree on some basic rules governing their trade, setting quality standards, and so on. In this way the first craft guilds were formed. Craft and merchant guilds would often control different areas of a particular industry. The merchant guild in a wool-processing town or city, for instance, would control the purchase of raw wool and the production and sale of the processed fibre, while the craft guilds would control the actual carding, dyeing, and weaving of the wool.

The internal structures of medieval craft guilds are well known from documents and were generally alike throughout Europe. Assemblies of the guild's members enjoyed some legislative powers, but the control of guild policy lay in the hands of a few officials and a council of advisers or assistants. The guild tended to be an extremely hierarchical body structured on the basis of the apprenticeship system. (*See* apprenticeship.) In this structure, the members of a guild were divided into a hierarchy of masters, journeymen, and apprentices. The master was an established craftsman of recognized abilities who took on apprentices; these were boys in late childhood or adolescence who boarded with the master's family and were trained by him in the elements of his trade. The apprentices were provided with food, clothing, shelter, and an education by the master, and in return they worked for him without payment. After completing a fixed term of service of from five to nine years, an apprentice became a journeyman, *i.e.*, a craftsman who could work for one or another master and was paid with wages for his labour. A journeyman who could provide proof of his technical competence (the "masterpiece") might rise in the guild to the status of a master, whereupon he could set up his own workshop and hire and train apprentices. The masters in any particular craft guild tended to be a select inner circle who possessed not only technical competence but also proof of their wealth and social position.

Apprenticeship was the basic element in the craft guild, since it secured the continuity of practice, tradition, and personnel on which the welfare of the guild depended. Apprenticeships in some trades came to be highly valued, and a family would have to pay a master a large sum of money for him to enroll their son as an apprentice. Often apprenticeships came to be restricted to the sons or other relatives of masters.

The craft guild policed its own members' professional practices, and guild courts and officials investigated complaints of poor workmanship, unfair competition, and other problems, levying fines on those found in violation of the guild's rules and standards.

Besides their economic and educational functions, guilds also served other purposes. A guild was often associated with a patron saint, and a local guild would maintain a chapel in the parish church to be used by its members. Guilds performed charitable work, not only among the poor and indigent among their own members but among the community at large. Guilds also built and maintained residences, called guildhalls, in which the membership would hold banquets and conduct official business.

Friction often arose between the wealthier members of the merchant guilds and the less prosperous but far more numerous members of the craft guilds in a particular city. Conflict between these two groups became especially intense when they competed for control of the city government, as happened in a number of cities in Italy, Germany, and the Low Countries.

Guilds' exclusivity, conservatism, monopolistic practices, and selective entrance policies eventually began to erode their economic utility. Apprenticeships became almost entirely hereditable, and masters set ridiculously high standards for apprentices to become journeymen and for journeymen to become masters. The guilds worked exclusively for their own interests and sought to monopolize trade in their own locality. They were frequently hostile to technological innovations that threatened their members' interests, and they sometimes sought to extinguish commercial activities that they were not able to bring under their own control. The merchant guilds became parties of aristocrats who dominated the town and city governments, sometimes over the opposition of the craft guilds.

The decline of the medieval craft guilds was a slow and tortuous process during the Renaissance and Reformation periods. New guilds were still being founded throughout Europe in the 17th century, but the 16th century had already marked a turning point in the fortunes of most guilds. Apart from the disruptive effects of the Reformation and the growth of the power of national governments, the craft guilds were seriously weakened by the appearance of new markets and greater capital resources. Merchants were becoming capitalistic entrepreneurs and forming companies, thus making the merchant guilds less important. Craft guilds broke down as the pace of technological innovation spread and new opportunities for trade disrupted their hold over a particular industry. Masters tended to become foremen or entrepreneurs, while journeymen and apprentices became labourers paid their wages by the day. The emergence of regulated companies and other associations of wealthy merchant-capitalists thus left the guilds increasingly isolated from the main currents of economic power.

It is perhaps a sign of the general insignificance of the surviving guilds that they evoked surprisingly little serious criticism until the Enlightenment of the 18th century. By the time decrees abolishing craft associations were enacted in France (1791), Spain (1840), Austria and Germany (1859–60), and Italy (1864), the guilds' authority had long been on the wane. Craft guilds continued to flourish in India, China, Japan, and the Islāmic world into the 20th century, but they too proved unable to withstand the impact of modern Western industrial organization.

In their heyday from the 12th to the 15th century, the medieval merchant and craft guilds gave their cities and towns good government and stable economic bases and supported charities and built schools, roads, and churches. Guilds helped build up the economic organization of Europe, enlarging the base of traders, craftsmen, merchants, artisans, and bankers that Europe needed to make the transition from feudalism to embryonic capitalism.

Guild Socialism, a movement that called for workers' control of industry through a system of national guilds operating in an implied contractual relationship with the public. The Guild Socialist movement developed in England and had its main impact there in the first two decades of the 20th century.

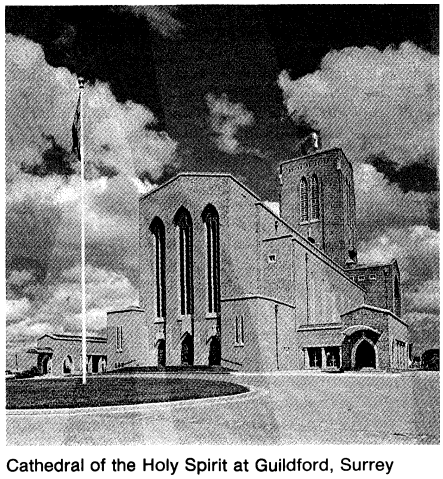
Guild Socialist doctrine first appeared in 1906, with the publication of *The Restoration of the Gild System,* by Arthur Joseph Penty, and an article by Alfred Richard Orage on the same subject in the *Contemporary Review.* Later, Guild Socialist theory developed in *The New Age,* a publication edited by Orage. There, a full statement of the doctrine, Samuel George Hobson's *National Guilds,* was first published serially in 1912–13. Guild Socialism gained a wider following when a group of younger men began to advocate it in a new publication, the *Daily Herald.* In 1915 the movement assumed an organized form with the founding of the National Guilds League.

The Guild Socialists stood for state ownership of industry, combined with "workers' control" through delegation of authority to national guilds organized internally on democratic lines. About the state itself they differed, some believing it would remain more or less in its existing form and others that it would be transformed into a federal body representing the workers' guilds, consumers' organizations, local government bodies, and other social structures (G.D.H. Cole, *Guild Socialism,* 1920; S.G. Hobson, *National Guilds and the State,* 1920).

Guild Socialism was much stimulated during World War I by the rise of the left-wing shop stewards' movement, demanding "workers' control" in the war industries. After the war, the building workers, led by Hobson and Malcolm Sparkes, founded building guilds that built houses for the state; but after the economic slump of 1921 the state withdrew financial help and the movement collapsed. The shop stewards' movement also disintegrated when the war ended; and the Guild Socialist movement fell to pieces, leaving behind it an effect in the incorporation of some element of "workers' control" into the programs of trade unionism and the programs of the Socialist and Labour parties. The National Guilds League itself was dissolved in 1925.

Guildford, district (borough), county of Surrey, England, at the west–east crossing of the River Wey on the north side of the gap by which its valley breaches the chalk ridge of the North Downs. It has an area of 105 sq mi (271 sq km).

The town of Guildford was already a manor in Saxon times, and its church tower shows



Cathedral of the Holy Spirit at Guildford, Surrey
Kenneth Scowen

pre-Norman work. Its earliest known charter dates from 1257. As well as the Norman castle there are many historic buildings along its axial High Street. On Stag Hill is the modern cathedral (1936–68) designed by Sir Edward Maufe, the second newly sited Anglican cathedral built in England since the Reformation. The new diocese was separated from Winchester in 1927. Nearby are the buildings of the University of Surrey (incorporated 1966).

The town has grown in modern times with some light industry, including motor vehicles; it is an attractive residential town within commuting range of London (28 mi [44 km] northeast). The rural area that forms the eastern half of the borough was part of the original metropolitan Greenbelt. Pop. (1981 prelim.) town, 56,652; (1982 est.) district, 124,100.

Guilford, town (township), New Haven County, southern Connecticut, U.S., on Long Island Sound. First settled by Puritans in 1639 as Menunketuck, it was admitted to New Haven Colony as a town in 1643 and probably renamed for Guildford, Surrey, Eng. Granite quarrying (stone was provided for the foundation of the Statue of Liberty) and oyster culture were early occupations. Guilford's economy now depends on agricultural pursuits, non-ferrous founding and manufacturing, and tourism. The town includes the resort villages of North Guilford, Sachem Head, and Leetes Island. It has some of the best preserved colonial houses in Connecticut including Hyland House (1660), the Henry Whitfield House (1639; the oldest stone house in New England), and the Thomas Griswold House Museum (1774; a classic example of colonial salt box construction). Pop. (1980) 17,375.

Guilford, Frederick North, 2nd earl of: *see* North, Frederick North, Lord.

Guilford, Joy Paul (b. March 7, 1897, Marquette, Neb., U.S.), U.S. psychologist and practitioner of psychophysics, the quantitative measurement of subjective psychological phenomena, exemplified by his studies of the relative affectiveness of colour, hue, brightness, and saturation for men and women.

Guilford taught at the universities of Kansas (1927–28), Nebraska (1928–40), and Southern California (1940–67), then retired. A leading U.S. exponent of factor-analysis testing for a comprehensive assessment of personality, Guilford constructed for this purpose batteries of tests, or factor inventories. His comprehensive, systematic theory of intellectual abilities, known as the structure of intellect, gave rise to what is known as informational-operational psychology.

Guilford Court House, Battle of (March 15, 1781), in the U.S. War of Independence, strategic victory for the Americans in North Carolina over the British, who soon afterwards were obliged to virtually abandon control of the Carolinas.

After the Battle of Cowpens (Jan. 17, 1781), the American commander Nathanael Greene united both wings of his 4,400-man southern army at Guilford Court House, N.C. There Lord Cornwallis, with a force of 1,900 British veterans, caught up with the Americans, and a battle ensued. American casualties were light; British casualties were heavy. Wishing to avoid another defeat such as the one suffered by Gen. Horatio Gates at Camden, S.C., the previous August, Greene withdrew his forces intact.

Declining to pursue the Americans into the backcountry, Cornwallis temporarily retired to Hillsboro, N.C. Acknowledging his failure to destroy patriot resistance in the South, Cornwallis abandoned the heart of the state a few weeks later and marched to the coast at Wilmington to recruit and refit his command.

Guilin (China): *see* Kuei-lin.

Guillaume (French personal name): *see under* William, except as below.

Guillaume DE BAILLOU: *see* Baillou, Guillaume de.

Guillaume DE GRIMOARD (pope): *see* Urban V, Blessed.

Guillaume DE LORRIS (fl. 13th century), French author of the first and more poetic part of the medieval verse allegory the *Roman de la rose* (*q.v.*), started by him some time *c.* 1230–40 but only continued some 40–50 years later by a different writer, Jean de Meun (*q.v.*).

Guillaume's work—the first 4,058 lines—is that of a courtly poet of great perceptiveness in his expression of character through allegorical symbols. Guillaume's part of the poem drew on the traditions of courtly love descended from the troubadours, but such a theme appears to have been already waning in popularity in the 13th century.

Little is known of Guillaume de Lorris except that the last part of his name derives from a village near Orléans.

Guillaume D'ORANGE, central hero of some 24 French epic poems, or chansons de geste, of the 12th and 13th centuries. The poems form what is sometimes called *La Geste de Guillaume d'Orange* and together tell of a southern family warring against the Spanish Muslims. Modern research suggests that at least part of the Guillaume legend may have been originally localized in the Spanish marches, where sons and nephews of the historical Wilhelmus, a Frankish nobleman (and cousin of the emperor Charlemagne) upon whom the Guillaume of the epics is based, played a part in political events of the 9th century.

Poems in the cycle include the *Couronnement de Louis,* the *Charroi de Nîmes,* the *Prise d'Orange,* the *Chevalerie Vivien, Aliscans,* and the *Moniage Guillaume.* The underlying theme is the devotion of Guillaume and his family—to each other, to their championship of Christendom against the infidel in Spain and the south, and, above all, to their ungrateful and uncooperative king, Louis the Pious.

The poems are anonymous and are mainly preserved in manuscripts—which are at least a century younger than the earliest of the poems—that often show evidence of material additions. The problem of dating the poems is further complicated by the discovery, in 1903, of the *Chanson de Guillaume,* a 13th-century Anglo-Norman text at first generally supposed to represent the earliest form of the Vivien episode. But the early date given to this fine chanson has not gone unchallenged, and the enigma remains to be solved. The Guillaume cycle was expanded by later poets.

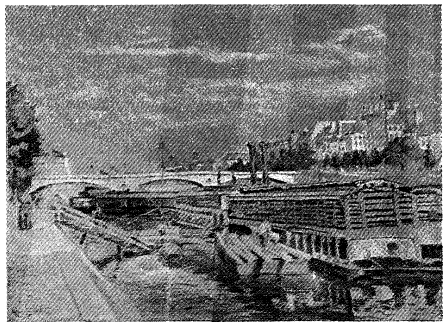
Guillaume, Charles Édouard (b. Feb. 15, 1861, Fleurier, Switz.—d. June 13, 1938, Sèvres, Fr.), French physicist whose exhaustive studies of ferronickel alloys culminated in the discovery of invar (a nickel–steel alloy) and gained him the Nobel Prize for Physics in 1920.

In 1883 Guillaume joined the International Bureau of Weights and Measures, Sèvres, and from 1915 served as its director. His early studies there included exhaustive investigations of the mercury thermometer and of the volume of the litre, which he found to be 1,000.028 cubic centimetres, not 1,000.000 cubic centimetres as had been accepted. From 1890 he focussed his attention on alloys and developed invar and elinvar. Invar's low coefficient of expansion (change in volume caused by change in temperature) and elinvar's low coefficient of elasticity (change in elasticity caused by change in temperature), combined with their low cost, resulted in their widespread use in scientific instruments.

Guillaumin, (Jean-Baptiste-)Armand (b. Feb. 16, 1841, Paris—d. June 26, 1927, Paris), French landscape painter and engraver who was a member of the Impressionist group.

Guillaumin was a close friend of the painter Camille Pissarro, whom he met while studying at the Académie Suisse. Together they found employment painting blinds, and Guillaumin portrayed his friend at work—"Pissarro Painting Blinds" (*c.* 1868). Guillaumin exhibited in the Salon des Refusés in 1863 and in the first Impressionist exhibit in 1874. One of the more impoverished members of his artistic circle, Guillaumin was obliged in 1872 to take a post with the department of bridges and causeways. It was not until 1892, when he won 100,000 francs in a city lottery, that he was able to give up his government job and paint full time.

Guillaumin painted views of Montmartre, Meudon, and the Seine—*e.g.*, "The Bridge of Louis Philippe" (1875) and "The Port at Charenton" (1878). His execution is direct, bold, and sometimes vehement, and his colour is harmonious. In his art Guillaumin chronicles Impressionist development—from his early still lifes in the style of Édouard Manet to brilliantly coloured late works in the style of Claude Monet.



"The Bridge of Louis Philippe," oil painting by Armand Guillaumin, 1875; in the National Gallery of Art, Washington, D.C.

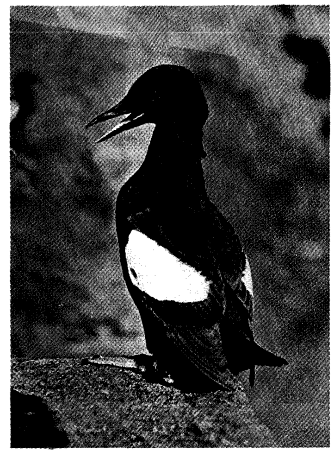
By courtesy of the National Gallery of Art, Washington, D.C., Chester Dale Collection; permission S.P.A.D.E.M., 1971, by French Reproduction Rights, Inc.

Guillemin, Roger Charles Louis (b. Jan. 11, 1924, Dijon, Fr.), French-born U.S. physiologist whose researches into the hormones produced by the hypothalamus gland led to his being awarded a share (with Andrew Schally and Rosalyn Yalow) of the Nobel Prize for Physiology or Medicine in 1977.

Guillemin was educated at the universities of Dijon, Lyon, and Montreal. He taught at the Baylor College of Medicine in Houston, Texas, from 1953 to 1970, except for the years 1960–63, when he was on the faculty of the Collège de France in Paris. From 1970 he was a resident fellow and research professor at the Salk Institute for Biological Studies in La Jolla, Calif. Guillemin was the recipient of the Albert Lasker Award in 1975 and the National Medal of Science in 1977. He became a U.S. citizen in 1963.

Among Guillemin's achievements were the isolation of the first hypothalamic hormone to be discovered, TRH (thyrotropin-releasing hormone); the isolation and synthesis of somatostatin, a hypothalamic hormone that regulates activities of the pituitary gland and the pancreas; and the discovery of a new class of hormonal substances called endorphins.

guillemot, any of three species of black and white seabirds of the genus *Cepphus,* in the auk family, Alcidae. The birds have a pointed, black bill and red legs. In British usage, the name guillemot also refers to birds that in America are called murres. Guillemots are deep divers that feed on the bottom. The best known of the three species is the black guillemot, or tystie (*C. grylle*). It is about 35 cm (14 inches) long and is coloured black with white wing patches in the breeding season. In winter it is fully white below and speckled brown and white above. The black guillemot breeds around the Arctic Circle and winters south to the British Isles, Maine, and the Bering Strait, usually remaining within sight of land and never forming large flocks. The similar pigeon guillemot (*C. columba*) breeds along both coasts of the North Pacific, south to Japan and southern California. The spectacled guillemot (*C. carbo*) breeds from Japan to the Kuril Islands. The two spotted eggs of guillemots are laid in a crevice, where the young remain for six weeks until they can fly.



Black guillemot (*Cepphus grylle*)

Peter Laub—Ardea

Guillén, Jorge (b. Jan. 18, 1893, Valladolid, Spain—d. Feb. 6, 1984, Málaga, Spain), Spanish lyric poet who experimented with different metres and used verbs rarely but whose work proved more accessible than that of other experimental poets.

Guillén, the son of a newspaper publisher, studied in Switzerland and at the University of Granada before graduating from the University of Madrid in 1913. He taught Spanish at the University of Paris from 1917 to 1923 and began publishing his poetry. He earned a doctorate at the University of Madrid in 1924 and taught at the University of Murcia, the University of Seville, and University of Oxford. In 1927 he participated in the tercentenary of Luis de Góngora, became a member of the Generation of 1927, and in 1928 published his collection *Cántico* ("Canticle"; *Cantico: A Selection of Spanish Poems*), which he expanded in subsequent editions in 1936, 1945, and 1950. He was influenced by Paul Valéry and Juan Ramón Jiménez, who sought "pure poetry," emphasizing the musical properties of language over narrative and didactic motives.

Guillén went to the United States during the Spanish Civil War, taught Spanish at Wellesley College (1940–57), and later lectured at numerous other universities in the United States, Europe, Canada, and Latin America. From 1957 to 1963 Guillén published *Clamor,* a three-volume collection of poems in which a sad awareness of the evanescence and limitations of life replaces the uncomplicated positivism of *Cantico.* In 1976 the Spanish government awarded him the first Miguel de Cervantes Prize. *Guillén on Guillén: The Poetry and the Poet* (1979) is a selection of bilingual editions of poems from various stages of Guillén's career, accompanied by comments by the poet.

Guillén (Batista), Nicolás (b. July 10, 1902, Camagüey, Cuba—d. July 16, 1989, Havana), Cuban poet of social protest and a leader of the Afro-Cuban movement in the late 1920s and 1930s. His commitment to social justice made him the national poet of revolutionary Cuba.

Guillén read widely during his youth and abandoned his law studies at the University of Havana in 1921 in order to concentrate on his poetry. Of mixed African and European descent, he combined a knowledge of traditional literary form with firsthand experience of the speech, legends, songs, and *sones* (popular dances) of the Afro-Cubans in his first volume of poetry, *Motivos de son* (1930; "Motifs of *Son*"), which was soon hailed as a masterpiece and widely imitated.

During the following years Guillén became more outspoken politically. No longer satisfied with mere picturesque portrayal of the daily life of the poor, he began to decry their oppression in the volumes *Sóngoro cosongo* (1931) and *West Indies Ltd.* (1934). The poems of *Cantos para soldados y sones para turistas* (1937; "Songs for Soldiers and *Sones* for Tourists") reflect his growing commitment; that year Guillén went to Spain to fight with the Republicans in the Spanish Civil War. From this experience came the poems collected in *España* (1937; "Spain").

Guillén returned to Cuba after the defeat of the Spanish republic, joined the Communist Party, and continued to speak out for social and political reform. He became recognized by many critics as the most influential of those Latin American poets who dealt with African themes and re-created African song and dance rhythms in literary form. He was arrested several times and was exiled from Cuba during the regime of Fulgencio Batista in the 1950s, and he was an ardent supporter of Fidel Castro's revolution in 1959. Guillén subsequently served as the longtime director of Cuba's Union of Writers and Artists and was a member of the Central Committee of the Cuban Communist Party. He continued to treat themes of revolution and social protest in such later volumes of poetry as *Elegías* (1958; "Elegies"), *La paloma de vuelo popular* (1959; "The Dove of Popular Flight"), and *Tengo* (1964; "I Have").

guillotine, instrument for inflicting capital punishment by decapitation, introduced into France in 1792 during the Revolution. It consists of two upright posts surmounted by a crossbeam and grooved so as to guide an oblique-edged knife, the back of which is heavily weighted to make it fall forcefully upon (and slice through) the neck of a prone victim.

Previous to the French Revolution, similar devices were in use in Scotland, England, and various other European countries—often for the execution of criminals of noble birth.

A French physician, Joseph-Ignace Guillotin, who was born at Saintes in 1738 and elected to the National Assembly in 1789, was instrumental in having a law passed requiring all sentences of death to be carried out by "means of a machine." This was done so that the privilege of execution by decapitation would no longer be confined to the nobles and the process of execution would be as painless as possible. After the machine had been used in several satisfactory experiments on dead bodies in the hospital of Bicêtre, it was erected on the Place de Grève for the execution of a highwayman on April 25, 1792. At first the machine was called Louisette, or Louison, but soon became known as *la guillotine.* Later the French underworld dubbed it "the widow." Use of the guillotine continued in France well into the 20th century, diminishing during the 1960s and 1970s, with only eight executions occurring between 1965 and the last one in 1977. In September 1981 France outlawed capital punishment and abandoned the use of the guillotine. *Compare* beheading.

Guimarães, town and *concelho* (township), Braga *distrito* ("district"), northwestern Portugal, at the foot of the Serra de Santa Catarina (2,018 feet [615 m]), northeast of the city of Porto. Founded in the 4th century, Guimarães in the 12th century became the first capital of Portugal. Its landmarks include the 10th-century castle (where Afonso I, Portugal's first king, was born) on a hill overlooking the town; the Romanesque church, Nossa Senhora da Oliveira (rebuilt 1387–1400); the 14th-century monastery and church of St. Francis (with tiles, frescoes, and a 15th-century cloister); and a Dominican convent now housing a notable museum of antiquities. An industrial centre, Guimarães produces woolen goods, linen, goldsmith's items, and cutlery. Pop. (1981) town, 22,092; *concelho,* 146,957.

Guimarães, Bernardo (Joaquim da Silva) (b. Aug. 15, 1825, Ouro Prêto, Braz.—d. March 10, 1884, Ouro Prêto), poet, dramatist, and regional novelist whose works marked a major transition toward greater realism in Brazilian literature and who was popular in his time as a minor romantic novelist.

After a youthful bohemian life in São Paulo, Guimarães retired to his native Minas Gerais to write and teach school. Guimarães' subject, like that of his contemporary José Martiniano de Alençar, was the Brazilian frontier, but he avoided Alençar's romanticism. His antislavery novel *A Escrava Isaura* (1875; "The Slave Girl Isaura"), which helped to promote abolitionist sentiment in Brazil, is an early example of Latin-American social-protest literature. The black heroine and the "good" white characters are alike. The novel was compared to Harriet Beecher Stowe's *Uncle Tom's Cabin* (1852).

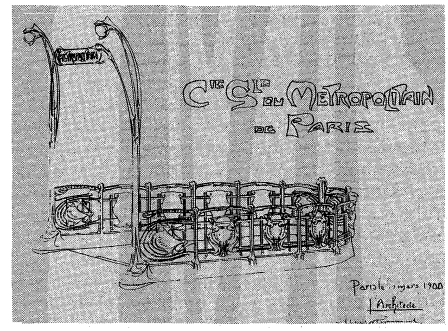
Guimarães Rosa, João (b. June 27, 1908, Cordisburgo, Braz.—d. Nov. 19, 1967, Rio de Janeiro), novelist and short-story writer whose innovative prose style, derived from the oral tradition of the *sertão* (hinterland of Brazil), revitalized Brazilian fiction in the mid-20th century.

Guimarães Rosa studied medicine at Belo Horizonte, returning to the region of his birth as a general practitioner after his graduation. His urge to travel, however, soon led him into the Brazilian foreign service, and he became a diplomat in several world capitals, attaining ambassadorial rank in 1963.

With the publication of *Sagarana* (1946), a collection of short stories set in the *sertão,* Guimarães Rosa was hailed as a major force in Brazilian literature. The demands of his diplomatic career, however, prevented the appearance of another work until 1956, when *Corpo de Baile* ("Corps de Ballet"), a collection of seven short novels, was published. His monumental epic novel, *Grande Sertão: Veredas* (1956; *The Devil to Pay in the Backlands*), firmly established his international reputation. Turning exclusively to the short story, Guimarães Rosa published several more collections before his death, notably *Primeiras Estórias* (1962; *The Third Bank of the River*).

Guimard, Hector(-Germain) (b. March 10, 1867, Lyon, Fr.—d. May 20, 1942, New York, N.Y., U.S.), architect, decorator, and furniture designer, probably the best-known French representative of Art Nouveau.

Guimard studied and later taught at the École des Arts Décoratifs and at the École des Beaux-Arts in Paris. Although much of his work is more engineering than architecture, he considered himself an *architecte d'art.* His Castel Béranger apartment building at 16 rue La Fontaine, Passy, Paris (1894–98), was one of the first Art Nouveau edifices outside Belgium, where the style originated. Several entrance structures (1898–1901) for the Paris Métro (subway), of cast iron in plant-like forms, are his best-known works. The Place de la Bastille station suggests Chinese



Project for a Paris Métro station, drawing by Hector Guimard, 1900

Photograph by courtesy of the Museum of Modern Art, New York City

pagoda architecture as well as Art Nouveau. The elevations and decorative ironwork of his apartment houses at 17–21 and 60 rue La Fontaine (1911) are tasteful and restrained. More bizarre, perhaps because its setting permitted a freer treatment, is the Castel Henriette in Sèvres (1903). Guimard also designed an Art Nouveau synagogue, at 10 rue Pavée, Paris (1913).

Guimard, (Marie-) Madeleine (baptized Dec. 27, 1743, Paris, Fr.—d. May 4, 1816, Paris), leading ballerina at the Paris Opéra for nearly 30 years.

Guimard was dancing at the Comédie-Française at the age of 15 but soon transferred to the Opéra. While understudying Marie Allard, she replaced her in the role of Terpsichore

Madeleine Guimard in *La Chercheuse d'esprit,* engraving by Jean Prud'hon, *c.* 1850

By courtesy of Ivor Guest

in *Les Fêtes grecques et romaines* (1762) and, with her light, delicate steps, won immediate recognition. Made premiere danseuse in 1763, she appeared in Rameau's *Castor et Pollux* and, with her clear and expressive pantomime, was an ideal performer in Jean-Georges Noverre's dramatic ballets, excelling in *Les Caprices de Galatée* and *Médée et Jason.* Nevertheless, she supported her colleague Maximilien Gardel, whose *La Chercheuse d'esprit* was her favourite ballet, in opposing Noverre's engagement as ballet master at the Opéra.

A thin woman, she was called "the skeleton of the graces" by her contemporaries. In the prime of her career she had smallpox, but its scars did not detract from her popularity or hinder her love affairs. The painter Jean-Honoré Fragonard was among her many ardent admirers, painting her several times and decorating one of her magnificent houses. She did not marry until after her retirement in 1789, when she became the wife of the dancer and poet Jean-Étienne Despréaux.

guimbarde (musical instrument): *see* Jew's harp.

Guimerá, Ángel (b. May 6, 1847, Santa Cruz de Tenerife, Canary Islands, Spain—d. July 18, 1924, Barcelona), Catalan playwright, poet, orator, and fervent supporter of the Catalan literary revival known as the Renaixensa movement.

Guimerá's parents took him to Catalonia when he was seven, and the region left its mark on him. He studied in Barcelona before settling in the village of Vendrell. In 1872 he moved permanently to Barcelona, where he was editor of *Renaixensa,* a literary magazine. In 1877 he won the highly competitive Catalan poetic contests (*Jocs Florals*) and was named master troubadour (*mestre en gai saber*).

His public speeches, collected in *Cants a la Pàtria* (1906; "Songs to the Fatherland"), his poetry, and most of his plays were concerned with awakening the Catalans' long-submerged pride in their ancient language and culture. His most celebrated play, the widely translated *Terra baixa* (1896; *Martha of the Lowlands*), was made into a film (1946) and was the basis for a German and a French opera (*Tiefland* and *La Catalane,* respectively). His other plays include historical and modern tragedies, rural drama, and comedy.

Guimet Museum, French MUSÉE GUIMET, museum in Paris, housing art collections from all parts of Asia. The original collection was begun in Lyon, Fr., in 1879 by Émile Guimet, donated to France in 1884, and moved to Paris in 1888.

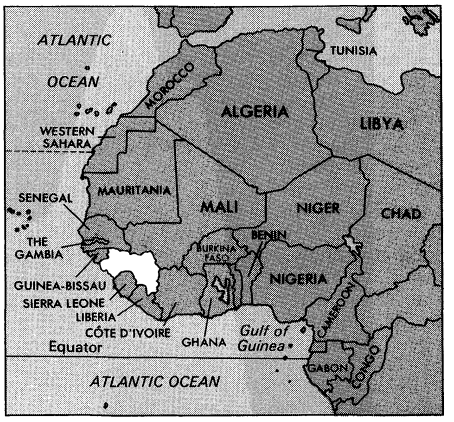
In 1945 the collections in Oriental art in the Louvre were transferred to the Guimet, and it was established as the Department of Asiatic Arts of the Louvre Museum. The library includes works on Asian religion and philosophy as well as art.

Guiné, Casa da (English: "House of Guinea"), also called (from 1481–82) CASA DE GUINÉ E MINA, or CASA DA MINA, byname CASA DA INDIA, 15th-century Portuguese establishment that managed the trade in products from overseas colonies. It was so called because it began by processing products from Guinea. Originally housed in a warehouse at Lagos in southern Portugal, it was reestablished in Lisbon with the death of Prince Henry the Navigator (1460). As trade from São Jorge da Mina (now Elmina, Ghana) on the African Gold Coast increased, it became known as the Casa de Guiné e Mina.

Until 1499, the Casa represented, in embryonic form, a colonial ministry in Portugal, in charge of storing merchandise, collecting duty on incoming goods, maintaining the Portuguese merchant fleet, and arranging shipping schedules. Portugal's overseas trade grew tremendously as contact with the Orient was established after Vasco da Gama rounded the Cape of Good Hope in 1497–98. The Casa was renamed Casa da India and subsequently divided into *mesas* (boards) to handle the spice trade, finances, ship scheduling and maintenance, training of seamen, documentation and correspondence, and legal and juridical matters. It later also controlled the colonization of Brazil and eventually evolved into the government colonial ministry.

Guinea, officially REPUBLIC OF GUINEA, French RÉPUBLIQUE DE GUINÉE, formerly (1979–84) PEOPLE'S REVOLUTIONARY REPUBLIC OF GUINEA, country of Western Africa,

covering an area of 94,926 square miles (245,857 square km). The capital is Conakry. Facing the Atlantic Ocean to the west, Guinea is bordered by Guinea-Bissau and Senegal on the north, Mali on the north and east, Côte d'Ivoire (Ivory Coast) on the southeast, and



Guinea

Liberia and Sierra Leone on the south. The population in 1990 was estimated at 6,876,000.

A brief treatment of Guinea follows. For full treatment, *see* MACROPAEDIA: Western Africa.

For current history and for statistics on society and economy, *see* BRITANNICA WORLD DATA ANNUAL.

The land. Guinea has four topographical regions: Lower Guinea, the Fouta Djallon, Upper Guinea, and the Forest Region. Lower Guinea comprises the coast and coastal plain, which are sandy and interspersed with lagoons and mangrove swamps. To the east the Fouta Djallon highlands rise sharply from the coastal plain and cover an area of more than 5,000 square miles (12,950 square km) at elevations above 3,000 feet (900 m). Their highest point, Mount Loura, rises to 4,970 feet (1,515 m) near the town of Mali in the north. Upper Guinea comprises the Niger Plains that slope northeastward toward the Sahara (desert). The Forest Region, an isolated forested highland in the southeast, rises to 5,747 feet (1,752 m) at Mount Nimba, the country's highest peak. Western Africa's three major rivers—the Niger, Sénégal, and Gambia—rise in the Fouta Djallon and drain more than half of Guinea's territory before exiting the country on their way to the Atlantic. Generally Guinea has laterite soils. Sandy brown soils predominate in the northeast, and alluvial soils occur along the major rivers.

The coastal region and much of the inland area have a humid tropical climate with a long rainy season of six months. The average annual rainfall at Conakry is 170 inches (4,300 mm), and annual temperatures average about 81° F (27° C). April is the hottest month; July and August are the wettest. Rainfall in the highlands varies between 63 and 91 inches (1,600 and 2,300 mm), and the average annual temperature is about 77° F (25° C). About two-fifths of Guinea is covered by tropical rain forest, containing teak, mahogany, and ebony trees. The coast is fringed with mangrove trees. In Upper Guinea the savanna comprises several species of tall grasses. Wildlife such as monkeys, hyena, hippopotamus, and poisonous snakes are common; elephant, wild boar, antelope, and chimpanzee are rarer.

Arable land (6 percent of the total land area) lies generally in the southeastern part of the country. Although the highland pasturelands provide ample feed for cattle during the summer rainy season, the dry winter months tax the nomadic skills of the country's herdsmen. Guinea has between one-third and one-half of the world's reserves of bauxite, as well as minable reserves of iron ore and diamonds.

The people. The four major geographic regions of Guinea largely correspond to the areas inhabited by the major ethnolinguistic groups. The Fulani people have come to dominate the Fouta Djallon region culturally; the Malinke have widely influenced Upper Guinea and the northern Forest Region; and the Susu are dominant in Lower Guinea. In the Forest Region, however, the Kissi, Loma, and Kpelle peoples each retain their own historical and cultural identities. Eight languages besides French, the official language, are taught in Guinea's schools; they are Basari, Pular (a dialect of Fulfulde, the language of the Fulani), Kissi, Koniagi, Kpelle, Loma, Malinke, and Susu. The majority of the population is Muslim; only a small percentage is nominally Christian, mostly Roman Catholic. The annual rate of growth of the population is fairly high by world standards but is comparatively low for sub-Saharan Africa. More than two-fifths of Guinea's population are less than 15 years old, and only one-fourth of the population is urban. Immigration is minimal, but emigration—especially from Fouta Djallon and Upper Guinea—is high.

Economy. Guinea has a developing, mixed economy based largely on agriculture and mining. The gross national product (GNP) is not growing as rapidly as the population; the GNP per capita is among the lowest in the world.

Agriculture accounts for about two-fifths of the GNP and employs more than four-fifths of the work force. The main commercial crops are bananas, coffee, pineapples, oil palm, peanuts (groundnuts), and citrus fruits. Staple crops of cassava, rice, and corn (maize) are supplemented by substantial livestock herds (especially cattle). The government gives priority to agriculture in its development spending, and programs to develop rice production have been launched with major financing from multilateral international agencies. Commercial fishing is little-developed but has considerable potential. Timber resources are used mainly for fuel.

Mining, accounting for about one-eighth of the GNP and employing only a small percentage of the work force, accounts for more than 90 percent of all exports. Guinea is the world's second largest producer of bauxite. Most bauxite production is accounted for by one of several joint ventures between the Guinean government and international consortiums of private companies, with the government receiving a substantial share of all profits. Diamond mining is undertaken by two private companies in which the government has a 50 percent holding. There is exploration for petroleum offshore, and substantial iron-ore reserves are being developed.

Manufacturing is largely small-scale and dominated by import-substitution industries. Most plants operate below capacity because of shortages of raw materials and skilled workers. Energy production has risen with the demands of the mining sector, and a major hydroelectric dam has been constructed on the Bafing River with financing from Yugoslavia.

Trade and finance account for one-fourth of the GNP but employ less than 2 percent of the work force. General road facilities remain inadequate, but special transportation and other facilities needed for mineral development have seen improvement. The country is served by a railway linking Conakry, Guinea's principal port and site of its international airport, with Kankan.

Guinea's budget includes large amounts for development, most of which is financed by foreign loans from both Eastern and Western blocs. Despite widespread smuggling of agricultural products, especially coffee, to neighbouring countries where higher prices are often obtainable, increasing mineral exports during the 1980s have resulted in substantial trade surpluses. Principal trading partners include the United States, France, Germany, Spain, and Brazil.

Government and social conditions. Political life in the Republic of Guinea was dominated by the Democratic Party of Guinea (PDG), organized by Ahmed Sékou Touré, who was elected president of Guinea in 1958. Touré was routinely reelected until his death in 1984, after which a Military Committee for National Redress (CMRN) assumed power in a coup and dissolved the PDG. Under the CMRN the president of the republic, who is also head of government, is assisted by a council of ministers.

Health conditions in Guinea are poor. Few of the people have access to safe water, and public-health measures are limited to elementary sanitation and vaccinations against smallpox and yellow fever. Malaria, schistosomiasis, tuberculosis, leprosy, yaws and other venereal diseases, and intestinal parasites are endemic. The infant mortality rate is one of the highest in sub-Saharan Africa and is among the worst in the world. Guinean life expectancy, about 40 years, is one of the lowest in the world.

Public education is compulsory for children age 7 to 13 but fails to reach two-thirds of this age group. Illiteracy is extremely high in Guinea. French has been adopted as the language of instruction, although local languages are also used. The University of Conakry (1984) functions on an irregular basis. There is also a polytechnic institute in Conakry and an agricultural school in Faranah. Television broadcasting began in 1977 and is under government control.

Cultural life. Museums in Conakry, Kissidougou, and Beyla highlight the prehistory, ethnography, and arts of Guinea. Local handicrafts include leather goods, woven and coiled baskets, tie-dyed textiles, and musical instruments and small sculptures handcrafted from wood. Guinea has two national dance troupes, which perform abroad.

History. Around AD 900, successive migrations of the Susu, a group related to the Malinke peoples, swept down from the desert areas of the north and east and pushed the original inhabitants, the Baga, to the Atlantic coast. Small kingdoms of the Susu rose in importance in the 13th century and later extended their rule to the coast. In the mid-15th century the Portuguese visited the coast and developed a slave trade.

In the 16th century the Fulani established domination over the Fouta Djallon region. The *almamys* (emir) of the Fulani founded a vast feudal empire and started a holy war in 1725 in order to convert the peoples of the plateau to Islām; the empire lasted into the 19th century. French merchants were active around the Nunez River in the 17th century, but, until the 19th century, trade, limited to slaves and ivory, was confined to the coast and was conducted mainly by the Portuguese.

In the early 19th century the French established a settlement on the Nunez River and in 1849 proclaimed the coastal region a French protectorate. The protectorate was called Rivières du Sud and was administered with Senegal until Rivières du Sud became a separate colony in 1890. It was renamed French Guinea and in 1895 became part of the federation of French West Africa. The colony was enlarged by addition of territories on the right bank of the Niger and in the hinterland of Sierra Leone and Liberia and by the cession in 1904 of the Los Islands from Great Britain. Pacification of the Fouta Djallon and of southern Guinea was achieved with difficulty.

In 1946 Guinea's status changed to that of an overseas territory of France. In 1958 it achieved independence and joined the United

Nations, and Sékou Touré became the first president. In 1970 an invasion, attempted by Guinean exiles and Portuguese troops, failed. Relations with Guinea-Bissau deteriorated in 1980 over a disputed maritime zone that was believed to lie over major petroleum resources. After Touré's death in 1984, his successors began to abandon the centralized economic control and political isolationism that had characterized his regime.

Guinea, the forest and coastal areas of western Africa between the tropic of Cancer and the equator. Derived from the Berber word *aguinaw,* or *gnawa,* meaning "black man" (hence *akal n-iguinamen,* or "land of the black men"), the term was first adopted by the Portuguese and, in forms such as Guinuia, Ginya, Gheneoa, and Ghinea, appears on European maps from the 14th century onward.

There is a distinction between Upper and Lower Guinea, which lie westward and southward, respectively, of the line of volcanic peaks that runs northeast from Annobón (formerly Pagalu) Island through São Tomé to Mount Cameroon. The Gulf of Guinea is a part of the Atlantic Ocean adjacent to this coastal area. Sections of the coast of Guinea were known by their chief products, such as the Grain Coast (from Cape Mesurado to Cape Palmas, along present-day coastal Liberia), so called because it was the source of the "grains of paradise" (Guinea pepper, *Xylopia aethiopica*); the Ivory Coast (beyond Cape Palmas and now mostly in Côte d'Ivoire), the Gold Coast (east of Cape Three Points, along present-day Ghana), and the Slave Coast (between the Volta River and the Niger River delta, along present-day Togo, Benin, and Nigeria).

Cape Bojador (latitude 26° N) was rounded by the Portuguese seaman Gil Eannes (Gilianes) in 1434, and some years later the first cargoes of slaves and gold were brought back to Lisbon. A papal bull gave Portugal exclusive rights over the western coast of Africa, and in 1469 Fernão Gomes was granted a trade monopoly, with the provision that 300 miles (480 km) of new coast be explored annually. The equator was reached in 1471 and the Congo River reached by Diogo Cão in 1482. After 1530 other Europeans, including English, Dutch, French, Danish, and Brandenburgers, established trading posts or forts in the area.

European penetration of Guinea was hindered by several factors: the hot, humid, and unhealthy climate; the density of the rain forest; the scarcity of harbours along the generally surf-bound coast; and the difficulties of river navigation.

Guinea, Gulf of, part of the eastern tropical Atlantic Ocean off the western African coast, extending from Cap López, near the equator, to Cape Palmas at 7° west. Its major tributaries include the Casamance, Volta, and Niger rivers.

The coastline of the Gulf of Guinea forms part of the western edge of the African tectonic plate and corresponds remarkably to the continental margin of South America running from Brazil to the Guianas. The coincidence between the geology and the geomorphology of these two coastlines constitutes one of the clearest confirmations of the theory of continental drift.

The continental shelf of the Gulf of Guinea is almost uniformly narrow and widens to as much as 100 miles (160 km) only from Sierra Leone to the Bijagós Archipelago, Guinea-Bissau, and in the Bight of Biafra. The Niger River has built a great delta of Holocene (less than 10,000-year-old) muds—and it is only here that the fit between the African and South American tectonic plates is seriously disturbed.

The only active volcanic region is the island arc aligned with Mount Cameroon (13,353 feet [4,070 m]) on the coast of the Cameroon Republic; the islands of this arc (Bioko [Fernando Po], Príncipe, São Tomé, and Annobón) extend 450 miles (724 km) offshore to the southwest.

The entire northern coast of the Gulf is washed by the eastward flow of the Guinea Current, which extends 250–300 miles (400–480 km) offshore from Senegal to the Bight of Biafra. The Gulf's tropical water is separated from the equatorward flow of the cool Benguela and Canary currents by sharp frontal regions off the Congo and Senegal rivers, respectively. The Benguela Current, as it swings westward, forms the South Equatorial Current to the south of, and running counter to, the Guinea Current.

The warm tropical water of the Gulf of Guinea is of relatively low salinity because of river effluents and high rainfall along the coast. This warm water is separated from deeper, more saline, and colder water by a shallow thermocline, *i.e.,* a layer of water between upper and lower levels, that lies usually less than 30 m (100 feet) deep. Coastal upwelling, and hence a rich production of plant and animal life, occurs seasonally and locally off Senegal and the Congo and off the central Gulf coasts of Ghana and Côte d'Ivoire.

The variety of the marine flora and fauna of the Gulf of Guinea is limited when compared with that of the western tropical Atlantic and, especially, with the Indo-Pacific biogeographic realm. This relative biological poverty results from (1) a lack of coral-reef ecosystems because of low salinity and the high turbidity of Guinea Current water, and (2) the climatic regression to cool conditions during the Miocene epoch (23.7 million to 5.3 million years ago), during which far fewer refuges for tropical species of animals and plants were available in the Atlantic than in the Indo-Pacific region.

Because most of the coast is low-lying, is without natural harbours, and is largely separated from the dry land of the interior by a belt of muddy mangrove-infested creeks and lagoons, the African coastal peoples have usually not taken easily to seafaring on the Gulf. Groups located in Senegal and Ghana, where the coast is less irregular and coastal fisheries are relatively productive, form an exception. The Gulf's natural resources include offshore oil deposits and metal ore deposits within the continental shelf.

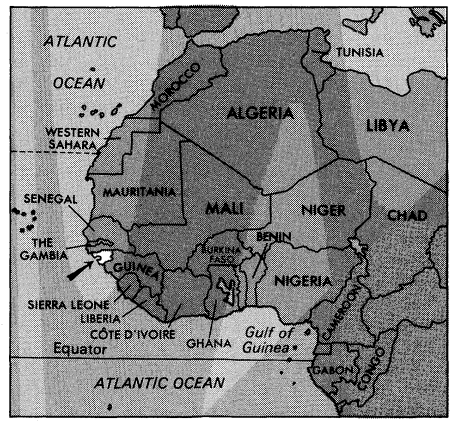
Guinea-Bissau, officially REPUBLIC OF GUINEA-BISSAU, Portuguese REPÚBLICA DA GUINÉ-BISSAU, formerly (until 1974) PORTUGUESE GUINEA, small country of western Africa, covering an area of 13,948 square miles (36,125 square km). The capital is Bissau. The Bijagós (Bissagos) Archipelago, lying off the Atlantic coast to the southwest, also forms part of the country. Its two neighbours are Senegal to the north and Guinea to the east and south. The population in 1990 was estimated to be 973,000.

A brief treatment of Guinea-Bissau follows. For full treatment, *see* MACROPAEDIA: Western Africa.

For current history and for statistics on society and economy, *see* BRITANNICA WORLD DATA ANNUAL.

The land. Guinea-Bissau may be divided, from southwest to northeast, into three regions: the coastal lowlands, the interior plain, and the northeastern highland. The coastal lowlands are covered by extensive mangrove swamps, and a dense network of rias, or drowned valleys, covers roughly one-third of the country, extending inland to the northeast. Average rainfall is highest in this region, decreasing from more than 100 inches (2,500 mm) along the coast to between 70 and 80 inches (1,800 and 2,000 mm) inland. Tropical crops such as rice and sugarcane are raised here.

The interior plain, lying generally to the northwest between the Geba River (one of several rivers meandering across the country's monotonously level landscape) and the Senegal border, is heavily forested and shares the coast's high temperatures (annually averaging between 79° and 81° F [26° and 27° C]); rainfall ranges between 60 and 70 inches (1,500 and 1,800 mm).



Guinea-Bissau

The northeastern highland comprises the outlying ridges of Guinea's Fouta Djallon plateau (rising to heights of 600 feet [180 m]); the highlands of the Bafatá Plateau in the centre of the country; and the Gabú Plateau in the northeast. Rainfall diminishes to less than 50 inches (1,300 mm) in this region, and the dry season (November to April) is more marked than in the southeast. It is essentially an extension of the Senegalese and Guinean savanna regions; it supports such dryland crops as sorghum, millet, and cotton.

Much of the country's wildlife is aquatic; crocodiles, snakes, and such birds as pelicans and flamingos abound. The savannas support substantial populations of gazelles, leopards, and hyenas.

Guinea-Bissau has substantial deposits of bauxite and phosphates, but these have not been developed.

The people. The peoples who inhabit Guinea-Bissau speak languages derived from the Niger-Congo family, and the Balanta Brassa, Fulani, Malinke, and Mandyako are the four major ethnic groups. The animist Balanta Brassa are a people who belong to a stateless society revolving around the family. The Fulani are essentially Muslim pastoralists; their society is hierarchical. The Mandyako are horticulturists. The Malinke are agriculturalists and traders.

Portuguese is the official language, but each tribe speaks its own vernacular, which in turn is divided into dialects. The majority of the people follow traditional religious beliefs. Islām is the dominant minority religion. Christianity has made few inroads in Guinea-Bissau. The annual rate of growth of Guinea-Bissau's population is relatively low in comparison with the rest of sub-Saharan Africa. The people are predominantly rural, and more than two-fifths of the population are less than 15 years old.

The economy. Guinea-Bissau has a developing, primarily agricultural economy. The gross national product (GNP) is not growing as rapidly as the population; the GNP per capita is one of the lowest in the world.

About half of the GNP originates from agriculture, which employs about four-fifths of the total labour force. Only about 10 percent of the total land area is arable. Part of Guinea-Bissau is located in the Sahel region, where rainfall is undependable and crop production varies with it; irrigation is therefore of great

importance. Most of the land is nationalized and is farmed by collectives, although the government grants some private concessions. Peanuts (groundnuts) and coconuts are the leading cash crops and provide about two-fifths of all export earnings; cashew nuts are also exported. Rice, cassava, plantains, sweet potatoes, sugarcane, and other vegetables and melons are the principal domestic crops. Cereal crops are not produced in adequate quantities for local needs, and some must be imported. Guinea-Bissau's crop production is marketed only through state agencies, and there is considerable smuggling of peanuts out through Senegal.

Much of the 46 percent of the land that is pasture is marginal; livestock pastoralism is concentrated among the Balanta Brassa and Muslim nomads. Cattle, goats, and pigs are the principal animals; milk production is inadequate, and consequently dairy products must be imported.

Forests cover about 38 percent of the land in Guinea-Bissau; of the wood that is cut, most is used for fuel, though a local hardwood called *bissilom* is exported. Fishing has been developed by joint Soviet-, Algerian-, and French-Guinean companies and provides about one-tenth of exports, as well as supplying local needs. Despite reported mineral reserves, there is very little mining in Guinea-Bissau. Clay, supplying a local brick-and-tile factory, is the only mineral extracted.

The main industry is food processing, including frozen and tinned fish; palm oil, palm kernels, and copra; and shelled peanuts and peanut oil. There is also manufacturing of textiles, clothing, beer, soft drinks, and rum. Electrical energy is produced by thermal power plants using imported fossil fuels.

The government controls all sectors of the economy. The poor performance of the state-owned industries, coupled with the Sahel drought of the late 1970s and early 1980s, locust plagues, and losses through smuggling, has put the government severely in debt. Portugal, the Scandinavian nations, the European Economic Community, and Saudi Arabia are the main sources of foreign aid, which often amounts to some two-thirds of the total national budget.

There are no railways in Guinea-Bissau. Less than one-tenth of the road network is paved. Inland waterways are navigable in the most heavily populated areas and are important for local transport; the principal seaport is Bissau. There is an international airport at Bissalanca, near Bissau.

Exports equal only about one-fifth of imports and consist primarily of agricultural products and fish; these are shipped mostly to Romania, Portugal, China, and France. Imports consist principally of food and beverages, textiles and clothing, petroleum products, transportation equipment, and machinery and spare parts and are obtained mainly from Portugal, Italy, Belgium and Luxembourg, France, Germany, and The Netherlands.

Government and social conditions. According to the 1984 constitution, Guinea-Bissau is a one-party state ruled by the left-wing African Party for the Independence of Guinea-Bissau and Cape Verde (PAIGC). The National People's Assembly, the country's legislature, has 150 members, who are designated by the eight directly elected regional councils from among their own members. The country's supreme authority is the party's Council of State, consisting of 15 members elected from among the members of the assembly. In the mid-1980s the country's dominant political figure was Brigadier General João Bernardo Vieira, who served as president of the Council of State, head of government, and commander in chief of the armed forces. Vieira governed Guinea-Bissau with the aid of a council of ministers. The PAIGC controlled the governments of both Guinea-Bissau and Cape Verde until 1980, when a coup in Guinea-Bissau caused a break in relations between the two countries (Cape Verde subsequently formed a party of its own).

Health conditions in Guinea-Bissau are among the worst in the world. Many people still suffer from such diseases as tuberculosis, whooping cough, typhoid fever, bacillary dysentery, and malaria. The poor state of health is perhaps best reflected in the country's high infant mortality rate and a life expectancy of only about 43 years.

The country's educational system is hampered by a lack of school facilities and trained teachers. These shortcomings, in large part a consequence of Portuguese colonial neglect, help account for Guinea-Bissau's high adult illiteracy rate of about 70 percent. The nation's radio station and newspaper (*Nô Pintcha*) are controlled by the government.

Cultural life. The major cultural institution is the Museum of Guinea-Bissau, located in the capital; exhibits there focus on ethnography, history, and natural science. The museum's major collection illustrates Guinea-Bissau's economy.

History. More than 1,000 years ago the coast of Guinea-Bissau was occupied by iron-using agriculturists. They were particularly skilled in the production of both irrigated and dry rice and were also the major suppliers of marine salt to the adjacent areas of the western Sudan. At about the same time, the area came under the influence of the Mali empire and became a tributary kingdom known as Gabú. After 1546 Gabú was virtually autonomous; vestiges of the kingdom lasted until 1867.

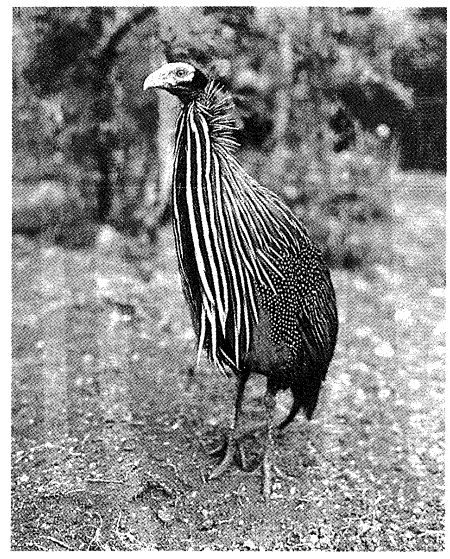
The earliest overseas contacts of the Guinea coast were with the Portuguese, probably from the 1440s. The Portuguese imported slaves from the Guinea area to the Cape Verde Islands and then expanded their slave-trading activities when development of the New World increased the demand for slave labour. Actual Portuguese control of Guinea-Bissau was marginal despite their claims to sovereignty over the area. Except for slaving activities, the local economy was stagnant, and intertribal warfare was frequent.

The end of the slave trade forced the Portuguese into the interior in search of new profits. In 1879 the administration of Guinea-Bissau was separated from that of Cape Verde. The Portuguese subjugation of the interior was slow and sometimes violent; it was not effectively achieved until 1915, though sporadic resistance continued until 1936. Nationalist attacks upon Portuguese administrative and military posts were instigated in 1961 by guerrillas of the PAIGC. More than a decade of warfare resulted in Guinea-Bissau's achievement of independence from Portugal in 1974.

A movement to merge with Cape Verde failed in 1977, and a coup in 1980 led by Brigadier General Vieira, a native Guinean, established the Council of the Revolution, which excluded Cape Verdean blacks from its membership. Constitutional government in Guinea-Bissau returned in May 1984.

Guinea Current, surface oceanic current of the Atlantic Ocean, the eastward continuation of the Atlantic Equatorial Countercurrent, off the western coast of Africa near the Gulf of Guinea. Always north of the equator, the southeastward-flowing Guinea Current changes position with the seasons so that its northern limit lies at approximately latitude 7° N during the winter and latitude 15° N during the summer. The warm, highly saline Guinea Current reaches a depth of less than 660 feet (200 m).

guinea fowl, any of a family, Numididae (order Galliformes), of African birds that are alternatively placed by some authorities in the pheasant family, Phasianidae. The family consists of 7–10 species, one of which, *Numida meleagris,* is widely domesticated for its flesh and as a "watchdog" on farms (it gabbles loudly at the least alarm). The largest and most colourful species is the vulturine guinea fowl (*Acryllium vulturinum*), of eastern Africa, a long-necked bird with a vulturelike bare blue head.



Vulturine guinea fowl (*Acryllium vulturinum*)
S.C. Bisserot—Bruce Coleman Inc./EB Inc.

Wild forms of *N. meleagris* are known as helmet guinea fowl from their large bony crest; the sexes look alike. The helmet guinea fowl has many local varieties widespread in the savannas and scrublands of Africa and has been introduced into the West Indies as well. About 50 cm (20 inches) long, the typical form has a bare face, red and blue wattles at the bill, gray white-spotted plumage, and hunched posture. It lives in flocks and walks about on the ground, feeding on seeds, tubers, and some insects. When alarmed the birds run, but when pressed they fly on short, rounded wings for a short distance. At night they sleep in trees. Helmet guinea fowl are noisy birds giving harsh, repetitive calls. The nest is a hollow in the ground and is scantily lined with vegetation. It contains about 12 finely spotted tan-coloured eggs, which require about 30 days' incubation. The downy young are active immediately after hatching and accompany the parents.

The earliest fossil guinea fowl is of *N. meleagris* of the upper Pleistocene epoch (beginning about 1.6 million years ago) of Czechoslovakia—indicating that the familiar species was once native to Europe.

guinea grains (seeds): *see* grains of paradise.

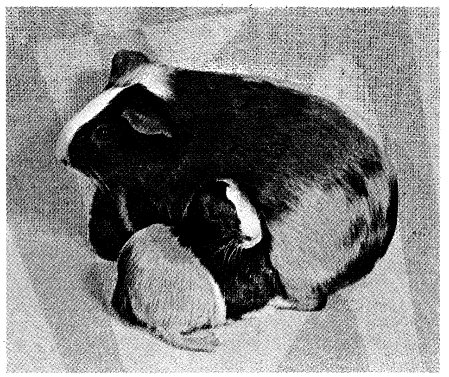
Guinea Highlands, French DORSALE GUINEÉNNE, mountainous plateau extending from the southern Fouta Djallon highlands through southeastern Guinea, northern Sierra Leone and Liberia, and northwestern Côte d'Ivoire (Ivory Coast). The source of the Niger, the longest and most important river of western Africa, the highlands form the divide between the streams that flow northward to the Niger and those that flow southward to the Atlantic coast. The Niger itself rises in Guinea near the Sierra Leone border at an elevation of 2,500 feet (750 m) and less than 200 miles (320 km) from the Atlantic; several of its major tributaries (including the Milo, the Sankarani, and the Bagoé rivers) also originate in the Guinea Highlands.

Composed of granitic gneisses and quartzite, the well-watered plateau averages more than 1,500 feet in elevation and is covered with variegated rain forest and humid savanna. Several mountain ranges rise above its surface, includ-

ing the Nimba Range (Mount Nimba, 5,748 feet [1,752 m]) and Sierra Leone's Loma Mountains (Mount Loma Mansa, 6,390 feet [1,948 m]) and Tingi Mountains (Sankanbiriwa, 6,080 feet [1,853 m]), where its highest peaks are to be found.

The plateau is inhabited by tribal groups who cultivate rice, fonio (a crabgrass cereal), corn (maize), oil palm, coffee, and kola nuts. Large iron-ore deposits in the Nimba Range have been worked since the early 1960s.

guinea pig (species *Cavia porcellus*), domesticated species of South American rodent of the family Caviidae (order Rodentia). The guinea pig was domesticated in pre-Incan times and



Guinea pigs (*Cavia porcellus*)
Joe B. Blossom—EB Inc.

was introduced into Europe soon after the discovery of America; it has since become a popular pet and a valuable research animal. It resembles most other cavies in being stout, short legged, and about 25 cm (10 inches) long. It has small ears and no external tail. The coat may be black, tan, cream coloured, chocolate brown, reddish brown, or white, or a combination of these colours. Hair length varies. In the Peruvian variety it is long and silky; in the Abyssinian it is coarse and forms whorls; in the English, or Bolivian, it is short and smooth.

The guinea pig feeds largely on grass and other green plants and, if supplied with such plants, can get along without water. It may be kept on dry rabbit or rat food, but must then have water. It is more prolific than its wild relatives and may breed three times a year, the female bearing up to eight young per litter; gestation takes 58 to 72 days. The young are well developed at birth and are weaned in about two weeks. Females are sexually mature in two or three months, but ideally should not be bred until they are about nine months old. The average life span is two years, but some may live six years or more.

guinea squash: *see* eggplant.

guinea worm, also called MEDINA WORM, or DRAGON WORM (species *Dracunculus medinensis*), member of the class Nematoda (phylum Aschelminthes). The guinea worm, a common parasite of man in tropical regions of Asia and Africa, has also been introduced into the West Indies and tropical South America. In addition to humans, a variety of other mammals are parasitized by the guinea worm. The disease caused by the worm is called dracunculiasis.

The female grows to a length of 50 to 120 cm (about 20 to 48 inches); the male (which is rarely found because it dies upon mating within a human or other host) measures 12 to 29 mm (about 0.5 to 1.1 inches). Both sexes live in the connective tissue of various organs of the body. Females may live for 10 to 14 months. The female bores close to the skin surface, at which point a blister develops and finally bursts. Millions of larvae are released with the blister fluid. If the larvae are discharged into a watery medium and are eaten by *Cyclops,* an aquatic crustacean, they develop in the crustacean's body into larvae capable of infecting human beings.

The human being becomes infected when he drinks water containing the barely visible flealike crustacean containing the worm larvae. Gastric juices kill *Cyclops,* and the guinea worm larvae bore from man's intestinal tract into blood vessels; they are carried to connective tissue areas, where they develop into adults. Adult worms slowly emerge from blisters, especially on the victim's legs or feet. When the victim enters a pond, stream, or other water, the released larvae are eaten by the crustaceans, to continue the cycle.

For humans the disease dracunculiasis can be extremely debilitating and painful, with worms slowly emerging from open blisters. The open blisters are also a common point of entry for other infections, such as tetanus.

Güines, city, eastern La Habana *provincia,* west-central Cuba. The city is situated in a fertile agricultural region, where irrigation facilitates the crops of sugarcane, tobacco, and various fruits and vegetables for which the region is known; cattle also are raised. Cigar factories, textile mills, and canneries are located in the city; sugar refineries are on the outskirts. Güines is accessible by railroad and highway from Havana. Pop. (1988 est.) 55,420.

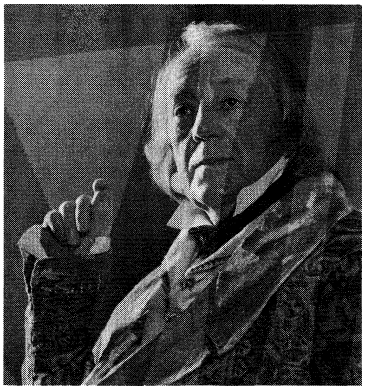
Guinevere, wife of Arthur, legendary king of Britain, best known in Arthurian romance through the love that his knight Sir Lancelot bore for her. In early Welsh literature, one Gwenhwyvar was "the first lady of this island"; in Geoffrey of Monmouth's inventive *Historia regum Britanniae* (early 12th century), she was named Guanhumara and was presented as a Roman lady. In some accounts it was suggested that she was Arthur's second wife.

An early tradition of abduction (and infidelity) surrounded the figure of Guinevere. According to the late 11th- or early 12th-century *Vita Gildae,* she was carried off by Melwas, king of Aestiva Regio (literally, "Summer Region"), to be rescued by Arthur and his army. In Chrétien de Troyes's late 12th-century romance of *Le Chevalier de la charette,* she was rescued by Lancelot (a character whom Chrétien had earlier named as one of Arthur's knights) from the land of Gorre, to which she had been taken by Meleagant (a version of the story that was incorporated in the 13th-century prose Vulgate cycle). Chrétien presented her as one receiving or refusing love in the manner of ladies celebrated in courtly love lyrics. There and in the early part of the Vulgate cycle, courtly love was exalted through the passion of Lancelot and Guinevere; but, in the austerely spiritual part of the Vulgate cycle, the *Queste del Saint Graal,* their adulterous love stood condemned, and Lancelot was unable to look directly at the Holy Grail because of it.

In the early chronicles and later in prose Arthurian romances, Guinevere was abducted by Mordred, Arthur's nephew (or, in some versions, his son), and this action was closely bound up with the death of Arthur and the end of the knightly fellowship of the Round Table. In the early accounts Guinevere was not unwilling; but, in Sir Thomas Malory's late 15th-century prose *Le Morte Darthur,* she became an unhappy victim as far as Mordred was concerned, though she was given her share of responsibility for the final disasters because her love for Lancelot had caused such bitter dissension.

Guinness, Sir Alec (b. April 2, 1914, London, Eng.), British actor famous for the variety and excellence of his stage and screen characterizations.

Throughout his school days Guinness amused his classmates by acting out stories he had invented at the age of seven while ill. He was first a copywriter for an advertising agency, then, after studying acting, made his stage debut in 1934 as an extra at the King's Theatre, Hammersmith, London. Three years later he joined the acting company of John Gielgud



Guinness in the role of William Dorrit, in the film *Little Dorrit,* 1987
Photofest

and appeared in such classics as *Richard II* (1937), *The School for Scandal* (1937), *The Three Sisters* (1937), and *The Merchant of Venice* (1938). In 1938 Guinness starred in a popular modern-dress version of *Hamlet* at the Old Vic Theatre, London. He produced *Twelfth Night* for the Old Vic company in 1948. While on leave from the Royal Navy during World War II, he made his New York stage debut in *Flare Path* (1942–43) and later appeared there in *The Cocktail Party* (1964) and *Dylan* (1964).

Guinness' initial screen role was as Pip's friend Herbert Pocket in *Great Expectations* (1946), which was adapted to the screen from the novel by Charles Dickens. Next came *Oliver Twist* (1948) and then a series of Ealing studio comedies that include the internationally popular *Kind Hearts and Coronets* (1949), in which Guinness played the eight heirs to a dukedom; *The Lavender Hill Mob* (1951), with Guinness as the mousy clerk turned bank robber; *The Man in the White Suit* (1951), with Guinness as the chemist who invents a fabric that will never wear out; and *The Captain's Paradise* (1953), in which he played a lovable bigamist.

Other famous films are *The Bridge on the River Kwai* (1957), for which he won the Academy Award for best actor; *Lawrence of Arabia* (1962), in which he played Prince Feisal; *Star Wars* (1977), in which he played Ben Kenobi; and *Little Dorrit* (1987), in which he played William Dorrit. In 1980 he won a special Academy Award for memorable film performances.

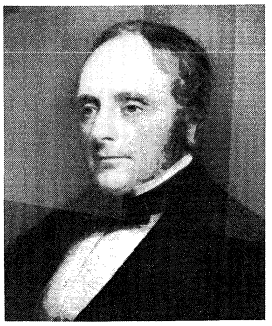
Guinness also wrote dramatizations (*The Brothers Karamazov* and *Great Expectations*) and a film script of *The Horse's Mouth* and coauthored the play *Yahoo* (1976), in which he played the role of Jonathan Swift. Guinness was knighted in 1960. An autobiography, *Blessings in Disguise,* appeared in 1986.

To make the best use of the Britannica, consult the INDEX *first*

Guinness, Sir Benjamin Lee, 1ST BARONET (b. Nov. 1, 1798, Dublin, Ire.—d. May 19, 1868, London, Eng.), Irish brewer and first lord mayor of Dublin (1851), whose brewery became one of the largest in the world.

Guinness assumed control in 1825 of a brewing business limited to domestic sales, Arthur Guinness and Sons, started by his father, Arthur Guinness (died 1855). He then devel-

oped a large export trade of porter and stout to the United States, England, and Europe,



Sir Benjamin Guinness, oil painting by an unknown artist; in a private collection

By courtesy of Guinness PLC

which became the foundation of his fortune. He represented Dublin in Parliament from 1865 until his death. He was created a baronet in 1867.

Guinness PLC, formerly (1982–86) ARTHUR GUINNESS & SONS PLC, or (1886–1982) ARTHUR GUINNESS SON AND CO. LTD., manufacturer of distilled liquors and brewer of a distinctive, dark, creamy stout. Headquarters, formerly in Dublin, are now in London.

The company was incorporated in 1886 as Arthur Guinness Son and Co. Ltd. and became a public limited company in 1982. Guinness was founded when Arthur Guinness bought a small brewery in Dublin. At first the brewery produced a variety of light and dark beers, but in 1799 it was decided to concentrate exclusively on porter, a dark beer with a rich head. The beer prospered and became known as the national beer of Ireland.

In 1855, upon the death of Arthur Guinness, his son Benjamin Lee Guinness took over the company. The beer had long had a strong following in Ireland, and Benjamin spread its fame overseas. Guinness is now sold in more than 120 countries worldwide and has a number of breweries abroad. In 1985 the firm acquired Arthur Bell & Sons PLC, a distiller of Scotch, and in 1986 it bought The Distillers Co. PLC, which was the largest Scotch whisky distiller in the world. Guinness' use of clandestine and apparently illegal stock transactions in acquiring Distillers created a major corporate scandal when these acts became known to the public.

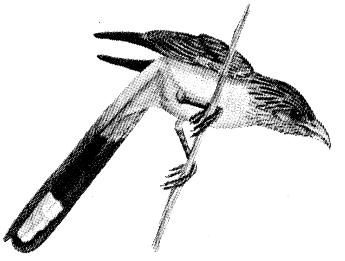
In addition to brewing and distilling, Guinness has interests in pharmaceuticals, plastics, engineering, and leisure and holiday activities. In 1955 the company began publishing *The Guinness Book of Records.* Originally conceived to help settle trivia disputes in pubs, the book is now published worldwide.

Guipúzcoa, province, in the autonomous Basque Country, northern Spain, situated on the Bay of Biscay between Vizcaya (Biscay) province and the French frontier. Its area of only 771 square miles (1,997 square km) makes it the smallest of the Spanish provinces. With Álava and Vizcaya, it became one of the three component provinces of the autonomous region of the Basque Country in 1980. The name was used as a geographical entity from the end of the 10th century, and as a county Guipúzcoa was unified with Castile in 1200. Its chief towns were founded or resettled during the 13th and 14th centuries. Its central position among the three Basque Country provinces has enabled it to preserve its language and ancient traditions more fully than either of the others.

To the east and west the province's boundaries are clearly defined by the valleys of the Bidasoa (French Bidassoa) and Deva rivers, and it is also traversed by the valleys of the rapid and unnavigable Urumea, Oria, and Urola rivers. The province's mountainous and partly forested interior accounts for its primary economic activity—lumbering. Everywhere there is careful and intensive cropping of the lower valley slopes, and much of the land is under pasture. Only a small portion of the total area is cropped, however, chiefly under corn (maize), beans, and numerous small apple orchards. A stock-raising economy dominates, especially of Swiss stall-fed dairy cattle. Iron is mined in the Deva Valley and has fostered light metallurgical industries throughout the province. Paper and textiles are also manufactured. Tourism, based on beach resorts near the provincial capital, San Sebastián (*q.v.*), is also significant economically. Towns of importance include the manufacturing centres of Vergara, Eibar, and Tolosa; the nation's chief customs town, Irún; and Puerto de Pasajes, a busy port. Pop. (1986 est.) 705,933.

Guipuzcoana, Compañía, English GUIPÚZCOA COMPANY, also called CARACAS COMPANY, trading concern chartered by the Spanish crown in 1728, with a monopoly on trade between Spain and Venezuela. It was one of a number of companies for colonial trade established under the 18th-century Bourbon kings, and it was the only one that was financially successful. The company was given extensive commercial privileges to promote officially sanctioned trade and thus to prevent smuggling. It also constructed naval vessels for the government. Named for the Basque province where it was headquartered, the company was responsible for the introduction of such crops as tobacco, indigo, cotton, and cacao into Venezuela. During the War of Jenkins' Ear (1739–48), the company's private army helped to defend the Venezuelan coast from British attacks. The company's sometimes high-handed methods resulted in a revolt among colonists in 1749 that took three years to put down. In 1778 the Compañía Guipuzcoana was abolished by law.

guira (*Guira guira*), bird of eastern tropical South America in the cuckoo family, Cuculidae. It is 40 cm (16 inches) long, with gray-brown streaked body, short frowsy crest, and a thinner bill than that of its close relatives, the anis. Guiras live in small flocks in grasslands and feed on grasshoppers and other insects. Guiras, like anis, give off a strong, pungent odour.



Guira (*Guira guira*)

Painting by Gene M. Christman

Güira de Melena, city, southwestern La Habana province, west central Cuba. It lies amid a fertile agricultural and livestock-raising region known primarily for tobacco, although potatoes and bananas, pineapples, and other tropical fruits are also cultivated. The dairy industry is well developed, and the city contains cigar factories. Pop. (1985 est.) 25,246.

Güiraldes, Ricardo (b. Feb. 13, 1886, Buenos Aires—d. Oct. 8, 1927, Paris), Argentine novelist and poet best remembered for his novel *Don Segundo Sombra* (1926). This work is a poetic interpretation of the Argentinian gaucho, the free-spirited vagabond cattle herder of the pampas (grasslands), and it has become a classic work of Spanish American literature.

The son of a wealthy landowner, Güiraldes spent his boyhood on his family's ranch in the province of Buenos Aires, where he learned the complex traditions of the gaucho. In 1910 he made the first of many journeys to Paris, becoming acquainted there with avant-garde French writers. His first volume of poetry and prose, *El cencerro de cristal* (1915; "The Crystal Bell"), was harshly received by critics because of its stylistic idiosyncracies but has since been recognized as the forerunner of post-World War I literary innovation in Argentina.

Güiraldes soon turned almost exclusively to prose, publishing several novels and short stories that combine his sophisticated formal approaches with his deep and sentimental feeling for his native land and its traditional themes, as in *Cuentos de muerte y de sangre* (1915; "Tales of Death and of Blood") and *Xaimaca* (1923; "Jamaica"). In *Don Segundo Sombra,* the work considered his masterpiece, he combined poetic description of country life with a subtle portrayal of the cattleman Don Segundo, a re-creation of the mythical gaucho, national symbol and folk hero of Argentina.

Guisan, Henri (b. Oct. 21, 1874, Mézières, Switz.—d. April 8, 1960, Lausanne), Swiss military leader and national hero; he was commander in chief of the Swiss Army during World War II.

Guisan was educated at Swiss and foreign universities and graduated with a degree in agriculture. At the age of 30 he achieved the rank of captain in the Swiss Army (1904). After being promoted to colonel (1921), he was appointed commander of the 1st Division in 1926, of the II Army Corps in 1932, and of the I Army Corps in 1933.

On the eve of World War II (August 1939), Guisan was elected general and commander in chief of the Swiss Army. His dramatic and inspirational speech to his officers (July 25, 1940) at the Rütli plateau—the historic site of the original Swiss pact of confederation in 1291—won him the allegiance of the entire nation. Anticipating possible aggression by the encircling Axis powers, he devised and implemented a plan of defense that forsook border areas in order to hold a mountain fortress core—the so-called *réduit.* The Axis powers decided not to attack Switzerland. Retiring from active service in 1945, Guisan was the next year made a member of the Royal Swedish Academy of Military Science.

Guiscard, Robert: *see* Robert *under* Robert (Apulia).

Guiscard, Roger: *see* Roger I *under* Roger (Sicily).

Guise, CARDINALS OF, Roman Catholic cardinals belonging to the House of Guise (a junior branch of the ducal House of Lorraine), grouped below chronologically and indicated by the symbol •. For other cardinals of the House of Guise, *see* Lorraine, cardinals of.

• **Guise, Louis I de Lorraine, 1er cardinal de** (1st cardinal of) (b. Oct. 21, 1527—d. May 29, 1578), brother of François, 2nd duc de Guise.

Named bishop of Troyes (1545) and of Albi (1550), he became in 1553 "cardinal de Guise"—to distinguish him from his brother, the eminent Charles, cardinal de Lorraine (*q.v.*). Unlike his brothers, he preferred the easy life of good food and drink to the life of war and political intrigue and thus gained the name of the cardinal of the bottle (*le cardinal des bouteilles*).

• **Guise, Louis II de Lorraine, 2e cardinal de** (2nd cardinal of) (b. July 6, 1555, Dampierre, Fr.—d. Dec. 24, 1588, Blois), brother of Henri de Lorraine, 3rd duc de Guise, whom he supported vigorously in the

War of the Three Henrys (Henry III, Henry of Navarre, Henry of Guise).

Guise became cardinal in 1574 and archbishop of Reims in 1583 and had an active and bloody role in the wars pursued by the Holy League. He was assassinated at Blois on the day after his brother's assassination; both bodies were burned and the ashes thrown into the Loire.

• Guise, Louis III de Lorraine, 3e cardinal de (3rd cardinal of) (b. Jan. 22, 1575—d. June 21, 1621, Saintes, Fr.), last of the cardinals of the House of Guise, brother of Charles, 4th duc de Guise.

In 1605 Guise became archbishop of Reims and in 1615 cardinal de Guise, but he was scarcely given to the religious life. He formed a long-lived liaison with Charlotte des Essarts, comtesse de Romorantin, after she had ceased being the mistress of King Henry IV; she bore him two children, and rumour had it that they were secretly married.

Guise, DUKES OF, titled French nobility of a junior branch of the ducal House of Lorraine, grouped below chronologically and indicated by the symbol •.

• Guise, Claude de Lorraine, 1er duc de (1st duke of) (b. Oct. 20, 1496, Condé-sur-Moselle, Fr.—d. April 12, 1550, Joinville), count and later (from 1527) duke of Guise, the first of the great members of the House of Guise.

He was brought up at the French court and on April 18, 1513, married Antoinette de Bourbon (1493–1583), daughter of François, comte de Vendôme. In 1515 he fought at Marignano and was seriously wounded; in 1521 he distinguished himself at the siege of Fuenterrabia. With the rewards that he received from the crown he built up the wealth and prestige of his family. His successes against the English in northern France in 1522 contrasted with the defeats suffered by the French in Italy and won him the admiration and gratitude of the people of Paris. In 1523 he was appointed governor of Champagne and Burgundy and became responsible for the defense of France's eastern border. At Neufchâteau he routed the Holy Roman Emperor's army. In 1525, after Francis I of France had been defeated and captured at Pavia, Guise assumed a prominent place in Louise of Savoy's council of regency. Although he was criticized for using troops needed for the defense of the realm to crush a peasant revolt in Lorraine, he gained the reputation of being a champion of religious and social orthodoxy, and in 1527 Francis I acknowledged his services by enlarging his estates and creating him duke and peer, a dignity hitherto reserved to princes of the blood. Guise claimed precedence over all other French nobles and eventually aroused the King's distrust; as provincial governor he acted so independently of the crown as to incur the displeasure of the Parlement of Paris. In 1536 and 1537 he fought the imperial troops in northern France, relieving Péronne, and in 1542 took part in the short-lived conquest of Luxembourg.

He died at his Château of Joinville in 1550. It was believed at the time that he had been poisoned in revenge for his suspected complicity in the death of François de Bourbon, lord of Enghien (1546), his wife's nephew, whose victory at Ceresole had revived the prestige of the rival House of Bourbon.

Claude de Lorraine, 1er duc de Guise, portrait by the School of Clouet, *c.* 1547; in the Musée Condé, Chantilly, Fr.

Giraudon—Art Resource/EB Inc.

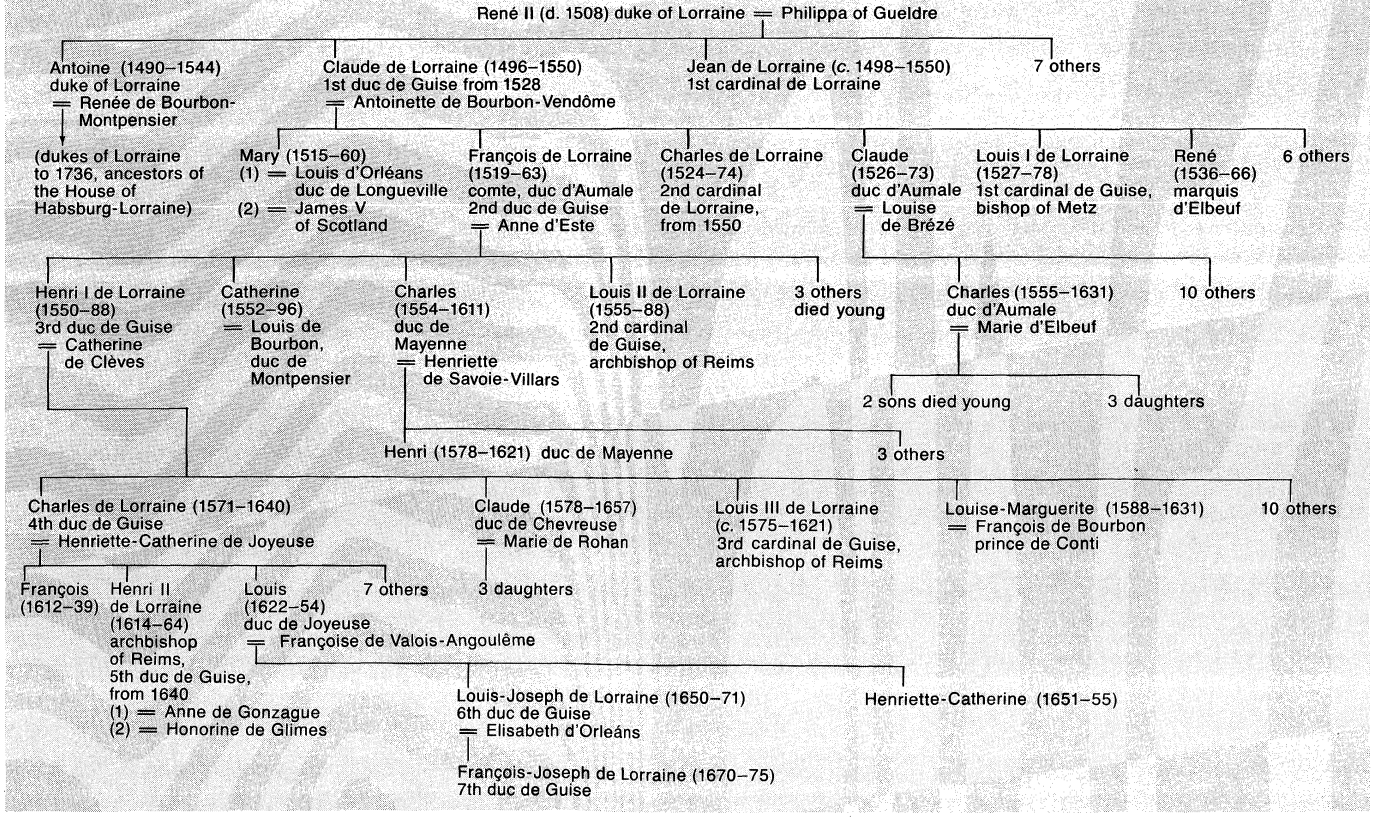
• Guise, François de Lorraine, 2e duc de (2nd duke of), DUC D'AUMALE, PRINCE DE JOINVILLE, byname THE SCARRED, French LE BALAFRÉ (b. Feb. 24, 1519, Bar, Fr.—d. Feb. 24, 1563, Orléans), the greatest figure produced by the House of Guise, a man of action, a political intriguer, a soldier loved by his men and feared by his enemies. He was generally loyal to the French crown and served it well.

As comte d'Aumale he fought in Francis I's army and was wounded almost fatally at the siege of Boulogne (1545); there he received the scar that won him his byname. In 1547 his countship of Aumale was turned into a duchy. On the accession of Henry II (1547) he was made master of the king's hunt and great chamberlain. He had to share the King's favour, however, with the constable Anne de Montmorency.

François succeeded to the duchy of Guise in April 1550 and soon after became prince de Joinville. In 1552 he was placed in charge of the defense of Metz against the emperor Charles V and obliged the Emperor to withdraw; in 1554 Guise again distinguished himself by routing an imperial army at Renty.

On account of the jealousy of the Montmorencies, he was sent in 1557 to conquer Naples and would have added another to the long roll of reputations ruined by Italy, had he not been suddenly recalled to repel a Spanish army, which had invaded northern France; it was no mean achievement that he was able to bring back his army virtually intact. He attacked the English in Calais and

House of Guise: Lines of Guise, Mayenne, and Aumale



within six days forced them to surrender (Jan. 6, 1558); he then completed their expulsion from France by capturing Guines and Ham.

The accession of Francis II (1559) produced a change of ministers: Montmorency was replaced as grand master of the royal household by Guise, who shared the chief power in the state with his brother Charles, cardinal de Lorraine. The Bourbons, as first princes of the blood, had a stronger claim to being the king's advisers but were deficient in political sense. Their leader, Anthony of Bourbon, was principally interested in recovering his wife's kingdom of Navarre from Spain and would not ally himself with Montmorency, whom he accused of having overlooked his interests at the recent peace talks. Anthony's brother Louis, prince de Condé, however, was more inclined to take advantage of the discontent caused among the nobles and Huguenots by the government's economic and religious reforms. With Condé's approval a conspiracy was formed to overthrow the Guises; but the

François de Lorraine, 2e duc de Guise, portrait by the School of Clouet, *c.* 1550; in the Bibliothèque Nationale, Paris

By courtesy of the Bibliotheque Nationale, Paris

Guises got wind of the plot. The Duc de Guise was appointed lieutenant general of the kingdom with full powers to deal with the conspirators (March 17, 1560). His ruthless handling of the situation intensified hatred of the Guises in certain quarters.

On the accession of the young Charles IX to the French crown, the queen mother, Catherine de Médicis, emerged as the dominant figure in the state. By assuming the regency herself and restoring Montmorency to favour, she indicated clearly that Guise domination would no longer be tolerated. The subsequent rise of the Bourbons, who were leaders of the Huguenot movement, and the policy of religious toleration pursued by the government brought about the dramatic reconciliation of Guise and Montmorency (March 1561); together with the Marshal de Saint-André (Jacques d'Albon) they formed a "triumvirate" in defense of the Catholic faith. The first of the resultant Wars of Religion again showed Guise to be an outstanding soldier. His timely intervention in the Battle of Dreux (December 19) ensured the defeat of the Huguenots. When Montmorency was captured, Guise became the sole commander of the royal army; and when Condé was captured, the admiral Gaspard de Coligny took over the direction of the Huguenot troops. As lieutenant general of the kingdom, Guise moved to besiege Orléans; but in February 1563 he was mortally wounded by a Huguenot assassin.

• Guise, Henri I de Lorraine, 3e duc de (3rd duke of), byname HENRY OF GUISE, or THE SCARRED, French HENRI DE GUISE, or LE BALAFRÉ (b. Dec. 31, 1550—d. Dec. 23, 1588, Blois, Fr.), popular duke of Guise, the acknowledged chief of the Catholic party and the Holy League during the French Wars of Religion.

Henri I de Lorraine, 3e duc de Guise, portrait by the School of Clouet, *c.* 1585; in the Musée Condé, Chantilly, Fr.

Giraudon—Art Resource/EB Inc.

Henri de Lorraine was 13 years old at the death of his father, François, the 2nd duke (1563), and grew up under the domination of a passionate desire to avenge his father's death, for which he held the Huguenot admiral Gaspard de Coligny responsible. In 1566 he went to Vienna hoping to gain military experience by fighting the Turks, but the war ended before he could go into action. He returned home to take part in the further wars of religion and performed deeds that were as daring as they were useless. Nevertheless he won the love of the people of Paris.

In 1572 Catherine de Médicis turned to the Guises for help in getting rid of the admiral Gaspard de Coligny, who was pressing the King to adopt policies at variance with her aims. After an attempt on the Admiral's life had failed, Guise attended the secret meeting (August 23) that planned the Massacre of St. Bartholomew's Day. On August 24 he personally supervised Coligny's murder, thereby avenging his father's death, but otherwise took no part in the massacre and even sheltered about 100 Huguenots in his house. By the following year, he was without a serious rival as head of the Catholic party; Catherine de Médicis came to depend on him to protect her from the intrigues of her son François, duc d'Alençon and later duc d'Anjou, and Henry of Navarre.

At Henry III's accession (May 1574) the Duc de Guise occupied a unique position at court as well as in the affections of the people of Paris. In October 1575 he calmed the anxieties of the Parisians by defeating a German army at Dormans, receiving a wound and scar that won him his father's nickname of "le Balafré." Fearing Guise's growing popularity, Henry III made peace with the Huguenots (May 1576). Guise, angered by what he regarded as a betrayal, formed the Holy League of nobles in defense of the Catholic cause; Henry III countered the move by placing himself at the head of the movement. His relations with Guise deteriorated further after the Peace of Poitiers (September 1577). While the King fell under the spell of new favourites, Guise strengthened the ties which existed for some time between his family and the Spanish monarchy and from 1578 onward had a pension from Philip II of Spain.

In 1584 Henry of Navarre became heir presumptive to the crown, and the League was revived in order to exclude him from the succession. Guise himself became ambitious for the crown. In the War of the Three Henrys he again drove the Germans out of France and, when invited to the capital, ruled there unopposed as a kind of "King of Paris." On May 12, 1588—the Day of the Barricades—the people rose against Henry III, but instead of seizing the throne, Guise helped to appease the mob, and Henry III was able to escape to Chartres. By the Edict of Union (July) the King surrendered to the League's demands, and on August 4 Guise was appointed lieutenant general of the kingdom. Soon after, Henry III decided to destroy Guise. On December 23 Guise fell into a carefully laid trap. As he left a Council meeting in answer to a royal summons, he was set upon by the King's bodyguard and stabbed. His body and that of his brother Louis II, cardinal de Guise, who was murdered the next day, were burned and the ashes thrown in the Loire.

• Guise, Charles de Lorraine, 4e duc de (4th duke of) (b. Aug. 20, 1571—d. Sept. 30, 1640, Cuna, Italy), duke of Guise who lived through the rapid decline in the family's power.

On the day of the assassination of his father, Henri, the 3rd duke (Dec. 23, 1588), Charles was arrested and transferred to the Château of Tours, in which he was imprisoned for three years, escaping in 1591. He was welcomed with enthusiasm by the Paris mob, which hoped he would wed the infanta of Spain and, with the help of Philip II, secure for himself the throne of France. But the opposition of his uncle Charles de Lorraine, duc de Mayenne, proved fatal to the scheme. At the end of the struggle, both he and Mayenne submitted to Henry IV, helped him to reduce the nobles in Languedoc, and received the government of Provence. In Cardinal de Richelieu's days he sided with the queen mother, Marie de Médicis, and was compelled to withdraw in 1631 to Italy, where he died in 1640.

• Guise, Henri II de Lorraine, 5e duc de (5th duke of) (b. April 4, 1614, Blois, Fr.—d. June 2, 1664), duke of Guise whose multiple attempts to revive the family's power came to naught.

Henri had already succeeded to the archbishopric of Rheims, a family benefice, when the death of his elder brother Charles, the 4th duke, made him head of the family, and in 1640 5th duke. He went against the absolutism of the age and joined the count of Soissons. Condemned to lose his head, he fled to Brussels and took command of the Austrian troops against France—noble traitors to their country being then not uncommon. In 1643, however, after Richelieu's death, he returned to France; but, being chosen their chief by the Neapolitans, at the time of Masaniello's revolt, and dazzled by this opening for his ambition, he betook himself to Naples. There his failure was complete; he was defeated and carried prisoner to Madrid. Delivered thence by the intercession of the Great Condé, he again attempted Naples and failed again. After this he spent the rest of his life at the French court and died in 1664 leaving no issue.

Henri's sisters never married, and of all his brothers, only one left a son, Louis-Joseph de Lorraine (1650–71), who became 6th duke of Guise. Louis-Joseph died of smallpox in 1671, leaving an infant son, Francis-Joseph (1670–75), 7th duke, a sickly babe, with whom, four years later, the direct line of the house of Guise expired.

Guise, Louis d'Armagnac, comte de (count of): *see* Nemours, Louis d'Armagnac, duc de.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

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guitar, plucked stringed musical instrument that probably originated in Spain early in the 16th century, deriving from the *guitarra latina,* a late-medieval instrument with a waisted body and four strings. The early guitar was narrower and deeper than the modern guitar, with a less pronounced waist. It was closely related to the *vihuela,* the guitar-shaped instrument played in Spain in place of the lute.

The guitar originally had four courses of strings, three double, the top course single, that ran from a violin-like pegbox to a tension bridge glued to the soundboard, or belly; the

Electric guitar
By courtesy of Gibson, Inc.

bridge thus sustained the direct pull of the strings. In the belly was a circular sound hole, often ornamented with a carved wooden rose. The 16th-century guitar was tuned c–f–a–d′, the tuning of the centre four courses of the lute and of the *vihuela*.

From the 16th to the 19th century several changes occurred in the instrument. A fifth course of strings was added before 1600; by the late 18th century a sixth course was added. Before 1800 the double courses were replaced by single strings tuned E–A–d–g–b–e′, still the standard tuning.

The violin-type pegbox was replaced *c.* 1600 by a flat, slightly reflexed head with rear tuning pegs; in the 19th century, metal screws were substituted for the tuning pegs. The early tied-on gut frets were replaced by built-on ivory or metal frets in the 18th century. The fingerboard was originally flush with and ended at the belly, and several metal or ivory frets were placed directly on the belly. In the 19th century the fingerboard was raised slightly above the level of the belly and was extended across it to the edge of the sound hole.

In the 19th century the guitar's body also underwent changes that resulted in increased sonority. It became broader and shallower, with an extremely thin soundboard. Internally, the transverse bars reinforcing the soundboard were replaced by radial bars that fanned out below the sound hole. The neck, formerly set into a wood block, was formed into a brace, or shoe, that projected a short distance inside the body and was glued to the back; this gave extra stability against the pull of the strings.

The 19th-century innovations were largely the work of Antonio Torres. The instrument that resulted was the classical guitar, which is strung with three gut and three metal-spun silk strings. Nylon or other plastic was later used in place of gut.

Among variant forms of the guitar are the 12-stringed, or double-course, guitar, and the Mexican *jarana* and the South American *charango,* both small five-course guitars. Lyre-shaped guitars were fashionable in 19th-century drawing rooms. Other forms of the guitar include the metal-strung guitar played with a plectrum in folk and popular music; the cello guitar, with a violin-type bridge and tailpiece; the Hawaiian, or steel, guitar, in which the strings are stopped by the pressure of a metal bar, producing a sweet, gliding tone; and the electric guitar, in which the tone depends not on body resonance but on electronic amplification.

Guitar music from the 16th to 18th century was notated either in tablature (showing the position of the fingers on the frets and the strings to be plucked) or in a system of alphabetical chord symbols. Jazz-guitar tablature shows chord symbols on a grid representing strings and frets.

The guitar grew in popularity during the 17th century as the lute and *vihuela* declined. It remained an amateur's instrument from the 17th to early 19th century. A few virtuoso guitarists, however, became known in Europe, among them Gaspar Sanz (fl. 1674), Robert de Visée (*c.* 1650–1725), Fernando Sor (1778–1839), and Joseph Kaspar Mertz (1806–56). Modern classical-guitar technique owes much to the Spaniard Francisco Tárrega (1852–1909), whose transcriptions of works by Bach, Mozart, and other composers formed the basis of the concert repertory.

In the 20th century, Andrés Segovia gave the guitar further prominence as a concert instrument, and composers such as Heitor Villa-Lobos and Manuel de Falla wrote serious works for it; others (*e.g.,* Pierre Boulez) scored for the guitar in chamber ensembles.

The guitar is widely played in the folk and popular music of many countries. In jazz ensembles it is part of the rhythm section and is occasionally played as a solo instrument. In popular music the guitar is usually amplified, and ensembles frequently include more than one instrument, a "lead" guitar for solos, another for rhythm, and a "bass" guitar to play bass lines.

guitarfish, also called FIDDLER RAY, or BANJO SHARK, an order (Rhinobatiformes) of fish closely related to the rays. The order contains some 47 to 50 species arranged in three families (Platyrhinidae, Rhinobatidae, and Rhynchobatidae).

Guitarfish have a flattened forebody with pectoral fins fused to the sides of the head. The hindbody resembles that of a shark, with two dorsal fins and a well-developed caudal fin. Guitarfish range in size up to about 2 metres (6 feet) in length. They inhabit tropical and warm temperate waters worldwide, generally preferring the shallows where they swim slowly and feed on small fishes, crustaceans, mollusks, and the like. Reproduction is ovoviviparous.

Guitry, Lucien (Germain) (b. Dec. 13, 1860, Paris—d. June 1, 1925, Paris), French actor noted for his combination of broad range and economy of effect.

Immediately after leaving the Conservatoire Guitry appeared as Armand in *La Dame aux camélias* (1878). His style of acting, sparing in gesture and theatrical effects, at first surprised, rather than pleased, the public and the critics. Sarah Bernhardt asked him to play at the Théâtre de la Renaissance in 1893, where he achieved his first successes. He appeared in plays of the most varied character and succeeded in representing the utmost frenzy of passion with the greatest economy of method. From 1918 onward he frequently acted in the plays of his son Sacha Guitry; he was remarkably successful in creating the principal part in *Pasteur.* A biography by his son was published in 1930 and *Sacha Guitry: The Last Boulevardier* by James Harding in 1968.

Guitry, Sacha, original name ALEXANDRE-GEORGES GUITRY (b. Feb. 21, 1885, St. Petersburg, Russia—d. July 24, 1957, Paris), prodigious French playwright who generally acted in his own plays.

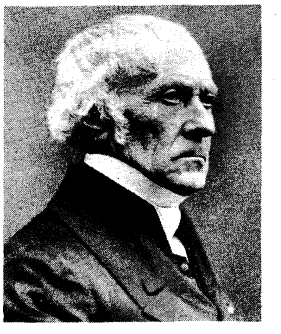
The son of the actor Lucien Guitry, Sacha was only 21 when he achieved success with his first play, *Nono.* This was followed by *Chez les Zoaques* (1906), *Petite Hollande* (1908), *Le Scandale de Monte Carlo* (1908), *Le Veilleur de nuit* (1911)—one of his best plays—and *Un Beau Mariage* (1911). It is difficult to draw an absolute distinction between his work as an actor and as a playwright, for his art was always to some extent in the nature of brilliant improvisation. His output was enormous: he had over 90 plays produced out of 130 that he wrote. He wrote a number of serious plays for his father to act in, including *Debureau* (1918), *Pasteur* (1919), and *Béranger* (1920). He wrote, directed, and acted in many motion pictures, of which the best known was perhaps *Roman d'un tricheur* ("The Cheat"). His autobiography, *Mémoires d'un tricheur* (translated into English as *If I Remember Right*), appeared in 1935. He was promoted commander of the Legion of Honour in 1936 and elected to the Académie Goncourt in 1939. Married five times, he taught all his wives, of whom Yvonne Printemps was the most celebrated, to act.

Guittone D'AREZZO (b. *c.* 1230, Arezzo, Tuscia—d. 1294, Florence), founder of the Tuscan school of courtly poetry.

Knowledge of Guittone's life comes mainly from his writings. Born near Arezzo, he travelled for commercial reasons, being an exile from Arezzo after 1256 for his Guelf sympathies. Guittone became the centre of an admiring circle when interest in the Sicilian lyric, which had been strongly influenced by the courtly love lyric of Provence, was developing in Tuscany. He experimented with elaborate and difficult forms of love poetry in a language that mingled local dialectisms, Latinisms, and Provençalisms, with none of the beauty and refinement of that used by the Sicilian school. He entered orders, and thereafter gave up love poetry, becoming more successful in his religious poetry. Guittone's "Ahi, lasso! o e stagion di doler tanto" ("Ah, alas! How long does so much misery last?"), written after the Florentine Guelf defeat at Montaperti in 1260, is a noble poem. His later work includes sonnets and moral lyrics. He is also known as the creator of the *lauda* or *laude,* a sacred ballad, in the vernacular. These songs of praise of God became a common form, especially among confraternities of lay people. His 41 letters are among the oldest documents of epistolatory prose in Italian.

Guiyang (China): *see* Kuei-yang.

Guizot, François (-Pierre-Guillaume) (b. Oct. 4, 1787, Nîmes, Fr.—d. Oct. 12, 1874, Val-Richer), French political figure and historian who, as leader of the conservative constitutional monarchists during the July Monarchy (1830–48), was the dominant minister in France.



Guizot, 1855
Archives Photographiques, Paris

Guizot's father was executed by the Convention in 1794, and Guizot went into exile with his mother. In 1805, after six years in Geneva, Guizot returned to Paris, where he studied law and frequented anti-Napoleonic literary

circles. In 1812 he was appointed professor of history at the University of Paris.

Joining the first Bourbon Restoration (1814), Guizot emerged as an influential proponent of constitutional monarchy and a member of a group called the Doctrinaires, whose platform Guizot explained in his *Du gouvernement représentatif et de l'état actuel de la France* (1816; "On Representative Government and the Present Condition of France").

Guizot spent the years from 1820 to 1830 mostly in historical research, producing such works as *Histoire de la civilisation en Europe,* 3 vol. (1828; *General History of Civilization in Europe,* 1837), and *Histoire de la civilisation en France,* 5 vol. (1829–32; "The History of Civilization in France").

In the July Monarchy, Guizot, as a leader of the conservatives, and his liberal rival and fellow historian Adolphe Thiers set the pace for political life. In 1832–37 Guizot was minister of education and was responsible for the so-called Guizot law (1833), which established the principle that secular primary education should be accessible to all citizens.

After brief service as ambassador to England (1840), Guizot became foreign minister; he dominated the ministry for the next eight years. In foreign affairs his policies were rather successful, especially as they affected relations with England. Domestically, however, Guizot and his associates were somewhat less successful. In 1846–47 a severe economic crisis, followed by political and financial scandals, led to growing anti-regime demonstrations. Guizot was forced to resign on Feb. 23, 1848. The next day the monarchy that he had served so vigorously collapsed, despite the King's abdication in favour of his grandson, and a new republic was proclaimed.

Except for an abortive attempt to rally opposition to the republic in 1849, Guizot spent the remainder of his life in relative political isolation. His many publications included *L'Histoire de la France, depuis les temps les plus reculés jusqu'en 1789,* 5 vol. (1872–76; *The History of France from the Earliest Times to the Year 1789,* 8 vol., 1883–91).

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Gujarāt, constituent state of the Republic of India, lying on the west coast of the subcontinent. It is bounded by the Arabian Sea to the south and west, by Pakistan to the northwest, and by the Indian states of Rājasthān to the north, Madhya Pradesh to the east, and Mahārāshtra to the southeast. The capital is Gandhinagar, on the outskirts of Ahmadābād, the former capital and largest city in the state.

The following article summarizes the administrative history, geography, demographic patterns, economy, and culture of modern Gujarāt; for additional treatment of its geography and history, *see* MACROPAEDIA: India.

The known history of Gujarāt dates from about 250 BC. During the 4th and 5th centuries AD, it formed a part of the Gupta Empire; it derived its name from the Gurjaras, who ruled the area during the 8th and 9th centuries. Shortly after the Gurjara period, its borders reached their furthest limits during the Solaṅki dynasty, which was also a time of extraordinary economic and cultural achievement. Gujarāt then fell successively under Arabic Muslim, Mughal, and Marāthā rule. In 1818 large areas of Gujarāt came under the administration of the British East India Company, and after 1857 Gujarāt became a province of British India. Following Indian independence in 1947, most of Gujarāt was included in the state of Bombay, which was divided into Gujarāt and Mahārāshtra on a language basis in 1960. The Gujarātī language belongs to the Indo-Aryan family and is derived from Sanskrit through Prākrit and Apabhraṃśa. It was the mother tongue of Mohandas Gandhi.

Geographically, Gujarāt is a land of great contrasts. It stretches from the wet, fertile rice-growing plains of the west coast to the almost rainless salt deserts of Kutch. This region is bounded on the south by the Gulf of Kutch, and on the north and east it is separated from Pakistan and mainland India by the Rann of Kutch, a huge salt marsh. The region south of Kutch is also arid, containing rolling hills in its centre. Northeastern Gujarāt is mainly an area of small plains and low hills. Rainfall here is sparse, and January temperatures may drop to freezing; on the other hand, a temperature of 118° F (48° C) has been recorded in the hot season. Southward, in central Gujarāt, rainfall increases and temperature ranges are less extreme. Southern Gujarāt is a region of warm climate and plentiful rainfall.

About two-thirds of the population of Gujarāt is engaged in agriculture, the gross crop area amounting to about one-half of the total land area. Wheat and millet are staple food crops, with rice production concentrated in the wetter regions. Sugar production is increasing, while cotton, tobacco, peanuts (groundnuts), and oilseeds are profitable cash crops; cash crops slightly exceed food crops in value. Lack of irrigation has kept the production of food below state needs, although in recent years agricultural yields have been improving.

Gujarāt is one of the five most industrialized states of India. Its fluorite deposits are one of the largest in Asia. Output of soda ash amounts to nearly 95 percent of the national production, baby food 65 percent, salt 55 percent, milk powder 50 percent, cloth about 40 percent, pharmaceuticals about 33 percent, and cotton textiles about 30 percent; Gujarāt has more than 1,250 textile factories. There is a 250,000 kW thermal-power station at Dhuvaran that uses coal, natural gas, and oil, but Gujarāt lacks hydroelectric facilities. The total generating power in the state increased substantially during the 1970s.

Major industrial towns are Ahmadābād, Baroda, and Surat; Rājkot, Bhavnagar, and Jāmnagar were once capitals of princely states. Gujarāt has around 3,500 mi (5,600 km) of railways and 27,000 mi of roads. It boasts 45 ports—besides the major international port of Kandla—and of these, 25 are open to foreign shipping and 20 to coastal shipping; 6 of them are all-weather ports. The state also has nine airports.

The folklore and folk culture of Gujarāt can be traced to the mythology of Krishna (Kṛṣṇa), an incarnation of the god Vishnu (Viṣṇu). Dances in honour of Krishna have survived in the form of the popular folk dance, the *garabā.* The architectural style of Gujarāt is well known for its luxuriousness and refinement, as exemplified by such monuments and temples as those at Somnāth, Modhera, Thān, Dwārkā, Ghumli, Girnār, and Pālitāna. Gujarāt is famous for its art and craft products. Among the most durable and effective of the state's cultural institutions are the trade and craft guilds known as *mahājans.* These guilds have, in the past, resolved disputes, acted as channels of philanthropy, and encouraged arts and culture.

Gujarāt has 8 universities among its more than 250 institutions of higher learning. Technical education is provided by engineering colleges and numerous other technical institutions. There are also several research institutions. Area 75,685 sq mi (196,024 sq km). Pop. (1981) 34,085,799.

Gujarāt (Pakistan): *see* Gujrāt.

Gujarāt Plains, vast plains area of central Gujarāt state, western India, extending over about 12,800 sq mi (33,000 sq km) and bounded by the Arabian Sea on the south, the desert fringe of Rājasthān state on the north, the hills of eastern Gujarāt on the east, and the Kāthiāwār Peninsula on the west. It is a projection of the alluvial Sindhu-Ganges Plains sloping from north to south, with an average elevation of about 80 ft (25 m).

First settled by Dravidians and later by Aryans, the region was ruled successively in ancient times by Hindu dynasties and Śakas from Bactria. It passed to Muslim rule at the close of the 13th century AD, was later part of the Marāṭhā kingdom, and then came under British control in the 19th century.

The plains are the outcome of extensive Pleistocene sedimentation and are drained by the Sābarmati, Māhi, Narbadā, and Ambikā rivers. Heavy flooding is common. Black soils occur in the west; elsewhere there are alluvium and sandy loams. Forests consist mostly of acacia and teak. Agriculture is the mainstay of the region's economy; one-fourth of India's cotton and one-sixth of the country's tobacco are grown in the plains. Other crops include cereals, peanuts (groundnuts), and oilseeds. It is one of the most industrially developed areas in the country (after West Bengal and Mahārāshtra states) and produces textiles, diesel and gasoline engines, pumps, electrical equipment, iron and steel, petrochemicals, pharmaceuticals, cement, and clay building products. Ahmadābād is a centre of the cotton textile industry; Vadodara has a petroleum refinery and produces petrochemicals.

Gujarāt woodwork, architectural carving executed in the state of Gujarāt in India. Gujarāt was the chief centre of wood carving in India from at least the 15th century. Even

Wooden bracket figure holding a fly-whisk and jar, from Gujarāt, 18th century; in the Prince of Wales Museum of Western India, Bombay
P. Chandra

when stone as a building material was handled with great ease and confidence, the people of Gujarāt continued to use wood freely in the construction of temple pavilions and in the richly carved facades, balconies, doors, columns, brackets, and grilled windows of residential buildings.

Wood carving in Gujarāt in the Mughal period (1556–1707) shows a happy synthesis of the indigenous and Mughal styles. Jaina wooden pavilions of the late 16th and 17th centuries are richly sculptured with scenes from Jaina mythology and contemporary life and with imaginative floral, animal, and geometrical motifs; figural sculpture has a great vivacity and rhythm. Application of a rich red lacquer to the wood was common. Many sumptuous wooden facades of the 19th century have been preserved, but the ornamenta-

tion lacks the grace and movement of earlier work.

Gujarati language, Indo-Aryan language that is spoken in the Gujarāt state and in the neighbouring states of Mahārāshtra and Rājasthān; it is the official language of Gujarāt. Gujarati has several dialects, including those of the south, the northwest, and Saurashtra. The standard language accords with the central dialect, spoken in such cities as Baroda. The language, which is written in a cursive modified Devanagari script, has a long literary tradition that dates back to the 12th century. Old Gujarati was also dubbed Old Western Rajasthani by the Italian scholar Tessitori, because the language was in his day used in an area including part of what is now the state of Rājasthān.

Gujarati has a fairly complex inflectional system, marking, for instance, three genders (masculine, feminine, and neuter; Hindī has only masculine and feminine), two numbers, and three cases (nominative, oblique, and agentive–locative) for nouns.

Gujrānwāla, city and district, Lahore division, Punjab province, Pakistan. The city, the district headquarters, is connected by rail and the Grand Trunk Road with Peshāwar and Lahore. An agricultural marketing centre (grains, melons, sugarcane), it is also a commercial and industrial centre, manufacturing ceramics, iron safes, and copper, brass, and aluminum utensils. With the establishment of an industrial park, textile, silk, pipe fitting, electric fan, and tannery production increased in importance. It was founded by a pastoral people called Gujars and in 1867 was incorporated as a municipality. Gujrānwāla has a hospital and several colleges affiliated with the University of the Punjab. The birthplace of the Sikh ruler Ranjit Singh, it remained his capital until he occupied Lahore in 1799. It contains a lofty cupola covering a portion of his ashes, together with the grave and Jinnah Bagh Gardens, originally named for his father, Maha Singh.

The district (area 2,312 sq mi [5,988 sq km]) is divided into the low-lying alluvial lands fringing the Chenāb and Degh rivers and the upland between them. Cultivation is dependent upon canal irrigation; wheat, cotton, rice, barley, and millet are the chief crops. The Gujrānwāla hydroelectric project provides power from the Chenāb River.. There are also rice and sugar mills and glassworks. The district was annexed by the British in 1849 and ruled by them until Pakistan's independence in 1947. Pop. (1981 prelim.) city, 597,000; district, 2,659,000.

Gujrāt, also spelled GUJARĀT, city and district, Rāwalpindi division, Punjab province, Pakistan. The city, the district headquarters, lies just north of the Chenāb River and is connected with Lahore and Peshāwar via the Grand Trunk Road. The present city, on the site of a succession of earlier cities, developed around the fort built by the Mughal emperor Akbar in 1580. In 1867 it was incorporated as a municipality. It has two hospitals and several colleges affiliated with the University of the Punjab. Manufactures include furniture, pottery, electric fans, cotton goods, footwear, brass ware, and carpets. A battle fought there in 1849 broke the Sikh power and permitted British annexation of the Punjab.

Gujrāt District (area 2,264 sq mi [5,864 sq km]) lies between the Chenāb and Jhelum rivers and marks the northern limits of the Punjab plains. The Lower Jhelum Canal irrigates 800,000 ac (320,000 ha) under wheat, millet, and legume cultivation. A mound at Mong (Mung) has been identified as the site of Alexandria Nicaea, the city built by Alexander the Great on the field of his victory over Porus in the 4th century BC. Pop. (1981 prelim.) city, 154,000; district, 2,247,000.

Gujrāt, Battle of (Feb. 21, 1849), engagement between the Sikh army of Sher Singh and a British–Indian army led by Hugh Gough, 1st Baron (later 1st Viscount) Gough, at Gujrāt (now in Pakistan). It was the last and decisive battle in the Second Sikh War (1848–49), leading to the British annexation of the Punjab (Pañjāb).

The British used artillery to silence the Sikh guns, then carried the Sikh lines and broke up the army of 50,000 in pursuit. Sher Singh surrendered on March 12, ending the war, and the Punjab was annexed by the governor general, James Ramsey, 10th earl (later 1st marquess) of Dalhousie. The battle rehabilitated Gough's military reputation; he had been criticized for his habit of frontal attacks and his failure to use artillery.

Gukovo, city, Rostov *oblast* (region), southwestern Russian Soviet Federated Socialist Republic. It is one of the centres of the coal industry in the Donets Basin, located on the eastern part of the coalfield. Construction is also important, absorbing one-quarter of the labour force. A technical college in the city is devoted to the mining industry. Pop. (1983 est.) 70,000.

Gula (Mesopotamian deity): *see* Bau.

Gulag, common abbreviation of GLAVNOYE UPRAVLENIYE ISPRAVITELNO-TRUDOVYKH LAGEREY (Russian: Chief Administration of Corrective Labour Camps), the system of Soviet detention camps, 1930–55, which at its fullest extent in the 1930s imprisoned millions of people. The name Gulag had been unknown in the West until the publication of Aleksandr Solzhenitsyn's *The Gulag Archipelago, 1918–1956* (1973), whose title likens the labour camps scattered through the Soviet Union to an island chain.

A system of forced-labour camps was first inaugurated by a Soviet decree of April 15, 1919, and underwent a series of administrative and organizational changes in the 1920s, ending with the founding of Gulag in 1930 under the control of the secret police, OGPU. (In 1934, the OGPU was abolished and its functions transferred to the NKVD.) Besides peasants arrested during collectivization, persons sent to the Gulag included dissident intellectuals, members of ethnic groups suspected of disloyalty, members of factions losing power within the Communist Party of the Soviet Union, travellers accused of conspiring with foreign governments while abroad, suspected saboteurs, ordinary criminals, and many others.

Inmates filled the Gulag in three major waves: in 1929–32, the early years of the first Five-Year Plan; in 1936–38, at the height of the Stalin purges; and in the years immediately following World War II. Solzhenitsyn claimed that between 1928 and 1953 "some forty to fifty million people served long sentences in the Archipelago"; most scholarly estimates more conservatively range from 6,000,000 to 15,000,000 for the period 1936–53.

In the post-Stalin period of "liberalization," the Gulag was officially disbanded. Its activities were absorbed by various economic ministries, and the remaining camps were grouped in 1955 under a new body, GUITK (Glavnoye Upravleniye Ispravitelno-Trudovykh Kolony, or Chief Administration of Corrective Labour Colonies).

Gulbarga, city, administrative headquarters of Gulbarga district and division, in northeastern Karnataka (formerly Mysore) state, India. Originally included in the territory of the Kākatīyas of Warangal, the city was annexed to the sultanate of Delhi in the early 14th century, first by the general Ulūgh Khān and then by the sultan Muḥammad ibn Tughluq. After the Sultan's death, it fell to the Bahmanī kingdom (of which it was the capital between 1347 and *c.* 1424), and, upon the breakup of that power, to Bijāpur. With the conquest of the Deccan by Aurangzeb in the 17th century, it was again included in the sultanate of Delhi, but it was separated from Delhi by the establishment of Hyderābād state in the early 18th century.

There are many ancient monuments in the city. In the eastern quarter are the tombs of the Bahmanī kings; the most notable building is a mosque said to be modelled upon that of Córdoba in Spain. Its colleges of arts, commerce, education, engineering, law, medicine, science (two colleges), and a women's college all are affiliated with Karnatak University in Dhārwār.

On the main line from Bombay to Madras, Gulbarga is a centre of the cotton trade, with ginning and pressing factories and spinning and weaving mills. It also has flour and oil mills and paint factories.

The lowland district, area 6,255 sq mi (16,200 sq km), lies on the north bank of the Krishna River and mainly in the valley of the Bhīma, a tributary of the Krishna. The rainfall is low, seldom exceeding 30 in. (750 mm). Limestone is quarried in places, but the majority of the population is engaged in agriculture. The chief crops are millet, pulses, cotton, and linseed. The district became part of Mysore (now Karnataka) in 1956. Gulbarga division encompasses the districts of Gulbarga, Bīdar, and Raichūr. Pop. (1981) city, 221,325; district, 2,080,643.

Gulbransson, Olaf (b. May 26, 1873, Christiania, Nor.—d. Sept. 18, 1958, Tegernsee, W.Ger.), illustrator identified with the German satirists of the early 20th century and noted for portrait caricature. He is also important as one of the first satirists of Adolf Hitler. Gulbransson studied at the Royal Norwegian Drawing School and worked for several Norwegian newspapers. After a visit to Paris in 1900, he returned to Oslo, where he distributed his first album, caricatures of famous Norwegians.

In 1902 he moved to Munich and began his long association with *Simplicissimus,* a leading publication in the fertile artistic and intellectual climate of the time. There he became famous for his gently satiric caricatures executed in a sure, bold style with a minimum number of lines. He also illustrated books and released drawings in folio form.

Guldberg, Cato Maximilian (b. Aug. 11, 1836, Christiania, Nor.—d. Jan. 14, 1902, Christiania), Norwegian chemist who, with Peter Waage, formulated the law of mass action, which details the effect of concentration, mass, and temperature on chemical reaction rates.

Educated at the University of Christiania, he taught at the royal military schools before becoming professor of mathematics at the University of Christiania in 1869. His study of chemical thermodynamics preceded his formulation in 1890 of Guldberg's law, which states that on the absolute scale the boiling point of a substance is two-thirds its critical temperature (the maximum at which a gas can be liquefied by pressure alone).

In 1864 Guldberg and Waage announced their law of mass action, which drew little attention until it was rediscovered by William Esson and Vernon Harcourt at the University of Oxford in the 20th century.

Gulf, province of south coastal Papua New Guinea, southwestern Pacific. Its 13,300 sq mi (34,500 sq km) extend from the Gulf of Papua north to foothills bordering the central highlands and east from the Turama River to Cape Possession. Draining from the central highlands, the Turama, Kikori, Purari, Vailala, Murua, Tauri, and Lakekamu rivers

have formed intricate deltas and vast swamps along the coast.

The inhabitants of the coastal region from Cape Possession to Orokolo were reportedly contacted by representatives of the London Missionary Society as early as 1884. Australians established mission stations at Kerema in 1906 and at Kikori in 1912. Several other stations and patrol posts were set up in coastal towns after World War II; Gulf became a province in 1979.

The principal settlements, all coastal, are Kerema, Kukipi, Baimuru, Ihu, Malalaua, Kaintoba, and Kikori. Exports include copra, rubber, and cocoa. There has been prospecting for petroleum and natural gas, and the province has great potential for the development of timber resources. Pop. (1989 est.) 72,900.

gulf, any large coastal indentation. A gulf is similar to a bay both in terms of shape and of origin, but it generally occupies a larger area.

A brief treatment of gulfs follows. For full treatment, *see* MACROPAEDIA: Oceans.

Most gulfs have been formed as a result of a rise in sea level. A significant increase in the level of the sea during the melting of the last Pleistocene glacial ice mass drowned sections of the continental margins, producing many of the world's major gulfs. Some pronounced coastal concavities, however, have resulted from the warping, folding, or downfaulting of the Earth's crust, which caused large segments of the shoreline to drop below sea level. The Gulf of California and the Persian Gulf were formed when such tectonic depressions were inundated by the sea.

Gulfs may occur alone or in groups. Single gulfs generally are formed along linear shores of continents, whereas clusters of gulfs tend to occur along irregular shorelines of complex geologic structure. In most cases, gulfs are connected with the sea by one or more straits. Some gulfs may have a group of islands at their mouths; others may open into another gulf on the opposite side.

Gulfs may differ from the adjoining sea by virtue of water properties and the processes of sedimentation. Differences of this sort are dictated by the size and shape of a particular gulf as well as by its depth and bottom topography. In a large number of cases, the degree to which a gulf is isolated from the adjacent sea is also a contributing factor, as are climatic conditions.

Consult the INDEX *first*

Gulf + Western Inc., formerly one of the largest and most diverse American corporations, and the company that brought the word conglomerate into the popular lexicon. Gulf + Western's name was changed to Paramount Communications Inc. in June 1989 as part of the new corporate focus on the fields of media and communications. *See* Paramount Communications Inc.

Gulf Coast, geographic area in the southeastern United States along the Gulf of Mexico. Stretching for more than 1,200 miles (1,900 km) from the coast of Florida, it extends about 100 miles (160 km) inland and runs west along Alabama, Mississippi, Louisiana, and Texas. Elevation is nowhere more than 500 feet (150 m). Precipitation is more than 60 inches (1,500 mm) in the southeastern and south-central parts and diminishes to about 20 inches (510 mm) in the lower Rio Grande valley in Texas. Cyclonic storms move across the area from west to east during autumn, when they sometimes reach hurricane force, and winter.

The gulf section of the Intracoastal Waterway also extends through this area. In the southern tip of Florida are mangrove swamp forests,

Shrimp boat in Gulf Coast waters off Port Aransas, Texas, along the Gulf of Mexico
Matt Bradley

while in the coastal sections of Texas, Georgia, and Louisiana are marsh, broom, saw, and water grasses. Major crops are rice, grown in southwestern Louisiana and southeastern Texas; sugarcane, in southern Louisiana and the Florida everglades; and citrus fruits, in central Florida and the lower Rio Grande valley in Texas. Offshore oil and gas exploration and production are of great economic importance along the coast of Louisiana and Texas. The Gulf Coast also has reserves of sulfur, magnesium, and phosphates. Manufacturing is mainly based on agriculture, and the location of important ports at Houston and Galveston in Texas and at New Orleans has contributed to the tremendous economic growth of the hinterland. Both commercial and sport fishing are widespread. Tourism, attracted by the excellent beaches of Florida, Alabama, Mississippi, and Texas, and by such cities as New Orleans, is a major industry of the region.

Gulf Intracoastal Waterway, an improved navigable waterway along the Gulf of Mexico coast of the United States, extending from Apalachee Bay, Florida, westward to the Mexican border at Brownsville, Texas, a distance of more than 1,100 miles (1,770 km). In part artificial, the waterway consists of a channel paralleling the coast behind barrier beaches, linked by a series of canals. The Gulf Intracoastal Waterway is an important route for barges, and several sections of it furnish access to major gulf ports for oceangoing vessels. *See* Intracoastal Waterway.

Gulf Islands National Seashore, recreation areas in the United States located near Pascagoula and Biloxi, southern Mississippi, and near Pensacola, northwestern Florida. Of a total area of 218 square miles (565 square km), about 103 square miles (267 square km) is in Florida and the remainder in Mississippi.

In Florida the offshore islands and keys have historic ruins and white sandy beaches. A small portion is designated as a wilderness area. The Naval Live Oaks Reservation and ruins of forts are all within its boundary. In Mississippi the offshore islands have historic ruins and wildlife sanctuaries accessible only by boat. In Ocean Springs, on the mainland, there is an urban park with nature trails, picnic areas, and a campground.

Gulf of ———: *see under* substantive word (*e.g.,* Mexico, Gulf of), except as below.

Gulf of Tonkin Resolution, resolution put before the United States Congress by President Lyndon Johnson on Aug. 5, 1964, assertedly in reaction to allegedly unprovoked attacks by North Vietnamese torpedo boats on the destroyers *Maddox* and *C. Turner Joy* of the U.S. Seventh Fleet in the Gulf of Tonkin between August 2 and August 4. Its stated purpose was to approve and support the determination of the president, as commander in chief, in taking all necessary measures to repel any armed attack against the forces of the United States and to prevent further aggression. It also declared that the maintenance of international peace and security in Southeast Asia was vital to American interests and to world peace.

Both houses of Congress passed the resolution on August 7, the House of Representatives by 414 votes to nil, and the Senate by a vote of 88 to 2. Several years later, especially in view of subsequent revelations concerning U.S. policy and operations in Vietnam, many congressmen came to see the resolution as giving the president a blanket power to wage war, and it became the subject of a Senate investigation.

Gulf Oil Corporation, major American petroleum company; it was acquired by Chevron Corporation (*q.v.*) in 1984.

Gulf Oil was originally incorporated in 1907 but has beginnings going back to the tapping in 1901 of an enormous oil gusher on Spindletop Hill, near Beaumont, Texas. The development of this well was funded by the Mellon family of Pittsburgh banking fame. Following the discovery, Thomas Mellon built the Gulf refinery in Port Arthur, Texas. The firm continued to develop oil fields in Texas, Oklahoma, and Louisiana, as well as in Mexico and Venezuela; by 1923 the Port Arthur facility was the largest in the world. Gulf was the first oil company to enter the consumer gasoline market when it opened a drive-in filling station in Pittsburgh in 1913. It has a heavy investment in forms of energy other than oil and has secondary interests in chemicals, minerals, and nuclear power.

Gulf Series, major division of Early Cretaceous rocks and time in the Gulf coastal region of the United States (the Cretaceous period began about 144 million years ago and lasted about 77.6 million years). The Gulf Series has been divided into five groups of rocks. The lowermost group is the Woodbine Sandstone Group, about 110 m (360 feet) of sandstones. The Woodbine is overlain by the Eagle Ford Shale, about 145 m (475 feet) of clayey shales, which in turn is overlain by the Austin Chalk, about 130 m (420 feet) of chalks and marls. The Taylor Marl overlies the Austin Chalk and consists of about 370 m (1,200 feet) of marls, limestones, sandstone, and chalk. The Navarro Group, the uppermost division of the Gulf Series, consists of about 200 m (650 feet) of limestones, marls, shales, and clays. Detailed information about the Gulf Series, its extent, boundaries, and subsurface relationships, has been provided by oil-well drilling. Extensive reefs constructed by corals and other animals existed during the time that rocks of the Gulf Series accumulated.

Gulf Stream, warm ocean current flowing northeastward off the North American coast between Cape Hatteras, N.C., and the Grand Banks of Newfoundland. In popular conception the Gulf Stream also includes the Florida Current (between the Straits of Florida and Cape Hatteras) and the West Wind Drift (east of the Grand Banks).

The Gulf Stream is part of a general clockwise-rotating system of currents in the North Atlantic. It is fed by the westward-flowing North Equatorial Current moving from North Africa to the West Indies. Off the northeastern coast of South America, this current splits into the Caribbean Current, which passes into the Caribbean Sea and through the Yucatán Channel into the Gulf of Mexico, and into the Antilles Current, which flows to the north and east of the West Indies. The Caribbean Current reemerges into the Atlantic through the Straits

of Florida between the Florida Keys and Cuba to form the Florida Current. Deflected to the northeast by the submerged Great Bahama Bank southeast of the Florida Peninsula, this swift current is joined by the Antilles Current and flows roughly parallel to the eastern coast of the United States to about Cape Hatteras. Here the path of the Gulf Stream becomes twisted as huge swirls of warm water break off. A part of the Gulf Stream forms a countercurrent that flows south and then west. The countercurrent rejoins the Gulf Stream on its seaward side along the coast of Florida and the Carolinas.

The main portion of the Gulf Stream continues north, veering more to the east and passing close to the Grand Banks, south of Newfoundland, where it breaks up into swirling currents. Some of these eddies flow toward the British Isles and the Norwegian seas and form the North Atlantic Current (or Drift). A larger number of the eddies flow south and east, either becoming part of westward-flowing countercurrents or joining the Canary Current.

History of scientific study. The Gulf Stream was first described by the Spanish navigator and explorer Juan Ponce de León early in the 16th century. Later it was studied by such scientists as Benjamin Franklin and the American naval officer Matthew Fontaine Maury, and in 1844 systematic surveying of the stream was begun by the United States Coast and Geodetic Survey. Concentrated modern efforts were inaugurated only in the early 1930s by the ketch "Atlantis" of the Woods Hole Oceanographic Institution in Massachusetts.

One of the difficulties of scientific study of the Gulf Stream is its extremely complex makeup. It is not a simple ribbon of moving water but rather a complicated network of currents that tend to shift course over time, to disappear and then reappear, and to develop eddies along the margins. Today, orbiting space satellites are utilized to map the path of the Gulf Stream. The satellites are equipped with sensors that can detect temperature and colour variations to trace the changing surface patterns of the current.

Movement and physical features. Most of the waters that enter the Gulf Stream system first have been driven westward across the Atlantic by the Northeast Trade Winds. In the Caribbean and the Gulf of Mexico the current is gradually narrowed, and its velocity increases to more than 3.5 knots (4 miles [6.5 kilometres] per hour) as it passes through the Straits of Florida. The volume of flow here has been measured at 1,060,000,000 cubic feet (30,000,000 cubic metres) per second, or many hundreds of times that of the Mississippi River. As it turns north between Florida and the Bahamas, the Florida Current flows at a depth of some 2,600 feet (790 metres) and then follows the continental slope beyond the edge of the shelf. Velocities gradually decrease to about one knot off Cape Hatteras.

In the western Atlantic, the current's deep-blue water, with its higher temperature and salinity, is readily distinguishable from surrounding waters, particularly along its well-defined western margin. The eastern edge gradually moves seaward as the current moves northward. The water between the current and the mainland, with its lower salinity and temperature, forms a boundary known as the Cold Wall. This water, overlying the continental shelf, frequently has a southerly flow, counter to that of the Florida Current.

Water in the eastern portions of the current is warmer than that in the western part. The lateral mixing of current and ocean waters results in eddy formations along the margin. Off the coast of the United States, the Gulf Stream system separates the relatively warm waters of the Sargasso Sea in the mid-Atlantic region from the colder waters to the west and north. In winter, for example, average surface temperatures of the Gulf Stream off New England may be 20° F (11° C) higher than those of surface waters only 150 mi to the northwest, although there is less than a 10° F (6° C) change in surface-water temperatures over a 1,000-mi distance to the southeast.

Beyond Cape Hatteras the Gulf Stream broadens and moves into deeper water. Here it crosses the Western Boundary Undercurrent, which consists of cold, southward-flowing water that sinks to considerable depths in the vicinity of Greenland. About 1,500 mi northeast of Cape Hatteras, in the area of the Grand Banks, the warm Gulf Stream waters come close to the cold, southward-flowing Labrador Current. The contact of cold, humid air moving over the Labrador Current with the warm surface waters of the Gulf Stream causes widespread condensation. This climatic condition causes the region to have one of the highest incidences of fog in the world.

Moving out into the North Atlantic, the current becomes shallower and begins to break down into a meandering pattern of disconnected filaments flowing in the same general direction. Much of the initial force of the current has been dissipated by this time, and momentum is afforded primarily by the westerly winds. Part of the water here is diverted southward into the Sargasso Sea area. Near the middle of the ocean, the North Atlantic Current divides. One branch moves southeast and south as the relatively cool Canary Current, which flows past the Iberian Peninsula and northwestern Africa. The other branch (the balance of the North Atlantic Current) moves toward northwestern Europe.

Effects on marine and human life. The marine organisms of the Gulf Stream system are not of great commercial value. Principal species include the bluefin tuna, the Atlantic salmon, and the flying fish. Its warm waters, however, in mingling with the colder waters both on the Grand Banks and off northwestern Europe, contribute to turbulence and the availability of nutrient salts that have made these regions among the most productive commercial fishing grounds in the world.

A major contribution of the Gulf Stream system is its warming effect upon the climates of adjacent land areas. In winter the air over the ocean west of Norway is more than 40° F (22° C) warmer than the average for that latitude, probably the greatest temperature anomaly in the world. The prevailing westerly winds carry the warmth and moisture of the ocean to northwestern Europe, giving Bergen, Nor., at 60° N latitude, the average high temperature for its coldest month of 34° F (1° C), while Reykjavík, Ice., 4° of latitude farther north, has a 30° F (-1° C) average for its coldest month. In southwestern England the climatic modification produced by the current is reflected in the extraordinary mildness of the winters at this northern latitude, including the growing of winter vegetables and flowers and the presence of subtropical vegetation and lemon trees in southern Devonshire. Along the western margins of the North Atlantic, however, where the winds are predominantly from the shore, the Gulf Stream has little effect. Halifax, Nova Scotia, nearly 1,000 mi south of Bergen, averages only 23° F (-5° C) during its coldest month.

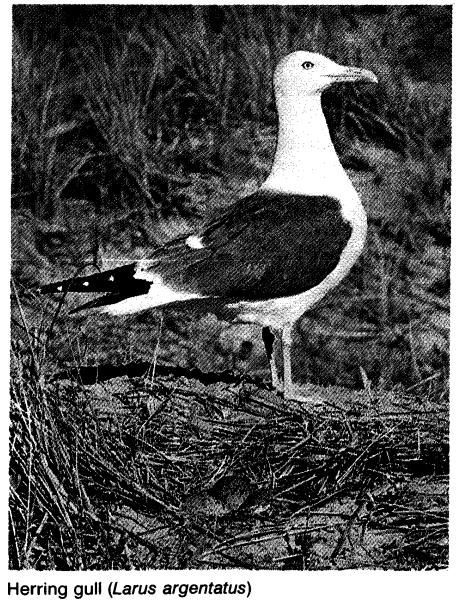
Gulfport, city, coseat (with nearby Biloxi) of Harrison County, southeastern Mississippi, U.S., port of entry on the Mississippi Sound and the Gulf of Mexico. It was founded in 1887 by Capt. William H. Hardy, Confederate soldier and engineer, as the site for the terminus of his Gulf and Ship Island Railroad. In 1902 Capt. Joseph T. Jones assumed control of the line, and he and his family were instrumental in developing the city and harbour. In the 1920s Gulfport experienced a short-lived boom as a seaside resort after the Gulf line was bought by the Illinois Central Railroad. Following World War II, enhanced by one of the world's longest man-made sand beaches (extending eastward for 28 mi [45 km] from Pass Christian through Gulfport to Biloxi and known as the Silver Strip), its resort-motel business developed rapidly. The surrounding coastal bayous and rivers abound with fish and the city's Mississippi Deep-Sea Fishing Rodeo is an annual (July) event. Gulfport's deepwater harbour, now a state-owned facility, has one of the world's most modern banana terminals. Seafood, naval stores, lumber, tung oil, and textiles are among commercial products. The Jefferson Davis Campus of the Mississippi Gulf Coast Junior College (1965) is in Gulfport.

Old Fort Massachusetts on Ship Island, scene of Civil War skirmishes, is 12 mi across the Sound. Mississippi City, now within Gulfport's corporate limits, was the scene (Feb. 7, 1882) of John L. Sullivan's bare-knuckled triumph over Paddy Ryan for the world's heavyweight championship. Inc. town, 1898; city, 1904. Pop. (1980) 39,676.

gulfweed (algae): *see* Sargassum.

Gulistan, formerly (until 1961) MIRZACHUL, city and administrative centre of Syrdarya *oblast* (region), Uzbek Soviet Socialist Republic, in the southeastern part of the Golodnaya (Hungry) Steppe, 75 mi (120 km) southwest of Tashkent. It became important after irrigation works were constructed, enabling cotton to be grown in the area. It served as administrative centre of Mirzachul *rayon* (district) in the 1920s. In 1963 it was made the capital of Syrdarya *oblast,* which was created in that year. Pop. (1970) 30,879.

gull, any of more than forty species of heavily built, web-footed seabirds of the subfamily Larinae, family Laridae. Gulls are most abundant as breeders in the Northern Hemisphere, which has about thirty species in temperate to arctic regions. Those nesting inland usually go to coasts in winter.



Herring gull (*Larus argentatus*)
John Markham

Adult gulls are mainly gray or white, with variable head markings. In breeding season the head is either pure white or solidly black, gray, or brown; it becomes streaked or smudgy in winter. The bill is strong and slightly hooked, showing, in some species, a spot of colour. Bill and leg colours help to distinguish species, as do wing patterns.

Gulls scavenge for food, taking insects, mollusks, and crustaceans on beaches; worms and

grubs in plowed fields; and fish and garbage from ships and along shores. Some of the larger gulls prey on the eggs and young of other birds, including their own kind.

Several genera are usually recognized for certain specialized gulls, but many authorities place these in the broad genus *Larus*.

The black-headed gull (*Larus ridibundus*), a dark-headed bird with crimson legs, breeds in Eurasia and Iceland and winters south to India and the Philippines, commonly feeding in fields, where its chief food is insects. Bonaparte's gull (*L. philadelphia*), of North America, has a black head and bill, a gray mantle, and pinkish to reddish legs. It nests in trees and hawks over ponds for insects. In the winter, at sea, it may plunge for fish. The California gull (*L. californicus*), of North America, breeds inland and winters on the Pacific coast. This species is credited with saving the crops of early Mormon settlers in the Salt Lake City region from destruction by the Mormon cricket, a long-horned grasshopper; it is the state bird of Utah. Franklin's gull (*L. pipixcan*) breeds in large colonies on inland marshes of North America and winters on the Pacific coast of South America.

The glaucous gull (*L. hyperboreus*), of northern seas, is mostly white with pinkish legs and a yellow bill with a red spot. Sometimes it winters as far south as Hawaii and the Mediterranean Sea. The great black-backed gull (*L. marinus*), with a wingspread of 1.6 m (63 inches), is the largest gull. It is nearly circumpolar but does not occur between Labrador and Japan. The herring gull (*L. argentatus*) is by far the most common of the Atlantic gulls. A bird of the Northern Hemisphere, it has a gray mantle, flesh-coloured legs and feet, and black-and-white-spotted wing tips. Herring gull populations are generally increasing as a result of expanding food supplies, chiefly garbage and sewage in or near coastal waters; herring gulls are primarily scavengers.

The kelp gull (*L. dominicanus*) is a very wide-ranging, black-backed species of the Southern Hemisphere, including Antarctica. The laughing gull (*L. atricilla*), a medium-sized bird with a black head, red bill, and red feet, often gives vent to a strident, laughing call. It breeds from Maine to northern South America and winters south to Brazil, often on fresh waters far inland. It is the only gull that breeds both in the Caribbean area and in the North Atlantic Ocean. The little gull (*L. minutus*), of Europe and occasionally North America, a black-headed species with a wingspread of about 60 cm (24 inches), is the smallest gull.

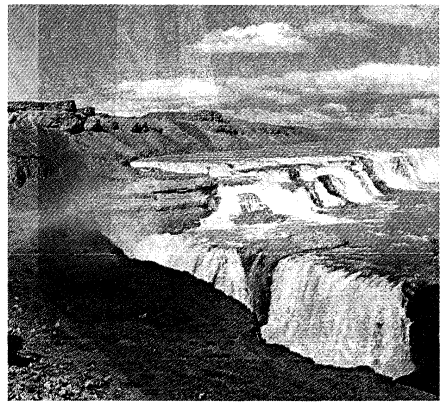
The Pacific gull (*L. pacificus*) breeds in the region of Tasmania and southern Australia. The ring-billed gull (*L. delawarensis*) is common on inland lakes in North America and often gathers in large flocks to feed on plowed fields. The sooty gull (*L. hemprichi*), of the western Indian Ocean, has a dark brown hood and a grayish brown mantle. Ross's gull (*Rhodostethia rosea*) is an attractive, pinkish white bird that breeds in northern Siberia and wanders widely over the Arctic Ocean. Sabine's gull (*Xema sabini*), abounding in the Arctic, has a forked tail and a habit of running and picking up food like a plover. The swallow-tailed gull (*Creagrus furcatus*), of the Galápagos Islands, is a striking bird, the only gull with a deeply forked tail. *See also* kittiwake.

Gull, Sir William Withey, 1ST BARONET (b. Dec. 31, 1816, Colchester, Essex, Eng.—d. Jan. 29, 1890, London), leading English physician of his time, lecturer and physician at Guy's Hospital, London, and an outstanding clinical teacher.

Gull received his M.D. from the University of London in 1846 and became lecturer on physiology and anatomy and then physician, at Guy's, where he taught or served as consulting physician for the rest of his life. He was a famous and popular teacher, and some of his epigrams are still current. Gull had a successful and fashionable private practice as well—including among his patients Queen Victoria and the Prince of Wales—which made him wealthier than any English physician before his time. He was created a baronet in 1872.

Gull contributed valuable articles to *Guy's Hospital Reports* on many clinical subjects, including xanthoma, intermittent hematuria, the treatment of tapeworm (with oil of male fern), hyperthyroidism, and hypochondria. He was one of the first clinicians to describe pathological lesions in tabes dorsalis (1856), intermittent hemoglobinuria (1866), arteriosclerotic atrophy of the kidney (1872; with H.G. Sutton), and myxedema (1873), known as Gull's disease. He believed in minimal use of drugs ("The road to a clinic goes through the pathologic museum and not through the apothecary's shop") and defended the use of vivisection and clinical investigation.

Gull Falls, Icelandic GULLFOSS, waterfall, southwestern Iceland, on the Hvítá (river), a tributary of the Ölfusá. It is fed by the meltwaters of the Lang Glacier on the central



Gull Falls, Iceland
Art Resource—EB Inc.

plateau, falling down 105 feet (32 m) to the southern farming region. Gullfoss ("Golden Falls") is one of Iceland's most popular tourist attractions and is accessible by road from Reykjavík.

Gullah, creole language based on English, spoken by former black slaves and their descendants (also called Gullahs and Geechees, West African tribal names) on the Sea Islands of South Carolina and Georgia and on the mainland nearby. Gullah consists of an English pidgin base characteristic of 17th- and 18th-century British colonists' speech, with additional vocabulary and some grammatical forms derived from various West African languages, including Vai, Mende, Twi, Ewe, Hausa, Yoruba, Ibo, Kikongo, and others. The influence of these African languages on Gullah is seen in the sound system, syntax, word intonation, grammar, vocabulary, and formation of new words.

Nearly 6,000 African words have been identified in Gullah, most of them used as personal names; examples are *Abiona* "born by the wayside" (Yoruba), *Anyika* "she is beautiful" (Vai), and *Pitipa,* a Mende name given to children born during a rain. Many African words in Gullah have been passed on from Gullah to English, such as *cooter* ("tortoise"), *goober* ("peanut"), *gumbo* ("okra"), *juke* (as in "jukebox"), and *voodoo* ("witchcraft"). Gullah speakers simplify English words and constructions, speak rapidly with no Southern drawl, and use an intonation unlike that of English. Representative sentences in Gullah are *Dey fa go shum* ("They went to see her," literally "They take go see her"); *Shishuh tall pass una* ("Sister is taller than you"); and *Umachil' nyamnyam fufu an t'ree roll-roun', but 'e ain't been satify* ("The girl ate mush and three biscuits, but she wasn't satisfied").

Gullstrand, Allvar (b. June 5, 1862, Landskrona, Swed.—d. July 28, 1930, Stockholm), Swedish ophthalmologist, recipient of the 1911 Nobel Prize for Physiology or Medicine for his research on the eye as a light-refracting apparatus.

Gullstrand
Archiv fur Kunst und Geschichte, West Berlin

Gullstrand studied in Uppsala, Vienna, and Stockholm, earning a doctorate in 1890. He became professor of diseases of the eye at Uppsala in 1894 and in 1913 was appointed professor of physiological and physical optics there.

Gullstrand contributed to knowledge of the structure and function of the cornea and to research on astigmatism. He improved corrective lenses for use after surgery for cataracts and devised the Gullstrand slit lamp, a valuable diagnostic tool that facilitates detailed study of the eye. Gullstrand's investigations led to a new concept of the theory of optical images. He expanded the classic theory of the German physicist Hermann von Helmholtz to include the redisposition of internal parts of the lens structure in accommodation, a mechanism by which the eye can focus for near or far vision within certain limits. Gullstrand showed that although accommodation depends about two- thirds on the increase in convexity of the lens surface, the remaining one-third does not.

gully, trench cut into land by the erosion of an accelerated stream of water. Various conditions make such erosion possible: the natural vegetation securing the soil may have been destroyed by human action, by fire, or by a climatic change; or an exceptional storm may send in torrents of water down the streambed. Gully erosion is closely related to intense local thunderstorms and not to widespread winter precipitation. Gullies in soft rock enlarge rapidly by headward erosion and may destroy much arable land if preventive measures are not taken.

Gully, John (b. Aug. 21, 1783, Wick, Gloucestershire, Eng.—d. March 9, 1863, Durham, Durham), prizefighter, racehorse fancier, and politician, a major personage of the 19th-century British sporting world.

In 1805, having failed as a butcher, Gully was in prison for his debts when he was visited by his Bristol pugilist friend Henry Pearce, "the Game Chicken." As the result of an informal bout between them in jail, Gully's debts were paid and he was matched against Pearce. They met at Hailsham, Sussex, on Oct. 8, 1805, before the Duke of Clarence (afterward King William IV). Gully lost in 64 rounds, but his fine showing enhanced his reputation. When Pearce retired because of ill health, Gully was recognized as his successor as heavyweight

champion. In 1807–08 Gully twice defeated the huge Bob Gregson and then retired from the prize ring.

He then took to horse racing and executed betting commissions for important patrons, among them the prince regent (later King George IV). In 1827 he lost £40,000 in backing Mameluke (which he had bought for 4,000 guineas) in the St. Leger. Gully's horses won the Derby and St. Leger in 1832, the Two Thousand Guineas race in 1844, the Derby and the Oaks in 1846, and the Two Thousand Guineas and the Derby in 1854. Because his horses were trained at Danebury, Hampshire, he and his betting associates were called the Danebury Confederacy.

From 1832 to 1837 Gully was member of Parliament for the pocket borough of Pontefract, Yorkshire. In 1862 he bought the Wingate estate and coal mines in County Durham. Gully married twice and had 24 children, a dozen by each wife.

Gulmarg, resort town situated in the Indian-held sector of Jammu and Kashmir state, in the northern part of the Indian subcontinent. Located at an elevation of 8,500 feet (2,600 m), Gulmarg (meaning "meadow of flowers") displays a breathtaking panoramic view of the whole Vale of Kashmir and of Nānga Parbat, one of the highest peaks (26,660 feet [8,126 m]) of the Himalayas. The valley and mountains may be viewed from various lookout points on Gulmarg's Circular Path. The resort is reputed to contain the world's highest golf course; it also has excellent facilities for tennis, skiing, and polo. Gulmarg was formerly a customs and watch station. Pop. (1981) 511.

gulper, any of nine species of deep-sea fish comprising three families, placed by some authorities in the order Anguilliformes (eels) and by others in a distinct order, Saccopharyngiformes (or Lyomeri). Gulpers range to depths

Gulper (*Eurypharynx pelecanoides*)
Painting by Jean Helmer

of 2,700 m (9,000 feet) or more. The members of one family, Monognathidae, have mouths of normal proportions, but the other gulpers (Eurypharyngidae and Saccopharyngidae) are noted for their enormous mouths. In the Eurypharyngidae, the mouth is longer than the body. In the Saccopharyngidae, it is somewhat smaller, but still huge. Gulpers are soft-bodied fish with tapered bodies, long tails, and greatly expandable stomachs that can accommodate large prey. Gulpers are usually solid black, and some are provided with light organs. Some gulpers grow as long as 1.8 m (6 feet); most of this length, however, is tail.

Gulu, town, northwestern Uganda, East Africa. It is situated about 175 miles (285 km) north of Kampala (the national capital) at an elevation of about 3,600 feet (1,100 m). It is the marketing centre of the main agricultural region of northern Uganda; cotton, tea, coffee, corn (maize), sorghum, and tobacco are grown in the surrounding area. Processing industries in Gulu handle cotton, coffee, tea, and oilseed and grain milling. Cigarettes, textiles, footwear, matches, and beverages are also manufactured in the town. Gulu has a large number of refugee camps where Sudanese, Rwandese, and Congolese refugees, who entered Uganda in the early 1960s, are permanently settled. The town is linked by road and railway with Lira, Soroti, and Pakwach and has an airport as well. Pop. (1980 prelim.) 14,958.

gum, also called GINGIVA, plural GINGIVAE, in anatomy, mucous membrane attached to and surrounding the necks of the teeth and adjacent alveolar bone. Before the erupting teeth enter the mouth cavity, gum pads develop; these are slight elevations of the overlying oral mucous membrane. When tooth eruption is complete, the gum embraces the neck region of each tooth. As well as being attached to adjacent alveolar bone, gum is connected to the cement of each tooth and to the tooth enamel.

Healthy gums are pink, stippled, and tough and have a limited sensibility to pain, temperature, and pressure. The gums are separated from the alveolar mucosa, which is red, by a scalloped line that approximately follows the contours of the teeth. The edges of the gums around the teeth are free and extend as small wedges into the spaces between the teeth (interdental papillae). Internally, fibres of the periodontal membrane (*q.v.*) enter the gum and hold it tightly against the teeth. Changes in colour, loss of stippling, or abnormal sensitivity are early signs of gum inflammation, or gingivitis (*q.v.*).

gum, in botany, adhesive substance of vegetable origin, mostly obtained as exudate from the bark of trees or shrubs belonging to the family Fabaceae (Leguminosae) of the pea order Fabales. Some plant gums are used in the form of water solutions in the manufacture of cosmetics, pharmaceuticals, and foods. When the water evaporates, a film having a considerable adhesive character is formed. Some plant gums, such as gum arabic, dissolve in water to give clear solutions. Other gums, such as gum tragacanth, form mucilages by the absorption of large amounts of water.

A gum is produced by making an incision in the bark of the tree and collecting the exudate repeatedly throughout the season. Gums so obtained consist of small lumps, usually transparent and light yellow. Trees produce gums by a process called gummosis, possibly as a protective mechanism, either after mechanical damage to the bark or after a bacterial, insect, or fungal attack upon it. The *Acacia senegal* tree yields the greatest amount of gum acacia when it is in an unhealthy condition, and good culture methods reduce the yield.

Gum arabic is the most widely used of the water-soluble gums. True gum arabic is gum acacia; that is, it is produced by species of *Acacia.* Examples of true gum arabic are gum sudan and gum kordofan, both of which originate in The Sudan, and gum senegal, which comes from Senegal. Gum arabic is also collected in northern Nigeria, Libya, Tunisia, and Tanzania. The name gum arabic is sometimes also applied to substitutes for gum acacia, including gum gatti, collected in India.

Gum tragacanth is second in importance commercially; it is produced by several shrubs of the genus *Astragalus,* principally *Astragalus gummifer,* native to the arid regions of Iran, Asia Minor, and Greece. The exudate is produced spontaneously on the bark of the shrub, but the yield may be increased by making an incision and driving wooden wedges into it. One of the oldest drugs known, its use dates from pre-Christian times. Gum tragacanth is still used pharmaceutically as a demulcent (coating) and as a binding agent in pill manufacture. In processed foods it is used as an emulsifier and in sauces as a thickener. Gum karaya and carob gum have been used as limited substitutes for gum tragacanth.

Chemically, the plant gums are complex compounds derived from carbohydrates; specifically, they are salts, either potassium, magnesium, or calcium, of acidic polysaccharides, the acidity of which is due to uronic acids in their structure. Rubber, chicle, and other latex products are not true gums. Varnish gums are actually resins and are chemically quite different from plant gums.

GUM, abbreviation of GOSUDARSTVENNY UNIVERSALNY MAGAZIN (Russian: "State Department Store"), the largest department store in the Soviet Union. Situated on Red Square opposite the Lenin Mausoleum in Moscow, GUM was established in 1921 in a commerical structure built in 1889–93 to house more than 1,000 shops. The store has consistently offered food, clothing, home appliances, watches and cameras, and other department-store lines of goods. Its food department features fruits and vegetables, meats and poultry, and other staple items.

GUM has increasingly employed Western display and sales methods in marketing its goods. Many of its goods are imports from eastern European countries, Vietnam, and other Communist-bloc countries, thus providing Western tourists with items not always obtainable in their homelands. The store has become a tourist attraction as well as a centre of retail trade. In 1959 GUM and other stores in the Soviet Union began to offer consumer credit. Many other changes were introduced in subsequent years, including modern advertising techniques.

Gum Nebula, largest known nebula in terms of angular diameter as seen from Earth, extending over at least 40° in the southern constellations Puppis and Vela. A complex of diffuse, glowing gas too faint to be seen with the unaided eye, it was discovered by the Australian-born astrophysicist Colin S. Gum, who published his findings in 1955. The Gum Nebula lies roughly 1,000 light-years from the Earth and may be the remnant of an ancient supernova—*i.e.,* violently exploding star.

Gumal Pass, also spelled GOMAL PASS, route along the Gumal River Valley in the extreme southwestern portion of North-West Frontier Province, Pakistan. The most important pass between the Khyber and Bolān passes, it connects Ghaznī in eastern Afghanistan with Tānk and Dera Ismāīl Khān in Pakistan via Domandi and Kot Murtaza. Actually a 4-mile (6-kilometre) defile (gorge), the name is sometimes applied to the full course of the Gumal River. The oldest trade route in the area, the Gumal Pass has been traditionally used by nomadic Afghan traders called Powindahs, whose entry into Pakistan is now restricted. By treaty agreement with the Mahsūd Wazīrī inhabitants, the British succeeded in opening the pass in 1889.

Gumal River, river that rises in eastern Afghanistan near Sarwāndī on the Khumbur Khūlē Range and enters western Pakistan near Domandi, being joined there by the Kundar River. Further joined by the Wāna Toi and Zhob rivers, it falls into the Indus River just south of Dera Ismāīl Khān after a course of 150 miles (240 km). Dams under construction in the 1980s at Miān Nūr and Khajūri Kach, below the confluence of the Gumal and Zhob rivers, formed part of a multipurpose scheme to include flood control, irrigation of about 164,000 acres (66,400 hectares) of cropland in the locality of Dera Ismāīl Khān, and the production of hydroelectric power.

gumbo, an aromatic soup-stew characteristic of the Creole cuisine of Louisiana, combining African, American Indian, and European elements. It takes its name from a Bantu word for okra, one of the dish's typical ingredients, which is prized for its ability to give body to the sauce.

A gumbo begins with a roux, a mixture of fat and flour slowly browned over low heat. To this base are added onions, garlic, green peppers, tomatoes, herbs and seasonings

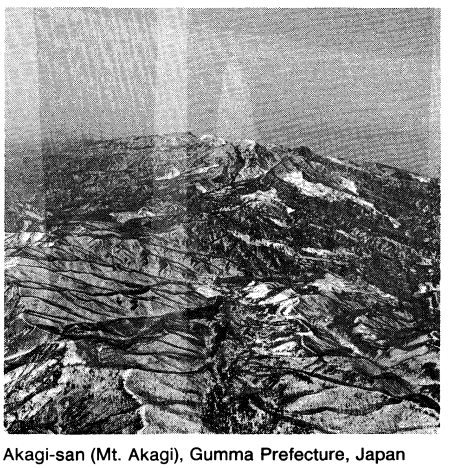
including hot chilies, and seafood, chicken, ham, duck, or game such as squirrel and rabbit. Gumbos frequently are based on shrimp, crab, and oysters, but ingredients vary widely; *gumbo z'herbes* is a meatless version containing a dozen leafy green vegetables that is traditionally eaten on Good Friday. Gumbos not containing okra are thickened with filé powder, pounded dried sassafras leaves added at the last minute before serving. All gumbos are eaten with a mound of white rice in the bowl to absorb the liquids and temper the dish's spiciness.

Gumel, also spelled GUMMEL, town and traditional emirate, northern Kano State, northern Nigeria. The emirate was founded *c.* 1750 by Dan Juma of Kano city (75 mi [121 km] southwest) and his followers of the Manga (Mangawa) tribe; shortly after his death in 1754, it became a tributary state of the Bornu Kingdom. The emirate survived the Fulani attacks of Usman dan Fodio's *jihād* ("holy war") in the early 19th century and never became part of the Fulani Empire of Sokoto. In 1845 Gumel's capital was moved from Tumbi (20 mi north in present-day Niger) to the present site. Wars with nearby Hadejia, Kano, and Zinder (Damagaram) plagued the emirate from 1828; the war with Hadejia continued until Gumel's emir, Abdullahi, was killed in battle in 1872. Slave raids toward the end of the century by Damagaram further depopulated Gumel. Emir Ahmadu submitted to the British in 1903 and the Gumel emirate was incorporated into Kano Province. In 1976 it became part of Kano State, and it is now the headquarters of a local government council.

Gumel town remains the area's chief market centre—millet and sorghum are the staple foods—and serves as a collecting point for peanuts (groundnuts), which are trucked to Kano city for export by rail. Limestone and diatomaceous earth deposits are exploited locally in scattered areas. The town has a farm-training centre and an advanced teacher-training college, and it is served by a hospital. It lies on a secondary highway linking it to Kano and Hadejia and is a hub for local roads serving northern Kano State. Pop. (1983 est.) 40,770.

Gumm, Frances (American actress): *see* Garland, Judy.

Gumma, landlocked prefecture (*ken*), Honshu, Japan, containing the western Kantō Plain. Most of its 2,454-sq-mi (6,356-sq-km) area is mountainous, with two-thirds more than 1,650 ft (500 m) in elevation and volcanic peaks towering over 6,560 ft. The prefectural capital, Maebashi, and most of the population are on a small segment of the plain in the southeast.



Akagi-san (Mt. Akagi), Gumma Prefecture, Japan
By courtesy of the Fishery Aviation Manufacturing Company, Japan

Sericulture and wheat cultivation are major economic activities. Industry, particularly auto manufacturing, increased dramatically during the late 1960s, influenced by the Keihin Industrial Region to the southeast. Mountain forests and mineral deposits (sulfur, manganese, limestone) are exploited. The silk-reeling industry is conducted on a small scale in Maebashi, Tomioka, Kiryū, and Isezaki. Haruna-san (Mt. Haruna) is a popular tourist attraction; nearby Haruna-ko (Lake Haruna) offers ice fishing in winter. Gumma University in Maebashi was founded in 1949. Pop. (1983 est.) 1,889,000.

gumma, soft, granulomatous, tumourlike mass, sometimes appearing during the late stages of syphilis, that occurs most often beneath the skin and mucous membranes but that may also be found in the bones, nervous system, and other organs and tissues. *See also* syphilis.

gummite, mixture of natural uranium oxides, representing the final oxidation and hydration stages of uraninite, that usually occurs as dense masses and crusts in many of the known uraninite localities. It varies widely in physical properties, appearance, and chemical composition; it usually contains oxides of lead and thorium and large amounts of water. Gummite, named in reference to the gumlike appearance of some varieties, is related to well-defined uranium oxides as limonite and wad are to iron and manganese oxides.

Gumplowicz, Ludwig, Polish LUDWIK GUMPLOWICZ (b. March 9, 1838, Kraków, Rep. of Kraków—d. Aug. 19/20, 1909, Graz, Austria), sociologist and legal philosopher, professor of public law at the University of Graz from 1875, who was known for his disbelief in the permanence of social progress and for his theory that the state originates through inevitable conflict rather than through cooperation or divine inspiration.

In Gumplowicz' view human beings have an innate tendency to form groups and develop a feeling of unity. He called this process syngenism. Initially, conflict arises between prepolitical racial groups. When one racial group has prevailed, it forms a state that becomes an amalgam of victor and vanquished. Wars then take place between states, and the process of conquest and assimilation occurs again, on a larger scale. Finally, each state creates by coercion a system of division of labour; as a result, social classes are formed, and they also engage in conflict. Laws are determined by victory in class struggles rather than by any notion of abstract justice. Higher civilization owes its existence to warfare in that culture is a product of prosperity, and leisure is made possible by conquest. Considering history a cyclical process, Gumplowicz denied that social planning and welfare measures can save societies from ultimate collapse.

Among the leading sociologists strongly influenced by Gumplowicz were Gustav Ratzenhofer, Albion W. Small, and Franz Oppenheimer. Émile Durkheim, León Duguit, Harold J. Laski, and others elaborated Gumplowicz' view of political parties as interest groups.

The Outlines of Sociology (2nd ed., 1963) is a translation of Gumplowicz' *Grundriss der Soziologie* (1885). His major works were written in German except for the Polish-language *System socyologii* (1887).

Gumti (India): *see* Gomati River.

Gümüşhane, also spelled GÜMÜŞANE, city, capital of Gümüşhane *il* (province), northeastern Turkey, on the Harşit Deresi (river), at an altitude of 5,000 ft (1,500 m) on the road between Trabzon and Erzurum. The origin and history of the ancient settlement are obscure. The silver (Turkish *gümüş*) mines from which the city's name is derived were mentioned by Marco Polo and the medieval North African traveller Ibn Baṭṭūṭah; they have been worked out since the 19th century. Since then the economy of Gümüşhane has been based upon the export of fruits (chiefly apples and pears) from its orchards and upon its position as a transit station between the port of Trabzon and western Iran. Russian occupation during World War I left half of the old city in ruin; the new city built since then is now the commercial and administrative centre. Nearby historical buildings include partially ruined castles, Turkish baths, mosques, and several Byzantine churches.

Gümüşhane *il,* 4,307 sq mi (11,154 sq km) in area, is drained by the Harşit, Çoruh, and Kelkit rivers. It is mostly mountainous and rugged, with settlements concentrated in river valleys. Bayburt is the largest town in the *il.* Pop. (1980) city, 12,735; (1983 est.) *il,* 265,600.

Gümüşpala, Ragıp (b. 1897, Edirne, Tur.—d. June 6, 1964, Istanbul), Turkish general and founder of the Justice Party (JP).

A career army officer, Gümüşpala served as the chief of the General Staff after the military coup of May 27, 1960, but was forcibly retired by the new government shortly thereafter. In February 1961 Gümüşpala formed the Justice Party in opposition to the ruling Republican People's Party (RPP). The Justice Party, in actuality, proved to be an offshoot of the outlawed Democrat Party of Adnan Menderes (*q.v.*). Gümüşpala led the JP to near victory in the 1961 elections, forcing the RPP to form a coalition government. In 1962 his campaign for amnesty for the imprisoned leaders of the late Menderes' former government led to the fall of the RPP-JP government.

gun, weapon consisting essentially of a metal tube from which a missile or projectile is shot by the force of exploding gunpowder or some other propellant. In military science, the term is often limited to a large piece of ordnance, such as a cannon, howitzer, or mortar. Portable firearms, such as muskets, rifles, and handguns are then distinguished as "small arms." The complexity of modern weapons, however, makes the distinction difficult, especially with the development of such intermediate types as machine guns, bazookas, and rocket launchers.

A brief treatment of the history of guns follows. For full treatment, *see* MACROPAEDIA: War, the Technology of.

The invention of gunpowder has been variously attributed to the Chinese and the Arabs. Certainly Europeans of the 13th century knew about gunpowder and by 1326 began manufacturing firearms. These early weapons were far from ideal. Casting deficiencies made cannon extremely dangerous to fire; they were inaccurate at all but very close range, and their bulk and weight made them difficult to deploy sufficiently close to a wall or tower. Early handguns could not even be aimed properly.

The more progressive armies nonetheless attempted to exploit the potential of these new weapons. During the Hussite Wars (1419–34), Jan Žižka of Bohemia made the first use of mobile artillery in Europe. Indeed, cannon at first were used mainly for defensive purposes. In 1429 the defenses of Orléans, for example, included 71 large cannon and some smaller culverins while the besieging British employed cannon and mortars, though with little effect.

By the beginning of the 16th century, the development of artillery was sufficient to support a separate branch of the army, alongside cavalry and infantry. At the Battle of Ravenna in 1512 the artillery took the enemy in the flank, playing a decisive part in winning victory for the French under Gaston de Foix. At the same time a rapid evolution of the handgun ensued. In 1520 the Spanish adopted the portable arquebus, which served them well in Pavia in 1525. In the wars between the Holy

Roman emperor Charles V and Francis I of France, the bow and crossbow became obsolete. Meanwhile, at sea there developed floating fortresses of guns. The standard fighting ship became the galleon, a vessel with two or three decks carrying its main batteries in the broadside and lighter pieces fore and aft.

In the 17th century the cavalry began to reduce its armour, and the lance was laid aside in favour of the sword and pistol. Cavalry became the arm of manoeuvre by falling upon the flank, or rear, of the enemy to deliver the decisive attack. To assist cavalry mobility, frontal fire was necessary, and consequently skirmishers vanished and a rigid line of infantry and artillery was formed. The improvement in firearms, as well as the introduction of the socket bayonet by Sébastiende Vauban in 1687, reduced the infantry to a single type. The previous distinction between pikemen, musketeers, fusiliers, and grenadiers was abandoned; and during the War of the Spanish Succession (1701–14) all foot troops were armed with the flintlock and the bayonet.

In the 18th century Frederick the Great used artillery to great effect, not only in preparation for infantry attack but also for searching out the enemy where the terrain concealed them. Napoleon took advantage of all the new possibilities of warfare and wrote, "The better the infantry, the more one must husband it and support it with good batteries. . . . The invention of powder has changed the nature of war: missile weapons now become the principal ones. . . . The power of infantry lies in its fire."

War at sea advanced correspondingly. During the 17th and 18th centuries the warship evolved into two major types. The main fighting ship of the fleet was the "ship of the line" or "line-of-battle ship," so called because it was meant to "fight in the line." Such ships were two-deckers or three-deckers (rarely also four-deckers) with heavy broadside armament as well as heavy timbers in their walls to repel enemy shot. The other main type comprised the lighter and faster cruisers, of which the largest was a frigate, a vessel with a single deck of guns of lesser calibre than those of the line-of-battle ship.

The 19th century is noteworthy for the increasing importance and effectiveness of land-based artillery and the continual improvement in the rifle. The inventory of missile weapons was growing extraordinarily. The Prussian needle rifle, a breech-loading weapon that helped win the Austro-Prussian War of 1866, gave way to the French *chassepot* in 1870. In 1885 Germany introduced the Mauser, a radically improved small-bore rifle fed by a metal magazine holding eight cartridges. A year later the French adopted the Lebel rifle, which fired a cartridge of smokeless powder. In 1888 the British adopted the magazine-fed Lee-Metford rifle.

The dominance of the magazine-fed rifle was soon challenged by the machine gun and improved artillery. During the Franco-German War of 1870–71, it was shown that massed defenders could be so completely broken by gunfire that the infantry attack consisted merely of occupying the ground. It was found that infantry armed with the breech-loading rifle had nothing to fear from cavalry. It was proved essential that all the artillery should be in line to initiate the attack and must not only crush the enemy's artillery but prepare the infantry advance by a long bombardment. Throughout the war neither the French nor the Germans succeeded in taking a single position by a frontal attack.

In World War I the proportion of medium and heavy artillery was vastly increased. Superheavy howitzers of 12 in. (31 cm) and upward and guns on railway mountings of 9.2 in. and upward were brought into use. Much publicity was given the German "Big Berthas," howitzers with bore diameters of nearly 17 in. (42 cm). And mortars, a type of weapon that had long been discarded, made their reappearance for the war of position in the trenches. By this time, too, infantrymen in all the armies had at their disposal a wide variety of high-powered repeating rifles, lightweight carbines, semiautomatic pistols and revolvers, and fully automatic machine guns. All these weapons fired ammunition that was far superior to that in use a generation earlier, much of it being filled with the propellant known as smokeless powder. Lead bullets covered with a thin jacket of cupronickel or other metal could be fired with great accuracy and lethal effect at man-size targets more than 500 yards (about 460 meters) distant; extreme ranges ran up to 3,000 yards and more. Military small arms had not only become lighter, more dependable, more accurate, and longer ranging than those of earlier years, but they had become capable of faster firing.

Between the world wars and during World War II, firepower and delivery systems vastly increased, so that during the war mechanized forces and air power swept back and forth across Europe. The new technology included land mines, artillery firing shells equipped with the new proximity fuse, and various rocket-firing weapons. The appearance of recoilless rifles, which fired shells of artillery calibre but light enough to be carried by one or two infantrymen, greatly added to the firepower of the infantry. Radar could spot a defender's weak point, which could then be attacked by rocket-firing tactical aircraft, heavy artillery, and ground combat troops armed with hollow-charged weapons.

After World War II, improvements in conventional arms were supplemented by the development of new types of "guns"—the silos housing guided missiles and the various rocket launchers consisting of tubes or guiding rails. Twentieth-century sea power likewise became more flexible. Modern combat ships fell into three major categories: (1) ships that fought chiefly by means of armed aircraft launched from their decks; (2) those that fought primarily with guns or with rocket-propelled missiles; and (3) those that fought mainly with underwater weapons such as mines, torpedoes, and depth charges. Among the latter was a further sharp distinction between surface and submarine craft. Submarines equipped to launch intermediate-range ballistic missiles with multiple nuclear warheads constituted a new category of artillery.

Gun War (1880–81), southern African war that ended 10 years of rule by the British Cape Colony over Basutoland (Lesotho). Cape magistrates had interfered with the chiefs' authority and with the traditional laws of the Sotho people; part of southern Lesotho was demarcated for white use, and a 1879 Disarmament Act was to be enforced in 1880. The Sotho refused to give up their guns. Fighting from defensive positions in rugged mountainous country, the Sotho kept the inefficient Cape forces at bay. A decisive engagement occurred at Qalabani (October 1880), in which the Sotho ambushed a column of Cape soldiers, killing or wounding 39 of them. Peace was patched up, but the Cape was unable to reassert control, and the British government in London took over responsibility for Lesotho in 1884. The Gun War is one of the few examples in southern Africa of Africans winning a conflict with whites in the 19th century.

Guna, also spelled GOONA, town, administrative headquarters of Guna district, Madhya Pradesh state, central India. A road and rail junction, Guna town is a major agricultural distribution centre. Cotton ginning, oilseed milling, and handloom weaving are important industries. The town has three colleges affiliated with Jiwaji University.

Guna district (4,254 sq mi, or 11,017 sq km) comprises a plains area bounded on the northwest by the Vindhya Range and on the southwest by the Mālwa Plateau. Constituted in 1922, it represents chiefly the former Isāgarh district of Gwalior princely state. The Pārbati, Sind, and Betwa are the main rivers. Wheat, sorghum, legumes, corn (maize), and oilseeds are the major crops. Pop. (1981) town, 60,255; metropolitan area, 64,659; district, 1,001,985.

guṇasthāna (Sanskrit: "level of virtue"), in Jainism, any of the 14 stages of spiritual development through which a soul passes on its way to *mokṣa* (spiritual liberation). The progression is seen as one of decreasing sinfulness and increasing purity, freeing the individual from the bonds of *karman* (merit and demerit) and the cycle of rebirths.

The initial stages of development are (1) *mithyā-tva,* literally, the state of being "deluded"; (2) *sāsvādana,* "having a taste for the truth"; (3) *miśra,* "mixed" right and wrong attitudes of mind; (4) *avirata-samyak-tva,* "correctness [of insight] while not yet having ceased [from wordly involvement]"; (5) *deṣa-virati,* "partial cessation" from worldly involvement; (6) *pramatta-virati,* "cessation with some relapses"; (7) *apramatta-virati,* "cessation without any relapses."

In the next seven stages the aspirant enters the holy life: (8) *a-pūrva-karaṇa,* "the pursuit of that which has not been experienced"; (9) *a-nivṛtti-karaṇa,* "the pursuit of nonreturn [to the cycle of rebirths]"; (10) *sūkṣma-saṃparāya,* "transition to a state of subtlety"; (11) *kṣīṇa-moha-tā,* "the state in which delusion has been dispelled"; (12) *antarāyopaśānti,* "annihilation of all obstruction [to liberation]." If a man dies while in the 12th stage, his soul passes quickly through the next two stages and he achieves *mokṣa* without having to be reborn. Next, (13) *sa-yoga-kaivalya,* can be described as "emancipation or spiritual release while still embodied." The aspirant who reaches this stage preaches, forms a community of monks, and becomes a Tīrthaṅkara (saint). The final stage, (14) *a-yoga-kaivalya,* is one of "emancipation while no longer embodied." The soul is now a *siddha* (perfectly liberated being) and leaves its body to reside at the top of the universe, forever freed from the chain of rebirths. This final release is called *mokṣa.*

Gundagai, town, southeastern New South Wales, Australia, on the Murrumbidgee River. The site, originally a sheep run called Willia Ploma, was surveyed in 1838, and the town, a former riverport, derived its present name from an Aboriginal term for "going upstream." A disastrous flood in 1852 drowned 89 townsfolk. The discovery of gold in 1861 at nearby Spring Flat stimulated both its growth and bushranger (outlaw) depredations. Mining continued until 1875 and was resumed in 1894, when changes were made in the legal interpretation of land rights. Gundagai became a municipality in 1889 and was merged with Adjungbilly Shire in 1923. Just off the Hume Highway, with rail connections to Sydney (196 mi [315 km] northeast) and Melbourne, it serves a district of the Western Slopes that has fruit and vegetables, wheat, cattle, and sheep farming and deposits of asbestos, gold, chromite, magnesite, and wolframite.

A monument in the town, "Dog on a Tuckerbox," honours the pioneer teamsters (bullock drivers) who once congregated there; the period is recalled in many well-known ballads, notably "Nine Miles from Gundagai," written in 1923 by Jack Moses, a travelling wine salesman. Pop. (1981) 2,308.

Gundahar (king of Burgundy): *see* Gunther.

gundi, any of about eight species of North African rodents of the family Ctenodactylidae (order Rodentia). Gundis live in dry,

rocky country, among rock crevices, caves, and ledges. Stocky animals resembling guinea pigs, they are 16 to 24 cm (6¼ to 9⅓ inches) long, not including the short, hairy tail. They have bristly "combs" on the inner two toes of each hind foot, which they use to groom their soft, usually pale fur. Little is known about the habits of gundis. Common gundis (*Ctenodactylus*), the best known, are shy, buff-coloured rodents that spend the hottest parts of the day under cover and emerge in the evening. They apparently feed only on plant material.

Gundicar, also called GUNDICARIUS (king of Burgundy): *see* Gunther.

Gundisalvo, Domingo, Latin DOMINICUS GUNDISSALINUS (fl. 12th century, Spain), archdeacon of Segovia, philosopher and linguist whose Latin translations of Greco-Arabic philosophical works contributed to the Latin West's knowledge of the Eastern Aristotelian and Neoplatonic traditions and advanced the integration of Christian philosophy with the ancient Greek intellectual experience.

Gundisalvo may have studied in France *c.* 1140, and his views reflect those of the Neoplatonic school of Chartres, Fr., and the mystical tradition centred at the Abbey of St. Victor in Paris. Two of his works, *De anima* ("On the Soul") and *De immortalitate animae* ("On the Immortality of the Soul"), suggest the Neoplatonic argument for the soul's natural immortality that markedly influenced later Scholastic philosophers—*e.g.,* Bonaventure and Albertus Magnus—at the University of Paris.

While a member of the cathedral chapters of Toledo (*c.* 1150) and Segovia (*c.* 1190), Gundisalvo collaborated with linguists versed in Arabic in making Latin translations of Arabic philosophical treatises, among them works by Avicenna. Gundisalvo was influenced by the Neoplatonic Christian views of St. Augustine, and he strove to relate the Augustinian illuminationist theory of knowledge (the thesis that ideas are the consequence of supernatural enlightenment) with the Greco-Arabic tradition. In *De processione mundi* ("On the Procession of the World"), by ascribing the emergent force of the universe to God's causality, he attempted to harmonize the Neoplatonic-Arabic doctrine of emanationism with the Christian teaching on creation.

Gundlakamma River, river, east central Andhra Pradesh state, southern India. The Gundlakamma rises in the Nallamalla Range of the Eastern Ghāts. After crossing the mountains, it enters the plains and flows in a northeasterly direction past Mārkāpur to the Coromandel Coast of the Bay of Bengal, into which it empties 12 miles east of Ongole, after a course of 140 miles (225 km).

Gundobad, also called GUNDIBALD (d. 516), barbarian general during the last days of the Roman Empire in the west, and king of the Burgundians (*c.* 474–516).

Nephew of the barbarian emperor-maker Ricimer, Gundobad briefly held the supreme military command in the Roman service. In 473 he emulated his uncle when he himself placed a puppet, Glycerius, on the throne of Ravenna, but the subsequent deposition of Glycerius by Julius Nepos, the appointee of the eastern emperor, sent Gundobad fleeing back to his Burgundians. After becoming joint ruler (with his brothers) of the Burgundians, he murdered his brother Chilperic; the latter's daughter, Clotilda, later (*c.* 493) married the Frankish king Clovis. In 500 Gundobad fought off a Frankish attack and killed another brother, Godegisel, who had brought it about.

Though formally an Arian, Gundobad was in fact a secret Catholic sympathizer and enjoyed good relations with the orthodox clergy, as with the Romans in general over whom he ruled; his concern for the latter appears clearly in his famous law code, the *Lex Gundobada* (*c.* 500).

Gundulić, Ivan (Franov) (b. Jan. 8, 1589, Dubrovnik, Republic of Venice [now in Yugoslavia]—d. Dec. 8, 1638, Dubrovnik), Croatian poet and dramatist whose epic poem *Osman* (written 1626; first published 1826) was the outstanding achievement of the Renaissance flowering of art and literature that gave Dubrovnik the name of the "South Slav Athens."

A prolific writer, Gundulić also occupied various governmental positions in the Dubrovnik city-republic. Inspired in general by the Italian Renaissance and in particular by Torquato Tasso's *Gerusalemme liberata,* Gundulić's *Osman* describes Sultan Osman II's defeat by the Poles at Khotin in Bessarabia (1621). The work comprises 20 cantos; cantos 14 and 15 are no longer extant.

Gunflint microfossils, assemblage of microscopic fossils uncovered in the Gunflint Iron Formation, a rock layer about 2,000,000,000 years old exposed in western Ontario, Canada. The fossils include filamentous structures resembling blue-green algae (*e.g., Gunflintia, Entosphaeroides,* and *Animikiea*), tiny spheroids (*e.g., Eosphaera* and *Huroniospora*), star-shaped forms assigned to the genus *Eoastrion,* and umbrella-shaped forms assigned to the genus *Kakabekia.* These and other fossils were first collected near Thunder Bay, Ont., in the 1950s. Analyses yield strong evidence that some of these fossils are the remains of the first photosynthetic organisms.

Gungunhana, also spelled GUNGUNYANA (b. *c.* 1850—d. *c.* 1896, Canary Islands), southern African king who ruled the last great independent Bantu kingdom, Gaza, in what is now southern Mozambique. He tried to maintain his independence by playing off the European powers against one another but was finally conquered by the Portuguese.

A grandson of the great warrior and founder of Gaza, Soshangane, Gungunhana became king in 1885. Though his grandfather had ruled the Portuguese as vassals, Gungunhana found himself under increasing pressure from them. In 1885 he asked for British protection, which was refused. He encouraged contacts with other Europeans, hoping to gain time in which to build up his own strength, but these contacts lost him the loyalty of many of his people. In 1890 he signed an agreement with Cecil Rhodes's British South Africa Company, but the British government, fearful of diplomatic repercussions with Portugal, disallowed it. War finally broke out with the Portuguese in 1895, and Gungunhana was defeated and captured. He died in exile.

Gunite (concrete): *see* shotcrete.

Gunkel, (Johann Friedrich) Hermann (b. May 23, 1862, Springe, Hannover—d. March 11, 1932, Halle, Ger.), Old Testament scholar, one of the first to develop the method of biblical criticism known as form criticism.

Educated at the University of Göttingen, Gunkel taught there and at Halle, Berlin, and Giessen. A leading member of the History of Religions school, he stressed the literary values of the Old Testament by comparative study of the legends on which it draws, particularly in Genesis, Psalms and the Prophets, on which he published works in 1901, 1903, and 1917. Extending his researches beyond current dogmatic interpretations, he promoted the study on literary-historical lines of the religious history of Israel, publishing *Die israelitische Literatur* (1906; "The Literature of Israel") and *Die Urgeschichte und die Patriarchen* (1911; "Earliest History and the Patriarchs"). He contributed *Psalmen* to the *Göttinger Handkommentar zum Alten Testament* (1910; "Göttingen Ready Reference Commentary on the Old Testament"), assisted in the first edition of the religious encyclopaedia *Die Religion in Geschichte und Gegenwart* (1903–13; "Religion in History and the Present"), and was coeditor of the second edition (1927–32). Together with Wilhelm Bousset he founded the series *Forschungen zur Religion und Literatur des Alten Testaments und des Neuen Testaments* (1903– ; "Research into the Religion and Literature of the Old and New Testaments").

gunmetal, also called G METAL, variety of bronze, formerly used for ordnance. Modern admiralty gunmetal, 88 percent copper, 10 percent tin, and 2 percent zinc, is used for gears and bearings that are to be subjected to heavy loads and low speeds. It withstands atmospheric, steam, and seawater corrosion and is suitable for valves, pump parts, and steam fittings.

Gunn, Thom, original name THOMSON WILLIAM GUNN (b. Aug. 29, 1929, Gravesend, Kent, Eng.), English poet whose verse is notable for its adroit, terse language.

The son of a successful London journalist, Gunn attended University College School, London, and Trinity College, Cambridge, and received his degree in 1953. He studied and taught at Stanford University, in California, intermittently from 1954 to 1958. He taught at the University of California at Berkeley (1958–66) and lived in San Francisco while working as a writer.

His first volume of verse was *Fighting Terms* (1954; rev. ed. 1962). *The Sense of Movement* (1957) won a Somerset Maugham Award, which he used for travel in Italy. "On the Move," a celebration of black-jacketed motorcyclists from that volume, is one of his best known poems.

Selected Poems, which also contains the work of his Cambridge contemporary Ted Hughes, appeared in 1962. *Positives* (1966) is a group of poems about Londoners, with photographs by the poet's brother Ander Gunn. *Touch* followed in 1967, *Poems, 1950–1966: A Selection* appeared in 1969, *Moly* in 1971, and *Jack Straw's Castle* in 1976. *Selected Poems 1950–1975* was published in 1979, and *The Passages of Joy* in 1982. *The Occasion of Poetry* (1982) is a collection of autobiographical and critical essays.

Gunn effect, high-frequency oscillation of electrical current flowing through certain semiconducting solids. The effect is used in a solid-state device, the Gunn diode, to produce short radio waves called microwaves. The effect was discovered by J.B. Gunn in the early 1960s. It has been detected only in a few materials.

In materials displaying the Gunn effect, such as gallium arsenide or cadmium sulfide, electrons can exist in two states of mobility, or ease of movement. Electrons in the state of higher mobility move through the solid more easily than electrons in the lower mobility state. When no electrical voltage is applied to the material, most of its electrons are in the high mobility state. When an electrical voltage is applied, all its electrons begin to move just as in ordinary conductors. This motion constitutes an electrical current, and in most solids greater voltages cause increased movement of all the electrons and hence greater current flow. In Gunn-effect materials, however, a sufficiently strong electrical voltage may force some of the electrons into the state of lower mobility, causing them to move more slowly and decreasing the electrical conductivity of the material. In electronic circuits incorporating the Gunn diode, this unusual relationship between voltage and current (motion) results in the generation of high-frequency alternating current from a direct-current source.

Gunnar (king of Burgundy): *see* Gunther.

Gunnarsson, Gunnar (b. May 18, 1889, Valthjófsstadur, Ice.—d. Nov. 21, 1975, Reykjavík), novelist and short-story writer who, like many Icelanders of the 20th century, chose to write in Danish rather than limit himself to a small Icelandic public.

Gunnarsson had published two collections of verse in Icelandic before he was 17. He went to Denmark determined to become a professional writer. After two years at a folk high school, he earned a precarious living as a free-lance writer.

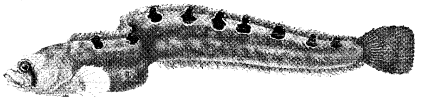
In 1912 the first volume of his novel *Af Borgslægtens historie* ("The Borg Family Papers") appeared. It became a Scandinavian best seller. The other three parts appeared from 1912 to 1914 (partial Eng. trans., *Guest the One-Eyed,* 1922). Gunnarsson lived and wrote in Denmark until 1939, when he retired to Iceland.

Gunnarsson followed *Af Borgslægtens historie* with more than 40 novels, as well as short stories, articles, and translations. Although he wrote in Danish, he drew exclusively on his Icelandic background and Icelandic history for his novels. Gunnarsson's works have been widely translated, and outside Scandinavia he has been particularly popular in Germany.

Gunnbjørns Fjeld, mountain in southeastern Greenland, 40 mi (65 km) inland from the Blosseville Kyst (coast). Highest point in Greenland (12,139 ft [3,700 m]), it is located in a belt of mountains exceeding 7,000 ft that extends 500 mi down the Blosseville Kyst. It was named for a 9th-century Icelandic voyager. Several large glaciers descend eastward to the Denmark Strait.

Gunnedah, town, east central New South Wales, Australia, at the junction of the Conadilly and Namoi rivers, in the centre of the Liverpool Plains district. The site, discovered in 1818 by the explorer John Oxley, remained undeveloped until easier access routes were located. From three livestock stations in 1827, it grew to a municipality in 1885. Its name is Aboriginal for "white stones." On the Oxley Highway, with air and rail service to Sydney (212 mi [341 km] southeast), Gunnedah is a service centre for a wheat-, stock-, wool-, and fodder-cropping area that also produces coal and lumber. The town has flour mills, engineering works, and one of the state's major stock-marketing and slaughtering operations. Pop. (1981) 8,909.

gunnel, any of the long, eel-like fishes of the family Pholidae (order Perciformes). Gunnels have a long, spiny dorsal fin running the length of the body and pelvic fins that, if present, are very small. About eight species are



Rock gunnel (*Pholis gunnellus*)
Painting by Gilbert Emerson

found in the northern regions of the Atlantic and Pacific oceans. They usually live along shores. The species *Pholis gunnellus,* known as rock gunnel, butterfish (after its slipperiness), or rock eel, is a common European and eastern North American form, usually brownish with darker markings and up to about 30 centimetres (12 inches) long.

Gunnison, city, seat of Gunnison County, west central Colorado, U.S., on the Gunnison River, just north of the San Juan Mountains of the Rockies at an altitude of 7,703 ft (2,348 m), and surrounded by Gunnison National Forest for which it is headquarters. It originated as a silver-mining camp and was incorporated in 1880 and named for Capt. John William Gunnison, Indian fighter and railroad surveyor who had explored the area in 1853. The Denver and Rio Grande Western Railroad arrived in 1881, and the city developed as a trade centre for a mining, farming, and recreation area. Its growth was sustained by the establishment there in 1901 of a state normal school (now Western State College of Colorado). Gunnison is a popular angling centre with many trout streams and several reservoirs (notably Taylor to the northeast and Blue Mesa to the west) in the vicinity. The Curecanti National Recreation Area and the Black Canyon of the Gunnison National Monument lie to the west. Big game hunting and the nearby Crested Butte Winter Sports Area draw many visitors. Pop. (1980) 5,785.

gunpowder, any of several explosive mixtures used in gunnery and blasting. The first such explosive invented was black powder, which consists of a mixture of saltpetre (potassium nitrate), sulfur, and charcoal. Prepared in suitable proportions, it burns rapidly when ignited and releases a large volume of whitish gas. In a confined space, the pent-up gas can be used for blasting or for propelling missiles, *e.g.,* bullets. Black powder is easily ignited and widely used for ignition charges, primers, fuses, and blank-fire charges in military ammunition. With varied proportions of ingredients, it is also used in fireworks, time fuses, signals, squibs, and spatting charges for practice bombs. The speed of burning can also be varied by using a different size of granules.

Black powder is thought to have originated in China, where it was used in fireworks and signals by the 10th century. There is, however, some evidence that the Arabs were the first to develop black powder. By 1304 the Arabs had produced the first gun, a bamboo tube reinforced with iron that used a charge of black powder to shoot an arrow. Black powder was adopted for use in firearms in Europe from the 14th century but was not employed for peaceful purposes, such as mining and road building, until the late 17th century.

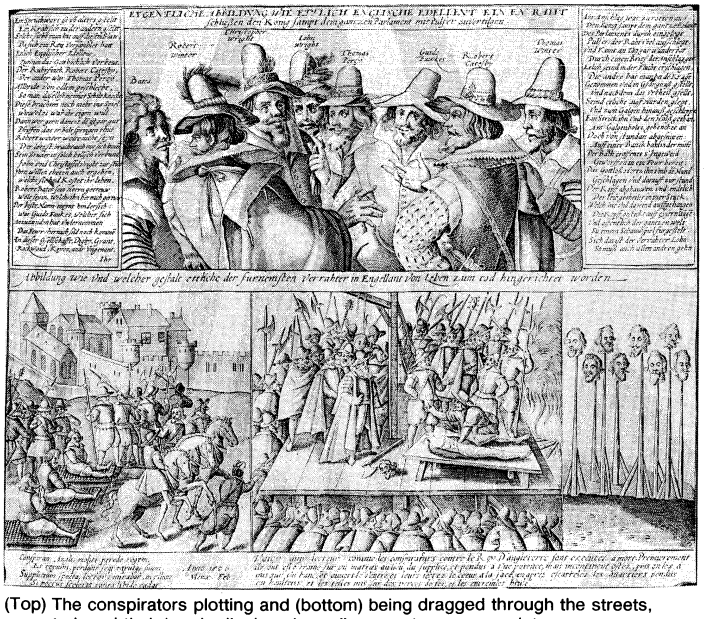
Beginning in the 1860s, black powder was gradually supplanted for use in firearms by guncotton (the first smokeless powder) and other forms of nitrocellulose. Unlike black powder, which explodes by the chemical reactions of its constituent ingredients, nitrocellulose is an unstable compound that explodes by decomposing rapidly, forming hot gases and vapours. It is manufactured by nitrating cellulose such as cotton or wood pulp with nitric and sulfuric acids. Early manufacturing techniques often failed to remove all traces of residual acids, which tended to cause unpredictable, spontaneous decomposition of the explosive. Modern manufacture of nitrocellulose includes the addition of special stabilizers that neutralize residual acids and other decomposition agents. The explosive properties of nitrocellulose are variable, depending on the amount of nitration as well as on the size and shape of the granules. Most forms of gunpowder produced today consist either of nitrocellulose or of a combination of nitrocellulose and nitroglycerine (*q.v.*).

Gunpowder Plot (1605), the conspiracy of English Roman Catholics to blow up Parliament and King James I, his queen, and his oldest son on Nov. 5, 1605. The leader of the plot, Robert Catesby (*q.v.*), together with his four co-conspirators—Thomas Winter, Thomas Percy, John Wright, and Guy Fawkes (*q.v.*)—were zealous Roman Catholics angered by James's refusal to grant further religious toleration. They apparently hoped that the confusion that would follow the murder of the King, his ministers, and the members of Parliament would provide an opportunity for the English Catholics to take over the country.

In the spring of 1605 the conspirators rented a cellar that extended under the palace at Westminster. There, Fawkes, who had been fighting in the Spanish Netherlands, concealed at least 20 barrels of gunpowder. The conspirators then separated until the meeting of Parliament.

In the interim the need for broader support persuaded Catesby to include more conspirators. One of these, Francis Tresham, warned his Catholic brother-in-law Lord Monteagle not to attend Parliament on November 5, and Monteagle alerted the government to the plot. Fawkes was discovered in the cellar on the night of November 4–5 and under torture revealed the names of the conspirators. Catesby, Percy, and two others were killed while resisting arrest, and the rest were tried and executed (Jan. 31, 1606).

The plot bitterly intensified Protestant suspicions of Catholics and led to the rigorous enforcement of the recusancy law, which fined those who refused to attend Anglican services. In January 1606 Parliament established November 5 as a day of public thanksgiving.



(Top) The conspirators plotting and (bottom) being dragged through the streets, executed, and their heads displayed on pikes; contemporary print
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

The day, known as Guy Fawkes Day, is still celebrated with bonfires, fireworks, and the carrying of "guys" through the streets.

gunsight, any of numerous optical devices that aid in aiming a firearm. Its forms include the simple iron sights on pistols and the more complex front and rear sights on target and high-powered sporting rifles. Front sights are usually fixed and rear sights movable so they can be adjusted both for elevation and for windage. When a bullet is fired, air resistance to its spin will warp its course slightly to the right or left, and gravity will pull it downward, producing a trajectory that will take the bullet below and slightly to one side of the point at which the gun barrel is "looking." Adjusting the sights so that the bullet will strike its target is called "laying" the firearm.

The first gunsights appeared as early as 1450. They consisted of a bead front sight and a notched standing rear sight. Since then, other designs have made possible a high degree of accuracy for situations in which the shooter can take his time in preparing to fire. Yet others, *e.g.,* the open rear sight, allow for aiming and shooting quickly. Special telescopic sights appeared in the 1600s. In 1737, King Frederick the Great of Prussia told of a target shoot in which he used telescopic sights. Snipers' rifles with telescopic sights were used in the U.S. Civil War and World War I. Optical advances in the 20th century led to enormously varied telescopic or "scope" sights in varying powers and often varying ranges of magnification. Heavy tank guns and some kinds of artillery may use telescopic or other optical gunsight devices, but most modern artillery is aimed electronically. Other military developments include sighting devices that illuminate the target with infrared rays and other means for a shooter to "see in the dark." Radar sighting is employed in aircraft and other fire-control systems.

Güntekin, Reşat Nuri (b. Nov. 25, 1889, Constantinople—d. Dec. 6, 1956, London), prolific Turkish novelist, short-story writer, journalist, and playwright. His best known work is the novel *Çalıkuşu* (1922, "The Wren"; Eng. trans. *The Autobiography of a Turkish Girl,* 1949). In *Çalıkuşu,* a picaresque tale of a young schoolteacher, Güntekin combines romance with realistic description of Anatolia.

Güntekin was educated at a French school in Smyrna and at Istanbul University. He became a teacher, an inspector of schools, and a member of parliament and was Turkish delegate to UNESCO. His literary career began in 1917 with the publication of short fiction and drama criticism. *Çalıkuşu,* which was serialized in a newspaper before its publication in book form, made his name and won him great popularity. His novels include *Dudaktan Kalbe* (1923; "From Lips to Heart"), which depicts social decadence; *Yeşil Gece* (1928; "The Green Night"), about the evils of fanaticism; and *Miskinler Tekkesi* (1946; "The Poor of the Dervish Convent"), the tale of a band of beggars. His plays include sentimental family dramas, such as *Tas Parcası* (1923; "A Piece of Stone") and *Eski Şarkı* (1951; "The Old Song"), and social satires such as *Hülleci* (1935; "The Hired Husband"). He made numerous translations. Güntekin's works were collected and published in 24 volumes, the last appearing in 1961.

Gunter, Edmund (b. 1581, Hertfordshire, Eng.—d. Dec. 10, 1626, London), English mathematician who invented many useful measuring devices, including a forerunner of the slide rule.

Gunter was professor of astronomy at Gresham College, London, from 1619 until his death. Descriptions of some of his inventions were given in his treatises on the sector, cross-staff, bow, quadrant, and other instruments. In *Canon Triangulorum, or Table of Artificial Sines and Tangents* (1620), the first published table of common logarithms of the sine and tangent functions, he introduced the terms cosine and cotangent. He also suggested to his friend Henry Briggs, the inventor of common logarithms, the use of the arithmetical complement.

Gunter's practical inventions included Gunter's chain. Commonly used for surveying, it was 22 yards (20.1 metres) long and was divided into 100 links. Gunter's quadrant was used to find the hour of the day, the sun's azimuth, and the altitude of an object in degrees. Gunter's scale, or Gunter's line, generally called the gunter by seamen, was a large plane scale with logarithmic divisions plotted on it. With the aid of a pair of compasses, it was used to multiply and divide. Gunter's scale was an important step in the development of the slide rule.

Guntersville, town, seat of Marshall County, northeast Alabama, U.S., on Guntersville Lake. Founded (*c.* 1785) by John Gunter on the site of a Cherokee Indian village at the southernmost point of the Tennessee River, it developed as a transfer port for goods being shipped south. Completion (1939) of Guntersville Dam (7 mi [11 km] northwest) stimulated industrialization. Guntersville Lake (82 mi long, 1–4 mi wide), formed by the dam, is a site for hydroplane racing. Inc. 1847. Pop. (1980) 7,041.

Gunther, also called GUNDICAR, GUNDICARIUS, GUNNAR, GUNDAHAR, or GUNTHARIUS, Burgundian king (died 437) who was the hero of medieval legends.

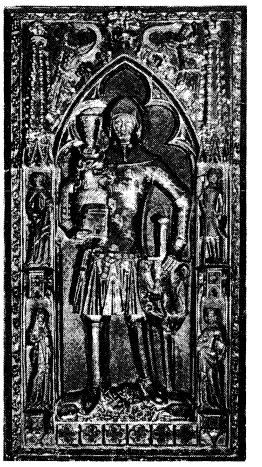
The historical Gunther led the Burgundians across the Rhine in the early 5th century, establishing a kingdom at Worms. He supported the imperial usurper Jovinus (411) and fell in battle against the Huns in 437.

Gunther (called Gunnar) figures in the Eddaic poem *Atlakvida,* in which he is slain by Atli (Attila) the Hun and avenged by his sister, Atli's wife. In the 11th-century Latin poem *Waltharius* (*q.v.*), he and his warriors try unsuccessfully to kill the hero (Walter of Aquitaine) and steal his treasure. The 12th-century German epic *Nibelungenlied* associates him with Siegfried, who helps Gunther to win Brunhild and in return marries Gunther's sister Kriemhild. When Siegfried is later killed on Gunther's order, Kriemhild revenges his death by having Gunther and his followers slain while visiting the court of her second husband, Etzel (Attila). *See also* Kriemhild.

Günther (b. 1304, Blankenburg, Harz—d. June 14, 1349, Frankfurt am Main), count of Schwarzburg-Blankenburg and rival king of Germany (1349), who claimed the throne as successor to the Holy Roman emperor Louis IV the Bavarian (died 1347) in opposition to Charles of Luxembourg.

The younger son of Henry VII, count of Schwarzburg-Blankenburg (died 1323), Günther inherited Blankenburg and Saalfeld in 1330. He served as a diplomat and military commander for Louis IV from 1334 to 1339. After Louis IV's death, the electors of Brandenburg, Saxe-Lauenburg, Frankfurt, and the archbishopric of Mainz, who were partisans of the Wittelsbach house, of which Louis IV had been a member, offered the throne to Edward III, king of England. When Edward declined (1348), they offered it to Günther; he was elected king at Frankfurt on January 30 and crowned on Feb. 6, 1349.

Günther, however, did not have clear title to the throne because the Reichstag (imperial diet), which had been alienated by Louis IV's dynastic policies, had elected Charles of Luxembourg, margrave of Moravia, anti-king on July 11, 1346. Charles IV won over many



Günther von Schwarzburg-Blankenburg, detail from his tomb sculpture, *c.* 1349; in the cathedral at Frankfurt am Main

Archiv fur Kunst und Geschichte, West Berlin

of Günther's followers and defeated him at Eltville. By the terms of the Treaty of Eltville (May 26, 1349), Günther, who was mortally ill, accepted 20,000 silver marks and amnesty for his supporters in exchange for relinquishing his claim to the German throne.

Günther, Ignaz (b. 1725, Altmannstein, Bavaria—d. 1775, Munich), sculptor who was one of the leading Rococo artists in Germany. His career was centred in Munich, where he settled in 1754. Most of his sculpture was carved from wood and then polychromed. Stylistically, his often ecstatic figures are characterized by elegant gestures, elongated proportions, and the cutting angular arrangement of the folds of their clothing or drapery. Among the finest of his sculptures are the "Annunciation" and "Pietà" (1764) in the abbey church at Weyarn, Bavaria; the statues in the church at Rott-am-Inn, Bavaria; the famed "Guardian Angel" in the Burgersaal, Munich (1763); and the "Pietà" in the cemetery chapel at Nenningen, Bavaria (1774).

"Guardian Angel," painted wood sculpture by Ignaz Günther, 1763; in the Bürgersaal, Munich

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Günther, Johann Christian (b. April 8, 1695, Striegau, Silesia—d. March 15, 1723, Jena), one of the most important German lyric poets of the period between the Middle Ages and the early Goethe.

He studied medicine at Wittenberg but after

two years of dissolute life went in 1717 to Leipzig, where an effort to procure him the post of stipendiary poet at the Saxon-Polish court at Dresden ended in a fiasco, for which Günther was partly to blame. In 1719 his father, who for long had opposed his son's poetical ambitions, disinherited him, despite Günther's pathetic attempts at reconciliation.

In his Leipzig *Lieder* he breaks away from Baroque mannerism and the learned traditions of humanism into classical lyricism. His true poetic quality, however, emerges when he writes of his personal sufferings in such poems as the *Leonorenlieder* and in the confessional poem in which he pleads to his father for mercy.

Gunther, John (b. Aug. 30, 1901, Chicago—d. May 29, 1970, New York City), journalist and author who became famous for his series of sociopolitical books describing and interpreting for American readers various regions of the world, beginning with *Inside Europe* (1936).

Gunther attended the University of Chicago, where he was elected to Phi Beta Kappa and earned a Ph.B. degree in 1922. Without waiting to receive his diploma, he embarked on a cattle boat bound for Europe. On his return he took a reporting job with the *Chicago Daily News* but relinquished it when the management declined to assign him as a European correspondent. He made his way to London and managed to gain a position on the *Daily News* London bureau, where he worked from 1924 to 1936. For the next nine years he covered various European capitals, the Balkan region, and the Middle East.

With the success of *Inside Europe,* Gunther quit the newspaper business to devote full time to book writing. He travelled widely while researching his books and in 1941 became a war correspondent, covering Gen. Dwight D. Eisenhower's headquarters in Europe and the British 8th Army. From 1942 to 1945 he reported on the war as a radio commentator on the National Broadcasting Company's Blue Network. He travelled in central and eastern Europe in 1948 for the *New York Herald Tribune* and *Look* magazine.

Gunther's other books—all highly successful—include *Inside Asia* (1939), *The High Cost of Hitler* (1939), *Inside Latin America* (1941), *D-Day* (1944), *Inside U.S.A.* (1947), *Roosevelt in Retrospect* (1950), *Inside Africa* (1955), *Inside Russia Today* (1958), *Inside Europe Today* (1961), and *Inside South America* (1967). His book *Death Be Not Proud* (1949) was a reminiscence of his son who died in youth.

Guntram, French GONTRAN (b. before 535—d. March 28, 592), Merovingian king of Burgundy who strove to maintain a balance of power among his warring relations.

Guntram received Burgundy in the quadripartite division of the lands of his father, Chlotar I, which took place on the king's death in 561, and added further territory when his brother, Charibert of Paris, died in 567 or 568. Well endowed with the political skills of prudence and duplicity, he strove to prevent either of his two remaining brothers, Chilperic I and Sigebert I, from gaining too great a power, allying now with the one, now with the other. After the death of Sigebert of Austrasia in 575 he protected the interests of the young Childebert II, Sigebert's son, against the aggressive Chilperic, and in 577 recognized Childebert as his heir. When Childebert nevertheless allied with Chilperic against him, he bought off the young king by the cession of territory (583) and confirmed him as his adopted son—action the more necessary since he was also faced by a usurper, Gundoald, whom he was then able successfully to overcome. The death of Chilperic in 584 left Guntram master of the scene; he protected the young Chlotar II, Chilperic's heir, and Fredegund, Chlotar's mother, but also settled remaining differences with Childebert by the Treaty of Andelot (587). Himself attacked by the Lombards in the 570s, he turned his attention to the south in his last years but was twice unsuccessful against the Visigoths.

Guntram had a good reputation among churchmen. In 585 he issued an edict calling for a stricter observance of Christian life, and his contemporary, bishop Gregory of Tours, so much admired him that he even considered the King able to perform miracles.

Guntūr, town, administrative headquarters of Guntūr district, northeastern Andhra Pradesh state, southern India, in the Krishna River Delta. The town was founded in the mid-18th century by the French, but in 1788 it was ceded permanently to the British. It became a municipality in 1866. A railroad junction and trade centre, Guntūr's economy is dominated by the growing of jute, tobacco, and rice. It is also the site of an agricultural research station. Andhra Christian College, a government college, a medical college, and several other colleges are affiliated with Andhra University. Nearby is a ruined 12th-century hill fortress.

The district, 4,393 sq mi (11,377 sq km) in area, is bounded on the east and north by the Krishna River, from which radiate canals that irrigate the nearby fields of millet, chilies, peanuts (groundnuts), and tobacco. Vegetable oil and textile mills, tobacco factories, and a cement factory are located there. Of note are the ancient Buddhist monuments (dating from the 1st to 3rd century AD) at Amarāvati and Nāgārjunakoṇḍa. Pop. (1981) town, 367,699; district, 3,434,724.

Gunung Kinabalu (Malaysia): *see* Kinabalu, Mount.

Günz Glacial Stage, major division of Pleistocene time and deposits in the Alpine region of Europe (the Pleistocene Epoch began about 2,500,000 years ago and ended about 10,000 years ago). The Günz Glacial Stage is one of the early recognized divisions that reflected the importance of repeated Pleistocene glacial episodes. The Günz Glacial Stage preceded the Günz-Mindel Interglacial and followed the Donau-Günz Interglacial, both periods of relatively moderate climatic conditions. The Günz Stage is correlated with the Baventian Stage sequence of marine deposits of Great Britain and the Menapian Glacial Stage of northern Europe. It is broadly equivalent to the Nebraskan Glacial Stage of North America.

Günz-Mindel Interglacial Stage, major division of Pleistocene time and deposits in the Alpine region of Europe and one of the divisions of the geological system that recognized the multiplicity of Pleistocene glaciations (the Pleistocene Epoch began about 2,500,000 years ago and ended about 10,000 years ago). The Günz-Mindel Interglacial preceded the Mindel Glacial Stage and followed the Günz Glacial Stage, a period of relatively moderate climatic conditions between two periods of glacial advance. The Günz-Mindel Interglacial is correlated with the Cromerian Interglacial Stage of northern Europe and the series of interglacials recognized in Britain: the Pastonian (oldest), Beestonian, and Cromerian. The Günz-Mindel Interglacial is also broadly equivalent to the Aftonian Interglacial Stage of North America.

Günzburg, David, Baron (b. July 5, 1857, Kamenets-Podolsky, Russia—d. Dec. 22, 1910, St. Petersburg), prominent Orientalist and Hebraist, a Russian Jewish community leader, and bibliophile.

The son of Horace Günzburg and grandson of Joseph Günzburg, both noted philanthropists, he received a traditional Jewish education. His university training in Oriental and Arabic languages was utilized in his edition and Arabic translation (1887) of the poem cycle *Tarshish* by the medieval poet Moses ibn Ezra. He also wrote a major work on Jewish art, *L'Ornement hébreu* (1903; "The Hebrew Ornament"). He was, in addition, an editor of the Russian Jewish encyclopaedia *Yevreyskaya Entsiklopediya.* Like his father and grandfather before him, Günzburg took a deep interest in the welfare of his oppressed co-religionists, belonging to many organizations such as the Society for the Diffusion of Enlightenment among the Jews and the central committee of the Jewish Colonization Association.

Günzburg, Horace, Baron (b. Feb. 8, 1833, Zvenigorodka, Russia—d. March 2, 1909, St. Petersburg) Russian businessman, philanthropist, and vigilant fighter for the rights of his Jewish co-religionists in the teeth of persecution by the Russian government. His father was the philanthropist Joseph Günzburg. His son David became a prominent Orientalist and bibliophile.

For a time, Horace Günzburg ran the banking firm that his father had founded, but he closed it during a financial crisis, even though it was solvent. In 1863, along with his father, he founded the Society for the Promotion of Culture Among the Jews of Russia, a highly successful organization that disseminated Jewish culture in the Russian language; he became president of the society upon his father's death in 1878 and almost single-handedly financed it, sponsoring translations into Russian of such classic works as Heinrich Graetz's *Geschichte der Juden von den ältesten Zeiten bis auf die Gegenwart* ("History of the Jews from Oldest Times to the Present") and the Bible. In the early 1870s, again like his father, he was created a baron.

In 1870 and again in 1877, as a representative of Russian Jewry, Günzburg appeared before governmental commissions investigating the "Jewish question." In 1882 he chaired a Jewish congress called in response to the government's infamous May Laws of that year, which further confined Jews to the overcrowded ghetto known as the Pale of Settlement.

Günzburg not only attempted to ameliorate governmental oppression but also actively supported organizations working in other ways in behalf of the Jews. He assumed successively the offices of chairman of the central committee of the Jewish Agricultural Society (1893) and the presidency of the board of directors of the Jewish Agricultural Farms in Minsk (1901). In 1908 he was a cofounder of the Russian Jewish Historical Ethnographic Society in St. Petersburg.

Günzburg's activities were not confined to helping the Jews. The government frequently called upon him for advice on laws dealing with the Stock Exchange and other major business institutions, and he was a large contributor to the building of the Stock Exchange Hospital, a trustee of the School of Commerce of Tsar Nicholas II, and an alderman of St. Petersburg.

Günzburg, Joseph (Yozel), Baron (b. 1812, Vitebsk, Russia—d. Jan. 12, 1878, Paris), Jewish philanthropist, banker, and financier who contributed much to the industrialization of 19th-century Russia and who successfully fought some of the discriminatory measures against Jews in Russia. His son Horace carried on his philanthropic work, and his grandson David was a well-known Orientalist and bibliophile.

After an early career as a contractor for the government, he founded a banking firm in 1859 in St. Petersburg. Along with other wealthy Russian Jewish families, he also financed the building of much of Russia's rail-

road network. He was created a baron in the early 1870s.

Günzburg is best remembered for his activities on behalf of his persecuted coreligionists. In 1863 he helped found the Society for the Promotion of Culture Among the Jews of Russia, of which he was the first president, to "disseminate among the Jews the knowledge of the Russian language and other useful subjects" in the hope that thereby "the Jews will become full-fledged citizens of the country." The society thrived, sponsoring translations of the Bible and other works into Russian and founding a number of Jewish cultural societies. Günzburg also succeeded in having discriminatory laws against Jews in military service removed and in gaining greater freedom of movement for Jewish merchants and artisans.

Guo Moruo, Wade–Giles romanization KUO MO-JO, original name KUO K'AI-CHEN (b. November 1892, Sha-wan, Lo-shan county, Szechwan Province, China—d. June 12, 1978, Peking), Chinese scholar, one of the leading writers of 20th-century China, and an important government official.

The son of a wealthy merchant, Guo early manifested a stormy, unbridled temperament. After receiving a traditional education, in 1914 he abandoned his Chinese wife of an arranged marriage and went to Japan to study medicine. There he fell in love with a Japanese woman who became his common-law wife. He began to devote himself to the study of foreign languages and literature, reading Spinoza, Goethe, the Bengali poet Tagore, and Walt Whitman. His own early poetry was highly emotional free verse reminiscent of Whitman and Shelley. His translation of Goethe's *Sorrows of Young Werther* gained enormous popularity among Chinese youth soon after its appearance in 1922. Two years later, Guo's translation of *Social Organization and Social Revolution*, by the Japanese Marxist Kawakami Hajime, greatly influenced his own thought, and he became an adherent of Marxism. Although his writing, even his prose, was still marked by Romantic moods, he declared a rejection of individualistic literature, calling for a "socialist literature that is sympathetic toward the proletariat. . . ."

Guo Moruo
Eastfoto

In 1926 he acted as a political commissar in the Northern Expedition, in which Chiang Kai-shek attempted to crush the warlords and unify China. But when Chiang purged the Communists from his Kuomintang (Nationalist Party) in 1927, Guo participated in the Communist Nan-ch'ang uprising. After its failure he fled to Japan, where for 10 years he pursued scholarly research on Chinese antiquities. In 1937 he returned to China to take part in the resistance against Japan and was given important government posts.

As a writer, Guo was enormously prolific in every genre. Besides his poetry and fiction, his works include plays, nine autobiographical volumes, and numerous translations of the works of Goethe, Schiller, Turgenev, Tolstoy, Upton Sinclair, and other Western authors. He also produced historical and philosophical treatises, including his monumental study of inscriptions on oracle bones and bronze vessels, *Liang Chou chin wen tz'u ta hsi t'u lu k'ao shih* (1935, new ed. 1957; "Corpus of Inscriptions on Bronzes from the Two Chou Dynasties"). In this work he attempts to demonstrate, according to Communist doctrine, the "slave society" nature of ancient China.

After 1949 Guo held many important positions in the People's Republic of China, including the presidency of the Chinese Academy of Sciences. In 1966 he was one of the first to be attacked in the Great Proletarian Cultural Revolution. He confessed that he had failed to understand properly the thought of Mao Zedong and that all his work should be burned. Strangely, however, Guo was not, as were many of his colleagues, stripped of all official positions; by the early 1970s he again enjoyed a position of great power.

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Guo Songdao (Chinese diplomat): *see* Kuo Sung-tao.

Guo Xi: *see* Kuo Hsi.

Guo Xiang (Neo-Taoist philosopher): *see* Kuo Hsiang.

Guo Ziyi (Chinese general): *see* Kuo Tzu-i.

guppy (*Lebistes reticulatus*, also *Poecilia reticulata*), colourful, live-bearing freshwater fish of the family Poeciliidae, popular as a pet in home aquariums. The guppy is hardy, energetic, easily kept, and prolific. The male guppy, much the brighter coloured of the sexes, grows to about 4 centimetres (1½ inches) long; the female is larger and duller in colour. Guppies have been bred in a number of ornate strains characterized by colour or pattern and by shape and size of the tail and dorsal fins. *See also* live-bearer.

(Top) Male and (bottom) female guppies (*Lebistes reticulatus*)
Jane Burton—Bruce Coleman Ltd.

Gupta DYNASTY, rulers of the Magadha state in northeastern India, later Bihār. They maintained an empire over northern and parts of central and western India from the early 4th to the late 6th century AD. The founder was Candra Gupta I (*q.v.*). The Gupta era produced the decimal system of notation and great Sanskrit epics and Hindu art and contributed to the sciences of astronomy, mathematics, and metallurgy. *See* Samudra Gupta.

Gupta script, any of a group of Indian alphabetic writing systems (sometimes modified to represent syllables instead of single sounds) derived from a northern Indian alphabet of the 4th–6th century AD. The ruling Gupta state at that time gave the script its name. It was developed out of Brāhmī and was spread with the Gupta empire over large areas of conquered territory, with the result that the Gupta alphabet was the ancestor (for the most part via Devanāgarī) of most later Indian scripts.

The original Gupta alphabet had 37 letters, including 5 vowels, and was written from left to right. Four main subtypes of Gupta script developed from the original alphabet: eastern, western, southern, and Central Asian. The Central Asian Gupta can be further divided into Central Asian Slanting Gupta and its Agnean and Kuchean variants and Central Asian Cursive Gupta, or Khotanese. A western branch of eastern Gupta gave rise to the Siddhamatrka script (*c.* AD 500), which, in turn, evolved into the Devanāgarī alphabet (*c.* AD 700), the most widespread of the modern Indian scripts.

Gūr-e amīr, in Samarkand, now in the Uzbek Soviet Socialist Republic, mausoleum of the 14th-century Mongol conqueror Timur, or Tamerlane. Though it has suffered from time and earthquakes, it is still sumptuous. It consists of a chapel crowned with a dome, enclosed by a wall, and fronted by an archway. The interior walls are covered with elegant turquoise arabesques and inscriptions in gold.

Gur languages: *see* Voltaic languages.

Gurage, ethnolinguistic group of the fertile region in southwest Ethiopia west of Lake Zewāy and east of the Omo River. These people are descendants of a mixture of Sidamo peoples with military conquerors from the Tigre province of Ethiopia and with later immigrants from the southeastern city of Harer. Contact with many outsiders has bequeathed an almost bewildering linguistic and cultural complexity to this group. The Gurage practice animism, Ethiopian Christianity, and Islām. The dominant language, Gurage, divided into many dialects, belongs to the Semitic branch of the Hamito-Semitic family.

Settled agriculturalists, the Gurage centre their lives on the cultivation of their staple crop, the *ensete,* or towering banana tree, prized not for its "false" (or inedible) fruit but for its roots.

The Gurage have no centralized institutional political power or leadership. Local power is vested in lineages; these descent groups display corporate rights, obligations, and influence. In contrast, the religious or ritual system is highly centralized; ritual officials sanction the authority of the political elders. Perhaps the most interesting aspect of this religious–political asymmetry is the integral place in the system assigned to the Fuga, the local representatives of what are believed to be remnants of earlier Negroid-Cushitic inhabitants of the Horn of Africa. This lower caste group of artisans and hunters are also ritual specialists whose powers are feared but deemed essential in all major Gurage religious functions. The Fuga share a ritual language with Gurage women, which Gurage men may not learn lest they penetrate the mysteries of the female initiation ceremonies.

Gurdāspur, city, administrative headquarters of Gurdāspur district, Punjab state, northwestern India, on the Pakistani border. The city is northeast of Amritsar, Punjab's largest city. It is primarily a trade centre for the district's agricultural products; handloom weaving is important.

Gurdāspur district, 1,373 sq mi (3,557 sq km) in area, lies between the Rāvi and Beās rivers and forms the state's northern tip. The land is mostly level except in the northeast, where the state extends into the Himalayan foothills. Irrigation permits the growing of wheat, corn (maize), rice, and other crops. Pop. (1981) city, 39,529; district, 1,513,435.

Gurdjieff, George Ivanovitch, original name GEORGE S. GEORGIADES (b. 1872?, Alexandropol, Armenia, Russian Empire—d. Oct. 29, 1949, Neuilly, near Paris), Greco-Armenian mystic and philosopher who

founded an influential quasi-religious movement.

Details of Gurdjieff's early life are uncertain, but he is thought to have spent his early adult years traveling in northeast Africa, the Middle East, India, and especially Central Asia, learning about various spiritual traditions. He moved to Moscow about 1913 and began teaching there and in Petrograd, returning to the Caucasus at the outbreak of the Russian Revolution in 1917. Rejoined by some followers, Gurdjieff established the Institute for the Harmonious Development of Man in 1919 at Tiflis (now Tbilisi), Georgia; it was reestablished at Fontainebleau, Fr., in 1922. Its members, many from prominent backgrounds, lived a virtually monastic life, except for a few banquets, at which Gurdjieff would engage in probing dialogue and at which his writings were read. Ritual exercises and dance were also part of the regimen, often accompanied by music composed by Gurdjieff and an associate. Performers from the institute appeared in Paris in 1923 and in four U.S. cities the following year and brought considerable attention to Gurdjieff's work. A disciple named P.D. Ouspensky introduced Gurdjieff's teachings to Western readers in an understandable intellectual form. Gurdjieff's basic assertion was that human life as ordinarily lived is similar to sleep; transcendence of the sleeping state required work, but when it was achieved, an individual could reach remarkable levels of vitality and awareness. The Fontainebleau centre was closed in 1933, but Gurdjieff continued teaching in Paris until his death.

gurdwārā (Punjabi: "doorway to the Gurū"), the place of worship of the Sikhs, a religious group of India. The *gurdwārā* contains—on a cot under a canopy—a copy of the *Ādi Granth,* the sacred scripture of Sikhism. It also serves as a meeting place for conducting business of the congregation and wedding and initiation ceremonies. The more historically important *gurdwārā*s serve as centres of pilgrimage during festivals. A free kitchen and frequently a school are attached to the *gurdwārā.*

The chief *gurdwārā* is the Harimandir, the "Golden Temple" at Amritsar, Punjab state, but every Sikh family endeavours to set aside one room of the house for the reading of the *Ādi Granth,* and this room is also called a *gurdwārā.* When entering a *gurdwārā* a Sikh takes off his shoes, washes his feet, and covers his head. The service usually consists of the opening of the book, singing of hymns, reading and discussion of a text, prayer, distribution of *kaṛāh prasād* (a preparation made of equal parts of wheat flour, sugar, and clarified butter), and dispersal.

During the period of Mughal persecution of the Sikhs, the management of some *gurdwārā*s (and the considerable lands and funds attached to them) passed into the hands of Hindu caretakers (*mahants*). After years of increasing agitation on the part of the Sikhs, the British government passed the Sikh Gurdwara Act in 1925 returning control of the *gurdwārā*s to the Sikhs. The *gurdwārā*s of historic importance are now managed by an elected body known as the Shiromanī Gurdwārā Prabandhak Committee ("Committee of Shrine Management").

Gurgān (Iran): *see* Gorgān.

Gurgaon, city, southeastern Haryāna state, northwestern India, situated between Delhi (northeast) and Rewāri (southwest), to which it is connected by road and rail. Sometimes called Hidayatpur, Gurgaon is an agricultural trade centre. In the surrounding region, irrigation by wells supports cultivation of grains and oilseeds. Pop. (1981) city, 89,115; metropolitan area, 100,877.

Guri Dam, officially EMBALSE RAÚL LEONI, hydroelectric project and reservoir on the Caroní River, Bolívar State, eastern Venezuela, on the site of the former village of Guri (submerged by the reservoir), near the former mouth of the Guri River. The first stage of the facility was completed in 1969 as a 348-foot-(106-metre-) high earth and rockfill dam with a crest length of 2,264 feet (690 m) and an installed electrical capacity of 1,750 megawatts, housed in a powerhouse in a central concrete gravity section of the dam. The facility was designed to be enlarged after stage one in two additional stages, whose scheduling would be determined by national power needs. These needs grew so fast, however, that stage two, begun in 1976, encompassed both later stages, and final work was completed in 1986. The dam's height was increased to 531 feet (162 m), and both wings were extended, increasing the crest length to 37,222 feet (11,409 m). The total projected hydroelectric capacity is 10,300 megawatts, making the facility one of the largest in the world.

The reservoir impounded by the dam had a capacity of 111,877,000 acre-feet (138,000,-000,000 cubic m), permitting its use for flood storage as well as floodwater evacuation.

Gurjara-Pratihāra DYNASTY, either of two dynasties of medieval Hindu India. The line of Haricandra ruled in Mandor, Mārwār (Jodhpur, Rājasthān), during the 6th–9th century, generally with feudatory status. The line of Nāgabhaṭa ruled first at Ujjain and later at Kannauj during the 8th–11th century. Other Gurjara lines existed, but they did not take the surname Pratihāra.

The origin of the Gurjaras is uncertain. A view once widely held was that they entered India in the wake of the Hūṇas (White, or eastern, Huns), who had invaded India in the 5th century and were connected with the Khazars. Now, however, most historians believe the Gurjaras had an indigenous origin. The name Gurjara does not appear before the end of the 6th century.

The relation of the earlier Haricandra line with the later and more important line of Nāgabhaṭa is uncertain. The founder of the later line, Nāgabhaṭa I (8th century), appears to have ruled in Mālwa, and his grandnephew Vatsarāja is attested as king of Ujjain in 783. Vatsarāja suffered a great defeat at the hands of the Rāṣṭrakūṭas, and both he and his son Nāgabhaṭa II seem to have accepted Rāṣṭrakūṭa suzerainty for a time. In the complicated and badly documented wars of the early 9th century—involving Pratihāras, Rāṣṭrakūṭas, and Pālas—Nāgabhaṭa II played an important part. In about 816 he invaded the Gangetic region and captured Kannauj from the local king Cakrāyudha, who had the protection of the Pāla ruler Dharmapāla. With the power of the Rāṣṭrakūṭas weakened, Nāgabhaṭa II became the most powerful ruler of northern India and established his new capital at Kannauj. Nāgabhaṭa II was succeeded by his son Rāmabhadra, about 833, who after a brief reign was succeeded by his son Mihira Bhoja about 836. Under Bhoja and his successor Mahendrapāla (reigned *c.* 890–910) the Pratihāra empire reached its peak of prosperity and power. The extent of its territory rivaled that of the Guptas and, in the time of Mahendrapāla, reached from Gujarāt and Kāthiāwār to northern Bengal, though much of it was loosely held under vassal kings.

After the death of Mahendrapāla the succession is obscure; the power of the Pratihāras was apparently weakened by dynastic strife. It was further diminished as a result of a great raid from the Deccan, led by the Rāṣṭrakūṭa king Indra III, who in about 916 sacked Kannauj. Under a succession of rather obscure kings the Pratihāras never regained their former influence. Their feudatories became more and more powerful, one by one throwing off their allegiance until by the end of the 10th century the Pratihāras controlled little more than the Gangetic Doāb. Their last important king, Rājyapāla, was driven from Kannauj by Maḥmūd of Ghazna in 1018 and was later killed by the forces of the Chandelā king Vidyādhara. For about a generation longer a small Pratihāra principality apparently survived in the Allahābād district.

The Pratihāras were the most important dynasty of medieval northern India, and their disappearance marked a stage in the political decline that accompanied the Muslim conquest.

Gurjev (Kazakh S.S.R.): *see* Guryev.

Gurkha, also spelled GORKHA, town, central Nepal. It is located on a hill overlooking the Himalayas. The town is famous for its shrine of Gorakhnāth, the patron saint of the region. There is also a temple to the Hindu goddess Bhavānī (Devī).

The ancestral home of the ruling house of Nepal, Gurkha was seized in 1559 by Drabya Shah, the younger son of the king of Lamjung, who established his own kingdom. His descendant, Prithvi Narayan Shah, created an ethnically diverse military force that came to be known as the Gurkhas (or Ghurkhas), with which he conquered the Malla kingdom and consolidated the numerous petty principalities into the state of Nepal. These troops were, from the mid-1800s, heavily recruited by Great Britain and, since 1947, have been a significant minority within the army of India. Upon returning home, many of the Gurkhas become teachers and community leaders, bringing Western ideas and technology to the mountain regions. Pop. (1971) 4,832.

Gurma, also spelled GOURMA, also called GOURMANTCHE, a Voltaic ethnic group that is chiefly centred on the town of Fada Ngourma in eastern Burkina Faso (formerly Upper Volta), although some inhabit northern Togo. Like the closely related Mossi (More), Konkomba, Tallensi, and LoDagaa, the Gurma are believed to have migrated from the Gambaga Scarp (escarpment) of present-day northeastern Ghana. Some of these migrants stopped at Tenkodogo and founded the first Mossi kingdom; others continued northeastward to the Fada Ngourma region. Mossi and Gurma disputed their common frontier until French conquest.

The Gurma live in wooded savanna that becomes drier and grassier to the north; their mostly flat land is marked by occasional inselberg hills. They live in round mud-brick houses arranged in circular compounds that are enclosed by woven-straw fences. Descent is patrilineal; a man and his one or more wives, perhaps a younger brother or an aging mother, and the children of all these live together. During the agricultural season (June–October) millet is grown between compounds. The closest neighbours belong to kin groups, and hamlets consist of compounds of lineage members, clan members, those who profess the same introduced religion (Islām or Christianity), or people with a common skill, such as blacksmithing. A village is a collection of hamlets, and chiefdoms (today sometimes corresponding to the administrative categories *arrondissements* and *cantons*) include several, or occasionally many, villages; chiefs then recognize the *morho naba,* or paramount chief, in Fada Ngourma, as well as the authorities of the Burkina Faso government. Weaving, dyeing, pottery, and basketry are important crafts. Most Gurma men, and many women, migrate to seek work in coastal western African states, but most later return to reside in their homeland.

Gurmukhi alphabet, writing system developed by the Sikhs in India for their sacred literature. It seems to have been modified

from the Landa script, which is used to write the Punjabi, Lahnda, and Sindhi languages. Landa, Gurmukhi, and two other scripts used in northwestern India, Śāradā and Ṭākrī, make up a related group that is probably descended from a common ancestor. According to Sikh tradition, Gurmukhi was invented in the mid-16th century by Aṅgad, the second Sikh Gurū (head of the Sikh religion), in order to correct certain inadequacies in the Landa script so that sacred literature might be accurately recorded. The alphabet has 42 letters, 32 consonantal signs and 10 vowel signs.

gurnard, any fish that is a member of the sea robin (*q.v.*) family, Triglidae, or of the flying gurnard (*q.v.*) group of the order Dactylopteriformes.

Gurney, Sir Goldsworthy (b. Feb. 14, 1793, Treator, Cornwall, Eng.—d. Feb. 28, 1875, Reeds, Cornwall), prolific English inventor who built technically successful steam carriages a half century before the advent of the gasoline-powered automobile.

Educated for a medical career, Gurney practiced as a surgeon in Wadebridge and London but soon turned his attention to solving practical scientific problems; he invented a steam jet, an oxyhydrogen blowpipe, and a musical instrument consisting of glasses played as a piano.

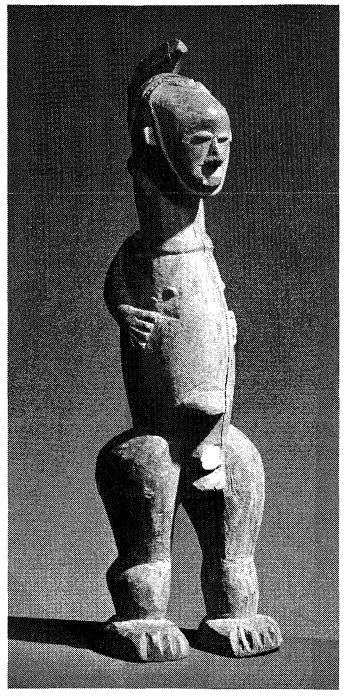
Following the sensational success of George Stephenson's *Rocket* locomotive in 1829, Gurney undertook to build a steam-powered road vehicle. In the carriage that he constructed he drove from London to Bath and returned at a speed of 24 km (15 miles) per hour; so well did it perform that he built several more and opened a passenger service. Powerful opposition to his invention arose at once among the horse-coach interests, and, although Gurney's vehicles were not excessively heavy (1½ to 2½ tons), they were soon taxed out of existence. Gurney was knighted in 1863 as a result of an entirely different technical feat, that of improving the lighting and ventilation of the House of Commons.

Guro, also spelled GOURO, also called KWENI, people of the Côte d'Ivoire (Ivory Coast), in the valley regions of the Bandama River; they speak a language of the Mande branch of the Niger-Congo family of African languages. The Guro came originally from the north and northwest, driven by Mande invasions in the second half of the 18th century.

Although formerly the major male occupation was hunting, the Guro are now basically agriculturists whose subsistence crops include plantains, rice, and yams; their cash crops include coffee, cocoa, and cotton. They practice shifting cultivation, men clearing the fields and women doing most of the other work. Some of their communal fields were being replaced by industrial plantations in the late 20th century. In the southern part of the Guro people's territory, arboriculture includes palm-wine extraction; in the north, kola oil and nuts are traded for dried fish from the Niger. The exchange of subsistence goods at markets is usually carried out by women; other items are traded by men.

Villages are composed of several patrilineages, the basic social and economic units of Guro society. They are headed by their eldest members, who form a village council. In traditional Guro society there was no office of village chief, but a distinguished lineage head was recognized as preeminent; he was consulted in settling disputes and represented the village to outsiders.

The Guro retain their own religion, involving many cults and deities. An earth master makes sacrifices to the earth for the benefit of the village and its inhabitants. Each village also has a diviner who is consulted before important decisions are made.



Carved wooden male figure from the Guro tribe, Côte d'Ivoire (Ivory Coast); in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, The Michael C. Rockefeller Memorial Collection of Primitive Art, gift of Mr. and Mrs. Robert L. Stolper, 1960 (1978.412.374)

Gurs, large concentration camp near Pau in southwestern France at the foot of the Pyrenees, used successively by independent France, Vichy France, and Nazi Germany. It was built initially to house Republican refugees from the Spanish Civil War and later held refugees from the oppressions of Germany and Austria. When France capitulated to the Germans in June 1940, Gurs became the main concentration camp for Marshal Philippe Petain's collaborationist government in unoccupied France, receiving Jews and various dissidents. By 1941 there were 15,000 inmates, including Jews expelled from Germany and Belgium. Malnutrition and wretched sanitation killed great numbers. In late 1942, when Germany occupied the whole of France, many inmates were herded to northern France and thence to the extermination camps of Poland. When deportations ended in mid-1943, only 1,200 inmates remained.

Gurū, in Sikhism, any of the first 10 leaders of the Sikh religion of northern India. The word *Sikh* is derived from the Sanskrit *śiṣya* ("disciple"), and all Sikhs are disciples of the Gurū (spiritual guide, or teacher). The first Sikh Gurū, Nānak, established the practice of naming his successor before his death (1539), and from the time of Rām Dās, the fourth to reign, the Gurūs all came from one family. Gurū Nānak also emphasized the mystical transference of the personality of the Gurū from one individual to another "as one lamp lights another," and many of his successors used as a pseudonym the name Nānak.

As the Sikhs developed from a pacifist to a militant sect, the role of the Gurū took on some of the features of a military leader in addition to the traditional ones of a spiritual guide. Two Sikh leaders, Gurū Arjun and Gurū Tegh Bahādur, were executed by order of the reigning Mughal emperor on grounds of political opposition.

The 10th and last Gurū, Gobind Singh, before his death (1708) declared the end of the succession of personal Gurūs. From that time on, the religious authority of the Gurū was considered to be vested in the sacred scripture, the *Ādi Granth,* while the secular authority rested with the elected representatives of the Sikh community, the *panth.* The 10 Sikh Gurūs and the dates of their reigns were:

1. Nānak (d. 1539), the son of a Hindu revenue official, who attempted in the new religion founded by him to bring together the best features of both Hinduism and Islām.
2. Aṅgad (1539–52), a disciple of Nānak, traditionally given credit for developing Gurmukhi, the script used to write down the Sikh scriptures.
3. Amar Dās (1552–74), a disciple of Aṅgad.
4. Rām Dās (1574–81), the son-in-law of Amar Dās, and the founder of the city of Amritsar.
5. Arjun (1581–1606), the son of Rām Dās, and the builder of the Harimandir (Golden Temple), the most famous place of pilgrimage for the Sikhs.
6. Hargobind (1606–44), the son of Arjun.
7. Har Rāī (1644–61), the grandson of Hargobind.
8. Hari Krishen (1661–64), the son of Har Rāī; he died of smallpox at the age of eight.
9. Tegh Bahādur (1664–75), the son of Hargobind.
10. Gobind Rāī (1675–1708), who assumed the name Gobind Singh after founding the fraternity known as the Khālsā.

guru (Sanskrit: "venerable"), in Hinduism, a personal spiritual teacher or guide who has himself attained spiritual insight. From at least the time of the *Upaniṣad*s (ancient commentaries on the sacred scriptures), India has stressed the importance of the tutorial method in religious instruction. In the educational system of ancient India, knowledge of the Vedas (sacred scriptures) was personally transmitted through oral teachings from the guru to his pupil. Classically, the pupil lived at the home of his guru and served him with obedience and devotion.

Later, with the rise of the bhakti movement, which stressed devotion to a personalized deity, the guru became an even more important figure. He was not only venerated as the leader or founder of the sect but was also considered to be the living embodiment of the spiritual truth and, thus, identified with the deity. In at least one sect, the Vallabhācārya, the devotee was instructed to offer his mind, body, and property to the guru. The tradition of willing service and obedience to the guru has continued down to the present day. The guru is frequently treated with the same respect paid the deity during worship, and his birthdays are celebrated as festival days.

Religious self-instruction is considered dubious. It is the guru who prescribes spiritual disciplines and who, at the time of initiation, instructs the student in the use of the mantra (sacred formula) to assist in his meditation. The example of the guru who, though human, has achieved spiritual enlightenment leads the devotee to discover the same potentialities within himself.

Guru Rimpoche (Buddhist mystic): *see* Padmasambhava.

Gurung, people of Nepal living mainly on the southern flank of the Annapūrna mountain massif. Their numbers are estimated at about 200,000. The Gurung speak a language of the Tibeto-Burman family. Many are Lamaist Buddhists in religion, while others have adopted Hinduism. They make their living in agriculture and livestock raising. Along with the Magar, Rai, and other Nepalese ethnic groups, they have won fame as the Gurkha soldiers of the British and Indian armies.

They trace their descent along paternal lines and are organized into two groups, or moieties, of patrilineal clans, one group being of higher social status than the other.

Guryev, also spelled GURIEV, or GURJEV, *oblast* (administrative region), southwestern Kazakh Soviet Socialist Republic, occupying an area of 43,250 sq mi (112,000 sq km), at the northeastern end of the Caspian Sea. It is generally flat, and its chief river is the Ural. The mainly sandy terrain is interspersed with salt marshes. The climate is continental and subject to severe droughts. High-quality oil in small quantities has been extracted from the Emba oil field since 1911. There are oil pipelines to Guryev, the capital, and to Kuybyshev, on the Volga from the Mangyshlak oil fields to the south. The Caspian and Ural fisheries and the fish-canning industry are also important. Agriculture, severely handicapped by lack of fresh water, is concerned mainly with sheep raising on the extensive desert pastures. The majority of the inhabitants are Kazakhs. Other urban centres, besides Guryev (the capital), include Kulsary and Balykshi. Pop. (1983 est.) 382,000.

Guryev, also spelled GURIEV, or GURJEV, city and administrative centre, Guryev *oblast* (region), Kazakh Soviet Socialist Republic, a port on the Ural River near its mouth on the Caspian Sea. Founded as a fishing settlement in the mid-17th century by the fishing entrepreneur Mikhail Guryev, it soon became a fort on the Ural fortified line manned by the Ural Cossacks. Fishing and trade were the main economic activities until Soviet times. Now, in addition to a large fish cannery, there are an oil refinery, petrochemical plant, metalworking and construction-materials industries, a meat-packing plant, and ship-repair yards. A branch of the Kazakh S.S.R. Academy of Sciences studies the natural resources of the area, and the city has a teacher-training institute, a museum, and a theatre. Pop. (1983 est.) 140,000.

Gus-Khrustalny, city and centre of a *rayon* (district), Vladimir *oblast* (administrative region), western Russian Soviet Federated Socialist Republic, on the Gus River. The city has long been famous as a centre of the glass industry, from which it takes its name. Its products, which include cut glass and decorative objects, are exported worldwide. The city also has a varied industrial base. There is a museum of glass and crystal. Pop. (1983 est.) 73,000.

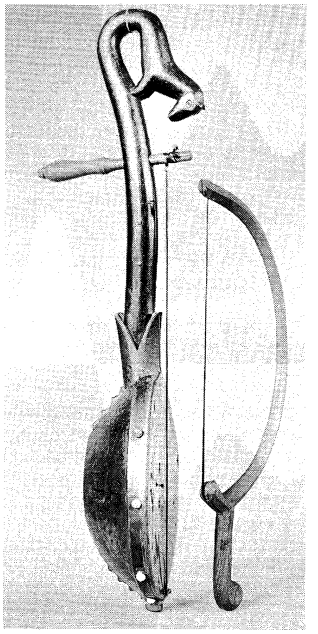
Gusau, town, Sokoto State, northern Nigeria, on the Sokoto River. It grew after the arrival of the railway from Zaria, 105 mi (169 km) southeast, in 1927 and is now a major collecting point for cotton and peanuts (groundnuts). Although cotton ginning, weaving, and dyeing are long established local activities, it was not until the late 1960s that a modern textile plant opened in the town. A seed-oil mill and soybean-meal processing plant have also been built. Besides cotton, cloth, and peanuts, Gusau exports tobacco (grown in the Sokoto River's *fadamas* ["floodplains"] around Talata Mafara, 48 mi northwest), chickens, and goats to Zaria. The town's Hausa and Fulani peoples also raise cattle, sheep, donkeys, horses, and camels and trade in millet, sorghum, rice, cowpeas, beans, and *fadama*-grown vegetables.

Gusau has an Islāmic women's teacher-training college, and its hospitals, health office, dispensary, and maternity clinic make it the chief medical centre for the eastern part of the state. It is the headquarters of a local government council. The town is located on the main railway between Kaura Namoda and Zaria, and it is on a secondary highway between Talata Marfara and Funtua. Pop. (1983 est.) 114,100.

Gusii, also called KISII, or KOSOVA, a Bantu-speaking people who inhabit the Kisii District of Nyanza Province, Western Kenya, an area between Lake Victoria and the Tanzanian border. Like most western Kenyan Bantu-speaking groups, the Gusii probably came to their present highlands from the Mt. Elgon region some 500 years ago. The Gusii economy comprises a multiplicity of productive activities: they farm pyrethrum, tea, millet, corn (maize), cassava, sorghum, yams, peanuts (groundnuts), and bananas; and they keep cattle, sheep, goats, chickens, and bees. In addition, Gusii men hunt, herd, milk, and fish, while women make butter and do most of the agricultural work.

The Kisii District is one of the most densely populated areas of Kenya. The patrilineal Gusii live in neighbourhoods of dispersed family homesteads. Their neighbours are the Nilotic Luo and Kipsikis. Traditionally the Gusii were "stateless," in that their indigenous political institutions were of a decentralized, or "segmentary," type that puzzled European colonial administrators. They are now represented by chiefs in the local Kenyan administration. Polygamy is practiced to a limited extent. The old custom of paying bridewealth in livestock has been changing with the development of a modern money economy.

gusla, also spelled GUSLE, Bulgarian bowed, stringed musical instrument of the Balkans,



Bulgarian *gusla* and bow, 18th century; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, the Crosby Brown Collection of Musical Instruments, 1889

with a round wooden back, a skin belly, and one horsehair string (rarely, two) secured at the top of the neck by a rear tuning peg. It is played in vertical position, with a deeply curved bow. It has no fingerboard, the string being stopped by the sideways pressure of the player's fingers. It is related to the medieval rebec and the Greek lira and is used in Yugoslavia to accompany the performance of the *guslari,* or epic singers.

The word *gusla* sometimes refers also to the *gadulka,* a similar Bulgarian instrument with three or four strings. The Russian *gusli,* an unrelated instrument, is a psaltery.

guslar, plural GUSLARI, any of a group of popular narrative singers of Yugoslavia who inherit a tradition that dates from the 17th century. Among the few performers continuing the oral tradition of epic poetry in the West, the *guslari* serve as transmitters and interpreters of a repertory of song and epic. Most of their songs are about the era of Turkish rule and were handed down by teachers or older singers. Because the narratives are orally transmitted, variation in content is inevitable. The *guslari,* performing largely in cafes, accompany themselves on the *gusla* (a one-stringed instrument) and intone their musical stories.

gust, sudden wind-speed increase of 4.6 metres per second (10.3 miles per hour) or more, to a peak speed of 8 metres per second (about 18 miles per hour) or more. It is briefer than a squall and usually lasts 20 seconds or less. Air turbulence around an obstacle causes gusts; they occur frequently over buildings and irregular ground and are generally absent over water. The term gust also denotes a sudden change in wind speed relative to a flying aircraft.

Gustaf (personal name): *see under* Gustav.

Gustafson, Ralph Barker (b. Aug. 16, 1909, Lime Ridge, near Sherbrooke, Que., Can.), Canadian poet whose work shows a development from traditional form and manner to an elliptical poetry that reflects the influence of Anglo-Saxon verse and the metrical experiments of the 19th-century British poet Gerard Manley Hopkins.

Gustafson earned a B.A. in English language and literature from Oxford University, and then became a tutor and journalist in London. He returned to Canada briefly in 1934 and again in 1938, then settled in New York after World War II. He later returned again to Canada, teaching at Bishop's University in Lennoxville, Quebec (1963–79), and representing his country as a poetry delegate to several foreign nations.

His early works, such as *The Golden Chalice* (1935), *Lyrics Unromantic* (1942), and *Flight into Darkness* (1944), show a gradually increasing individuality of style. His later works, *Rocky Mountain Poems* (1960), *Rivers Among Rocks* (1960), *Sift in an Hour Glass* (1966), *Ixion's Wheel* (1969), and *Selected Poems* (1972), although often arcane and cryptic, are considered his best. He also produced two volumes of short stories, *The Brazen Tower* (1974) and *The Vivid Air* (1980).

Gustafsson, Greta: *see* Garbo, Greta.

gustation: *see* taste.

Gustav, Swedish GUSTAF, Latin GUSTAVUS, name of Swedish kings grouped below chronologically and indicated by the symbol •.

• Gustav I Vasa, original name GUSTAV ERIKSSON VASA (b. May 12, 1496?—d. Sept.

Gustav I Vasa, portrait after J. Binck, 1542; in the University of Uppsala, Sweden

By courtesy of the Svenska Portrattarkivet, Stockholm

29, 1560, Stockholm), king of Sweden (1523–60), founder of the Vasa ruling line, who established Swedish sovereignty independent of Denmark.

Early life. Gustav was the son of a Swedish senator and of a noble family whose members had played a prominent part in the factious aristocratic politics of 15th-century Scandinavia and that was connected by marriage with the family of Sture, which had supplied Sweden with three regents. Gustav fought in the army of Sten Sture the Younger against Christian II of Denmark in 1517–18 and was one of the hostages sent by Sten to Christian in 1518 as part of the terms of an armistice. Christian violated the agreement and carried Gustav off to Denmark. In 1519 Gustav fled from his captivity to Lübeck, where he made friends who were to be of great importance later. On May 31, 1520, he returned to Sweden. Sten Sture had meanwhile died of wounds, and Christian was master of almost all Sweden save Stockholm. In November, by the "Stockholm bloodbath," Christian removed the most dangerous of his opponents, including Gustav's father and two of his uncles.

Faced with the alternatives of rebellion or flight, Gustav chose the former. He succeeded in rousing the midland province of Dalarna to resist, purchased by judicious concessions the support of lay and ecclesiastical magnates to whom a union of the three Scandinavian kingdoms under Christian had become unwelcome, and was able (since Sten Sture's son was a mere boy) to pass as leader of the surviving Sture party. A considerable body of folk legend deals with his real and supposed adventures at this period. For the eviction of the Danes, as he soon found, outside help was necessary; and he obtained it from the rich free city of Lübeck, whose merchants felt themselves threatened by Christian's aggressive economic policies. This aid enabled Gustav to establish Sweden's independence and may have been responsible for his election as king (June 6, 1523). In return for it, Lübeck extorted far-reaching commercial privileges, and it was to be one of Gustav's main concerns to emancipate his country from its dependence on his former backers.

Reign. Gustav's crown continued for some years to be precarious. Christian II had been driven out of Denmark by his uncle, who succeeded him as Frederick I, and a common fear of Christian's restoration soon drew Frederick and Gustav together, so that despite recurrent periods of tension the threat from Christian, and afterward from his heirs, enforced a measure of harmony between Sweden and Denmark. But Gustav had to face serious internal dangers: from aggrieved members of the old Sture party who resented his favour to some of their former enemies; from the men of Dalarna, who added to this grievance complaints on economic and religious grounds; and from great nobles, who found Gustav a more formidable ruler than they had expected. Indeed, Gustav proved to be a harsh master and an exigent lord; he became known for being suspicious, mendacious, cruel, vengeful, demagogic, and capricious; and, to his enemies, he seemed to have most of the attributes of a tyrant.

The need to pay his debts to Lübeck, and to strengthen the royal authority, forced Gustav to impose heavy taxes, and it was essentially with a view to tapping the church's wealth that he embarked on the measures that led to the Reformation in Sweden. The Diet at Västerås in 1527 put the church's property at his mercy. Gustav had few theological interests or preferences, but he resented the presence in Sweden of any authority that challenged his own, and he had some sympathy with the idea of services in Swedish, for he was an indifferent Latinist himself. The move toward Lutheranism, however, was both accelerated and retarded by purely political considerations. Sweden did not become irrevocably a Lutheran country until 1544 at the earliest, and it was a long time before Protestantism was popular outside Stockholm.

The last great revolt of the reign, in 1542–43, had a strong anti-Protestant strain. Gustav's vain attempts to become a member of the Schmalkaldic League, formed by the German Protestants, were dictated by a desire to provide himself with allies rather than by religious convictions. In foreign policy, indeed, he inclined always to caution and a husbanding of resources. If he intervened in the so-called Count's War between pretenders to the Danish crown (1534–36), it was because he saw at last a chance of liberating Sweden from Lübeck's tutelage, and his only other adventure was the later war with Muscovy (1555–57).

Gustav's greatest achievement was the creation of a strong monarchy. He based his power on a massive agglomeration of crown and family lands, acquired for the most part by confiscation from the church, which put him beyond the rivalry of any other noble house. The supervision and exploitation of these lands was his personal concern, and with it went an infinite solicitude for the least detail of fiscal policy. In the 1540s, due to a lack of trained Swedes, he imported German administrators. This was a brief episode, but their work had a lasting effect in Sweden. It enabled Gustav to maintain his personal supervision and to combine it with high efficiency.

As the political heir of a faction, he found it expedient to bribe his nobility with church lands, and he was successful in many policies that the Stures had only attempted. In 1544, for instance, he induced the Diet to declare the monarchy hereditary rather than elective. He summoned the estates frequently in the uncertain years at the beginning of his reign, though less often thereafter, and his use of them to endorse his policies undoubtedly aided their development as an effective parliamentary body. On the other hand, he reduced to a position of relative insignificance the aristocratic council of state, which had played the leading part in the constitutional struggles of the preceding century.

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• **Gustav II Adolf,** Latin GUSTAVUS ADOLPHUS (b. Dec. 9, 1594, Stockholm—d. Nov. 6, 1632, Lützen, Saxony), king of Sweden (1611–32) who laid the foundations of the modern Swedish state and made it a major European power.

Early years of reign. Gustav was the eldest son of Charles IX and his second wife, Christina of Holstein. He was still some weeks short of his 17th birthday when he succeeded his father in 1611, and it was only in exchange for important constitutional concessions that the Swedish Estates (the Riksdag or Assembly) permitted him to assume full control of the government. He found himself in an extraordinarily difficult position. Charles IX had usurped the throne, having ejected his nephew Sigismund III Vasa (who was also king of Poland) in 1599, and the resulting dynastic quarrel involved Sweden and Poland in a war that continued intermittently for 60 years. Until 1629 Gustav had always to reckon with the danger of a legitimist invasion from Poland and the attempted restoration of the elder Vasa line. Charles had also begun a war in Russia in an attempt to put forward a Swedish candidate for the vacant Russian throne and then, when his armies were deeply committed in Russia, had rashly provoked war with Denmark. Not only had Charles placed Sweden in a calamitous situation internationally but he had left behind him a legacy of domestic troubles. His usurpation of the throne had meant not only expulsion of a Catholic sovereign whose rule seemed to threaten Sweden's Lutheranism but also the defeat of the aristocratic constitutionalism of the Council of State, and it had been followed by the execution of five leading members of the high aristocracy. Charles's rule had been arbitrary and violent; his religious views (he was suspected of leaning toward Calvinism) had involved him in an incessant struggle with the Lutheran church. At his death the country was exhausted by constant warfare, the monarchy was generally unpopular, and the accession of a new king seemed to offer the opportunity to extort from the crown guarantees against a recurrence of misgovernment.

Gustav II Adolf, portrait by Matthäus Merian the Elder, 1632; in Skokloster, Uppland, Swed.
By courtesy of the Svenska Portrattarkivet, Stockholm

Resolution of foreign wars. Thus, in 1611 Gustav had three foreign wars and a major constitutional crisis upon his hands. As the war with Denmark was as good as lost, he set about to end it on the best possible terms. By the Peace of Knäred (1613) Sweden was forced to leave its only North Sea port, Älvsborg, in Danish hands as security for the payment of an enormous war indemnity. That indemnity entailed crushing taxation and, even with the aid of last-minute loans by the Dutch, was not paid off until 1619. The war left bitter hatred behind it, and Gustav never forgot that Denmark was the national enemy and might be expected to take advantage of any Swedish weakness. Meanwhile, the war with Poland remained largely in abeyance, although in 1617 Gustav sent an abortive expedition to seize the fortification of Dünamünde outside Riga (in present Latvian S.S.R.). The main danger, however, seemed to be Sigismund's attempts to pursue his claims by fifth-column activities in Sweden and propaganda in Europe.

The war in Russia was much more serious, and it was here that Gustav, in a succession of difficult and indecisive campaigns, learned the rudiments of warfare. It dragged on until ended by the Peace of Stolbova in 1617, by which time it had clearly changed its character. Charles IX had intervened in Russia to prevent the Poles from placing their own candidate on the Russian throne; the election of the Russian Michael Romanov in 1613 had ended that danger, and Gustav continued the struggle with the deliberate intention of annexing as much of Russian territory as pos-

sible. He feared Russia's military and naval potential; he feared that once the country's position was stabilized, a new tsar might try to make Russia a Baltic maritime power. He was determined, therefore, to exploit Russia's momentary weakness to cut it off from direct maritime contact with the West and to channel Russian trade through Swedish middlemen, thus enriching his impoverished exchequer with tolls and duties. In this last respect the outcome proved disappointing, but politically and strategically Stolbova was a treaty of European importance. By annexing Ingria and Kexholm, Sweden came to possess a continuous belt of territory connecting Finland with the Swedish province of Estonia. It thus cut Russia off entirely from the Baltic, thrust it back toward Asia, and postponed its emergence as a major European power until the time of Peter the Great.

Resolution of internal problems. Meanwhile, the internal tensions that Gustav Adolf had inherited had been largely resolved. The charter that the Estates extorted from Gustav when he became king in 1611 might well have entailed the virtual subjection of the monarchy to the council and the high aristocracy. This, however, did not happen; for the man who had drawn the charter, the chancellor Axel Oxenstierna, became, in fact, the King's closest collaborator and remained so for the whole of the reign—a great historic partnership in which the temperaments and gifts of each supplemented those of the other. The King observed the spirit of the charter, and the aristocracy did not always insist on the observance of its exact provisions. They found in Gustav a king favourable to their interests. He enlisted the nobility in the service of the state and thus provided them with numerous economic benefits. It was one of the healthiest features of Swedish society during this period that the nobility served the state, prepared to sacrifice even its privileges in the interests of the country. Thus the long-standing constitutional struggle between crown and aristocracy was suspended during his reign, largely because of the personality of the sovereign and the unique collaboration between himself and Oxenstierna. In this improved climate it was possible to undertake measures of sweeping reform.

The first decade of the reign, therefore, saw the creation of a new Supreme Court (1614) and the establishment of the Treasury and the Chancery as permanent administrative boards (1618), and by the end of the reign an Admiralty and a War Office had been created—each presided over by one of the great officers of state. The Form of Government of 1634 summed up these reforms in a general statute giving Sweden a central administration more modern and efficient than that of any other European country. Stockholm became a true capital with a permanent population of civil servants, the most important of whom were noblemen. And in the 1620s a thorough reform professionalized local government and placed it securely under the control of the crown. The Council of State became, for the first time, a permanent organ of government, able to assume charge of affairs while the King was fighting overseas. An ordinance of 1617 fixed the number of Estates in the Riksdag at four (nobles, clergy, burghers, and peasants) and regulated its procedures on a basis that lasted until 1866. Both council and Riksdag were identified with the King's policies, not least because of Gustav's brilliant gift for expounding them: his speeches reveal him as a master of debate and an orator of extraordinary eloquence and force. And the decisions were always his, though they were usually arrived at after intimate consultation with Axel Oxenstierna. His hesitations, his vacillation in the face of grave decisions (such as that of intervening in the Thirty Years' War in Germany), reflect his profound sense of responsibility to the nation. Of all these domestic reforms, however, none had a more enduring and more beneficial effect upon his country than his work for education: his creation of the *Gymnasia* in the 1620s gave Sweden, for the first time, an effective provision for secondary education; his splendid munificence to the University of Uppsala gave it the financial security that was essential to its development; and his foundation of the University of Dorpat (now Tartu State University) provided the first centre for higher learning in the Baltic languages.

In 1620 he married Maria Eleonora of Brandenburg. In 1621, taking advantage of a Turkish attack upon Poland, Gustav renewed the war with Sigismund. His capture of Riga was followed by a gradual conquest of Livonia (present Latvian and Estonian S.S.R.'s). His object was to compel Sigismund to renounce his claims to Sweden, and he hoped to gain his end by the economic pressure which would result from Poland's loss of access to its main export routes to western Europe. It was in pursuit of this policy that, in 1626, he transferred the seat of war to Prussia: a stranglehold on the Vistula River, he hoped, would bring Poland to its knees. But already he was concerned with the larger question of the danger to German Protestantism entailed by the victorious campaigns of the Habsburg commanders, Tilly and Wallenstein. He saw his Polish campaigns as one aspect of the general struggle of Protestantism against the Counter-Reformation: if Sigismund were restored to the Swedish throne, the re-Catholicization of Scandinavia would follow soon after, the Habsburgs and their allies would be able to close the passage into the Baltic to Dutch shipping, and the United Netherlands might then be unable to continue their struggle against Spain.

Thus, the fate of Europe was bound up with what happened in Livonia or Prussia. Protestant Europe was slow to appreciate the connection, but as the Protestant cause plunged to disaster in Germany, its leaders increasingly turned their eyes to Gustav as a possible saviour. But before he was prepared to commit himself to any Protestant league, Gustav required adequate assurance of support. The disastrous defeat (1626) of Christian IV of Denmark, who had intervened in Germany without such an assurance, justified his caution, but it also made Swedish intervention inevitable. The Imperialists' occupation of the German Baltic shore and their plans for a Habsburg-Polish navy seemed to pose a direct threat of invasion. In this emergency, Gustav and Christian joined forces to send an expedition to Stralsund, the last remaining Protestant bastion in Pomerania, which arrived just in time to prevent its capture by Wallenstein (1628). From this moment, full-scale involvement in the German war became simply a question of time. The Polish war was resolved in 1629 by the Truce of Altmark, and Gustav was at last free to turn his attention to Germany. In June 1630 the Swedish expeditionary force landed at Peenemünde.

Entrance into the Thirty Years' War. The motives prompting his intervention have long been a subject of historical controversy. An older generation of historians saw him, as his contemporaries did, simply as the Protestant Hero, the "Lion of the North"; later, he was viewed as having been moved by purely political considerations; and in recent days he has been characterized as an economic imperialist who sought to remedy Sweden's poverty by seizing control of the whole Baltic coastline, and thus to monopolize trade between Russia and western Europe. The most probable explanation, however, is the one which he himself adduced: that he sought security from dangers which seemed to threaten the Swedish state and the Swedish church; that he considered his actions essentially defensive; and that he had no precise long-range plans, either economic or political, when he landed on German soil.

He had, however, an army of unusual quality, fighting in a style new to Germany, and he combined tactical innovations with a grander concept of strategy than Europe had seen for many years. By reducing the size of the tactical unit, by opposing a flexible linear formation to the cumbrous massive formations of his opponents, by solving (at least for his time) the perennial problem of combining infantry and cavalry, missile weapons and shock, and, lastly, by producing the first easily manoeuvrable light artillery, he completed the transformation of the art of war begun by the Dutch commander Maurice of Nassau, prince of Orange, earlier in the century. The vastness of his operations in Germany initiated a permanent increase in the size of European armies. The whole process had profound social effects on the history of Europe.

Gustav landed in Germany without allies. Whatever the feelings of the Protestant populations, the Protestant princes resented Swedish interference, and the refusal of George William of Brandenburg to cooperate with the Swedes thwarted Gustav's attempts to save Magdeburg from capture and sack at the hands of Tilly's armies. His position was strengthened, however, by the Treaty of Bärwalde in January 1631, an alliance with France in which almost all the advantage lay with Sweden; in June he extorted by force the reluctant collaboration of Brandenburg; in September John George of Saxony, provoked by violations of his neutrality, formally allied himself with Sweden. In September, at Breitenfeld, the Swedish-Saxon forces shattered Tilly's army in a battle that was a landmark in the art of war and a turning point in the history of Germany. In the ensuing months Gustav swept triumphantly through central Germany, systematically consolidating his base areas as he advanced; by Christmas he had established himself at Mainz. It seemed that the fate of Germany lay in his hands.

These developments forced Gustav to reassess the limited and vague plans with which he had embarked on the expedition. In 1630 he had defined his aims as security and indemnity, the indemnity to be a cash payment to cover his war expenses, the security to be provided by a permanent Swedish alliance with Pomerania. By the close of 1631, with most of northern and central Germany under his control and the liberation of the southern German Protestant states already in prospect, his plans had broadened. He had always insisted that the German Protestant princes must work for their own salvation, and he saw the best hope for their future preservation in the creation of a comprehensive, permanent Corpus Evangelicorum (or Protestant league). His experience of the feckless and selfish German princes convinced him that such a league could be effective only if it were organized and directed by himself, and military necessity in any case demanded a unified command that could not be directed by anyone other than himself. Security, then, was to be achieved by a Protestant league of which he would be patron, military director, and political head. For indemnity he no longer claimed monetary compensation but large territorial cessions, particularly, the transference of Pomerania to Sweden. Thus, the old security had become the new indemnity. Many Germans feared, and some Swedish diplomats now believed, that a final settlement must probably entail the deposition of the German emperor Ferdinand II and the election of Gustav as emperor in

his place. It was a solution he must certainly have contemplated, but there is no firm evidence of his attitude; probably he considered it only as a last resort. Certainly it would have alienated those German allies who had no wish to exchange a Habsburg domination for a Swedish one. They already resented Gustav's dictatorial methods as well as the Swedish army's practice of making war support war. A Swedish administration was being organized in the occupied areas; Gustav rewarded his generals and supporters by conferring the conquered lands on them; in some of the treaties he concluded with German princes there was more than a hint that he regarded them as his feudal inferiors. In October 1632 he did, indeed, lay the basis for a league of Protestant princes; but it was confined mainly to southern Germany, where the peril from an Imperialist reaction was greatest, and the two greatest Protestant states—Saxony and Brandenburg—never became part of it.

Last phase of Gustav's campaign. The prospect of success depended upon the outcome of the campaign of 1632, which was designed to cripple Bavaria as a preliminary to the conquest of Vienna in 1633. Up to a point, it was highly successful. The brilliant crossing of the Lech River in Bavaria, in the face of Tilly's armies, opened the way to the occupation of Munich. In this crisis, Wallenstein, whom the Emperor had dismissed from his service in 1630, was recalled to lead the imperial armies. His threat to Nürnberg forced Gustav to leave Bavaria in order to relieve the city. His attack on Wallenstein's entrenchments on the Alte Veste—an operation that probably no other contemporary comander would have attempted—was unsuccessful, and for the next few weeks there followed a tense war of manoeuvre that ended when Gustav fell upon Wallenstein's army at Lützen (Nov. 6, 1632) as it was dispersing to winter quarters. Morning mist robbed Gustav of the advantage of surprise and gave Wallenstein time to reunite his forces. The fight raged fiercely all day, but when night fell the Swedes had won a clear tactical victory and an important strategic success. It was, however, dearly bought, for while leading a cavalry charge Gustav became separated from his men and perished in the melee.

Assessment. His death came at a moment when it had already begun to appear that the victory he believed to be essential to the stability of Germany and the security of Sweden might be more difficult to achieve than he had imagined. But he had lived long enough to deflect the course of German history. His intervention in the Thirty Years' War, at a moment when the armies of the Habsburg emperor and the German princes of the Catholic League controlled almost the whole of Germany, ensured the survival of German Protestantism against the onslaughts of the Counter-Reformation. The consequences, for Germany and for Europe, extended far beyond the religious field. By supporting the German princes against the Emperor, Gustav Adolf defeated the attempts of the Habsburgs to make their imperial authority a reality and thus played a part in delaying the emergence of a united Germany until the 19th century. As a military commander, he was responsible for military innovations that marked an epoch in the history of the art of war. But from the point of view of his own country, these achievements were less significant than his domestic labours—his extraordinarily wide-ranging creative work in the fields of administrative organization, economic development, and education. (M.Ro.)

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• **Gustav III** (b. Jan. 24, 1746, Stockholm—d. March 29, 1792, Stockholm), king of Sweden (1771–92), who reasserted the royal power over the Riksdag (parliament) during a reign known as the Gustavian Enlightenment (or Swedish Enlightenment; *q.v.*).

Gustav, the eldest son of King Adolf Fredrik, was an intelligent and cultured advocate of the Enlightenment. In 1766 he married Sofia Magdalena, daughter of King Frederick V of Denmark. Gustav succeeded in 1771 to a Swedish throne that had been weak since it was subordinated to the Riksdag in 1720—the start of the so-called Age of Freedom.

In August 1772 Gustav III seized effective power of the government, thus bringing the Age of Freedom to an end. He quickly introduced a number of enlightened reforms, including increased free trade, freedom of the press, amendment of the poor law, and the strengthening of the navy.

Gustav III's amiability and efficient rule were not enough to satisfy his critics. His initiation of the unpopular Russo-Swedish War of 1788–90, and the treasonous activity by the

Gustav III, detail from a portrait by Lorentz Pasch the Younger; in a private collection

By courtesy of the Svenska Portrattarkivet, Stockholm

Anjala League officers on the Finnish front, worsened his situation. Gustav was able to avoid complete disaster in the war, however, by a brilliant naval victory at Svensksund (July 1790). He also managed to excite a wave of patriotism through his personal charm. In the atmosphere created by an aristocratic conspiracy against him in the early 1790s, however, Gustav was shot and mortally wounded by Capt. Jacob Johan Anckarström while attending a midnight masquerade at the Stockholm opera house in March 1792; he died a few days thereafter. Gustav was a vigorous patron of the arts and wrote plays; in 1786 he collaborated with Johan Kellgren on the opera *Gustaf Wasa.*

• **Gustav IV Adolf** (b. Nov. 1, 1778, Stockholm—d. Feb. 7, 1837, Sankt Gallen, Switz.), Swedish king whose intemperate foreign policy led to his overthrow in a coup d'etat of 1809.

The son of the assassinated Gustav III, Gustav IV came to the throne in 1792 under the regency of his uncle Charles, duke of Södermanland. Although the regency ended in 1796, Gustav IV was plagued by a morbid fear of Jacobinism, and he avoided coronation until 1800, when agricultural and financial crises necessitated the convocation of a Riksdag (estates general).

Gustav IV Adolf, detail from a portrait by Per Krafft the Younger; in the Malmö Museum, Sweden

By courtesy of the Svenska Portrattarkivet, Stockholm

In 1805 Gustav IV brought Sweden into the European coalition against Napoleon. When Russia joined with France in 1807, Gustav stubbornly decided to remain in the field, even though that would mean a Russian attack on Finland. The situation grew more dangerous when, also in 1807, Denmark–Norway declared war on Sweden, thus completely isolating it. In these circumstances certain groups of liberal officials and officers in Sweden's western army arranged a coup d'etat, and on March 13, 1809, the King was overthrown. His heirs being declared ineligible to succeed him, he and his family left Sweden for exile. Gustav finally settled in Switzerland under the name Colonel Gustafsson.

• **Gustav V,** Swedish in full OSCAR GUSTAF ADOLF (b. June 16, 1858, Stockholm—d. Oct. 29, 1950, Stockholm), king of Sweden from 1907. The eldest son of King Oscar II and Sophie of Nassau, he was created duke of Värmland and from 1872 acted as crown prince. He entered the army, travelled widely, and in 1881 married Victoria, daughter of the grand duke Frederick I of Baden. Succeeding on his father's death (Dec. 8, 1907), he took as his motto "With the people for the Fatherland" and proved a capable constitutional monarch in a period of expanding democracy.

• **Gustav VI Adolf,** in full OSCAR FREDRIK WILHELM OLAF GUSTAF ADOLF (b. Nov. 11, 1882, Stockholm—d. Sept. 15, 1973, Hälsingborg, Swed.), king of Sweden 1950–73, the last Swedish monarch to hold real political power after constitutional reforms initiated in 1971.

The son of the future king Gustav V and Victoria of Baden, Gustav entered the army

Gustav VI Adolf, detail from an oil painting by Carl Gunne, 1951; in the Royal Castle, Stockholm

By courtesy of the Svenska Portrattarkivet, Stockholm

in 1902 and by 1932 had risen to the rank of general. His lifelong interest in archaeology began during his studies at the University of Uppsala, and throughout the 1920s he participated in archaeological expeditions in Greece, Italy, and Cyprus. He also excavated and wrote papers on ancient Swedish monuments

and was considered an authority on Chinese ceramics, owning one of the world's largest private collections of Asian pottery. At the age of 88, he took part in excavations at Etruscan ruins in Acquarossa, Italy.

Through his first marriage to Princess Margaret of Connaught, who died in 1920, Gustav had five children, the eldest of whom, Gustav Adolf, duke of Västerbotten, became his heir. In 1923 Gustav married Lady Louise Mountbatten, and in October 1950 he succeeded to the throne. His grandson Carl Gustaf, the son of Gustav Adolf, became crown prince after his father's death in 1947.

In 1965 the Riksdag raised to 25 the age at which a king could begin his rule, and in 1971 it enacted legislation, effective at Gustav's death in 1973, stripping the monarchy of its most important political functions. The Crown Prince acceded to the largely ceremonial throne as Carl XVI Gustaf.

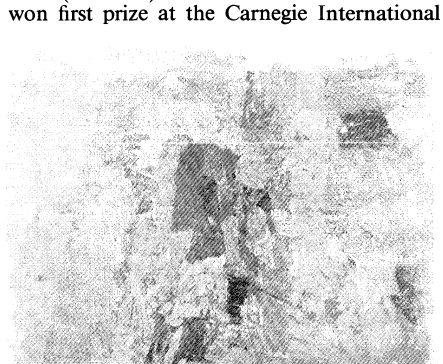
Gustavus (Latin personal name): *see under* Gustav.

Gustavus Adolphus Union, German in full GUSTAV-ADOLF-WERK DER EVANGELISCHEN KIRCHE DEUTSCHLAND, worldwide organization for the spreading of the Christian faith, founded by Gottlob Grossmann at Leipzig in 1832, as a bicentennial memorial to the Swedish king Gustav II Adolf, who was killed at the Battle of Lützen.

Based on the biblical idea of the Diaspora, the organization was to aid Protestant minority churches in Germany and abroad, and in 1842 it merged with a similar society in Darmstadt. Membership was open to all Protestants and also included a few Catholics. Aid from voluntary contributions was given to provide church and school buildings, pastors and teachers, and, after 1945, support for refugee communities. World War II greatly increased and spread the work of the organization.

Guston, Philip (b. June 27, 1913, Montreal, Can.—d. June 7, 1980, Woodstock, N.Y., U.S.), American painter prominent in action painting, or Abstract Expressionism (*q.v.*).

Guston studied at Otis Art Institute in Los Angeles for three months in 1930 but was largely self-taught. From 1935 to 1940 he painted many murals for the Federal Art Project. He taught at the State University of Iowa (1941–45) and at other universities. He won first prize at the Carnegie International



"Dial," oil on canvas by Philip Guston, 1956; in the Whitney Museum of American Art, New York City

By courtesy of the Whitney Museum of American Art, New York City

exhibition in 1945, was awarded Guggenheim fellowships in 1947 and 1968, and won the Rome Prize Fellowship of the American Academy in Rome in 1948.

Guston's characteristic style, reminiscent of Claude Monet, developed early in the 1950s with his "White Painting" series. Works of this series ("Dial," 1956; "The Clock," 1957; and "The Tale," 1961) are done in oil on canvas in subdued tints delicately brushed in square patches on the centre of a canvas of white background.

Güstrow, city, Mecklenburg-West Pomerania *Land* (state), northern Germany, on the canalized Nebel River south of Rostock. Developing out of an early settlement near an ancient Wendish fortress, the town was a significant agricultural market and commercial centre by the time it was chartered in 1228. From 1235 to 1436 Güstrow was the residence of the Wendish princes of Werle and, from 1520 to 1695, the seat of the dukes of Mecklenburg-Güstrow. During the Thirty Years' War it was the capital of the Catholic general Albrecht von Wallenstein's short-lived Duchy of Mecklenburg (1628–29). Historic landmarks include the former ducal castle (1558–64) and the cathedral (begun in 1226).

The centre of a fertile agricultural district, Güstrow has institutes of animal husbandry and pedagogy. A rail and traffic junction, its primary industries are engineering, food processing, and woodworking. Güstrow is an important sports centre in the north. Pop. (1988 est.) 38,806.

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Gutenberg, Beno (b. June 4, 1889, Darmstadt, Ger.—d. Jan. 25, 1960, Los Angeles, Calif., U.S.), American seismologist noted for his analyses of earthquake waves and the information they furnish about the physical properties of the Earth's interior.

Gutenberg served as a professor of geophysics and director of the seismological laboratory at the California Institute of Technology, Pasadena, from 1930 to 1957, when he retired.

Gutenberg worked with Charles Richter to develop a method of determining the intensity of earthquakes. Calculating the energy released by present-day shallow earthquakes, they showed that three-quarters of that energy occurs in the Circum-Pacific belt. Gutenberg wrote several books, including *Earthquakes in North America* (1951); he edited *Internal Constitution of the Earth* (1939) and, with Richter, wrote *The Seismicity of the Earth* (1941).

Gutenberg, Johannes, in full JOHANN GENSFLEISCH ZUR LADEN ZUM GUTENBERG (b. the last decade of the 14th century, Mainz, archbishopric of Mainz [Germany]—d. probably Feb. 3, 1468, Mainz), German craftsman and inventor who originated a method of printing from movable type that was used without important change until the 20th century. The unique elements of his invention consisted of a mold, with punch-stamped matrices (metal prisms used to mold the face of the type) with which type could be cast precisely and in large quantities; a type-metal alloy; a new press, derived from those used in wine making, papermaking, and bookbinding; and an oil-based printing ink. None of these features existed in Chinese or Korean printing, or in the existing European technique of stamping letters on various surfaces, or in woodblock printing.

Life. Gutenberg was the son of a patrician of Mainz. What little information exists about Gutenberg, other than that he had acquired skill in metalwork, comes from documents of financial transactions. Exiled from Mainz in the course of a bitter struggle between the guilds of that city and the patricians, Gutenberg moved to Strassburg (now Strasbourg, Fr.) probably between 1428 and 1430. Records put his presence there from 1434 to 1444. He engaged in such crafts as gem cutting, and he also taught crafts to a number of pupils.

Some of his partners, who became aware that Gutenberg was engaged in work that he kept secret from them, insisted that, since they had advanced him considerable sums, they should become partners in these activities as well. Thus, in 1438 a five-year contract was drawn up between him and three other men: Hans Riffe, Andreas Dritzehn, and Andreas Heilmann. It contained a clause whereby in case of the death of one of the partners, his heirs were not to enter the company but were to be compensated financially.

Invention of the press. When Andreas Dritzehn died at Christmas 1438, his heirs, trying to circumvent the terms of the contract, began a lawsuit against Gutenberg in which they demanded to be made partners. They lost the suit, but the trial revealed that Gutenberg was working on a new invention. Witnesses testified that a carpenter named Conrad Saspach had advanced sums to Andreas Dritzehn for the building of a wooden press, and Hans Dünne, a goldsmith, declared that he had sold to Gutenberg, as early as 1436, 100 guilders' worth of printing materials. Gutenberg, apparently well along the way to completing his invention, was anxious to keep secret the nature of the enterprise.

After March 12, 1444, Gutenberg's activities are undocumented for a number of years, but it is doubtful that he returned immediately to Mainz, for the quarrel between patricians and guilds had been renewed in that city. In October 1448, however, Gutenberg was back in Mainz to borrow more money, which he received from a relative. By 1450 his printing experiments had apparently reached a considerable degree of refinement, for he was able to persuade Johann Fust, a wealthy financier, to lend him 800 guilders—a very substantial capital investment, for which the tools and equipment for printing were to act as securities. Two years later Fust made an investment of an additional 800 guilders for a partnership in the enterprise. Fust and Gutenberg eventually became estranged, Fust, apparently, wanting a safe and quick return on his investment, while Gutenberg aimed at perfection rather than promptness.

Fust won a suit against him, the record of which is preserved, in part, in what is called the Helmaspergersches Notariatsinstrument (the Helmasperger notarial instrument), dated Nov. 6, 1455, now in the library of the University of Göttingen. Gutenberg was ordered to pay Fust the total sum of the two loans and compound interest (probably totaling 2,020 guilders). Traditional historiography suggested that this settlement ruined Gutenberg, but more recent scholarship suggests that it favoured him, allowing him to operate a printing shop through the 1450s and maybe into the 1460s.

Printing of the Bible. There is no reason to doubt that the printing of certain books (*werck der bucher,* specifically mentioned in the record of the trial, refers to the Forty-two-Line Bible that was Gutenberg's masterpiece) was completed, according to Gutenberg's major biographers, in 1455 at the latest. It has been estimated that the sale of the Forty-two-Line Bible alone would have produced many times over the sum owed Fust by Gutenberg, and there exists no explanation as to why these tangible assets were not counted among Gutenberg's property at the trial. After winning his suit, Fust gained control of the type for the Bible, and for Gutenberg's second masterpiece, a Psalter, and at least some of Gutenberg's other printing equipment. He continued to print, using Gutenberg's materials, with the assistance of Peter Schöffer, his son-in-law, who had been Gutenberg's most skilled employee and a witness against him in the 1455 trial. The first printed book in Europe to bear the name of its printer is a magnificent Psalter completed in Mainz on

Aug. 14, 1457, which lists Johann Fust and Peter Schöffer.

The Psalter is decorated with hundreds of two-colour initial letters and delicate scroll borders that were printed in a most ingenious technique based on multiple inking on a single metal block. Most experts are agreed that it would have been impossible for Fust and Schöffer alone to have invented and execute the intricate technical equipment necessary to execute this process between Nov. 6, 1455, when Gutenberg lost control of his printing establishment, and Aug. 14, 1457, when the Psalter appeared. It was Gutenberg's genius that was responsible for the Psalter decorations. In the 1960s it was suggested that he may also have had a hand in the creation of copper engraving, in which he may have recognized a method for producing pictorial matrices from which to cast reliefs that could be set with the type, initial letters, and calligraphic scrolls. It is at present no more than a hypothesis, but Gutenberg's absorption in both copper engraving and the Psalter decorations would certainly have increased Johann Fust's impatience and vindictiveness.

A number of other printings used to be attributed to Gutenberg. They are now considered the work of other minor printers; among these is a Thirty-six-Line Bible printed in Bamberg, a typographic resetting of the Forty-two-Line Bible. Attributed to Gutenberg himself is a *Türkenkalender,* a warning against the impending danger of Turkish invasion after the fall of Constantinople in 1453, printed December 1454 for 1455 use, some letters of indulgence, and some school grammars. The identity of the printer of a *Missale Speciale Constantiense* is still not established, but it was probably produced about 1473 in Basel, Switz.

In January 1465 the archbishop of Mainz pensioned Gutenberg, giving him an annual measure of grain, wine, and clothing and exempting him from certain taxes. His financial status in his last years has been debated but was probably not destitute. (H.E.L.-H./Ed.)

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Gutenberg Bible, also called FORTY-TWO-LINE BIBLE, or MAZARIN BIBLE, the first complete book extant in the West and the earliest printed from movable type, so called after its printer, Johannes Gutenberg (*q.v.*), who completed it about 1455 working at Mainz, Ger. The three-volume work, in Latin text, was printed in 42-line columns and, in its later stages of production, was worked on by six compositors simultaneously. It is sometimes referred to as the Mazarin Bible because the first copy described by bibliographers was located in the Paris library of Cardinal Mazarin.

Like other contemporary works, the Gutenberg Bible had no title page, no page numbers, and no innovations to distinguish it from the work of a manuscript copyist. This was presumably the desire of both Gutenberg and his customers. Experts are generally agreed that the Bible, though uneconomic in its use of space, displays a technical efficiency not substantially improved upon before the 19th century. The Gothic type is majestic in appearance, medieval in feeling, and slightly less compressed and less pointed than other examples that appeared shortly thereafter.

The original number of copies of this work is unknown; some 40 are still in existence. There are perfect vellum copies in the U.S. Library of Congress, the French Bibliotheque Nationale, and the British Library. In the United States almost-complete texts are in the Huntington, Morgan, New York Public, Harvard University, and Yale University libraries.

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Gütersloh, city, North Rhine-Westphalia *Land* (state), west-central Germany. Chartered in 1825, the town has a garden atmosphere and extends into the surrounding old farm country. The collections of the local museum include peasant culture, handicrafts, and textiles. The city developed in the 19th century around the textile and meat-processing industries; today, with a diversified economy, it also produces machinery, metal products, and furniture. Pop. (1989 est.) 83,407.

Guthorm (Danish king of East Anglia): *see* Guthrum.

Guthrie, city, seat (1907) of Logan county, central Oklahoma, U.S., on the Cottonwood Creek near its junction with the Cimarron River, north of Oklahoma City. It was founded virtually overnight on April 22, 1889, with the opening of Indian lands to settlement. The gathering place for homesteaders (a station on the Santa Fe Railway), it was named for Judge John Guthrie. Incorporated in 1890, it served as the capital of the Oklahoma Territory, and the state government was maintained there until moved to Oklahoma City in 1910. In 1905 Carry Nation began her prohibition activities in Guthrie, which then abounded in saloons and gambling halls.

A service centre for a surrounding oil and agricultural area, the city has light industry, including the manufacture of furniture and oil-field equipment. Guthrie's Capitol Square is the site of a Scottish Rite (Freemasonry) Temple. An annual celebration commemorates the settlers' "Run of '89." Pop. (1988 est.) 11,783.

Guthrie, Edwin Ray (b. Jan. 9, 1886, Lincoln, Neb., U.S.—d. April 23, 1959, Seattle, Wash.), American psychologist who played a major role in the development of the contiguity theory of learning, a classical account of how learning takes place.

Guthrie studied at the University of Nebraska and the University of Pennsylvania, obtaining his doctorate in symbolic logic from the latter in 1912. He joined the faculty of the University of Washington in 1914. Most of his work on the psychology of learning was conducted at Washington, where he remained until 1956.

Guthrie argued on philosophical grounds that the simple association in time of an external stimulus and a behavioral response was sufficient for an animal or human subject to connect the two mentally. This view contrasted with that of other psychologists who felt that some form of reinforcement, either positive (a reward) or negative (a punishment), was necessary to establish the association between stimulus and response. Guthrie also denied the reinforcement theorists' contention that the association must be repeated several times before it is established as a behavioral pattern; on the contrary, only a single incident was enough for the association to be learned, he argued. Guthrie gathered experimental data to support his theory and presented his views in *The Psychology of Learning* (1935).

Guthrie, Jimmy, byname of ANDREW JAMES GUTHRIE (b. 1897, Hawick, Roxburghshire, Scot.—d. 1937, near Chemnitz, Ger.), Scottish motorcycle-racing champion who won the Tourist Trophy race on the Isle of Man six times. He thought he had won a seventh in 1935 until a recalculation of times revealed he had lost by four seconds.

He set several world records during his career, including the world one-hour mark of 114.092 mph (1935). Two years later, he won the European championships in both the senior and junior classes. Guthrie died in a racing crash. In 1939, a memorial to him was placed on the Tourist Trophy course.

Guthrie, Sir (William) Tyrone (b. July 2, 1900, Tunbridge Wells, Kent, Eng.—d. May 15, 1971, Newbliss, County Monaghan, Ire.), British theatrical director whose original approach to Shakespearean and modern drama greatly influenced the 20th-century revival of interest in traditional theatre. He was knighted in 1961.

Guthrie graduated from the University of Oxford and in 1923 made his professional debut as an actor and assistant manager of the Oxford Repertory Company. He was briefly an announcer and director for the British Broadcasting Company (BBC) and directed the 1926–27 season of the Scottish National Theatre troupe. He then returned to the BBC to become one of the first writers to create plays designed for radio performance.

As director of productions at the Festival Theatre, Cambridge (1929–30), he experimented with new approaches to traditional theatre. James Bridie's *Anatomist,* Guthrie's first independent production, was staged at the Westminster Theatre, London, in 1931. His next production, Luigi Pirandello's *Six Characters in Search of an Author,* in 1932, established his reputation as a creative director.

Guthrie's work at the Old Vic and Sadler's Wells theatres, London, brought him recognition as a major director. During 1933–34 and 1936–45 he was the director of the Shakespeare Repertory Company, which performed at the two theatres.

During the 1940s Guthrie was critically acclaimed for his direction of operas such as Benjamin Britten's *Peter Grimes* (1946) and Edmond Rostand's *Cyrano de Bergerac* (1946). One of Guthrie's best-known operas, the strikingly realistic English-language version of Bizet's *Carmen,* was performed at Sadler's Wells Theatre (1949) and at the Metropolitan Opera House (1952) in New York City.

Guthrie produced his own play, *Top of the Ladder,* at the St. James Theatre, London, in 1950. His 1953 productions of Shakespeare's *Richard III* and *All's Well That Ends Well* at the first Shakespeare Festival at Stratford, Ont., were considered outstanding achievements. He continued at Stratford for the next four seasons, strongly influencing the development of Canadian theatre.

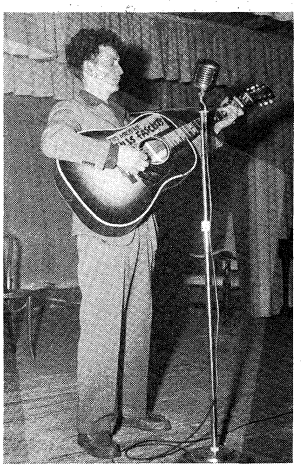
The Tyrone Guthrie Theater (1963) in Minneapolis, Minn., modeled after the Stratford Theatre, followed Guthrie's tenets for creating effective drama as outlined in his two major publications: *Theatre Prospect* (1932) and *A Life in the Theatre* (1960).

BIBLIOGRAPHY. James Forsyth, *Tyrone Guthrie* (1976), is a biography. Alfred Rossi, *Astonish Us in the Morning: Tyrone Guthrie Remembered* (1977), contains tributes from actors and actresses Guthrie had directed.

Guthrie, Woody, byname of WOODROW WILSON GUTHRIE (b. July 14, 1912, Okemah, Okla., U.S.—d. Oct. 3, 1967, New York, N.Y.), American singer and composer whose songs, many of them now classics, told of the common people and their struggles.

Guthrie left home at the age of 15 to travel the country by freight train. He carried with him his guitar and harmonica and became a

welcome figure in the hobo and migrant camps of the Great Depression of the 1930s. Singing songs drawn from his own country heritage and writing others based on his experiences with the dispossessed, Guthrie became a musical spokesman for labour and populist sentiment. Such songs as "So Long (It's Been Good To Know Yuh)," "Hard Traveling," "Blowing Down This Old Dusty Road," "Union Maid," and (inspired by John Steinbeck's *The Grapes of Wrath*) "Tom Joad" were gradually adopted by other performers and became part of the folk canon. Making his way to New York City, he joined Pete Seeger and others in the Almanac Singers, with whom he continued to perform for farmer and worker groups after serving in the Merchant Marine during World War II. Probably the most famous of his more than 1,000 songs, "This Land Is Your Land"



Woody Guthrie
EB Inc.

was also one of his last and was taken up by the civil-rights movement of the 1960s.

The last years of his life were spent in a New York hospital fighting Huntington's chorea, a degenerative disease of the nervous system. At the time of his death Guthrie had already begun to assume legendary proportions as a folk figure. A film version of his autobiography *Bound for Glory* (1943) appeared in 1976. His son Arlo Guthrie (b. 1947) also achieved considerable success as a writer and singer of folk songs.

Guthrum, also spelled GODRUM, or GUTHORM, also called AETHELSTAN, ATHELSTAN, or ETHELSTAN (d. 890), leader of a major Danish invasion of Anglo-Saxon England who waged war against the West Saxon king Alfred the Great (reigned 871–899) and later made himself king of East Anglia (reigned 880–890).

Guthrum went to England in the great Danish invasion of 865, and in mid-January 878 he attacked Alfred's kingdom of Wessex. Although all Wessex was overrun, a successful counterattack by Alfred in May brought Guthrum to terms. While negotiations were in progress, Guthrum allowed himself to be baptized under the name Aethelstan, with Alfred as his godfather. The treaty was signed at Aller in present-day Somerset, and in accordance with its terms Guthrum withdrew to East Anglia, where in 880 he founded a partly Christian state and issued coinage under his baptismal name. A copy of a peace treaty that he made with Alfred the Great in 886 is still in existence.

Guthrum's death is noticed by the Anglo-Saxon Chronicle in 890, and he appears to have been vaguely remembered in Danish and Norman traditions preserved by Saxo Grammaticus and Dudo of St. Quentin.

Guti, mountain people of ancient Mesopotamia who lived primarily around Hamadan in the central Zagros Range. The Guti were a strong political force throughout the 3rd and 2nd millennia BC, especially about 2230, when they swept down into Babylonia (southern Mesopotamia), overthrowing the Akkadian empire (ruled at that time either by Naram-Sin or by his son Shar-kali-sharri), and traditionally took over control of most of the region. The Gutian rulers, in power about one century (until *c.* 2130), do not appear to have held all of Babylonia during this whole period; there is evidence of independent rulers in various parts of Babylonia, such as Gudea at Lagash. Very little is known about the Gutian domination, and the period appears to have been one of general political turmoil and cultural stagnation.

The dynasty of Guti traditionally ended about 2130 when Utu-khegal of Uruk defeated Tirigan, the last king of the Gutian dynasty. Although the Guti, from their home in the Zagros, continued to menace the subsequent dynasties and kingdoms, they were never again able to take control of southern Mesopotamia.

Gutiérrez Nájera, Manuel (b. Dec. 22, 1859, Mexico City, Mex.—d. Feb. 3, 1895, Mexico City), Mexican poet and prose writer whose musical, elegant, and melancholy poetry and restrained rhythmic prose sketches and tales mark the transition in Mexican literature between Romanticism and Modernism. His active support of the fledgling Modernist movement, which attempted to revitalize and modernize Spanish poetic language, gave encouragement to a generation of younger writers in Mexico.

Gutiérrez Nájera received his early education at home from his mother and later studied French and Latin, reading widely and becoming strongly influenced by the French poets Alfred de Musset, Théophile Gautier, and Paul Verlaine. His first article appeared in the newspaper *La Iberia* when he was 13, and until his death he wrote several a week. In 1894 he founded the *Revista azul* ("Blue Review"), a literary journal that became Mexico's first forum for Modernist poetry and published young writers who were later to have a significant influence on the course of Mexican poetry. Recognized as more of an influence on literary trends than as a major poet in his own right, he is still admired for his *crónicas,* a genre of short story that he created. His life was cut short by alcoholism.

Gutiérrez Solana, José (b. 1886, Madrid, Spain—d. June 26, 1947, Madrid), painter and writer, a key figure in the Spanish cultural revival of the early 20th century. Though he never achieved great international renown, he was, at his death, perhaps the most famous painter in Spain.

The descendant of an old but impoverished family of Santander, he attended art school in Madrid for a short period, but he was primarily self-taught. He spent his days in the slums and suburbs of Madrid and in the Cantabrian harbours, studying and identifying himself with the most wretched aspects of Spanish life. These journeys were the basis for his gloomy and corrosive literary works, the two volumes of *Scenes and Customs of Madrid* (1912, 1918), and for his intense and dramatic paintings. He first exhibited in 1907 and won medals in 1922, 1929, and 1942. A man respected by his country, he led an isolated life in Madrid, despite his honours.

Influenced by the Spanish masters, especially Goya, he painted tragic scenes of urban life, scenes of grief and horror depicted in sombre earth tones and blood reds. He painted in thick pigments, charging his subjects with a garish energy; his subjects include bulls, urban landscapes, and, in two famous paintings, prostitutes in "Claudia's Place" and literary life in "La tertulia de Pombo" (a *tertulia* is an informal conversational gathering, often held in a cafe or restaurant). His influence survives in the school of Madrid.

Gutoku Shinran (Buddhist reformer): *see* Shinran.

Guto'r Glyn (fl. *c.* 1440–93), Welsh bard whose works were among the first to show a consciousness of nationhood among the people of Wales. *Gwaith Guto'r Glyn* ("The Works of Guto'r Glyn," first published in 1939) was collected by J.Ll. Williams and edited by Sir Ifor Williams. Guto'r Glyn lived at Glynceiriog and Valle Crucis, Denbighshire (now in the county of Clwyd).

gutta balata (gum): *see* balata.

gutta-percha, yellowish or brownish leathery material derived from the latex of certain trees in Malaysia, the South Pacific, and South America, especially *Palaquium oblongifolia* and, formerly, *P. gutta.* To obtain the latex, the tree may be felled and rings cut in the bark; in plantation cultivation the fresh leaves are gathered, chopped, and crushed. The mass is boiled in water and the gum removed and pressed into blocks.

On heating, gutta-percha becomes plastic and is very resistant to water. It has been widely used as insulation for underwater electrical equipment and cables, in the manufacture of golf balls, and in chewing gum. In the second half of the 20th century it steadily lost ground to synthetics.

Gutta-percha closely resembles balata, obtained from *Bumelia retusa,* and chicle.

Gutzkow, Karl (Ferdinand) (b. March 17, 1811, Berlin, Prussia [Germany]—d. Dec. 16, 1878, Sachsenhausen, Frankfurt am Main), novelist and dramatist who was a pioneer of the modern social novel in Germany.

Gutzkow began his career as a journalist and first attracted attention with the publication of *Maha Guru, Geschichte eines Gottes* (1833; "Maha Guru, Story of a God"), a fantastic satirical romance. In 1835 he published *Wally, die Zweiflerin* ("Wally, the Doubter"), an attack on marriage, coloured by religious skepticism, that marked the beginning of the revolt of the Young Germany (*q.v.*) movement against Romanticism. The book excited virulent discussion, and the federal Diet condemned Gutzkow to three months' imprisonment and ordered the suppression of all his works. After his release he produced the tragedy *Richard Savage* (1839), the first in a series of well-constructed and effective plays. His domestic tragedy *Werner oder Herz und Welt* (1840; "Werner or Heart and World") long remained in the repertory of the German theatres. Gutzkow also wrote *Das Urbild des Tartüffe* (1844; "The Model for Tartuffe"), a clever and topical satirical comedy; and *Uriel Acosta* (1846), which uses the story of the martyrdom of that forerunner of Spinoza to make a plea for religious freedom. By this time he had published the novel *Blasedow*

Gutzkow
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

und seine Söhne (1838; "Blasedow and His Sons"), a humorous satire on the educational theories of the time.

In 1847 Gutzkow went to Dresden, where he succeeded the Romantic writer and drama theorist Ludwig Tieck as literary adviser to the court theatre. In 1850 there appeared the first of the nine volumes of *Die Ritter vom Geiste* ("The Knights of the Spirit"), now considered the starting point of the modern German social novel; it also anticipated the Naturalist movement.

His final well-known work, *Der Zauberer von Rom* (1858–61; "The Magician of Rome"), is a powerful study of Roman Catholic life in southern Germany.

guwen (script): *see* ku-wen.

Guy (personal name): *see under* Guido, except as below.

Guy, name of rulers grouped below by country and indicated by the symbol •.

Foreign-language equivalents:

Dutch	Gwijde
French	Gui, or Guy
German	Wido
Italian	Guido

Flanders

• **Guy,** also called GUY OF DAMPIERRE, French GUI DE DAMPIERRE, Dutch GWIJDE VAN DAMPIERRE (b. *c.* 1225—d. March 7, 1305, Compiègne, Fr.), count of Flanders (from 1278) and margrave of Namur (Namen). He was the son of Margaret, countess of Flanders and Hainaut.

The government of Guy of Dampierre was unfortunate. It was the interest of the Flemish weavers to be on good terms with England, the wool-producing country, and Guy entered into an alliance with the English king Edward I against France. This led to the invasion and conquest of Flanders by the French king Philip IV the Fair in 1300. Guy with his sons and the leading Flemish nobles were taken prisoners to Paris, and Flanders was ruled as a French dependency. The Flemish rose in rebellion, however; a French garrison at Bruges was massacred on May 19, 1302, and on the following July 11 a French army of invasion was defeated near Courtrai. The aged Guy died in captivity before the French recognized the independence of Flanders in the Treaty of Athis-sur-Orge (1305).

Germany/Holy Roman Empire

• **Guy:** *see* Guy II (Spoleto).

Jerusalem

• **Guy,** byname GUY OF LUSIGNAN, French GUI, or GUY, DE LUSIGNAN (b. *c.* 1129—d. 1194), king of Jerusalem who lost that crusader kingdom in wars against the Muslims.

In 1180 he married Sibyl, sister of the leprous Baldwin IV, king of Jerusalem. When Baldwin died in 1185, Sibyl's son by a previous marriage, the six-year-old Baldwin V, inherited the crown. But the child died in 1186, possibly poisoned by Guy. Sibyl then became queen and, announcing her intention to choose the most worthy noble to be her husband and king, divorced Guy, only to choose him again as king and husband.

War broke out with Saladin (1137–93), sultan of Egypt and Syria, and, when the city of Tiberiade fell in 1187, Guy resolved to deliver it. His troops were defeated at Ḥaṭṭīn (near Tiberiade) by Saladin's superior forces. Guy himself was captured, along with many other nobles, but was released when he ceded the town of Ascalon (Ashkelon), a port in Palestine. Jerusalem fell to Saladin on Oct. 2, 1187, ending the kingdom founded by Godfrey of Bouillon during the First Crusade (1096–99).

The fall of Jerusalem provoked a new crusade from Europe (the Third Crusade, 1189–92). While awaiting this aid, Guy, despite a vow not to war against Saladin, besieged Saint-Jean-d'Acre (Akko), though unsuccessfully. After Sibyl died in 1190, Guy and Conrad de Montferrat, husband of Sibyl's sister Isabella, fought over the now empty throne. In 1192 Guy ceded the title to the English king Richard I the Lion-Heart in exchange for sovereignty over the island of Cyprus.

Spoleto

• **Guy II,** byname GUY OF SPOLETO, Italian GUIDO DI SPOLETO, French GUI DE SPOLÈTE (d. 894), duke of Spoleto, who was claimant to the throne of the Holy Roman Empire in the chaotic end of the Carolingian era.

The son of Guy I, duke of Spoleto, he failed in his bid for the throne of the West Franks in 888, despite the support of Archbishop Fulk of Reims. He was successful, however, in defeating Berengar, king of Italy (889), and in forcing the pope to crown him Holy Roman emperor in 891. He is usually not counted in the lists of emperors.

Guy DE CHAULIAC (medieval surgeon): *see* Chauliac, Guy de.

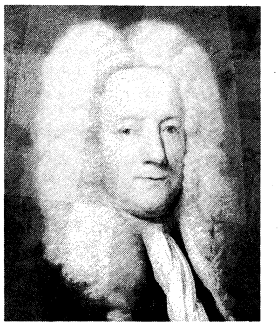
Guy OF BURGUNDY (pope): *see* Calixtus II.

Guy OF WARWICK, English hero of romance whose story was popular in France and England from the 13th to the 17th century and was told in English broadside ballads as late as the 19th century. The kernel of the story is a single combat in which Guy defeats Colbrand (a champion of the invading Danish kings Anlaf and Gonelaph), thereby delivering Winchester from Danish dominion. The Anlaf of the story is probably the Norwegian king Olaf I Tryggvason, who, with Sven Forkbeard of Denmark, harried the southern counties of England in 993 and pitched his winter quarters at Southampton. Although the romance of Guy perhaps was inspired by some historical incident, Winchester was not in fact saved by the valour of an English champion but by the payment of money.

The earliest French version of the tale probably dates from the 12th century; 13th-century versions survive in French and Anglo-Norman manuscripts. Four versions survive in English, as translations from the French or Anglo-Norman, the two earliest dating from about 1300. One of these has an appended sequel concerning Guy's son Reinbrun.

The strong religious interest of the legend as it survives makes it likely that it had passed through monastic hands. The romance is not distinguished by unity of structure or by grace of style and probably owed its popularity to its combined secular and religious elements, furthered in England by its patriotic appeal.

Guy, Thomas (b. 1644/45, Southwark, London—d. Dec. 27, 1724, London), founder of Guy's Hospital, London, said to be the last general hospital endowed in full by one person.



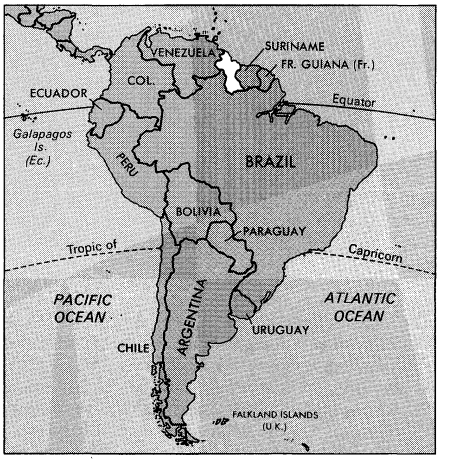
Thomas Guy, detail of an oil painting by John Vanderbank, 1706

By courtesy of the Special Trustees of Guy's Hospital

A bookseller from 1668, dealing largely in Bibles, Guy ultimately amassed a fortune from printing and investments. In 1704 he became a director of St. Thomas's Hospital, Southwark, and he paid for the construction (1707) of three new wards. In the 1720s, finding St. Thomas's still overcrowded, he built Guy's Hospital across the street. He was member of Parliament for Tamworth from 1695 to 1707; he also was chosen sheriff of London but declined to serve.

Guyana, officially CO-OPERATIVE REPUBLIC OF GUYANA, formerly (until 1966) BRITISH GUIANA, republic of northeastern South America, covering an area of 83,000 square miles (215,000 square km). The capital is Georgetown. Guyana's maximum length from north to south is about 500 miles (800 km), and its maximum width from east to west is about 285 miles (460 km). It is bordered by the Atlantic Ocean on the north, Suriname on the east, Brazil on the south and southwest, and Venezuela on the west. Unresolved border disputes remained with Venezuela and Suriname in the late 20th century. The 1990 population was estimated at 765,000.

A brief treatment of Guyana follows. For full treatment, *see* MACROPAEDIA: Guyana.



Guyana

For current history and for statistics on society and economy, *see* BRITANNICA WORLD DATA ANNUAL.

The land. A narrow Atlantic coastal plain extends up to 10 miles (16 km) inland and includes much reclaimed land that is protected by a network of sea walls and drainage canals. The tropical forest zone begins some 40 miles (64 km) inland and covers more than 80 percent of the country. A hilly white-sands (zanderij) region lies south of the coastal plain within the forest zone and supports a dense hardwood forest. The Pacaraima Mountains in the western part of the forest zone separate Guyana from the Orinoco River watershed to the west and provide headwaters for the Mazaruni and Essequibo rivers. Savannas, including the extensive Rupununi Savanna in the far south, cover about one-tenth of the country. Guyana's four main rivers—the Courantyne, Berbice, Essequibo, and Demerara—all flow from the south and empty into the Atlantic. Their southerly upland reaches have numerous rapids and waterfalls.

The average annual temperature is 80° F (26.6° C), and rainfall occurs during two wet seasons along the coast and one in the southwest, ranging from 90 inches (2,290 mm) along the coast to 70 inches (1,780 mm) far inland, annually. Native wildlife is varied and abundant and includes the great anteater, capybara, tapir, giant otter, sloth, jaguar, and North American manatee.

Guyana's most important mineral resource consists of one of the world's largest deposits of bauxite. Other important minerals are manganese, diamond, gold, copper, iron ore, molybdenum, and nickel.

The people. Guyana's population is about half East Indian in ethnic makeup, with a large black (Afro-Guyanese) minority, some mulattoes and creoles, and smaller groups of indigenous Indians (Amerindians), Chinese, Portuguese, and Lebanese. The official language is English, but a creole patois is spoken, and there are small communities of Hindi and Urdu-speakers. More than half of the people are Christians, one-third are Hindus, and nearly one-tenth are Muslims. The population, concentrated principally along the Atlantic coast and around Georgetown, is predominantly rural. Demographic rates are typical of a developing country, and the population growth rate is moderate.

The economy. Guyana has a developing market economy in which both the private and public sectors participate; the latter remains heavily dominant. The production of bauxite and alumina and of agricultural products such as sugar and rice are the largest sectors of the economy. During the 1980s the gross national product (GNP) had a negative real growth rate, and the GNP per capita was the lowest in South America.

Agriculture accounts for about one-fourth of the GNP and employs about one-fifth of the work force. Arable land, concentrated in the narrow Atlantic coastal plain, is laid out in strips between the sea or a river and inland swamps; these strips of farmland are protected on all sides by dikes and canals. Subsistence farming is in decline but centres on cassava, corn (maize), bananas, citrus fruits, and vegetables. The principal cash crops include sugarcane, rice, coffee, and cocoa. Pastures along the coast and in the Rupununi Savanna support mainly cattle, pigs, chickens, and sheep. Most of the annual fish catch comes from the Atlantic Ocean and consists largely of shrimp and prawns.

Guyana's tropical rain forests contain valuable commercial hardwood species, in particular the greenheart tree, which are cut into saw logs and veneer logs used for heavy construction work and furniture. Some timber is exported.

Mineral industries are a major source of foreign exchange and are dominated by bauxite production (nationalized in the 1970s) and export. Light small-scale manufacturing accounts for only about one-tenth of the GNP and employs one-eighth of the work force. Capital and consumer goods largely must be imported. Electricity is generated almost entirely from imported fuels. Most of the country's roads are unpaved, and Guyana's limited miles of railway are operated by the government for the mining industry.

The balance of trade is unfavourable, with exports covering only about three-quarters of imports. Fuel leads imports and bauxite leads exports. The principal trading partners are the United States, the United Kingdom, and Trinidad and Tobago.

Government and social conditions. Guyana's 1980 constitution provides for a president as chief of state and a unicameral National Assembly with 53 members elected by universal adult suffrage, 10 by regional councils, and 2 by the National Congress of Local Democratic Organs. Cabinet members are appointed by the president and include a prime minister chosen from the National Assembly. The principal political party is the People's National Congress (PNC); others include the People's Progressive Party (PPP), the United Force, and the Working People's Alliance (founded in 1979).

Guyana's generally good health conditions declined after independence in 1966. The most prevalent diseases are malaria, beriberi, influenza, and measles. Life expectancy is 67 years for men and 71 for women. Infant mortality is rather high.

Education is free and compulsory for all children between the ages of 6 and 14, and most eligible children attend school. The University of Guyana, founded in 1963, is at Georgetown. Guyana's news media are completely controlled by the government.

Cultural life. Guyana's coastal population has evolved distinctive black, East Indian, and creole cultures featuring colourful dress and music and dance. Hindu and Muslim religious feasts are observed, and splendid, colourful, and intricate costumes are created and special songs and dances composed for the famous pre-Lenten Carnival. Amerindian culture is also evident.

Tension among the black and East Indian communities is mirrored in hostility between the largely East Indian PPP and the largely creole–black PNC. In the late 20th century a black, East Indian, and mulatto middle class began to emerge.

History. American Indians inhabited Guyana prior to European settlement, but little is known of these indigenous peoples except that their name for the land, *guiana* ("land of waters"), has given the country its present name. By the early 17th century Dutch settlements dominated the territory, but during the Napoleonic Wars the British occupied the Dutch colonies, afterward purchasing Demerara, Berbice, and Essequibo. The slave trade was abolished in 1807 when about 100,000 slaves were already there, but emancipation was not complete until 1838. In 1831 the three colonies were united as British Guiana.

Starting in the 1840s, East Indian and Chinese indentured servants were brought to work the plantations, as the freed slaves bought their own land and refused to labour on the sugar estates. By 1917 almost 240,000 East Indians had migrated to British Guiana.

British Guiana was made a crown colony in 1928, and in 1953 it was granted a constitution adopting parliamentary home rule, universal adult suffrage, and an elected legislature. Political parties began to emerge, developing as the largely East Indian People's Progressive Party and the largely black People's National Congress. The PNC formed a coalition government and led the country into independence as Guyana in 1966. In 1970 Guyana became a republic within the Commonwealth. Raymond Arthur Chung was elected the first president, and Forbes Burnham became prime minister. Throughout the 1970s Guyana's political life and government was dominated by Burnham and the PNC. The primary opposition came from Cheddi Jagan and the PPP. After a three-year boycott of parliament by the PPP in protest against growing one-party rule by the PNC, Burnham promulgated a new constitution in 1980 and subsequently held an election, which most of the parties boycotted. The PNC was victorious, but Jagan and others, corroborated by international observers, charged Burnham, who had become executive president, with electoral fraud. Burnham died in 1985 and was succeeded as president by Hugh Desmond Hoyte. In the late 1980s Hoyte moved to allow greater foreign investment in the country as a means of buffering the economy, which had seriously deteriorated during the 1980s.

Guyenne, also spelled GUIENNE, former region of southwestern France, merged with Gascony for the last centuries before the French Revolution in the *gouvernement* of Guyenne and Gascony (Guyenne-et-Gascogne). The Guyenne region corresponds to the modern *département* of Gironde and to most of the *départements* of Lot-et-Garonne, Dordogne, Lot, and Aveyron. The region was under English control during much of the later Middle Ages.

From Roman times until the Middle Ages, the region of Guyenne was simply part of the region of Aquitaine (*q.v.*), of which the name Guyenne is a corruption. Historically, the name Guyenne first became important through the Treaty of Paris (1259) between Louis IX of France and Henry III of England. By this treaty, Louis IX accepted Henry III as his vassal for Guyenne and also for Gascony, which the English had held previously. (England had received both Aquitaine and Gascony in the 12th century through Henry II's marriage to Eleanor of Aquitaine.) Guyenne was retaken by the French at the beginning of the Hundred Years' War, but the Treaty of Brétigny in 1360 restored it, with the whole of the old Aquitaine, to the English. In the later phases of the Hundred Years' War, France reconquered all these areas. The last attempt by the English to retake the territory was repulsed at the Battle of Castillon (1453).

The *gouvernement* of Guyenne and Gascony in 1789

Louis XI gave the duchy of Guyenne to his brother Charles de France, duke de Berry, in 1469, but, after the latter's death in 1472, it was reunited to the French crown. During the religious wars in the 16th century and during the Fronde in the 17th, Guyenne was the scene of bitter fighting.

Guymon, city, seat (1907) of Texas county, northwestern Oklahoma, U.S. It lies on the high plains of the Panhandle, near the North Canadian River. Originally called Sanford, it was founded by E.T. Guymon in 1901 on the arrival of the Rock Island Railroad. The city is a trading centre for an irrigated agricultural and gas and oil region centred in the huge Guymon–Hugoton gas field. There are pipeline facilities and helium and gas extraction plants in the area. The city's Texas County Feed Yard has a capacity for 18,000 head of cattle, and there are livestock auctions and meat-packing activities. Oklahoma Panhandle State University (1909) is at Goodwell, 10 miles (16 km) southwest. Inc. town, 1905; city, 1923. Pop. (1986 est.) 8,860.

Guynemer, Georges-Marie (b. Dec. 24, 1894, Paris—d. Sept. 11, 1917, near Poelcapelle, Belg.), one of the most renowned combat pilots of World War I and France's first great fighter ace.

He was educated at the Lycée Stanislas and developed an early interest in aeronautics. Nevertheless, on the outbreak of World War I he tried unsuccessfully to join first the infantry and then the cavalry. Finally, he enlisted in the air service as a student mechanic. Later he was accepted as a pilot trainee (making his first flight on Feb. 17, 1915), and, after he received his pilot's certificate, he joined the M.S.3 Squadron (Les Cigognes, meaning "the storks") as a corporal pilot. He remained with

this squadron for the rest of his short life, flying successively Morane-Saulnier two-seaters, Nieuport single-seaters, and Spad fighters. Al-

Guynemer
H. Roger-Viollet

though a frail youth suffering from tuberculosis, he was credited with 53 air victories and was shot down 8 times before his death in combat in 1917.

Guyon, Jeanne-Marie Bouvier de La Motte, MADAME DU CHESNOY, *née* BOUVIER DE LA MOTTE, byname MADAME GUYON (b. April 13, 1648, Montargis, Fr.—d. June 9, 1717, Blois), French mystic and writer, a central figure in the theological debates of 17th-century France through her advocacy of quietism, an extreme passivity and indifference of the soul, even to eternal salvation, wherein she believed that one became an agent of God.

At 16 she married Jacques Guyon, lord du Chesnoy, and began to raise a family, but, at the death of her husband in 1676, she turned completely toward the mystical experiences she had long felt. Led through a long cycle of personal religious developments by Barnabite Friar François Lacombe, she left her children and began travels with Lacombe to Geneva, Turin, and Grenoble (1681–86). Regularly, the heretical nature of her teachings—which tended to exclude the external world and the mechanisms of the church—aroused the suspicions of local bishops, and she was forced to move on. During this period she published the most important of her many writings: the *Moyen court et très facile de faire oraison* (1685; "The Short and Very Easy Method of Prayer"). In 1687 Lacombe was put in prison, where he died, and Guyon was arrested in 1688 but was released after a few months at the intervention of Madame de Maintenon, second wife of Louis XIV, who introduced her to the royal circle.

After her release, Guyon attracted her greatest disciple, the influential Abbé de Fénelon (1651–1715), who found in her teachings the answers to some of his own spiritual dilemmas. By 1694 Fénelon's writings, coloured by quietism, had generated a great alarm; and, in the midst of complicated political and religious maneuvers, a conference met at Issy (1695), at which Fénelon defended Guyon's teachings. Quietism, however, was officially condemned by the Roman Catholic church, Guyon was arrested and imprisoned, and Fénelon continued the pamphlet war. After her release from prison (1703), Guyon lived and wrote quietly at Blois.

Her writings were published from 1712 to 1720 (45 vol., reprinted 1767–90).

guyot, also called TABLEMOUNT, isolated submarine volcanic mountain with a flat summit more than 200 m (660 feet) below sea level. Such flat tops may have diameters greater than 10 km (6 miles). (The term derives from the Swiss-American geologist Arnold Henry Guyot.)

In the Pacific Ocean, where guyots are most abundant, most summits lie 1,000 to 2,000 m (3,300 to 6,600 feet) below sea level. Their sides, like those of other submarine volcanoes and volcanic islands, are slightly concave, rising gently from the surrounding deep-sea floor and steepening to about 20° at their summits.

Fossil corals with a maximum depth tolerance of only 150 m (500 feet), along with rounded volcanic cobbles and boulders, have been dredged from the tops of guyots. These data indicate that guyots originate as volcanic islands at the shallow crests of mid-oceanic ridges and rises. During and immediately after their formation, the islands are truncated by wave erosion. According to the generally accepted theory of seafloor spreading, the seafloor migrates laterally away from the ridge or rise crests at rates of several centimetres per year. As the seafloor is propagated away from the crests, it also sinks; thus, guyots become more deeply submerged with time.

Guyot, Arnold Henry (b. Sept. 28, 1807, Boudevilliers, near Neuchâtel, Switz.—d. Feb. 8, 1884, Princeton, N.J., U.S.), Swiss-born American geologist, geographer, and educator whose extensive meteorological observations led to the founding of the U.S. Weather Bureau. The guyot, a flat-topped volcanic peak rising from the ocean floor, is named after him.

He studied at the College of Neuchâtel and in Germany, taught at Paris from 1835 to 1840, and became professor of history and physical geography at the Neuchâtel Academy in 1839. In 1838, under the influence of the famed naturalist-geologist Louis Agassiz, he took up the study of the structure and motion of glaciers.

In 1848 Guyot settled in Cambridge, Mass., and until 1854 lectured on geography and teaching methods for the Massachusetts Board of Education. He wrote a series of geography textbooks that served as models of the kind used in American schools for many years. In 1854 he became professor of geology and physical geography at Princeton University. Guyot developed topographical maps of the Appalachian and Catskill mountains. His published works include *The Earth and Man* (Eng. trans., 1849); *Creation, or the Biblical Cosmogony in the Light of Modern Science* (1884); and *Tables, Meteorological and Physical* (4th ed., 1887).

Guyton de Morveau, Louis Bernard (b. Jan. 4, 1737, Dijon, Fr.—d. Jan. 2, 1816, Paris), French chemist, educator, and aeronaut whose proposals for a revised chemical nomenclature helped establish the distinction between elements and compounds.

Guyton studied law at Dijon, practiced there from 1756 to 1762, and was an advocate-general in the provincial *parlement* of Burgundy from 1762 to 1782. In the latter year he retired to devote himself full time to chemistry, a field he had become interested in during the 1760s. In the 1780s he published several works, including *Méthode de nomenclature chimique* (1787; "Method of Chemical Nomenclature"), in which he tried to reform the existing system of naming chemicals. At that time chemicals were hardly ever named according to their constituents but rather according to their origins, their appearance, the name of their discoverer, or other arbitrary qualities. Guyton proposed instead that the simplest chemical substances (*i.e.,* elements) should be given the simplest names, and that the names of compounds should recall their chemical components. His suggestions were widely adopted throughout Europe.

Guyton was one of the first to conclude that iron and steel differ solely in their carbon content. He also made improvements in the manufacture of gunpowder, and he was the first to use chlorine and hydrochloric acid gas as disinfectants. He was also one of the earliest balloonists, making two flights in 1784. He helped organize the world's first air force—Revolutionary France's Compagnie d'Aérostiers, whose reconnaissance balloonists helped the French forces win several battles in the 1790s.

Güyük, also spelled KÜYÜK (b. 1206, Mongolia—d. 1248, Mongolia), grandson of Genghis Khan and eldest son and successor of Ögödei, the first *khagan,* or great khan, of the Mongols.

Güyük was elected to the throne in 1246, partly through the maneuvering of his mother. He was strongly influenced by Nestorianism, a form of Christianity considered a heresy by Western Christians, and he favoured Christian advisers. His election to the throne embittered the conqueror of Russia, Batu (d. *c.* 1255), also a grandson of Genghis. Güyük's early death, however, prevented the dispute from tearing the Mongol Empire completely asunder.

Guzmán, Alonso Pérez de: *see* Medina-Sidonia, Alonso Pérez de Guzmán, duque de.

Guzmán, Jacobo Arbenz: *see* Arbenz (Guzmán), Jacobo.

Guzmán, Martín Luis (b. Oct. 6, 1887, Chihuahua, Mex.—d. Dec. 22, 1976, Mexico City), novelist who was one of the finest writers of the Revolutionary period in Mexico.

After studying law at the National Autonomous University of Mexico in Mexico City, Guzmán joined the Mexican Revolution and served as a colonel in the revolutionary forces of Pancho Villa. From 1914 to 1934, he lived in exile in Madrid and New York City, where he was editor of the periodical *El gráfico* ("The Graphic"). His experiences in the revolution were recorded in his volume of memoirs, *El águila y la serpiente* (1928; *The Eagle and the Serpent*), which is admired for its insights into the personalities of those who shaped the revolution. He is also famous for his novel *La sombra del caudillo* (1929; "The Shadow of the Leader"), in which he depicted the political corruption of the 1920s in Mexico. His other major works include *Memorias de Pancho Villa* (1940; *Memoirs of Pancho Villa*), *Mina el mozo, héroe de Navarra* (1932; "Mina the Youth, Hero of Navarre"), *Muertes históricas* (1958; "Historical Deaths"), and *Crónicas de mi destierro* (1963; "Chronicles of My Exile").

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Guzmán Blanco, Antonio (b. Feb. 28, 1829, Caracas, Venez.—d. July 20, 1899, Paris), Venezuelan president and typical Latin-American caudillo (military dictator) of his era.

Guzmán Blanco was the son of a famous journalist and politician, Antonio Leocadio Guzmán, who had married into the Blanco family of Caracas' upper class. He began his career by consolidating the support of provincial caudillos behind his leadership, increasing his power when he gained appointment as a special finance commissioner to negotiate loans with London bankers. In 1870 he seized control of the government as head of the Regeneración (Regeneration) movement, and in 1873 he had himself elected constitutional president. For a period of 19 years (1870–89) he was the absolute ruler of Venezuela.

Guzmán Blanco brought Venezuela out of civil war and economic stagnation and put it on the road to orderly government and modern development. Public buildings, railroads, and schools were constructed, and Caracas was modernized to function as the centre of the new network of telegraph, ports, and roads. The dictator sponsored public education, restored public credit, subsidized agriculture, promoted international trade, and laid the

groundwork for an era of significant technological advance. His most strenuous efforts, however, were directed against the Roman Catholic church: birth, education, and marriage were placed under civil supervision; religious communities were suppressed and their property confiscated; and religious freedom for non-Catholics was proclaimed.

But Guzmán Blanco committed many brutalities during his dictatorship in order to eliminate opposition. Civil liberties were curbed, and the press was gagged. Little was done to improve the lot of the Venezuelan masses. Moreover, the dictator accumulated a personal fortune at public expense, profiting especially through the negotiation of loans with foreign bankers. He spent a great deal of his reign in Europe, enjoying the company of the upper classes. During one such visit a coup d'état ousted him from power (1889), and he spent the last decade of his life in Paris.

Guzmán Fernández, (Silvestre) Antonio (b. Feb. 12, 1911, La Vega, Dominican Republic—d. July 4, 1982, Santo Domingo, Dominican Republic), the president of the Dominican Republic from May 1978 to July 1982.

At the age of 15, Guzmán was working in his family's textile store. By age 17 he was already managing stores for the Curaçao Trading Company. He invested in land and started growing rice, soon expanding into other agricultural exports. Guzmán was a wealthy cattle rancher by 1940. After the death of Rafael Trujillo, dictator of the Dominican Republic, Guzmán joined the left-of-centre Dominican Revolutionary Party (PRD).

When Juan Bosch, founder of the party, was elected president in December 1962, Guzmán was made secretary of agriculture, serving until Bosch was deposed in September 1963. In 1966 Guzmán was the unsuccessful candidate for vice president as the running mate of Juan Bosch. The PRD boycotted subsequent elections, but by the elections of 1978, the PRD and Bosch were heading for a final rift. Bosch still preferred to boycott the elections, but most members of the PRD wished to rejoin the political process. Bosch left the PRD to form a new party, and the PRD chose Guzmán as its candidate.

As candidate of the PRD, Guzmán promised to cut back the expensive urban public-works program of the current president, Joaquín Balaguer. In the election of May 1978 Balaguer's supporters in the military ordered the counting of the election vote halted when it appeared that Guzmán was winning. Warnings issued by President Jimmy Carter made it clear that the United States would oppose a coup in favour of Balaguer. The point was reinforced when Carter sent a high-level civilian and military delegation to attend Guzmán's inauguration. Having inherited a $1,800,000,000 debt, Guzmán installed a cabinet of technocrats in order to deal with the Dominican Republic's severe economic problems, which were aggravated by the collapse of world sugar prices. The administration's aggressive agricultural policy was successful in its first year when, for the first time in its history, the country became self-sufficient in two important staple crops, rice and beans. Guzmán also undertook an ambitious program of rural school and health-centre construction and adopted measures to repair the nation's crumbling road system.

In 1981 Guzmán became the first elected president since the country's founding to declare he wouldn't run for reelection. Although his candidate of choice did not get the party's nomination, the PRD's candidate won the peaceful May 1982 presidential election. Before the inauguration, Guzmán was found shot to death. He apparently committed suicide, although officially his death was called accidental.

After nearly half a century of ruthless dictatorship, foreign intervention, and repressive oligarchy, Guzmán can be given the credit for having moved the military out of politics in the Dominican Republic. He had inherited a turbulent political and economic situation and left a stable economy and democratic institutions guaranteeing civil liberties.

Guzmán y Pimental, Gaspar (Spanish prime minister): *see* Olivares, Gaspar de Guzmán y Pimental, conde-duque de.

Guzmania, genus of about 85 species of tropical American and West Indian epiphytes

Guzmania, growing on a jungle tree
W.H. Hodge

(plants that are supported by other plants and have aerial roots exposed to the humid atmosphere) and terrestrial plants of the pineapple family (Bromeliaceae). Several species are grown indoors for their handsome foliage and flowers.

Guzmania leaves are stiff, often stemless or short-stemmed, and grow in a rosette. The yellow or white flowers grow on stalks in clusters that often have showy bracts (leaflike appendages beneath the flowers).

Gvozdena Vrata (Europe): *see* Iron Gate.

Gvozdeva, Ostrova (U.S.–U.S.S.R.): *see* Diomede Islands.

Gwādar, town and seaport, Baluchistan province, southwestern Pakistan. Located on the sandy Nūh headland that juts southward into the Arabian Sea, the town is an important fishing (sardines and sharks) and trade centre. The main industrial concern is a fish-processing factory; salt is obtained by the evaporation of seawater. Gwādar became part of the sultanate of Muscat and Oman in 1797, and it was not until 1958 that the town and adjoining hinterland were given up by Oman to Pakistan.

The adjacent hinterland to the north is drained by several small rivers, including the Dasht River. Jowar (sorghum), wheat, barley, dates, and livestock are raised. Roads connect Gwādar town with Pasni to the east and with Turbat to the northeast. Pop. (1981 prelim.) town, 17,000.

Gwādar Bay, Persian KHALĪJ-E GAVĀTER, inlet of the Arabian Sea indenting the sandy Makran coast at the Iran–Pakistan border. It is about 20 miles (32 km) long and 10 miles (16 km) wide. The Dashtiārī River flows into it from the northwest, and the Dasht from the northeast. The town of Gwādar, Pak., lies on the Arabian Sea coast about 30 miles (48 km) to the east of Gwādar Bay.

Gwalchmai AP MEILYR (fl. *c.* 1140–80), one of the earliest Welsh court poets (*gogynfardd*) at the court of Owain Gwynedd at Aberffraw, Anglesey. His extant poems include traditional eulogies to the Welsh princes Owain Gwynedd and Madog ap Maredudd and a "boasting poem," *Gorhoffedd,* celebrating his prowess in war and with women. The son of Meilyr, the earliest of the court poets, Gwalchmai had at least two sons who were also bards, Einion and Meilyr.

Gwalior, city, northern Madhya Pradesh state, central India. Gwalior municipality comprises the urban areas of old Gwalior, Lashkar, and Morār and is the fourth largest city in Madhya Pradesh. Gwalior is on a major national highway and is a railway junction. It was constituted a municipality in 1887.

The old city of Gwalior centres on a walled fortress, one of the most famous in India, that is situated atop a cliffed plateau nearly 2 miles (3 km) long that rises a sheer 300 feet (90 m) from the plain. The fort was first mentioned in a temple inscription of about AD 525. Of strategic importance in guarding the main route from the plains of northern India, it was in the hands of Hindu rulers until 1232 and then changed hands several times between Muslim and Hindu rulers until 1751; thereafter it remained a Marāṭhā stronghold, although it was captured by the British in 1780, 1843, and 1858. It was evacuated by the British in 1886 in exchange for the imposition of British rule over the city of Jhānsi. The fortress contains eight tanks (reservoirs), six palaces, six temples, a mosque, and several other buildings. The Teli-kā-Mandir (11th century), the Gūjari Mahal (*c.* 1500), and the surviving atrium of the Great Sās-Bahū Temple (1093) are outstanding examples of Hindu architecture within the fort. Just below the

Atrium of the Great Sās-Bahū Temple at Gwalior, Madhya Pradesh, India; the Small Sās-Bahū Temple is to the left
Milt and Joan Mann—CAMERAMANN INTERNATIONAL

fort's walls are 15th-century rock-cut Jaina statues that are nearly 60 feet (18 m) high.

Four miles (6 km) south of the fortress lies the city of Lashkar; founded in 1810 as a military camp, it later served as capital of the princely state of Gwalior. The city of Lashkar contains many palaces and the cenotaph of the rani of Jhānsi. Nearby at Anti stands the tomb of the Mughal scholar Abū-ul-Fazl 'Allāmī.

Other places of interest in Gwalior include a zoological garden, several museums, a central technical institute, and an industrial-research laboratory. Gwalior is the seat of Jiwaji University (founded 1964) with several affiliated colleges in the city, including science, medical, and education schools. Nearby is the 16th-century tomb of the Indian singer Tānsēn, and the city is still a music centre, with its own distinctive style and tradition.

Gwalior is an important commercial and industrial centre that is heavily engaged in the distribution of agricultural produce, cloth fabrics, building stone, and iron ore. The city's major industries include the manufacture of footwear, pottery, biscuits (cookies), cigarettes, textiles, carpets, plastics, rayon, glass, and matches; cotton, flour, sugar, and oilseed milling; and stone carving.

The area in which Gwalior is situated was previously the core of the former Gwalior princely state. This state was once the domain of the Sindhia family (*q.v.*), a Marāṭhā dynasty that controlled much of northwestern India during the second half of the 18th century. The foundations of the Gwalior state were laid by Ranoji Sindhia in about 1745, and the state reached its greatest extent under Sindhia Mahādāji (reigned 1761–94). Mahādāji was the ruler of a vast territory that included parts of central India and Hindustan proper, while his officers exacted tribute from the principal Rajput rulers, including those of Jaipur and Jodhpur. Under Mahādāji's grandnephew, Daulat Rao, the Gwalior state lost considerable territory to the British in 1803 and 1818 after losing wars to them. The state came completely under British domination in the 1840s. In the Indian Mutiny of 1857, the Sindhia ruler of Gwalior remained loyal to the British, but his army joined the mutineers and temporarily occupied Gwalior city before being defeated.

The princely state of Gwalior was absorbed by independent India in 1948. At the time of its incorporation, it had an area of about 26,000 square miles (68,000 square km) and comprised almost all of what is now northern Madhya Pradesh; the Gwalior state extended from the Chambal River southward to the Vindhya mountain range. The area was merged with Madhya Pradesh in 1956. It is made up chiefly of a rich alluvial plain, irrigated by canal networks from the Harsi, Tigra, and Kaketo dams. Wheat, sorghum, rice, and pulses are the chief crops; sandstone is quarried. Pop. (1981) city, 539,015; metropolitan area, 555,862.

Gwandu, also called GANDO, town and traditional emirate, Sokoto state, northwestern Nigeria. It lies near a branch of the Zamfara River, a tributary of the Sokoto. Originally settled by the Kebbawa, a subgroup of the Hausa people, it was named for the surrounding *gandu* ("royal farmlands") that formerly belonged to Muhammadu Kanta, who founded the Kebbi kingdom in the 16th century. Although Fulani herdsmen had grazed their cattle in Kebbi territory for centuries, not until the era (1804–12) of the Fulani jihad (holy war) did Gwandu become an important Fulani town. In 1805, Usman dan Fodio, the jihad leader, moved the jihad headquarters from Sabongari to Gwandu. Muḥammad Bello, his son and successor (1817), began construction of the town's walls in 1806. After the Fulani victory over the Gobirawa at Alkalawa in 1808, Usman split his vast empire, which then extended over most of what is now northern and central Nigeria, into two spheres of influence. He made his brother Abdullahi dan Fodio emir of Gwandu and overlord of the western and southern emirates (1809) and placed Bello in charge of the eastern emirates. From 1815 Abdullahi maintained Gwandu as one of the two capitals of the Fulani empire.

The Gwandu emirate received tribute from its vassal emirates, including Nupe, Ilorin, Yauri, Agaie, Lafiagi, and Lapai in Nigeria, until the British arrived in 1903. The town had by then become a caravan centre for desert products from the north and forest products, notably kola nuts, from the south. Gwandu offered no military resistance to the British occupation. The Gwandu emirate was greatly reduced in size by British cessions in 1907 to French West Africa. Its emir, however, remains the third most important Muslim traditional leader in Nigeria, following only the *sarkin musulmi* of Sokoto and the *shehu* (sultan) of Bornu.

The town of Gwandu remains a collecting point for peanuts (groundnuts), tobacco, and rice; it also serves as a major local market centre in millet, sorghum, onions, bananas, cotton, goats, cattle, skins, and kola nuts. The town has a dispensary, and there is a government swamp-rice project located in the riverine floodplains. Pop. (latest est.) 20,210.

Gwangju (South Korea): *see* Kwangju.

Gwelo (town, Zimbabwe): *see* Gweru.

Gwent, county of southeastern Wales, created in 1974 from the former county of Monmouthshire (except the Rhymney Valley), the county borough of Newport, and small areas of the former county of Breconshire. The administrative seat is Cwmbrân (*q.v.*). Gwent has five administrative districts (Blaenau Gwent, Islwyn, Monmouth, Newport, and Torfaen) and covers an area of 531 square miles (1,376 square km).

Gwent was one of the major divisions of Celtic Wales. Despite the anomalous status of the former county of Monmouthshire and the tendency to refer to "Wales and Monmouthshire" as if they were separate, this part of the principality is now regarded as an integral part of Wales, although only a tiny minority of the inhabitants speak Welsh.

The heart of the county is the plain of Gwent, in the basin of the River Usk, which widens to include an undulating coastal plain along the Severn Estuary. To the west are the deep, incised valleys, with intervening plateau uplands, of the eastern rim of the South Wales coalfield, and to the east the equally incised valley of the River Wye and its flanking hill country. To the north, the county includes a fringe of the mountainous Brecon Beacons National Park.

Gwent was and still is the gateway between England and South Wales. The Romans built a military headquarters and major fortress at Caerleon (Isca). Similarly, the Normans erected castles, characteristic of the Welsh Marches (border country), in particular at Chepstow and Monmouth; but the Welsh culture and way of life were preserved in the hills. In the 20th century, Gwent's border location has made it the focus of motorway links between South Wales and Birmingham and London, and a modern road bridge (1967) connects it with the Bristol area across the Severn.

Economically, the county reveals contrasts and, to some degree, competition between agriculture and industry. The Usk River valley and the coastal fringe are important for dairying; market gardening is practiced near Newport and Abergavenny, and sheep are reared on the uplands. The better farmland of the plain, however, is under increasing pressure for residential and commercial development to accommodate commuters. Industry was formerly confined to the valleys and the Coal Measures, which yield good bituminous coal. There, the early ironworks and collieries were later joined by aluminum smelting and other heavy industries. Today, light industries, notably nylon, textiles, electronics, and foodstuffs, have brought diversification, especially on the plain. The massive Llanwern steelworks (1961), immediately east of Newport, has accentuated the pressures upon agricultural land.

Rapid economic development has brought both prosperity and new challenges. Coastal development has been at the expense of the older industrial areas in the inland valleys, and there have been attempts to compensate for this trend by diverting funds toward industrial readjustment in the valleys.

Newport is the largest town and dominates the county, but Cwmbrân, Wales's first "new town," was selected as the administrative seat. Pop. (1987 est.) 443,100.

Gweru, formerly GWELO, town, central Zimbabwe, on the Gweru River. The original Matabele settlement was named iKwelo ("The Steep Place"), after the river's high banks. The modern town, founded in 1894 as a military outpost, developed as an agricultural centre and became a municipality in 1914. Situated along the road and railway between Harare (formerly Salisbury) and Bulawayo and near the rail spur to Maputo, Mozambique, Gweru has become a busy trade centre with some industrial development. Its products include ferrochromium, textiles, dairy foods, footware, and building materials. The surrounding area, with its rich deposits of gold, chrome, iron, asbestos, and limestone, supports a number of mines. The training section of Zimbabwe's air force is in Gweru. Pop. (1982) 78,940.

Gwinnett, Button (b. *c.* 1735, Gloucester, Gloucestershire, Eng.—d. May 16, 1777, St. Catherine's Island, off Savannah, Ga., U.S.), American merchant, patriot, and signer of the Declaration of Independence, known chiefly because his autographs are of extreme rarity and collectors have forced their value to a high figure. (In 1927 one of his 36 autographs sold at public auction for $51,100.)

Gwinnett emigrated from England to Georgia sometime before 1765. In January 1776 he was elected a delegate from that colony to the Continental Congress and, as such, signed the Declaration. Returning to Georgia, Gwinnett was a member of the convention to frame a new state constitution. He died from wounds received in a duel with Lachlan McIntosh, a Continental general, whose brother Gwinnett had arrested.

Gwyn, Nell, original name ELEANOR GWYN (b. Feb. 2, 1650, London, Eng.—d. Nov. 14, 1687, London), English actress and mistress of Charles II, whose frank recklessness, generosity, invariable good temper, ready wit, infectious high spirits, and amazing indiscretions appealed irresistibly to a generation that welcomed in her the living antithesis of Puritanism.

Her father, according to tradition, died in a debtors' prison at Oxford during Nell's infancy. Her mother kept a bawdyhouse in the Covent Garden district, where Nell was brought up "to fill strong waters [brandy] to the guests" (Pepys, *Diary,* Oct. 26, 1667). In 1664, through the influence of her older sister, Rose, Nell became an orange-girl at the Drury Lane Theatre. Quickly attracting the attention of the theatre's leading actor, Charles Hart, whose mistress she became, Nell mounted the stage and probably made her first appearance in December 1665.

From 1666 to 1669 Nell was the leading comedienne of the King's Company, playing continuously, save for a brief absence in 1667, while she was the mistress of Lord Buckhurst, afterward 6th Earl of Dorset. She created such popular roles as Florimel in John Dryden's *Secret Love,* Mirida in James Howard's *All Mistaken,* and Jacinta in Dryden's *Evening's Love.* An excellent singer and dancer and much in demand as a speaker of impudent prologues and epilogues, "pretty, witty Nell" was ill-suited to serious parts, yet she was often cast for roles in romantic dramas.

Nell became a mistress of Charles II in 1669. Her last stage appearance was with Hart in Dryden's *Conquest of Granada by the Spaniards* (January 1670), the production of which had been postponed several months for her return to the stage after the birth of her first son by the king in 1670.

Established in a fine house and admitted to

Nell Gwyn, detail of an oil portrait from the studio of Sir Peter Lely; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

the inner circles of the court, Nell spent the rest of her life entertaining the king and his friends, living extravagantly, and intriguing against her rivals. She persuaded the king to create her son Charles Beauclerk, 1st Baron Heddington and Earl of Burford and, subsequently, Duke of St. Albans. Her second son, James, Lord Beauclerk (b. 1671), died in 1680. Nell settled her mother in a house in Chelsea, where, in July 1679, overcome by brandy, Mrs. Gwyn fell into a nearby brook and was drowned.

Of all the mistresses of Charles II, Nell was the only one beloved by the public. She was small, slender, and shapely, with a heart-shaped face, hazel eyes, and chestnut-brown hair. She was illiterate and scrawled an awkward "E.G." at the bottom of her letters, written for her by others. She never forgot her old friends and, as far as is known, remained faithful to her royal lover from the beginning of their intimacy until his death and, after his death, to his memory.

When Charles II died in February 1685, Nell was so deeply in debt that she was outlawed by her creditors. The king's deathbed request to his brother, "Let not poor Nelly starve," however, was faithfully carried out by James II, who paid off enough of her debts to reestablish her credit, gave her sizable amounts in cash, and settled on her a pension of £1,500 a year. In March 1687 Nell was stricken by apoplexy and partial paralysis. She died eight months later and was buried in the Church of St. Martin-in-the-Fields.

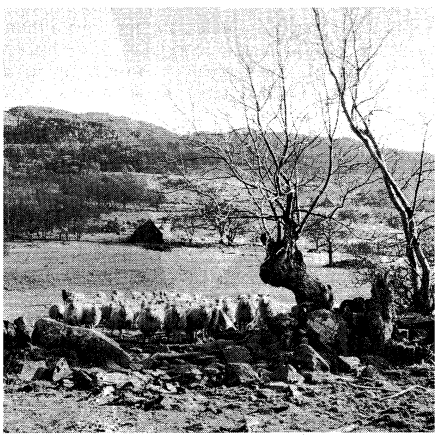
Gwynedd, county of northwestern Wales, created in 1974 from the former counties of Caernarvon, Anglesey, and Merioneth and part of Denbighshire. The administrative seat is Caernarvon (*q.v.*). Gwynedd has five administrative districts (Aberconwy, Arfon, Dwyfor, Meirionnydd, and Ynys Môn) and covers an area of 1,494 square miles (3,869 square km).

The county is named after the medieval Welsh princedom of Gwynedd, which, under the Llewellyns, proudly held out against the territorial ambitions of Edward I of England in the late 13th century. From their great castles at Caernarvon and Conwy, the Normans did not penetrate inland. Gwynedd thus remained a stronghold of Welsh culture, with a far higher proportion of Welsh-speaking people (two-thirds) than existed in any other county in the principality. Apart from the concentrations at the coastal resorts, the dispersed settlement pattern of today is a complex product of Welsh family homestead inheritance procedures.

The county is largely covered with mountains of old hard rock cut by Ice Age glaciers. It includes almost all of the Snowdonia National Park (1951), which covers about half its total area. The area's ruggedness and wetness largely restrict farming to breeding hardy sheep, but increasingly the family farms have proved to be uneconomical, and there has been much amalgamation of them, with associated depopulation. Since the 1950s, English people from the conurbations of the Midlands and Lancashire have bought the vacated farm buildings as "second homes." In addition to its attractions of hill climbing and tourism, Snowdonia National Park has extensive slate quarries, notably in the vicinities of Bethesda and Ffestiniog, a hydroelectric-power plant and aluminum-smelting plant at Dolgarrog in the Conwy Valley, a small nuclear-power station at Trawsfynydd, and extensive areas of land worked by the Forestry Commission. The county's lakes furnish water for large English cities, Liverpool and Birmingham in particular.

North of the mountains are the lowlands of the Lleyn peninsula, the Menai coastlands, and the island of Anglesey (Môn). Prehistoric dolmens, stone circles, and standing stones show that these lowlands have been inhabited since early times. Anglesey is important to the fresh-milk market, supplying Merseyside, and vegetables, especially potatoes, are also grown. The Lleyn has similar agricultural activities, but the soils and conditions are less favourable than those of Anglesey.

The most populous part of the county is along the coast from Caernarvon to Llandudno. The largest town, Llandudno, developed as a resort following its rail link with the Chester to Holyhead Railway (1848) and is now an important shopping centre. Bangor



Flock of sheep in the Dysynni Valley, county of Gwynedd, Wales; in the background is Cader Idris

A.J. Huxley

is a university and cathedral city and cultural centre, while Holyhead on Holy Island, joined to Anglesey by a causeway, is a cross-channel port and rail and road terminus. Pop. (1987 est.) 236,300.

Gyalzing (India): *see* Gezing.

Gyandzha, also spelled GANDZHA, formerly (1935–89) KIROVABAD, or (1804–1918) YELIZAVETPOL, city, Azerbaijan, Soviet Union. It lies along the Gyandzha River. The town was founded sometime in the 5th or 6th century, about 4 miles (6.5 km) east of the modern city. That town was destroyed by earthquake in 1139 and rebuilt on the present site. Gyandzha became an important centre of trade, but in 1231 it was again leveled, this time by the Mongols. Captured in 1606 by the Persians, it became the centre of the Gyandzha khanate. In 1804 Gyandzha was annexed by the Russians and renamed Yelizavetpol. It was made a provincial seat in 1861 and in 1935 was renamed Kirovabad. Kirovabad developed industrially and became one of the largest cities of Azerbaijan. The city's original name was restored in 1989.

Alumina was made from local alunite in Gyandzha, using power from hydroelectric plants on the Gyandzha and Kura rivers, but is now manufactured from imported bauxite. The city also manufactures machinery and instruments. Situated at the centre of a rich farming area, it has several industries processing agricultural products and making cotton

The Dzhuma Mosque, 17th century, in Gyandzha, Azerbaijan

Novosti Press Agency

textiles and carpets. Gyandzha has agricultural and teacher-training institutes. Notable buildings include Dzhuma-Mechet Mosque (built 1620) and the modern mausoleum of the 12th-century Persian poet Neẓāmī Ganjavī. Pop. (1989 prelim.) 278,000.

gyangu (Japanese: "gangster"), also called YAKUZA, Japanese gangster or mobster, a member of a *bōryokudan* (*q.v.*), or gang of racketeers.

Gyangzê (China): *see* Chiang-tzu.

Gyda Peninsula, also called GYDAN PENINSULA, Russian GYDANSKY POLUOSTROV, peninsula, northern Russian S.F.S.R. It is a northern extension of the West Siberian Plain reaching into the Kara Sea and situated between the bays of Ob and Tazovsky to the west and the estuary of the Yenisey to the east. In length the peninsula is about 250 miles (400 km), with a similar width; it is predominantly low-lying, varying in elevation between 165 and 525 feet (50 and 160 m). It is a region of forest-tundra and tundra, with numerous lakes and marshes. Hunting, fishing, and breeding of reindeer are the principal occupations. There are deposits of natural gas in the peninsula.

Gyges (d. *c.* 648 BC), king of Lydia, in western Anatolia, from about 680 to about 648 BC; he founded the Mermnad dynasty and made his kingdom a military power.

According to all the ancient sources, Gyges came to the throne after slaying King Candaules and marrying his queen, but there are several versions of the event itself. Herodotus wrote that Candaules, who was inordinately proud of his wife's beauty, compelled Gyges to see her nude. She caught Gyges spying on her and forced him on pain of death to kill her husband. In the standard version of Plato's *Republic,* Gyges was a shepherd who found a ring that made him invisible and used it to seduce the queen and murder the king. A third version is provided by Nicholas of Damascus, in the 1st century BC. Drawing upon the 5th-century Lydian historian Xanthus, Nicholas depicted Gyges as an army officer, already suspected of treachery by the royal house, who killed Candaules after the queen had accused him of attempted seduction.

Gyges cooperated with King Ashurbanipal of Assyria in a struggle against the Cimmerians,

who had overrun Phrygia, in northern Anatolia. He then invaded Ionia in western Anatolia, capturing the Greek city of Colophon and attacking Miletus, after which he travelled to Greece to make offerings at Delphi. His downfall came when he lost Assyrian military support because he had dispatched troops to aid a revolt in Egypt. This left him open to another Cimmerian invasion, during which he was defeated and killed.

Gylberde, William: *see* Gilbert, William.

Gyliakian Series, major division of Cretaceous rocks and time in Japan (the Cretaceous Period began about 144,000,000 years ago and lasted about 77,600,000 years). Rocks of the Gyliakian Series overlie those of the Miyakoan Series and underlie rocks of the Urakawan Series. Two stages, the Upper and Lower Gyliakian stages, are recognized and represent shorter spans of time. Distinctive fossil cephalopods (mollusks) enable correlations to be made with rocks elsewhere.

Gylippus (fl. 5th century BC), Spartan general who in 414–413, during the Peloponnesian War, broke the Athenian siege of Syracuse, Sicily. Urged by the Athenian exile Alcibiades to send a general to take charge of the defense of Syracuse, the Spartans appointed Gylippus, and his arrival in 414 kept Syracuse from surrendering. Gylippus broke the Athenian blockade by land, organized resistance from other Sicilian states, and finally defeated his enemy's fleet in a battle in the harbour. The Athenians attempted a retreat by land, then surrendered (413); Gylippus sought to spare their commanders, Nicias and Demosthenes, but was overruled. Later, Gylippus embezzled a large sum of Spartan funds and, when discovered, went into exile.

Gyllenborg, Gustaf Fredrik, Greve (Count) (b. Nov. 25, 1731, Suinstad, Östergötland, Swed.—d. March 30, 1808, Stockholm), Swedish poet known for his satirical and reflective poetry. Although members of his family were prominent in political life, as a courtier he took no part in politics and attacked the weaknesses of modern society in the spirit of the French Romantic philosopher Rousseau in such poems as "Verldsföraktaren" (1762; "The Misanthrope"). A pessimism typical of the late 18th century is expressed in his most famous poem, "Menniskans elände" (1762; "Misery of Man"). Gyllenborg wrote little of importance after 1763, devoting himself to a civil service career.

Gyllenborg's poems were published in *Vitterhetsarbeten af Creutz och Gyllenborg* (1795); his memoirs, *Mitt lefverne 1731–1775,* in 1885.

Gyllensten, Lars (Johan Wictor) (b. Nov. 12, 1921, Stockholm), Swedish intellectual, professor of histology, poet, and prolific philosophical novelist.

Gyllensten was reared and educated in Stockholm and was a professor of medicine at the Karolinska Institute for 18 years. He served on the Nobel Committee for Literature from 1968 and was made permanent secretary of the Swedish Academy in 1977. The Swedish Foundation for the Promotion of Literature gave him its annual award in 1972.

Gyllensten's principal theme in his novels is the subjective and relative nature of man's perception of truth. He reaches the conclusion that absolute skepticism is the necessary basis for experience and knowledge. This theme is developed in *Barnabok* (1952; "Children's Book") against the background of a gradually dissolving marriage. In its sequel, *Senilia* (1956), the aging process has a similar function in relation to its main character, but this time the inner monologue finds a positive resolution. *Sokrates' död* (1960; "The Death of Socrates") is a historical novel set in 5th-century BC Athens. In *Lotus i Hades* (1966; "Lotus in Hades") a religious, mystical solution emerges, as in *Diarium spirituale* (1968) and *Grottan i öknen* (1973; "The Cave in the Desert"). He explores an ideologically bankrupt world in such novels as *Moderna myter* (1949; "Modern Myths") and *Kains memoarer* (1963; *The Testament of Cain,* 1967).

Other works by Gyllensten include *Det blä skeppet* (1950; "The Blue Ship"), *Carnivora* (1953), *Senatorn* (1958; "The Senator"), *Baklängesminnen* (1978; "Memories Backward"), and more than 40 monographs on embryology.

Gyllenstierna, Johan, Greve (Count) (b. Feb. 18, 1636, Brännkyrka, Swed.—d. June 10, 1680, Landskrona), statesman and chief adviser of King Charles XI of Sweden.

From the beginning of his career (at the Riksdag, or Parliament, of 1660), Gyllenstierna advocated a strong royal authority and opposition to the nobles of the Riksråd (Council of the Realm). During Charles XI's minority, an opposition group in the regency and in the council had Gyllenstierna elected president of the Riksdag of 1668 and later appointed councillor of state. A baron (*friherre*), he became a count in 1674.

He strongly opposed the chancellor Magnus Gabriel De la Gardie, who continued to dominate the government even after Charles had attained his majority in 1672; the outbreak of war with Denmark in 1675, however, revealed the complete failure of De la Gardie's foreign and financial policies. Gyllenstierna then built up at the royal headquarters in Skåne a position of power almost amounting to a military dictatorship. He concluded an advantageous peace and an alliance with Denmark at Lund in 1679. The confirmation of royal autocracy by the Riksdag in December 1680 subordinated the council's powers, fulfilling Gyllenstierna's goals in the same year as his death.

gymel (from Latin *cantus gemellus,* "twin song"), medieval musical style of two-part polyphonic composition, possibly of popular origin, in which the voices move mainly in consecutive intervals of a third or a sixth. Crossing of parts is a common characteristic. Although gymel compositions have been preserved in manuscripts dating from the beginning of the 13th century, the name itself is first found in a detailed description of the style by the 15th-century theoretician Guilielmus Monachus.

Gymel seems to have been favoured in England during the 13th century, preceding English descant (*q.v.*) and thus leaving its mark on the development of English polyphony. In late 15th- and early 16th-century English choral music, the word gymel denotes a duo, as well as the splitting of a part into two parts.

gymkhana, originally in 19th-century India and England, a display of athletics and equestrian events; in the 20th century, also a form of automobile sport in which a series of events is planned to test driving skill and demonstrate accurate car handling. Auto gymkhanas usually are held on parking lots on which a series of short but intricate courses are laid out. A typical event is a race over a tight, twisting course marked out by pylons or similar devices; competing drivers complete the course one at a time and are timed to 1/100 second and penalized for errors, such as brushing a pylon or going off course. Other events may include driving in reverse, 180° and 360° turns, parking tests, and braking tests.

Gymnasium, in Germany, state-maintained secondary school that prepares pupils for higher academic education. This type of nine-year school originated in Strassburg in 1537. Although the usual leaving age is 19 or 20, a pupil may terminate his studies at the age of 16 and enter a vocational school. In Germany the *Gymnasium* is differentiated into three main types, according to curriculum: classical, which includes Latin, Greek, and one modern language; modern (*Realgymnasium*), with Latin and two modern languages; and mathematical and scientific (*Oberschule*), with two modern languages and optional Latin. Senior departments of elementary schools, middle schools (*Mittelschulen*), and teachers' training, commercial, and senior girls' colleges also provide general secondary or postprimary education.

gymnasium, large room used and equipped for the performance of various sports. The history of the gymnasium dates back to ancient Greece, where the literal meaning of the word *gymnasion* was "school for naked exercise." The gymnasiums were of great significance to the ancient Greeks, and every important city had at least one. These were usually built by the state and, from mere gathering places where exercises were performed, grew to imposing structures with dressing rooms, baths, training quarters, and special areas for contests.

Originally, gymnasiums were public institutions where only male athletes over the age of 18 received training for competition in the public games of that time (as opposed to the palaestrae, which were private schools where boys were trained in physical exercises). The supervision of the gymnasiums was entrusted to gymnasiarchs, who were public officials responsible for the conduct of sports and games at public festivals and who directed the schools and supervised the competitors. The *gymnastai* were the teachers, coaches, and trainers of the athletes.

The Greek gymnasiums also taught philosophy, literature, and music, and public libraries were nearby. In German-speaking countries, the term *Gymnasium* is still applied to the higher grades in secondary schools and is not associated with athletics or sports; the German word Turnverein (*q.v.*) is used to designate a site for physical exercise. In English-speaking countries, however, the gymnasium had no connection with academic courses, and the term ordinarily designates a room or building for the practice of physical education. Outside the school system, the term was largely replaced in the late 20th century by the term health club.

gymnastics, the performance of systematic exercises, often with the use of rings, bars, and other apparatus, as competitive sports and to improve strength, suppleness, agility, coordination, body control, and physical conditioning. In ancient Greece the term applied to all exercises practiced in the gymnasium (*q.v.*) as a part of education and to maintain a healthy body. Many of these exercises came to be parts of the classical games and later became such separate sports as athletics (track and field), wrestling, and boxing. After the Olympic Games were abandoned in AD 393, gymnastics disappeared with other sports until revived in the 18th and 19th centuries. Only tumbling (*q.v.*), derived from acrobatics and having an even more ancient origin than gymnastics, persisted, mainly as a theatrical exercise.

The modern sport was virtually the result of the work of the German Friedrich Jahn (*q.v.*), who invented many of the exercises and some of the apparatus of later gymnastics, such as the parallel bars, the rings, and the horizontal bar. Jahn's work was aimed mainly at strengthening the body. In Sweden, Peter Henrik Ling promoted gymnastics with emphasis on rhythm and fluidity of movement, thus adding a second aspect to the sport. Calisthenics (*q.v.*), also introduced in the first half of the 19th century, was originally a part of education for women. Jahn's work resulted in

the formation of the turnverein (*q.v.*)—an association of gymnasts, or a place for gymnastic exercise, that spread throughout Germany and was later taken to the United States by emigrants. A similar movement, the Sokol (*q.v.*), originated and spread in Bohemia (Czech-speaking) and was also transported to the United States. Both the U.S. and British military academies early adopted gymnastics.

Both the turnvereins and the Sokols led to national organizations, which were also formed in France, Switzerland, and Sweden and ultimately throughout Europe. In 1881 the Fédération Internationale Gymnastique (FIG) was founded to supervise international competition. The greatest single impetus for international competition came from the inclusion of gymnastics in the revived Olympic Games in 1896. Events for men have been held thereafter; events for women began in 1936 with combined exercises (*g.v.*) and with a full regime of events from 1952. The number of events varied in the early Games, but they were eventually regularized for men into seven: the horizontal bar, the parallel bars, the side horse (also called pommel horse), long horse (also called vaulting horse; *see* vaulting), rings, and floor exercise (*qq.v.*). The combined exercises (also called the all-around) combines the scores of the other six events. Women's events include the balance beam, the uneven parallel bars (*qq.v.*), the vaulting horse, floor exercise, rhythmic sportive gymnastics (*q.v.*), and the combined exercises, as for men.

Dominant men gymnasts in early Olympic Games were German, Swiss, Italian, and Swedish. From the 1950s the gymnasts of Japan and the Soviet Union as well as other Eastern-bloc countries dominated. A series of brilliant women gymnasts from the 1950s did much to popularize the sport with the general public, culminating in the 1970s with the phenomenal worldwide popularity of the Russian Olga Korbut and the Romanian Nadia Comaneci. World championships sponsored by FIG were held from 1950. In the world at large, gymnastics became increasingly popular. *See* Olympic Games; *see also* Sporting Record: *Gymnastics.*

Gymnodinium, genus of marine or freshwater organisms called dinoflagellates. Members of the genus are bilaterally symmetrical with a delicate pellicle (or envelope) and disk-shaped chromatophores, which, when present, contain yellow, brown, green, or blue pigments. The genus is claimed by both botanists and zoologists, for, like all dinoflagellates, it has both plantlike and animal-like species. Some species are photosynthetic; others seek out food. *Gymnodinium,* which may be bioluminescent, undergoes periodic blooms, or population increases, and may colour water bright yellow or red. It also produces a toxin similar to that of the dinoflagellate *Gonyaulax;* both toxins are fatal to fish and irritate the nose and throat of human beings.

gymnosperm, any woody plant that reproduces by means of a seed (or ovule) in direct contact with the environment, as opposed to an angiosperm, or flowering plant, whose seeds are enclosed by mature ovaries, or fruits. "Gymnosperms" is generally considered to be an informal term designating four separate extant divisions of related plants—Coniferophyta, Cycadophyta, Ginkgophyta, and Gnetophyta.

A brief treatment of gymnosperms follows. For full treatment, *see* MACROPAEDIA: Gymnosperms.

Over half of all gymnosperms are trees, and most of the rest are shrubs. Gymnosperms occur on all continents but Antarctica, especially in the temperate latitudes. The most widely dispersed are the junipers (genus *Juniperus*), which can be found throughout the Northern Hemisphere. Others widely found in the Northern Hemisphere include the firs (*Abies*), larches (*Larix*), spruces (*Picea*), and pines (*Pinus*). The most widely dispersed gymnosperms of the Southern Hemisphere are the podocarps (*Podocarpus*).

In contrast, many species of gymnosperms are severely limited in geographic distribution. Redwoods (*Sequoia sempervirens*), for example, are limited to California and Oregon in the United States, the big trees (giant sequoias; *Sequoiadendron gigantum*) to California only, *Microcycas* to Cuba, *Stangeria* to southern Africa, and *Taiwania* to Taiwan. The spruces and larches are the most northerly of all trees. The highest known altitude to be reached by a vascular plant is that of a joint fir (*Ephedra*) growing at 17,500 feet (5,350 m) in Kashmir.

Many of the most valuable softwood timber trees are gymnosperms. They include the pines, Douglas firs (*Pseudotsuga*), cedars (*Cedrus*), and redwoods of the Northern Hemisphere, and the kauris (dammar pines; *Agathis australis*), podocarps, dacrydiums (*Dacrydium*), and araucarias (*Araucaria*) of the Southern Hemisphere. Paper pulp is derived from the hemlocks (*Tsuga*), spruces, firs, and pines. Many of the timber and pulp trees are also planted as ornamentals, as are the junipers, larches, cycads, arborvitaes (*Thuja*), yews (*Taxus*), and the ginkgo (*Ginkgo biloba*). The Japanese use pines and junipers in the art of tree dwarfing (bonsai).

The gymnosperms are only a minor source of food. There is wide commerce in pine nuts, the seeds of the piñon pines (*Pinus edulis, P. monophylla,* and *P. quadrifolia*), and the seeds of the araucarias, ginkgo, and gnetums are eaten locally. Although poisonous to human beings in their natural state, the seeds and stems of the cycads—especially those of the genera *Cycas, Encephalartos, Macrozamia,* and *Zamia*—when processed yield a starch that is an important local food in times of famine. The fleshy cones (called berries) of the junipers contain an essential oil used to flavour alcoholic beverages, particularly gin.

Other essential oils are derived from spruce, pine, juniper, fir, hemlock, and arborvitae trees. The oils are used in soaps, air fresheners, disinfectants, pharmaceuticals, cosmetics, and perfumes. Some are prized for their own pleasing aromas, while others are odour-fixative or antiseptic. Tannin, used for curing leather, is obtained from the hemlock and spruce.

Kauri copal is a natural resin obtained from the kauri tree of New Zealand. Baltic amber is a fossil resin from an extinct pine species.

Turpentine is an oleoresin derived from pines. It is processed to yield oil of turpentine (commonly called turpentine) and rosin. Turpentines are also obtained from the balsam fir (*Abies balsamea*), spruces, and European larch (*Larix decidua*).

Some joint firs yield ephedrine, an alkaloid drug used to treat certain respiratory illnesses. Gymnosperms were a major component in the vegetation that was compressed over millions of years into coal.

Gymnosperms can be considered as pests if they invade rangeland or abandoned fields that are to be reused. Nonetheless, gymnosperms are important for erosion control and, especially the conifers, are planted for reforestation, shelter belts, and windbreaks.

Most gymnosperms are evergreen, and of the evergreens, most retain their leaves more than one year. Only the cycads have compound leaves, the rest having simple leaves of various forms. Gingko leaves fork equally and repeatedly, while the leaves of cycads resemble those of palms. The veins in the leaves of gnetums form a network like those of angiosperms. Conifer leaves may be needlelike, scalelike, or broad. In the joint firs and *Phyllocladus,* the main photosynthetic organs are the stems, not the leaves.

Gymnosperms produce male and female reproductive cells (pollen grains and megaspores, respectively) in separate male and female strobili (conelike structures), which may be borne on different plants (as in the cycads) or on the same plants (as in most conifers). Male cones, or microstrobili, vary in size from 1/8 inch (2 mm) long in the junipers to 30 inches (80 cm) long in some cycads. Each cone consists of a number of scales arranged in a spiral on a central axis. Each scale bears two or more pollen sacs on its undersurface.

Female cones, or megastrobili, can be of great size. Those of the cycad *Macrozamia denisonii* of Australia may be almost 40 inches (100 cm) long and weigh up to 84 pounds (38 kg). Certain junipers produce the smallest seed cones, only 3/16 inch in diameter. Scales of the seed cones may be fleshy and fused together, as in the "berries" of junipers, or papery or woody and distinct, as in spruces and pines. Some gymnosperms bear their seeds in structures of a fleshy outer covering and a hard, stonelike interior, resembling plums. This occurs in gingkos, yews, podocarps, *Torreya,* and *Cephalotaxus.*

Gymnosperm megaspores are borne exposed to the air in ovules, on the surfaces of the scales of the megastrobili, or on the stalks of leaves. Pollen grains are carried to the ovules and germinate there, sending extensions called pollen tubes into the ovular tissues. After fertilization, an embryo develops; the surrounding integument hardens into a seed coat. Most gymnosperms are pollinated by the wind, a few by insects. Gymnospermous seeds are dispersed by the wind and animals, and a few (the bald cypresses, *Taxodium*) by water.

The earliest gymnosperms were members of the now-extinct division Pteridospermophyta (or seed ferns), which originated in the Late Devonian epoch (374 million to 360 million years ago). They were abundant until the Triassic period (245 million to 208 million years ago), when their dominance was displaced by the angiosperms. Four divisions of gymnosperms are now extinct. The division Coniferophyta (conifers) is the most widespread today.

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gymnostome, any ciliated protozoan of the large holotrichous order Gymnostomatida; included are oval to elongated protozoans with simple, uniformly distributed hairlike processes (cilia) and a mouth opening (cytostome) on the body surface rather than in a groove or pit as in other ciliates. Gymnostomes are found in fresh and salt water and in the sands of intertidal zones; parasitic forms live in the digestive systems of various animals; the genus *Bütschlia,* for example, lives in cattle. Free-living genera that feed on animal matter often have stiff rods (known as ne-

Gymnostome (*Didinium nasutum*) attacking *Paramecium*
J.M. Langham

matodesmata, sometimes called trichites) embedded in the gullet wall; the plant feeders (*e.g., Chilodonella*) have trichites fused into pharyngeal baskets. The genus *Didinium,* a predator of the protozoan ciliate *Paramecium,* divides asexually for extended periods. In time of famine it forms a resistant stage (cyst) and undergoes nuclear reorganization.

gymnure, also called HAIRY HEDGEHOG, any of five species of Asian mammals composing the subfamily Echinosoricinae of the hedgehog (*q.v.*) family (Erinaceidae). These ratlike animals lack the short, barbless spines of spiny hedgehogs but have coarse guard hairs.

Moonrat (*Echinosorex gymnurus*)
The National Audubon Society Collection/Photo Researchers

Their tails are well developed. Gymnures are extremely malodorous. An example is the common gymnure (*Echinosorex gymnurus*), which is also called moonrat, or Malayan rat shrew. It is coloured black, with whitish head and dark eye marks. The common gymnure is a large insectivore; its head and body may be 44 centimetres (17 inches) long, its naked scaly tail 21 cm long. Little is known of this animal's habits.

Gympie, city, southeastern Queensland, Australia, lying on Gympie Creek and the Mary River. It was first known as Nashville, after James Nash, who discovered gold there in 1867; its present name comes from *gimpi-gimpi,* the Aboriginal word for the stinging tree. Proclaimed a town in 1890, it was made a city in 1905. In addition to gold, which was mined until 1930, limestone and silver have been worked in the locality. The Borumba Dam (completed 1964), on Yabba Creek, mitigates floods and impounds water for irrigating the area, which yields dairy products, tropical fruits (especially pineapples), vegetables, and beef cattle; there are also state plantations of pine trees. Situated on the Bruce Highway and the main northern rail line to Brisbane (90 mi [145 km] south), Gympie has sawmills, a joinery works, and food-processing plants. Pop. (1981) 10,768.

gynecological examination, procedures aimed at assessing the health of a woman's reproductive system. The general examination usually makes use of a culdoscope for a view of the internal organs. More specialized procedures include the Pap smear (*see* Papanicolaou's stain) for the detection of cancer of the uterine cervix. In the diagnosis of possible infertility, useful procedures include the Rubin's test, which helps determine whether the fallopian tubes, the slender hollow structures through which the eggs travel from the ovaries to the uterus, are occluded; hysterosalpingography, or X ray of the uterus and fallopian tubes after injection of a contrast medium; the evaluation of ovulation and hormonal factors by the laboratory examination of cervical and uterine tissues and by the determination of blood and urine levels of estrogenic hormones.

gynecology: *see* obstetrics and gynecology.

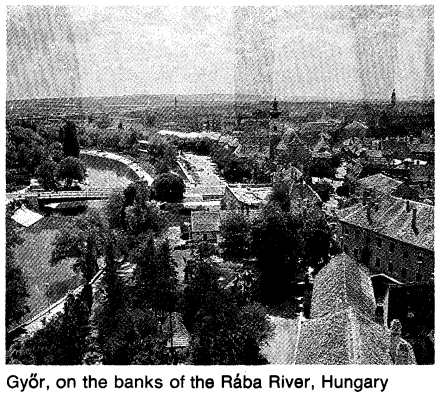
gynecomastia, enlargement of the breasts in the male, usually because of hormone imbalance. The growth and development of male breasts are like those of the female until puberty is reached. At this time the male reproductive organs (testes) begin secreting male hormones (androgens), which normally suppress further breast development. The breasts of the female continue to grow because of the presence of the female hormone, estrogen. Gynecomastia may develop at any age in the male, but it is more frequent during boyhood or senility. In most cases only one breast is involved. In some cases only the nipple and closely surrounding tissue (areola) swell to a button-like enlargement; in more unusual cases the whole breast may assume the size of a normal female organ.

Enlargement is a result of the growth of connective tissue. Mammary ducts and false milk cavities may form in the tissue. Fluids may be excreted from the nipple either spontaneously or as a result of manipulation; the fluids do not contain milk. Conditions termed pseudogynecomastia are caused by excessive body fat, inflammatory disorders, granular lesions, or growth of tumours.

True gynecomastia is related to hormonal imbalance, or the increase in estrogenic hormones in the male. Tumours located elsewhere in the male body may cause the estrogen abnormality; in these cases, gynecomastia is a secondary disorder of the other maladies. Tumours of the testes or of the pituitary gland are commonly the cause of gynecomastia. Elderly men show a greater incidence of this abnormality because of the reduced secretion of androgens as the result of aging. Injuries to the breast do not seem to cause gynecomastia, but, once the disorder is present, injury may provoke a rapid increase in growth. Treatment for gynecomastia usually involves hormone therapy, correction of the estrogen-stimulating disorder, or removal of the tumours responsible for improper hormone balance.

Gyōda, city, Saitama Prefecture (*ken*), Honshu, Japan, lying on the alluvial plain between the Tone-gawa (Tone River) and the Arakawa. The site was settled in ancient times, and Oshi Castle was constructed there in 1490. During the Tokugawa era (1603–1867) the manufacture of *tabi* (socks) was introduced into Gyōda. This industry grew steadily until the end of World War II, when it was gradually replaced by clothing manufacture. Electric appliances and rubber goods are also produced in Gyōda, and rice paddies surround the city. Pop. (1980) 73,205.

Győr, German RAAB, historic town and capital of Győr-Sopron *megye* (county), northwestern Hungary. It is on the Moson arm of the Danube, the meandering southern arm in Hungary proper, where the south bank tributaries, Rába and Rábca (alternatively, Répce), converge. The Marcal River joins the Rába just south of Győr. The town and its environs are composed of narrow, winding streets with interesting old houses in an assortment of architectural styles, interlaced with the meandering river channels.



Győr, on the banks of the Rába River, Hungary
Gyorgy Lajos—INTERFOTO MTI

A Roman town, Arrabona, originally succeeded a Neolithic settlement and a Celtic merchant community; Győr continued for centuries as a prosperous agricultural centre with special focus on horse breeding, viticulture, and grain production. Stephen I made it a county seat. The Püspökvár (fortified bishop's palace), built in the 13th century and remodeled in the 16th century, stands atop the Káptalan Hill, adjacent to an impressive cathedral (12th through 17th century). Several other churches are of historical and architectural significance. The museum contains an interesting collection of Roman artifacts. In the 17th century, Győr became a fortified stronghold against the Turks, and it was chartered as a free royal town in 1743.

Modern industrial development in Győr includes the manufacture of railway rolling stock, diesel engines, and frames for trucks and buses. Tobacco, furniture, food processing, and textiles are also important. The town is a strategic river crossing and is connected by rail and road with Vienna, 80 mi (129 km) northwest, and Budapest, 72 mi southeast. Pop. (1985 est.) 130,000.

Győr-Sopron, *megye* (county), northwestern Hungary, occupying an area of 1,549 sq mi (4,012 sq km), bordering Austria and Czechoslovakia to the north. It contains some of the nation's richest farmland, supporting sugar beets, apricots, and livestock. In the west central part of the *megye* is the Hanság, a region of swamps and moorland, partly drained and recovered through canalization. Between the Danube main channel and the Moson arm is the Szigetköz, a low-lying watery flatland, with scattered villages, noted for fishing and wildfowl. On a northern spur of the Bakony Mountains, just southeast of Győr (the *megye* seat), is Pannonhalma Apátság, a Benedictine abbey founded in AD 969 by Prince Géza and chartered by Stephen I in 1001. Its 300,000-volume library includes the finest medieval archives in Hungary. In the courtyard of the Eszterházy Castle at Fertőd, annual open-air Haydn memorial concerts are held.

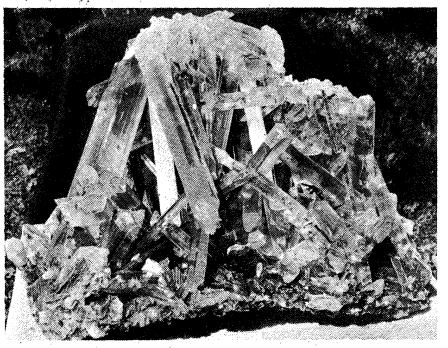
Principal towns, aside from Győr, are Sopron, Mosonmagyaróvár, and Kapuvár. Pop. (1984 est.) 430,000.

György, FRATER: *see* Martinuzzi, György.

gypcrete, also called GYPCRUST, gypsum-cemented duricrust, an indurated, or hardened, layer formed on or in soil. It generally occurs in a hot, arid or semiarid climate in a basin that has internal drainage. It usually is composed of about 95 percent gypsum (a hydrated calcium sulfate mineral) and is initially developed in a playa as an evaporite. Gypcrete ranges from a loose, powdery deposit to massive crystalline gypsum and may be as much as 4 metres (12 feet) thick.

gypsum, a common sulfate mineral of great commercial importance, composed of hydrated calcium sulfate ($CaSO_4 \cdot 2H_2O$). In well-developed crystals the mineral commonly has been called selenite. The fibrous massive variety has a silky lustre and is called satin spar; it is translucent and opalescent and is valued for ornaments and jewelry. The fine-grained massive variety called alabaster is carved and polished for statuary and ornamental use when pure and translucent. Gipsite is the earthy pulverulent variety.

Gypsum occurs in extensive beds associated with other evaporite minerals (*e.g.,* anhydrite and halite), particularly in Permian and Triassic sedimentary formations; it is deposited from ocean brine, followed by anhydrite and



Selenite gypsum from Naica, Chihuahua, Mex.

Joseph and Helen Guetterman collection; photograph, John H. Gerard—EB Inc.

halite. It also occurs in considerable quantity in saline lakes and salt pans, and is an important constituent of cap rock, an anhydrite-gypsum rock forming a covering on salt domes, as in Texas and Louisiana. Very commonly it is formed from the hydration of anhydrite by surface and ground waters; thus, many gypsiferous strata grade downward into anhydrite rocks. This replacement causes a 30 percent to 50 percent volume increase and results in intense, tight folding of the remaining anhydrite layers. Gypsum also occurs disseminated in limestones, dolomitic limestones, and some shales.

Gypsum deposits occur in many countries, but the United States, Canada, France, Italy, the Soviet Union, and Britain are the leading producers. In the U.S., commercial sedimentary gypsum deposits occur in New York and Michigan; others of economic importance occur in Virginia, Ohio, Iowa, Kansas, Texas, Nevada, and southern California. In Canada, gypsum is produced for export in Nova Scotia and New Brunswick. In France, gypsum is common in the marls and clays of the Paris basin (hence the name plaster of paris), especially in Montmartre.

Crude gypsum is used as a fluxing agent, fertilizer, filler in paper and textiles, and retarder in portland cement. About three-fourths of the total production is calcined for use as plaster of paris and as building materials in plaster, Keene's cement, board products, and tiles and blocks. Gypsum plaster is a white cementing material made by partial or complete dehydration of the mineral gypsum, commonly with special retarders or hardeners added. Applied in a plastic state (with water), it sets and hardens by chemical recombination of the gypsum with water.

For especially hard finish plaster, the gypsum is completely dehydrated at high temperature, and such chemicals as alkali sulfate, alum, or borax are added. Hair or fibre and lime or clay may be added to the plasters during manufacture. The plaster coats, except for some finish coats, are sanded. *See also* plaster of paris. For detailed physical properties, *see* sulfate mineral (table).

Gypsy, also spelled GIPSY, Romany ROM, any member of a dark Caucasoid people originating in northern India but living in modern times worldwide, principally in Europe. Most Gypsies speak Romany, a language closely related to the modern Indo-European languages of northern India, as well as the major language of the country in which they live. It is generally agreed that Gypsy groups left India in repeated migrations and that they were in Persia by the 11th century, in southeastern Europe by the beginning of the 14th, and in western Europe by the 15th century. By the second half of the 20th century, Gypsies had spread throughout North and South America and to Australia.

True Gypsies refer to themselves by one generic name, *Rom* (meaning "man" or "husband"), and to all non-Gypsies by another term, *gadje* (an exclusive term with a pejorative connotation meaning "bumpkin," "yokel," or "barbarian").

The migratory nature of the Gypsies, their absence in official census returns, and their popular classification with other nomadic groups makes the estimating of the total numbers of Gypsies a formidable task. Estimates of the total Gypsy population range from 2,000,000 to 3,000,000. A significant statistical picture cannot be gained from the sproadic reporting by Gypsiologists in different countries. The majority of Gypsies were still in Europe in the late 20th century, especially in the central and southern regions.

The exotic stereotype of the nomadic Gypsy has often disguised the fact that fewer and fewer may have remained truly migratory, although writers on Gypsies disagree on this point. However, it is clear that nomadism by the Gypsies has been largely insular in character. All nomadic Gypsies migrate at least seasonally along patterned routes that ignore national boundaries. They also follow along a chain, as it were, of kin or tribal links. The Gypsies' own supposed disposition to wander has been forcibly furthered by exile or deportation. Only 80 years after their first appearance in western Europe in the 15th century, they fell under the penalty of banishment in almost all the nations of western Europe. Despite their systematic exile, or transportation abroad, however, Gypsies continued to reappear in one guise or another back in the countries that they had left.

All unsettled tribes who live among settled peoples seem to become convenient scapegoats. So it is with the Gypsies who have regularly been accused by the local populace of many evils as a prelude to later official and legal persecution. Their relations with the authorities in the host country have been marked by consistent contradiction. Official decrees were often aimed at settling or assimilating them, yet local authorities systematically refused them the bare hospitality of a campsite. The philosophy of the Nazis favouring those of Aryan stock during World War II did not prevent them from a methodical extermination of an estimated 400,000 Gypsies. French laws in modern times forbade them campsites and subjected them to police supervision, yet the Gypsies were taxed and drafted for military service like ordinary citizens. Spain and Wales are two countries often cited as examples where the Gypsies have become settled, if not wholly assimilated. In modern times, the Socialist countries of Eastern Europe have attempted a program of enforced settlement to end Gypsy migration.

Traditionally Gypsies have pursued occupations that allowed them to maintain an itinerant life on the perimeters of settled society. The men were livestock traders, animal trainers and exhibitors, tinkers (metalsmiths and utensil repairmen), and musicians; the women told fortunes, sold potions, begged, and worked as entertainers. Before the advent of veterinary medicine, many farmers looked to Gypsy livestock dealers for advice on herd health and husbandry. Damaged pots, pans, and metal utensils were saved for repair by the Gypsy tinker.

Though still itinerant, modern Gypsy life reflects the "progress" of the *gadje* world. Travel is by caravans of cars, trucks and trailers. Livestock trading has given way to the sale of used cars and trailers. Although mass production of stainless steel pots and pans has rendered the tinker obsolete, some urban Gypsies have found employment as car mechanics and auto body repairmen. Travelling circuses and amusement parks also provide employment for modern Gypsies as animal trainers and handlers, concession operators, and fortune-tellers.

The archetypal Gypsy family consists of a married couple, their unmarried children, and at least one married son, his wife and their children. Upon marriage, a young Gypsy couple typically lives with the husband's parents while the young wife learns the ways of her husband's group. Ideally, by the time an older son is ready to move away with his family, a younger son will have married and joined the household with his new wife. Although the practice declined significantly in the late 20th century, traditional Gypsy marriages were arranged by the elders in the family or band *(vitsa)*, to strengthen political and kinship ties to other families, bands, or occasionally, tribes. A central feature of Gypsy marriages was the payment of a bride-price to the parents of the bride by the parents of the groom.

Gypsies recognize tribal divisions among themselves with some sense of territoriality emphasized by certain cultural and dialectal differences. Some Gypsiologists have delineated three main tribal groups: (1) the Kalderash (smiths who came from the Balkans and then from central Europe and are the most numerous); (2) the Gitanos (French *Gitans*, mostly in the Iberian Peninsula, North Africa, and south France, strong in the arts of entertainment); (3) the Manush (French *Manouches*, also known as *Sinti*, mostly in France, Alsace, and Germany, often travelling showmen and circus people). Each of these main divisions were further divided into two or more subgroups distinguished by occupational specialization or territorial origin, or both.

There has never been on record any one authority, either congress or "king," accepted by all Gypsies, although "international" congresses of Gypsies have been held in Munich, Moscow, Bucharest, and Sofia (1906) and at Rowne in Poland (1936). However, if Gypsy kings are a romantic popular fiction, the existence of political authorities among the Gypsies is an established fact. The use of the word "tribe" by writers on Gypsies has been ambiguous. Those who affected noble titles such as "duke" or "count" in their early historical dealings with local nationals were probably no more than chieftains of bands, who moved in groups of anything from 10 to a few hundred households. These chieftains (*voivodes*) are elected for life from among outstanding families of the group, and the office is not heritable. Their power and authority vary according to the size of the band, its traditions, and its relationships with other bands within a tribe.

It was the *voivode* who acted as treasurer for the whole band, decided the pattern of its migration, and became its spokesman to local municipal authorities. He governed through a council of elders that also consulted with the *phuri dai*, a senior woman in the band. The *phuri dai*'s influence was strong, particularly in regard to the fate of the women and children, and seemed to rest much on the evident earning power and organization of the women as a group within the band.

Strongest among the Gypsy institutions of social control was the Romany *kris*, connoting both the body of customary law and values of justice as well as the ritual and formation of the tribunal of the band. Basic to the Gypsy code were the all-embracing concepts of fidelity, cohesiveness, and reciprocity within the recognized political unit. The ultimate negative sanction of the *kris* tribunal, which dealt with all disputes and breaches of the Gypsy code, was excommunication from the band. However, a sentence of ostracism might exclude the individual from participation in certain band activities and punish him with menial tasks. In some cases, rehabilitation was granted by the elders and followed by a feast of reconciliation.

Bands are made up of *vitsas*, which are name

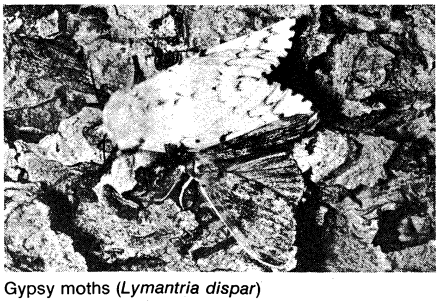
groups of extended families with common descent either patrilineal or matrilineal, as many as 200 strong. A large *vitsa* may have its own chief and council. *Vitsa* membership can be claimed if offspring result through marrying into the *vitsa*. Loyalty and economic cooperation are expected at the household rather than the *vitsa* level. There is no generic term for household in Romany. For cooperation, a man probably relies on an action-set composed of a circle of meaningful kinsmen with whom he is physically close and not, at the time, in dispute.

Gypsies have been one of the vehicles through which folk beliefs and practices have been disseminated and, in areas where they are settled (*e.g.*, Romania), have been positive guardians of "national" customs, dances, and the like, which were disappearing among the peasantry in the second half of the 20th century. Although Gypsies have been the carriers of customs and ideas, have enriched the arts of music and the dance, and have been innovators in certain basic crafts, they have not contributed to the world of literature. Romany is not a written language any more than flamenco is a written music. Illiteracy, no longer an accepted norm, was not the only reason; reluctance to reveal the inner world of an exclusive culture was certainly another reason.

Increasingly in the second half of the 20th century, Gypsies struggled with contradictions in their culture. No longer did they defend themselves so much against persecution from a hostile society but rather against erosion to their life-styles from urban influences in industrialized societies. Themes of familial and ethnic loyalty typified in Gypsy music helped to preserve the conservatism of Gypsy ways, yet some of the younger and more talented exponents of this music, drawn away by the material rewards in the outside world, were thereby threatening the integrity and economic security of the culture whose virtues they sang. Integrated housing, economic independence, and intermarriage with non-Gypsies have undermined Gypsy law. If it is true that, unlike the peasant, the Gypsy wants to remain a Gypsy, then his classical ability to select and adapt to his own cultural advantage features from the outside world was undergoing perhaps its severest test.

Gypsy language: *see* Romany language.

gypsy moth (*Lymantria dispar*), European member of the tussock moth (*q.v.*) family Liparidae (order Lepidoptera). It was introduced into eastern North America in 1866 and has become a serious pest of forest and fruit trees. The heavy-bodied, weak-flying female moth is white with black zigzag markings and has

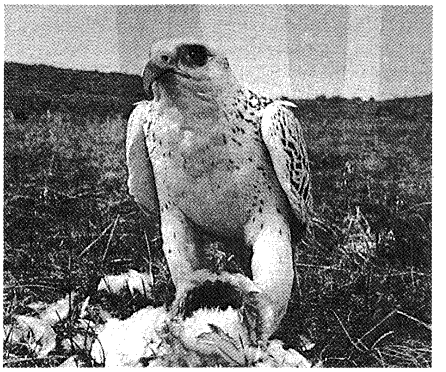


Gypsy moths (*Lymantria dispar*)
Alexander B. Klots

a wingspan of 38 to 50 millimetres (1½ to 2 inches). The smaller, darker male is a stronger flier. Eggs deposited in clusters during July are covered with a mass of buff-coloured hair from the female's abdomen; they hatch the following spring.

The flattened, pale-brown larvae, which grow to 50 mm (2 in.), are voracious feeders and may completely strip trees of their leaves in several weeks. The adult moth emerges from a chrysalis after about 10 days, completing the annual generation.

gyrfalcon (*Falco rusticolus*), Arctic bird of prey of the family Falconidae, the world's largest falcon (*q.v.*). The gyrfalcon may reach 60 centimetres (2 feet) in length. Confined as a breeder to the circumpolar region except for isolated populations in Central Asian high-



Gyrfalcon (*Falco rusticolus*) with prey
Shelly Grossman—Woodfin Camp

lands, it is sometimes seen at lower latitudes in winters when food is scarce. The gyrfalcon varies from pure white with black speckling to dark gray with barring. The legs are fully feathered.

The gyrfalcon hunts near the ground for hares, rodents, and birds of the tundra and seacoast. Its only rival is the higher flying peregrine falcon. In traditional falconry, the gyrfalcon was the bird of kings. The gyrfalcon is now the official mascot of the U.S. Air Force Academy.

gyroscope, any device consisting of a rapidly spinning wheel set in a framework that permits it to tilt freely in any direction, *i.e.*, to rotate about any axis. The momentum of such a wheel causes it to retain its attitude when the framework is tilted; from this characteristic derive a number of extremely valuable applications. Gyroscopes are used in such instruments as compasses and automatic pilots on board ships and aircraft, in the steering mechanisms of torpedoes, in antiroll equipment on large ships, and in inertial guidance systems.

J.-B.-L. Foucault, a 19th-century French scientist, is responsible for giving the name gyroscope to a wheel, or rotor, mounted in gimbal rings—*i.e.*, a set of rings that permit it to turn freely in any direction (Figure 1, top). During the 1850s Foucault conducted an experiment using such a rotor and demonstrated that the spinning wheel maintained its original orientation in space regardless of the Earth's rotation.

This ability of a gyroscope to maintain its orientation suggested its use as a direction indicator, but it was not until 1910 that the first workable gyrocompass was installed, on board a German warship. In 1911 Elmer A. Sperry marketed a gyrocompass in the United States, and one was produced in Britain not long after.

In 1909 Sperry built the first automatic pilot using the direction-keeping properties of a gyroscope to keep an aircraft on its course. The first automatic pilot for ships was produced by the Anschütz Company in Kiel, Germany, and installed in a Danish passenger ship in 1916. A three-frame gyroscope (Figure 1, top) was used, also in 1916, in the design of the first artificial horizon for aircraft. This instrument indicates roll (side to side) and pitch (fore and aft) attitude to the pilot and is especially useful in the absence of a visible horizon.

In 1915 the Sperry Company, employing a two-frame gyroscope, devised a gyrostabilizer to reduce the rolling of ships, thus minimizing damage to cargo, reducing stresses in the hull structure, and adding to the comfort of passengers. The roll-reducing action of this type of gyrostabilizer was quite effective and was independent of the speed of the ship. It had a number of disadvantages, including its excessive weight, cost, and space requirements, and it was not installed on later ships, in part because of the introduction by Japanese shipbuilders of an underwater fin-type ship stabilizer in 1925.

Conventional three-frame gyroscopes are used in ballistic missiles for automatic steering together with two-frame gyroscopes (Figure 1, bottom) to correct turn and pitch motion. German engineers made significant advances in this field during the 1930s, and their knowledge was later used in the design of guidance systems for the V-1 flying bomb, a pilotless aircraft, and the V-2 rocket, an early ballistic missile.

In addition, the ability of gyroscopes to define direction with a great degree of accuracy, used in conjunction with sophisticated control

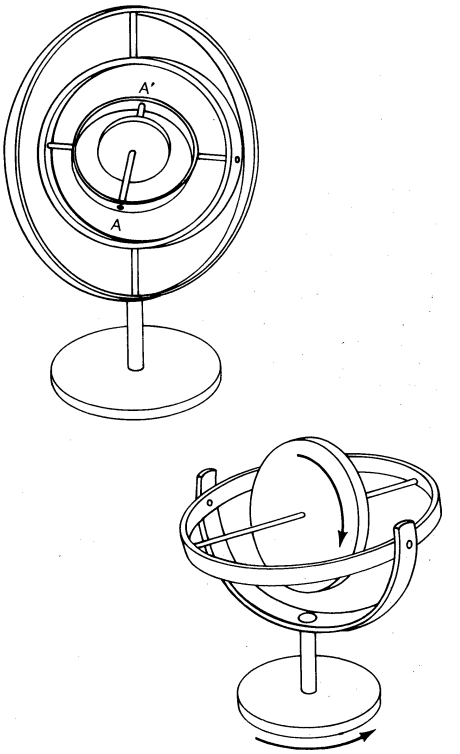


Figure 1: (Top) Three-frame gyroscope and (bottom) two-frame gyroscope
From W. Burger and A. Corbet, *Ship Stabilizers, Their Design and Operation in Correcting the Rolling of Ships* (1966); Pergamon Press Limited

mechanisms, led to the development during World War II of stabilized gunsights, bombsights, and platforms to carry guns and radar antennas aboard ships.

Modern inertial navigation systems for vehicles such as spacecraft require a small platform, stabilized by gyroscopes to an extraordinary degree of precision. It was not until the 1950s that this type of platform was perfected, following work in the design of air-supported bearings and flotation gyroscopes.

If the base of a three-frame gyroscope (Figure 1, top) is held in the hand with the rotor spinning and turned about any of the three axes, the rotor axle will continue to point in the original direction in space. This property is known as gyroscopic inertia. If the speed of the wheel decreases, the gyroscopic inertia gradually disappears; the rotor axle begins to wobble and ultimately takes up any convenient position. Rotors with a high speed and

a concentration of mass toward the rim of the wheel display the strongest gyroscopic inertia. It is thus apparent that gyroscopic inertia depends on the angular velocity and the momentum of inertia of the rotor, or on its angular momentum. The rotor wheel is subject to the laws of rotational motion and inertia in that a freely rotating body will maintain a fixed direction in space, and the rotor tends to preserve its angular momentum, or spinning action, unless acted on by some external force.

The consequence of gyroscopic inertia is that to the observer on Earth the spin axis of a gyroscope makes an apparent movement over a period of time, although this apparent motion merely reflects the revolution of the Earth about its axis. There is one exception to this, that when the spin axis points toward the polar star, there is no movement of the spin axis with respect to the observer's surroundings, as the axis is parallel to the Earth's axis and points toward the celestial poles. This apparent movement is shown in Figure 2, in which, at position 1, the spin axis is parallel to the horizontal plane and the end of the spin axis, marked A, points due north. As the direction of the Earth's rotation is counterclockwise when seen from above the North Pole, the relative direction of the A-end will change through northeast, east, southeast, south (position 5), etc., and this clockwise movement will continue until, at the end of one period of rotation of the Earth (23 hours 56 minutes) the rotor and spin axis revert to their original position with respect to the observer on the Earth's surface. While this is taking place, the A-end is apparently tilting upward between positions 1 and 5 and tilting downward between positions 5 and 1. The change in azimuth (direction) of the spin axis is often referred to as "drifting"; sometimes "tilting" and "drifting" are collectively called "apparent wander."

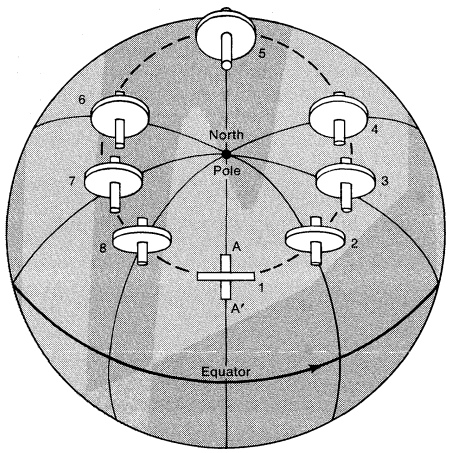


Figure 2: Apparent movement of the spin axis of a gyroscope

From W. Burger and A. Corbet, *Ship Stabilizers, Their Design and Operation in Correcting the Rolling of Ships* (1966); Pergamon Press Limited

If, while the rotor of a three-frame gyroscope is spinning, a slight vertical downward or upward pressure is applied to the horizontal gimbal ring at A or A′, the rotor axle will move at right angles in a horizontal plane. But no movement will take place in the vertical plane. Similarly if a sideways pressure is applied at the same point, the rotor axle will tilt upward or downward. This second property is called "precession." A precession or angular velocity in the horizontal plane is caused by the application of a couple—*i.e.,* parallel forces equal and opposite, in the vertical plane perpendicular to that of the rotor wheel. Precession is the tendency of the rotor's axis to move at right angles to any perpendicular force applied to it.

Three-frame gyroscopes. The unrestrained or "free" three-frame gyroscope has little practical use, because its spin axis is subject to tilting and drifting owing to the rotation of the Earth. In the controlled state it is widely used. The term control of a gyroscope implies that the spin axis, by small continuous or intermittent applications of torque (twisting force), is made to precess so that it oscillates around a mark fixed in relation to coordinates on the Earth rather than in relation to space.

Controlled gyroscopes fall into three categories: north-seeking, directional, and gyrovertical. The north-seeking gyro is used for marine gyrocompasses. In the settling (or normal) position the spin axis is kept horizontal and in the plane of a meridian. The directional gyroscope is used in aircraft and is sometimes called a self-levelling free gyroscope corrected for drift. With its spin axis horizontal it has directional properties but does not automatically seek the meridian plane. The gyrovertical has its spin axis vertical and is used to detect and measure angles of roll and pitch.

These types of three-frame gyroscopes are called displacement gyroscopes because they can measure angular displacements between the framework in which they are mounted and a fixed reference direction—the rotor axis.

Two-frame gyroscopes. The following simulated experiments conducted on the two-frame gyro such as that shown in Figure 1 illustrate the basis of important applications.

If, with the rotor spinning and the spin axis in the horizontal plane, the base is rotated uniformly in the horizontal plane, a definite resistance owing to gyroscopic inertia will be felt. At the same time, the spin axis will begin to precess in the vertical plane and will continue to do so until the axis is vertical and all gyroscopic inertia disappears. If the experiment is then repeated as before, except that while the base is being turned in the horizontal plane, the precessional movement of the spin axis is stopped by the application of force to the end of the axle where it terminates in the gimbal ring, the resistance to the turning motion of the hand due to gyroscopic inertia will cease to exist. In effect, the precession process will have been reversed. A vertical downward force applied to the end of the rotor axle, then, introduces a torque that makes the base precess at the same rate and in the same direction as the turning movement of the hand. The quicker the base is turned, the greater the force that must be exerted on the axle to stop the precession. Two important conclusions may be drawn from this experiment: (1) There is resistance to the turning motion of the base if, and only if, the spin axis precesses. (2) The force needed to stop the precession is directly proportional to the rate of turning of the base. This force can be exerted by a spring arrangement in which the gyroscope (Figure 3, top) measures the rate of change of azimuth and is used in aircraft and ships as a "rate-of-turn indicator."

The gyroscope illustrated in Figure 3, bottom, is used on ships to measure the rate of roll; *i.e.,* the angular roll velocity. The spin axis is positioned at right angles to the fore-and-aft line and the rate of roll is measured about this line.

These gyroscopes are called velocity or rate gyroscopes as distinct from "displacement" gyroscopes. The sensitive or input axis of a rate gyroscope is at right angles to its spin axis, while with a displacement gyroscope the spin axis is directly equivalent to the sensitive or input axis. A north rate gyroscope combined with a north displacement gyroscope, therefore, have their spin axes at right angles to each other.

A wide variety of gyroscopic devices have been developed. Some of the more familiar types are discussed here.

Stabilizer for ships. The main components of a ship stabilizer are a set of fins and the gyroscopes. The fins protrude from the ship's hull and are so operated that the forward motion of the ship produces a tilt in one direction on one fin and in the opposite direction on the other fin. When properly controlled, therefore, these fins oppose the rolling motion. The gyroscopes sense the vertical angular displacement and the roll velocity and provide the proper control for the fins.

Inertial navigation systems. Neither position nor velocity can be sensed directly by an inertial system. An acceleration (change of velocity), however, can be detected by an accelerometer and this can be used to determine the position of a ship, aircraft, or space vehicle. Basically this navigational system comprises three components: the platform, the gyroscopic frame, and the computer.

The accelerometers, mounted with their input axes mutually at right angles, are carried

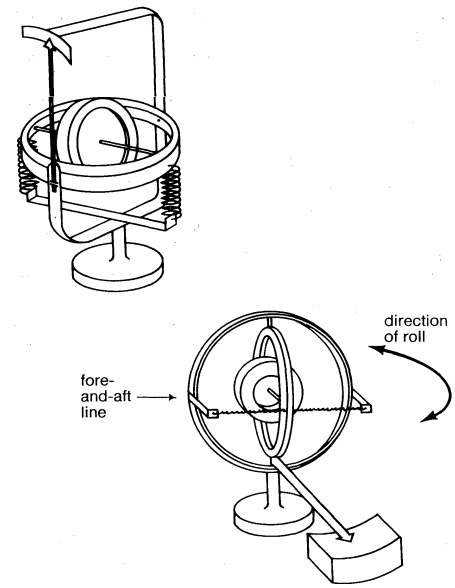


Figure 3: *Rate gyroscopes*
(Top) Velocity gyro for measuring rate of turn; (bottom) velocity gyro for measuring rate of roll

From W. Burger and A. Corbet, *Ship Stabilizers, Their Design and Operation in Correcting the Rolling of Ships* (1966); Pergamon Press Limited

on a platform. Two accelerometers measure acceleration in the horizontal plane—the requirement for surface navigation. For space navigation an additional accelerometer measures acceleration in the vertical plane. Each of the acceleration signals can be converted into distance travelled by determining, first, the total change in velocity which, added to the known initial velocity, gives the vehicle velocity; and, second, the total change in position that, added to the known initial position, yields the present vehicle position.

The gyroscopic frame is responsible for the stabilization of the platform. Three rate gyroscopes are fitted in the frame with their input axes mutually perpendicular. Two of the gyroscopes provide the horizontal alignment of the platform—an essential requirement to eliminate the influence of accelerations due to gravity—while the third is responsible for the north–south alignment. Pitch, roll, and yaw are detected by the three gyroscope input axes. The gimbal deflection of each of the gyroscopes is converted into a signal voltage that, when amplified, drives a servomotor which, via a gear train, rotates the frame back to its original position.

Tilting and drifting due to the Earth's rotational movement (Figure 2) are also detected by the gyroscopic frame. If the platform is to

be kept horizontal and north–south stabilized, torque signals must be applied to the roll and pitch servomotors to offset the precession caused by tilting, as well as to the azimuth servomotor to eliminate the precession caused by drifting.

The rate gyroscopes are not spring-restrained. Instead, "flotation gyroscopes" in which the precession is opposed by the viscous drag of a liquid are employed. The opposing torque is therefore proportional to the precession rate, instead of the precession displacement, as in a spring-restrained gyroscope.

The computer performs the necessary calculations. Specifically, it applies certain corrections to the acceleration; integrates acceleration to velocity and velocity to distance; computes latitude and longitude; and converts geocentric latitudes into geographic latitudes. If the inertial system is used for inertial guidance in space navigation, then the computer also compares the vehicle's position with the destination or target position to provide steering commands and compares the vehicle's velocity vector (both direction and magnitude) with the programmed velocity vector to provide rocket steering and engine cutoff commands.

Stabilized platforms and gunsights. The inertial type of platform is extremely small and must be stabilized to an extraordinary degree of precision, but the method of stabilization used for gun platforms is essentially the same. The gyroscopes that detect platform displacement are not as accurate as the flotation type.

The gyroscopic gunsight revolutionized aerial gunnery. The sight fitted on the gun contains a rate gyroscope capable of measuring angular velocities in two planes at right angles to each other. The gyroscope sight can be thought of as the three-frame gyroscope shown in Figure 1, top, constrained by horizontal and vertical springs to the inner and outer gimbal, respectively. Instead of a mechanical spring arrangement, variable-strength magnetic fields are used to constrain the rotor axle in azimuth and elevation. The field coils for producing the horizontal component of this magnetic field are coupled to the range finder. The current through the vertical field coils is adjusted so that the field depends on the drop of the projectiles due to gravity. The sensitivity of the gyroscope in the horizontal plane is a function of the sighting range; in the vertical it is a function of the gravity drop. In operating this gunsight, often called a "predictor" sight, the gunner holds the image of a central dot over the target while the gun is automatically aimed by the gyroscope at the place where the target will be at the expiration of the time of flight of its projectile.

Aircraft instruments. The three primary gyroscopic instruments fitted to the flight panel are a rate-of-turn indicator (*see* above), a directional gyroscope, and an artificial horizon. Such gyroscopes may be driven by electric motors or by air jets.

The directional gyroscope forms a standard reference for the pilot and navigator. It is a three-frame gyroscope with its spin axis in the horizontal plane. As soon as tilt develops, a switch is closed between the gyroscope housing and the vertical gimbal ring and a motor introduces a torque in the horizontal plane that causes the gyroscope to precess back toward the horizontal.

The artificial horizon displays the rolling and pitching motion of the aircraft. It consists basically of a three-frame gyroscope with its spin axis vertical and automatic correcting devices to counteract the apparent motion of the spin axis around the celestial pole and any other random precessions.

Other applications. The gyroscope principle has been utilized in many other applications, such as the gyrocompass and gyropilot, and in nonrotating gyroscope devices.

A compensated magnetic compass, free from external accelerations, indicates magnetic north, which varies from true north from place to place on the Earth's surface. A gyrocompass, however, when properly adjusted, can be made to indicate true north. The marine gyrocompass is a three-frame gyroscope with its spin axis horizontal. To achieve the north-seeking and actual location (or meridian-settling) properties of a gyroscope, use is made of the tilting effect of the spin axis when it is not pointing true north. As soon as tilt develops, a pendulum type device introduces torques that precess the spin axis toward the meridian, causing it to describe a spiral with an ever-decreasing radius. When stabilized the spin axis is maintained in the meridian plane by a precession equal but opposite to the drift at the particular latitude. When there is no tilting effect the marine gyrocompass will lose its directional properties and become useless. This is the case at the poles and also when a vehicle moves due west with a speed equal to the surface speed of the Earth. Because the latter condition can easily exist in an aircraft in the middle and upper latitudes, it cannot be used for air navigation.

Aircraft gyrocompasses are based on automatically monitored directional gyroscopes in which the monitoring device senses the direction of the meridian and ensures that the gyroscope axis is maintained in this direction. The monitoring device consists of a magnetic sensing unit, called the flux valve, and allowance is made for variation in the direction of the Earth's magnetic field.

The gyropilot, commonly called an automatic pilot (*q.v.*), consists basically of three devices, each of which detects disturbances of the aircraft in one plane and corrects for these disturbances by moving the appropriate control: the rudder control for azimuth and sudden change in heading (yaw) disturbances, aileron control for roll disturbance, and elevator control for pitch disturbance. In modern gyropilots rate detection forms the principal reference and displacement detection plays a secondary role. In such designs yaw disturbance is detected by a rate gyroscope and the change in heading is detected by the associated gyrocompass. The two signals are added electronically and cause corrective rudder control to be applied to the rudder servomotor. The roll disturbance is detected by a roll rate gyroscope and by a roll angle pendulum, which senses displacement. The aileron servo applies corrective action. Pitch disturbance is detected by a pitch rate gyroscope and a pitch pendulum. The elevator servo applies corrective action.

Extensive use is made of two-frame gyroscopes to measure a vehicle's rate of turn. Rate gyroscopes are also mounted on theodolites used for orientation of field artillery and for surveying. Theodolites, mounted on gyrocompasses, are used in underground mine exploration, since magnetic compasses would be disturbed by metal deposits. Vertical three-frame gyroscopes with pen recorder attachments often are used to analyze rolling and pitching movements of ships and rocking motions of trains.

Gythium (Greece): *see* Yíthion.

Gyulafehérvár (Romania): *see* Alba Iulia.

H I region, also spelled HI REGION, in astronomy, interstellar matter composed of neutral hydrogen atoms. Most of the matter between the stars in the Milky Way Galaxy, to which the Earth belongs, as well as in other spiral galaxies, occurs in the form of relatively cold, neutral hydrogen gas with a temperature of only about 100 K and a density of approximately one atom per cubic cm. There also exist cold compact H I clouds with a density of at least 10 particles per cubic cm. H I clouds are easily detectable at radio wavelengths, because they emit a characteristic energy at a wavelength of 21 cm (*see* 21-centimetre radiation).

H II region, also spelled HII REGION, in astronomy, interstellar matter consisting of ionized hydrogen atoms. Such regions occur as hot, ionized gaseous clouds, sometimes called emission nebulae. The energy that is responsible for ionizing and heating the hydrogen in an emission nebula comes from a central star that has a surface temperature in excess of 20,000 K. The density of these clouds normally ranges from 10 to 1,000 particles per cubic cm; their temperature is about 10,000 K. Some electrons and protons in the ionized gas recombine and form neutral hydrogen atoms. Such a process results in the emission of energy at specific wavelengths, the most prominent of which are the hydrogen Balmer lines in the visible part of the electromagnetic spectrum. H II regions can emit visible light. The Orion Nebula (*q.v.*) is one of the most conspicuous H II regions in the sky.

H-bomb (hydrogen bomb): *see* thermonuclear bomb.

Ha, also called ABAHA, or WAHA, a Bantu-speaking people belonging to the Interlacustrine Bantu ethnolinguistic family who live in western Tanzania bordering on Lake Tanganyika. Their country, which they call Buha, comprises grasslands and open woodlands. Agriculture is their primary economic activity. Sorghum, millet, corn (maize), cassava, yams, peanuts (groundnuts), and other crops were cultivated by hoe techniques until efforts were made by the Tanzanian government to introduce plow agriculture. Cattle are raised mostly in the southwestern grasslands of Buha; elsewhere there is less water and problems with tsetse flies. For the Ha, as with a number of peoples of East Africa, cattle are vital as the gifts that help establish social ties at marriage or on other occasions. Goats and other livestock are also raised.

The Ha reside in dispersed homesteads, normally as an extended family with a few generations of related males at its core. On a larger scale Buha traditionally existed as six independent kingdoms, called Buyunga, Muhambwe, Heru, Luguru (Kunkanda), Bushingo, and Bujiji (Nkalinzi). Since about the 18th century a small number—about 2 percent—of Tutsi people have lived among the Ha. The Tutsi, the well-known East African pastoralists, have formed an aristocratic ruling class. At the same time the two groups substantially share language and culture and at times may have intermarried.

The Ha (and Tutsi) recognize Imana as their supreme being and emphasize the creative power of this deity. The spirits of ancestors influence the fortunes of the Ha, and thus ancestral shrines and the ancestral cult are important. Nature spirits are thought to dwell in the fields and other parts of the countryside. Christian missionary activity among the Ha has included that of Roman Catholics, Anglicans, Lutherans, Pentecostals, and Seventh Day Adventists.

The Ha, who claim to have lived in Buha indefinitely into the past, were contacted and described by Arab travelers in the 19th century; by the end of the century several European explorers and missionaries had made brief visits. For some years up to the end of World War I this area was under a tenuous German colonial authority. An invasion of troops from the former Belgian Congo (now Zaire) was followed by the British, who reinforced the system of indirect rule that had been established by the Germans. The Ha, nevertheless, could not be forced to provide labour for the British during World War II, and the British subsequently introduced a system of regulation involving taxes, fines, and salaries. Since independence the Tanzanian government has discouraged political organization based on independent kingdoms and ethnic distinctions. The Ha numbered about 800,000 in the late 20th century.

Ha-erh-pin (China): *see* Harbin.

Ha-Gadah Ha-Ma'Aravit: *see* West Bank.

Ha-Galil (Israel): *see* Galilee.

Ha Giang, town, northern Vietnam. The town lies along the Lo River about 215 miles (350 km) northwest of Hanoi. It is a market centre in a forested mountainous region about 13 miles (20 km) southeast of the China–Vietnam border. The area in which Ha Giang is situated produces much of the tea grown in northern Vietnam and also produces some paddy rice, together with corn (maize). The dense forests in the area provide medicinal plants as well as significant quantities of lumber. The Tay, Meo, and Yao ethnic minority groups comprise part of the population of both the town and the surrounding area.

Ha-gra (Jewish scholar): *see* Elijah ben Solomon.

ha-Kotel ha-Ma'aravi (Jordan): *see* Western Wall.

ha-Levi, Isaac ben Moses: *see* Duran, Profiat.

ha-Levi, Judah (Jewish poet): *see* Judah ha-Levi.

Ha-mi, Pinyin HAMI, Uighur QOMUL, city and oasis in eastern Uighur autonomous *ch'ü* (region) of Sinkiang, China. An important stage on the roads from Kansu province into Central Asia and to the west, Ha-mi was known to the Chinese in early times as I-wu, the name Ha-mi being the Chinese rendering of the Mongolian version (Khamil) of the Uighur name for the city. The Chinese occupied the oasis in early times, when they pursued an expansionist policy in western Asia. During the Later Han dynasty it was temporarily occupied in AD 73. It was again temporarily occupied in 610 during the Sui dynasty and yet again during the T'ang dynasty after 630, when it became the seat of a regular prefecture, under the name I-chou, remaining under Chinese domination until 763, when the Tibetans overran the Chinese Northwest. In the 9th century it came under the rule of the Uighurs and in the 13th century came under Mongol domination. After the Mongol withdrawal it became one of the various small Uighur states and in 1473 was annexed by its neighbour, the sultanate of Turfan. In the late 16th and 17th centuries it came under the control of the Dzungars. From 1698 onward, the Ch'ing dynasty, embroiled with the Dzungars, used it as a base for their campaigns and incorporated it into their empire. It was badly damaged, like most of Sinkiang, in the Muslim Rebellion of 1860–70. Since 1949 Ha-mi has been provided with both rail and highway communications with the rest of China. A coalfield nearby produces coal to supply industry in Wu-lu-mu-ch'i (Urumchi). In the late 1950s Ha-mi became a major iron and steel producer. Pop. (1985 est.) 141,100.

ha-Sharon (Israel): *see* Sharon, Plain of.

Haabai Group (Tonga, Pacific Ocean): *see* Ha'apai Group.

Haad Yai (Thailand): *see* Hat Yai.

Haag, Den (The Netherlands): *see* Hague, The.

Haaibra Wahibra (Egyptian king): *see* Apries.

Haakon, also spelled HÅKON, name of Norwegian kings grouped below chronologically and indicated by the symbol •.

• **Haakon I** ADALSTEINSFOSTRE, byname HAAKON THE GOOD, Norwegian HÅKON DEN GODE (b. *c.* 920—d. *c.* 961, Fitjar, Nor.), Norwegian king and one of the most eminent Scandinavian rulers of his time. He fostered the growth of governmental institutions but failed in his attempt to Christianize the lesser Norwegian chieftains.

Haakon, the youngest son of Harald I Fairhair, was brought up at the court of the English king Athelstan. At the age of 15, after his father died, he returned to Norway and deposed his half brother Erik Bloodax (reigned *c.* 930–935), who had earned his name by murdering seven of his eight half brothers.

Haakon had been reared as a Christian in England, and he brought English missionaries to Norway and built a few churches; but he was resisted in his efforts at Christianization by the Norwegian chieftains. He had greater success in compelling each coastal district to provide warships for his fleet and in helping the three great law districts to develop codes of law and administration. Meanwhile, with Danish aid, Erik Bloodax's sons, including Haakon's successor, Harald II Graycloak, who had all taken refuge in Denmark, launched raids on Norway against Haakon's forces and eventually killed him in battle on the island of Fitjar, in southwestern Norway. His reign was dated as *c.* 933–960 by medieval historians but later was more reliably approximated as *c.* 946–961.

• **Haakon II** SIGURDSSON, byname HAAKON BROADSHOULDERED, Norwegian HÅKON HERDEBREID (b. *c.* 1147—d. 1162), king of Norway (1157–62), illegitimate son of Sigurd Munn (d. 1155).

On the death of his uncle King Eystein II in 1157, the 10-year-old Haakon received the support of Eystein's partisans against the rival king, Inge I, whom they finally defeated and killed in 1161. In 1162, however, the supporters of another pretender, Magnus Erlingsson, defeated the forces of the boy-king Haakon and killed him.

• **Haakon III** SVERRESSON, Norwegian HÅKON SVERRESSON (d. 1204), king of Norway (1202–04), the illegitimate son of King Sverre Sigurdsson.

During his short reign he tried to heal the breach between the crown and the church, so that exiled bishops returned to their sees. It was said that the sickness which caused his sudden death was the result of poison put into his drink at the instigation of his Swedish stepmother, Margaret.

• **Haakon IV** HAAKONSSON, byname HAAKON THE OLD, Norwegian HÅKON HÅKONSSON, or HÅKON DEN GAMLE (b. 1204, Norway—d. December 1263, Orkney Islands), king of Norway (1217–63) who consolidated the power of the monarchy, patronized the arts, and established Norwegian sovereignty over Greenland and Iceland. His reign is considered the beginning of the "golden age" (1217–1319) in medieval Norwegian history.

Acknowledged as the illegitimate posthumous son of Haakon III and the grandson of Sverrir of Norway, Haakon was reared at the court of Inge II and, on Inge's death in 1217, was proclaimed king by the Birchlegs, the adherents of Sverrir. Doubts of his pa-

ternity, especially by the ecclesiastical leaders, were allayed after his mother passed through an ordeal of hot irons (1218). The early years of his reign were disturbed by uprisings in the eastern region of the country by workers and wealthier freeholders, who opposed domination by landed aristocrats.

After the insurrections had been crushed, Haakon's elder kinsman Earl Skuli Baardsson, who had chiefly conducted the government, attempted to gain sovereignty for himself. When Haakon's efforts to conciliate him failed, Skuli revolted openly and proclaimed himself king but was quickly defeated and killed by Haakon's forces (1240). In 1247 the king was crowned, in a ceremony then rare in Norway, by the pope's legate.

Haakon improved the efficiency of the royal administration and also gained passage of laws prohibiting blood feuds and regulating church–state relations as well as the succession to the throne. His treaty with Henry III of England in 1217 was the earliest commercial treaty known in either nation. He also concluded a commercial treaty with the important north German trading city of Lübeck (1250) and signed a Russo-Norwegian treaty defining the northern boundary between the two nations. By acquiring sovereignty over Iceland and Greenland in 1261–62, he attained the greatest extension of the Norwegian Empire. The two colonies agreed to accept Norwegian rule and taxation in return for a trade guarantee and maintenance of civil order. In 1263 Haakon sailed to the Scottish Isles to protect the Norwegian possessions of the Isle of Man and the Hebrides against a threatened attack by Alexander III of Scotland. After a few skirmishes, Haakon retired to the Orkney Islands, where he died.

Also known as a patron of the arts, Haakon sponsored a Norse version of the medieval romance of Tristan and Iseult; many other French romances were published in Norse versions during his reign. A biography, *Hákonar saga Hákonarsonar,* was written after his death by the Icelandic chronicler Sturla Thórdarson (d. 1284).

• **Haakon V** MAGNUSSON, byname HAAKON MAGNUSSON THE ELDER, Norwegian HÅKON MAGNUSSON DEN ELDRE (b. 1270, Norway—d. May 8, 1319, Norway), king of Norway (1299–1319) whose anti-English foreign policy paved the way for the commercial domination of Norway by north German traders of the Hanseatic League. His reign marked the end of the "golden age" in medieval Norwegian history.

The younger son of Magnus VI Lawmender, Haakon succeeded his older brother, Erik II Magnusson, in 1299. Determined to reduce the power of the higher nobles and clerics, which had increased during Erik's reign, Haakon abolished the title of baron in 1308, removed members of the aristocracy from the royal council, and regained the right to appoint selected priests. He built several royal fortresses, most notably the one at Akershus (in use until 1815). His shift of the centre of the government eastward from the North Sea ports reflected the decline in contacts with Norway's western colonies and in royal revenues from trade.

Haakon continued the preferential treatment given to Hanseatic traders by his brother Erik (reigned 1280–99), thus arousing the resentment of English merchants. He complemented his anti-English trade policy by siding with the Scots in their revolt against English rule. He also was embroiled in intermittent wars against Denmark and Sweden throughout his reign.

Haakon and especially his wife, Euphemia, were enthusiastic patrons of the arts and commissioned the writing and translation of many chivalric romances. Because he had no sons, he revised the law of succession, enabling Magnus VII Eriksson, the son of his daughter Ingeborg and her husband, the Swedish prince Erik, to succeed him.

• **Haakon VI** MAGNUSSON, byname HAAKON MAGNUSSON THE YOUNGER, Norwegian HÅKON MAGNUSSON DEN YNGRE (b. 1339, Norway—d. 1380, Norway), king of Norway (1355–80) whose marriage to Margaret, daughter of the Danish king Valdemar IV, in 1363 paved the way for the eventual union (1397) of the three major Scandinavian nations—Denmark, Norway, and Sweden—the Kalmar Union. Haakon was deeply embroiled throughout his reign in political conflicts with Sweden, Denmark, and the cities of the north German trading confederation, the Hanseatic League.

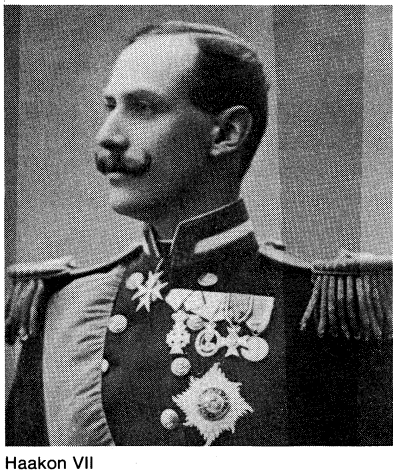
The younger son of Magnus VII Eriksson, king of Norway and Sweden, Haakon was named his father's successor in Norway in 1343 and became king there in 1355, five years after the nation had been devastated by the Black Death, probably bubonic plague. The plague had killed large numbers of the nobility, clergy, and civil servants, weakening the power of both the aristocracy and the royal administration. The Swedish nobility remained strong, however, and, under the leadership of Haakon's brother Erik, rebelled against the rule of Magnus VII. Haakon came to his father's aid and was named joint king of Sweden in 1362 after Erik's death.

Haakon again assisted Magnus against the rebellious Swedish nobles in 1364, but the two kings were defeated, and Haakon retreated while his father was taken prisoner. A temporary agreement (1370) with the leaders of the Hanseatic League, who had launched a war against Norway and Denmark in 1367, freed him to rescue his father in 1371. He conceded special trading privileges to the Hanseatic merchants in a final peace treaty (1376), which helped secure the right to the Danish throne for his son Olaf V (1370–87) by placating Danish magnates fearful of Hanseatic intervention. Olaf also succeeded to the Norwegian throne on Haakon's death (1380), but he died in 1387 at the age of 17, leaving his mother (Haakon's widow), Margaret, to rule in both Denmark and Norway.

• **Haakon VII**, original name CHRISTIAN FREDERIK CARL GEORG VALDEMAR AXEL (b. Aug. 3, 1872, Charlottenlund, Den.—d. Sept. 21, 1957, Oslo), first king of Norway following the restoration of that country's independence in 1905.

The second son of the future king Frederick VIII of Denmark, he was originally called Prince Charles (Carl) of Denmark. He was trained for a naval career. In 1896 he married Princess Maud, daughter of England's Edward VII. He was offered the Norwegian crown in 1905, after the dissolution of the Swedish–Norwegian union, and he agreed to accept it only if he were approved in a Norwegian plebiscite. Overwhelmingly approved on Nov. 12, 1905, he was elected king by the Storting (parliament) on November 18. He took the Old Norse name of Haakon.

Haakon VII reigned during two world wars. A champion of democracy, he fled to England during the German invasion of Norway in 1940. His refusal to submit when a German-pressured Storting body asked him to abdicate inspired the Norwegians to resist the German occupation. Haakon VII returned to Norway in 1945 and continued in the high esteem of his people until his death.



Haakon VII
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Haakon SIGURDSSON, byname HAAKON THE GREAT, Norwegian HÅKON DEN STORE (d. 995), Norwegian noble who defeated Harald II Graycloak, becoming the chief ruler (*c.* 970) of Norway; he later extended his rule over the greater part of the country. He resisted an attempt by the Danish king Harald III Bluetooth to Christianize Norway and was the last non-Christian Norwegian ruler.

The son of the Norwegian earl of Lade, who was killed by Harald II Graycloak, Haakon was exiled to Denmark after his father's death. After overthrowing his father's murderer with the aid of Harald Bluetooth, he became sovereign in the west, while Harald Bluetooth annexed southeastern Norway. Haakon supported Bluetooth against the Holy Roman emperor Otto II in 974 but revolted against Bluetooth's efforts to impose Christianity in Norway, subsequently expanding his own sovereignty in the western and northern regions of the country.

Haakon's advocacy of the ancient Norse religion gained him great popularity among the non-Christian Norwegian chieftains. His arrogance toward the end of his life, however, cost him the support of his followers, and he was killed by his own men in 995. He was immediately succeeded by Olaf I Tryggvason, who had invaded Norway earlier that year.

Haanja, morainal region of southeastern Estonian Soviet Socialist Republic. The moraine is steep on the north but slopes more gently toward the south, extending slightly into Latvia. Deeply incised valleys separate the hills, and there are many lakes. Haanja is the highest and most irregular part of Estonia. It reaches an elevation of 1,042 feet (318 m) at Mount Muna, the highest point in the republic; other high points are Mount Välla (976 feet [297 m]) and Mount Kerekunna (971 feet [296 m]). The natural vegetation of the region is field and meadow. Haanja is now covered with woods and farms, and flax is an important traditional crop. Gypsum deposits are present at the southeastern edge of the moraine.

Ha'apai Group, also spelled HAABAI GROUP, central island cluster of Tonga, in the South Pacific Ocean about 2,000 miles (3,000 km) northeast of Sydney. Comprising 36 coral and volcanic islands, the group has a total land area of 43 square miles (110 square km), dispersed over about 5,000 square miles (13,000 square km). The administrative headquarters and principal port in the group is Pangai, which is situated on the west coast of Lifuka, a crescent-shaped coral island (4.4 square miles [11.4 square km]) that was once the seat of the Tongan kings. Tofua, the group's largest island (18 square miles [47 square km]), rises to Lofia (1,700 feet [500 m]), an active volcano with a 3-square-mile (8-square-

kilometre) crater lake; for fear of an eruption, the Tongan king George Tupou I ordered the island evacuated in 1854, and few people live there today. Uninhabited, well-wooded Kao island (5 square miles [13 square km]) is a volcanic cone rising to 3,380 feet (1,030 m) to form the highest point in Tonga. Nomuka is the centre of a small island cluster within the larger Ha'apai Group. To the southwest of the main group lie the volcanic islets of Hunga Tonga (rising to 490 feet [150 m]) and Hunga Ha'apai (400 feet [120 m]); both have guano deposits that cannot be worked because of the lack of suitable harbours. The well-known events of the mutiny of the HMS *Bounty* occurred in 1789 south of Tofua. Pop. (1986) 8,979.

Haardt Mountains, also called HARDT MOUNTAINS, mountain range in Rheinland-Pfalz *Land* (state), southwestern Germany. They comprise the eastern part of the Pfälzer Forest Mountains and lie west of the Rhine River basin, extending from the French border to a point about 20 miles (30 km) south of Mainz. Their densely forested slopes rise to 2,208 feet (673 m) in Mount Kalmit. Geologically the Haardt Mountains are a continuation of the Vosges Mountains to the south. With many vineyards and orchards, the region is a centre for winemaking and tourism. Cities include Neustadt an der Weinstrasse and Bad Dürkheim.

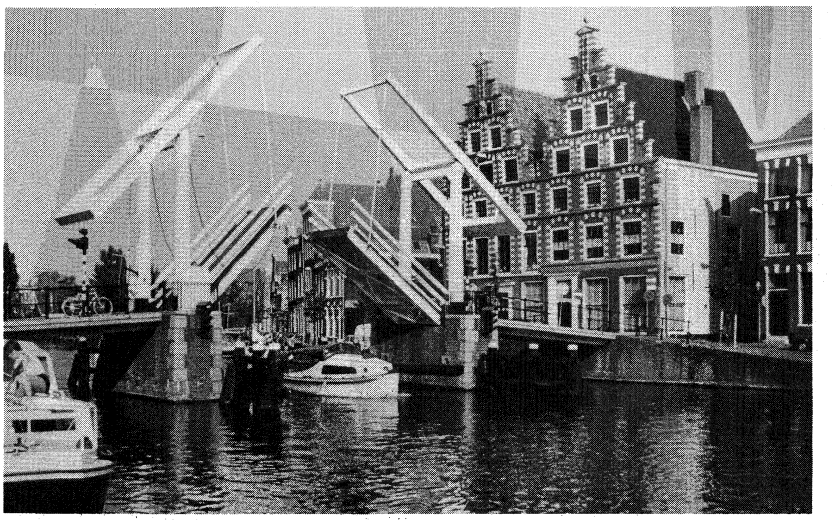
Ha'aretz (Hebrew: "The Land"), newspaper published in Tel Aviv, Israel's oldest daily and generally considered the country's highest quality newspaper.

Founded in Jerusalem in 1919 as an independent liberal paper in the tradition of Russian-Hebrew journalism, *Ha'aretz* moved to Tel Aviv in 1923. Bought by Zalman Schocken in 1937, the newspaper was edited and published by his son, Gershom, from 1939.

Ha'aretz's influence and prestige are second to none in Israel, and it has maintained an active independent stance, attacking government and societal abuses throughout its history. Its readers include the leaders of every sector of Israeli society. The paper is noted for its balanced and sober approach to national, international, and regional news; its cosmopolitan flavour; and its general lack of bias in reporting. *Ha'aretz* is one of only a few Israeli daily newspapers not aligned with a political party and is respected for its independence. It has foreign correspondents in major world capitals.

Haarlem, *gemeente* (commune) and capital, Noordholland *provincie,* western Netherlands. It lies along the Spaarne River, 4.5 miles (7 km) from the North Sea, just west of Amsterdam. Haarlem was mentioned in the 10th century and by the 12th century had become a fortified town and the residence of the counts of Holland. It was chartered in 1245 and was ravaged in 1346 and 1351 during the civil wars in Holland. In 1492 it was captured by insurgent peasants of North Holland, and, after being retaken by regular troops, it was deprived of its privileges. In the mainly Protestant rising against Spain (1572), it endured seven months of siege until starvation forced its surrender to the Duke de Alba's son, Frederick, who exacted terrible vengeance. Recaptured (1577) by William of Orange and incorporated in the United Netherlands, it entered a period of prosperity that reached its peak in the 17th century, when it was a refuge for Huguenots and an artistic centre. The Haarlem school of painting included Frans Hals, Salomon van Ruysdael, Jacob van Ruisdael, Philips Wouwerman, and Adriaen and Isaac van Ostade. The important sculptor Claus Sluter was born in Haarlem, and Laurens Coster, also of Haarlem, was one of the first medieval printers to use movable type.

Haarlem is the seat of Roman Catholic (1559) and Jansenist dioceses and of a court of law. The centre of Haarlem is formed by the old town, which has numerous canals and gabled houses. The Amsterdam Gate, moats, and some earthworks remain of the old town's medieval fortifications. In the market square are the town hall (13th century, with 17th-century additions); the Meat Market, or Vleeshal (1603); and the Great Church (St. Bavokerk, or St. Bavo's Cathedral; 1397–1496).



The Spaarne River in Haarlem, Netherlands
Beeldbank and Uitgeefprojekten, International Picture Service

The Great Church has a 262-foot- (80-metre-) high tower and contains notable choir screens and stalls, the tomb of Frans Hals, and a famous pipe organ made by Christian Müller in 1738. Among the city's other churches are the former chapel of the Béguinage (the oldest in the city); the Bakenesser Church, which has a delicate tower built in 1530; the New Church (Nieuwe Kerk), built in the Dutch Baroque style in 1645–49; and the Roman Catholic cathedral (1895–1930). The city's museums include the Frans Hals, with an important collection of Haarlem-school paintings and group portraits by Hals; the Roman Catholic Episcopal Museum; and the Teyler Museum, known for its original Italian 16th-century and Dutch 17th-century drawings and its collection of 19th-century paintings. The Public Library (founded 1596) preserves old manuscripts and incunabula and has a collection of early Dutch literature. The Dutch Society of Sciences (1752) and the Teyler Foundation (1778) are in Haarlem.

The city's early industries (wool weaving and brewing) were replaced in the 17th century by silk, lace, and damask weaving introduced by the Huguenots. The city declined in the 18th century but developed industrially in the late 19th with printing, typefounding, shipbuilding, cocoa and chocolate processing, and the manufacture of machinery, chemicals, and textiles. Since World War II, foreign-owned industries (mostly from the United States) have been located in Haarlem. Horticulture, and especially market gardening, has been widely practiced since the 17th century, and the city, surrounded by flower fields, exports bulbs.

Haarlem is the centre of a residential complex that includes Bloemendaal, Aerdenhout, Bentveld, Heemstede, Overveen, Sant-poort, and the planned community of Schalkwijk. The fashionable Zandvoort beach and the Kennemerduinen National Park (1950) are on the western (North Sea) side. Pop. (1987 est.) *gemeente,* 149,099; (1988 est.) metropolitan area, 214,418.

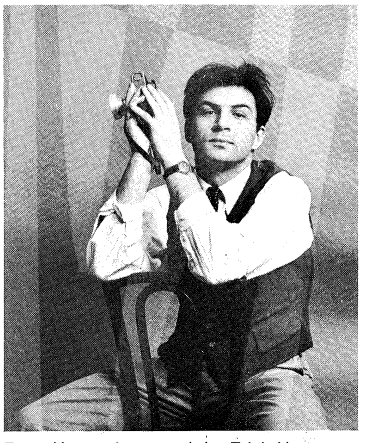
Haarlem, Pieter Claesz van (Dutch painter): *see* Claesz, Pieter.

Haarlem Lake, Dutch HAARLEMMERMEER, polder (area 45,700 acres [18,486 hectares]) coextensive with the *gemeente* (commune) of Haarlemmermeer in Noordholland *provincie,* western Netherlands. Originally, a number of lakes—with a combined area of about 14,000 acres (5,700 hectares) in 1531—were formed into one by successive inundations, and by the 1830s the water area had increased to nearly 45,000 acres (18,200 hectares). Floods frequently threatened the cities of Haarlem and Amsterdam, and a plan to dike and drain the lake with pumps powered by 160 windmills had been proposed by Jan Adriaanszoon Leeghwater as early as 1640. After hurricanes in 1836 carried floodwaters to the gates of Amsterdam and inundated Leiden, a royal commission of inquiry's proposal to drain the lake was approved (1839); reclamation took place between 1840 and 1852. A waterway called the Ring Canal was first dug around the lake in order to receive the water and to accommodate shipping, which the lake had previously carried. Since the water from the lake had no natural outlet, pumping by steam engines began in 1848, and the lake was dry by 1852. The polder area (42,096 acres [17,036 hectares]) recovered from the waters brought in enough money to cover the cost of the enterprise, so that the actual cost to the nation was only the interest on the capital. The soil of the polder is of varied kinds, mainly clay and loam, most of it fertile. Most of the land is arable, with small portions used as pasture.

Haarlemmermeer, *gemeente* (commune), Noordholland *provincie,* The Netherlands, occupying the reclaimed Haarlem Lake, which was drained between 1840 and 1852. There is a network of roads and ditches at right angles within the enclosing canal and dike. The population is concentrated in the villages of Hoofdorp, Nieuw-Vennep, Badhoevedorp, and Zwanenburg, which are situated along the dike and in the polder. There is a polder museum at the Cruquius Pumping Station (operational 1849–1933) near Heemstede, and Amsterdam's airport, Schiphol, is in the northeast. The polder's fertile soils support wheat, beets, potatoes, dairy and stud farming, and horticulture (flowers, bulbs, vegetables). The commune's manufactures include aircraft, steel furniture, machinery, and lifeboats. By the early 1980s much of the polder had become urbanized. Pop. (1986 est.) 87,504.

Haas, Ernst (b. March 2, 1921, Vienna, Austria—d. Sept. 12, 1986, New York, N.Y., U.S.), Austrian-born photojournalist, influential primarily for his innovations in colour photography.

As a youth his interests were divided between medicine and painting, but after World War II he abandoned both in favour of photography. His early photographs were experimentations in abstract light and form, showing the



Ernst Haas, photograph by Erich Hartmann
Erich Hartmann—Magnum

influence of the Swiss photographer Werner Bischof. When in 1947 Haas became a staff photographer for the picture magazine *Heute,* he developed his own photojournalistic style. His first notable photo story, "Returning War Prisoners," led to an invitation to join Magnum Photos, a prestigious international photojournalists' agency. Soon after that, he photographed "The Miracle of Greece," a photo story that gained him an international reputation.

In 1950 Haas moved to New York City, and in 1953 he made the photo-essay, "New York," for *Life.* Although these pictures were the first he had made in colour, Haas used colour so originally that *Life* gave the essay a 24-page spread, an unprecedented length for a colour photo essay. Colour essays on Paris (1955) and Venice (1956) followed and met with similar success. In the essay on Paris, Haas first experimented with the effects of camera motion on colour still photography.

In 1962 Haas was given a one-man show of colour photographs at the Museum of Modern Art in New York City. The following year his first photographic book, *Elements,* was published. These photographs of natural forms show a renewed interest in abstract design. This book was followed by *The Creation* (1971), *In America* (1975), *In Germany* (1977), and *Himalayan Pilgrimage* (1978).

Haas, Walter A. (b. May 11, 1889, San Francisco, Calif., U.S.—d. Dec. 7, 1979, San Francisco), American business executive credited with saving the foundering Levi Strauss & Co., the major manufacturer of "blue jean" denim pants. Haas's efforts after World War II laid the groundwork for the company's dramatic growth during the blue-jean boom of the 1960s and '70s.

Haas's association with Levi Strauss & Co. began in 1914 with his marriage to Elise Stern, whose father Jacob was one of four nephews who had inherited the company from their uncle Levi Strauss, the founder. The company was doing poorly, and the nephews were considering liquidation, but Haas urged otherwise and within two years after joining the firm in 1919 had managed to reverse its fortunes. In 1928 he became president, a post he was to retain until 1955.

Haas's most significant move came in 1946, when he decided to get Levi Strauss out of the wholesale dry-goods business, which then accounted for 75 percent of the company's $8,000,000 annual sales, and concentrate instead on manufacturing. Haas also expanded the company's distribution, diversified its product line, and aimed more products at young people. By the time of his death sales exceeded $2,000,000,000 annually. Haas's family continued to control Levi Strauss, with his sons Walter A., Jr., and Peter serving as chairman and president, respectively.

Haavelmo, Trygve (Magnus) (b. Dec. 13, 1911, Skedsmo, Nor.), Norwegian economist who was a pioneer in what became the field of economic forecasting. He was awarded the 1989 Nobel Memorial Prize in Economic Science.

After the outbreak of World War II, Haavelmo left Norway and delivered his doctoral dissertation, "The Probability Approach in Econometrics," at Harvard University in 1941. Although he had two doctorates from the University of Oslo, his innovative thesis, cited by the Nobel committee for its influence, was first published in 1944 in *Econometrica,* an American periodical. Haavelmo worked at the University of Chicago during the 1940s (where he was also a visiting professor in the late 1950s) before returning to Norway in 1947. He retired from the University of Oslo faculty in 1979, becoming professor emeritus.

Haavelmo's statistical techniques made possible the development of econometric models that predict how a change in one aspect of the economy will affect others; that is, he demonstrated that statistical probability theory could be integrated into economic formulations. His econometrics made possible the predictions regarding the course of national economies and the more accurate formulation of governmental economic policies.

Haavikko, Paavo (b. Jan. 25, 1931, Helsinki), Finnish humanist poet, novelist, and dramatist. His work is modernistic, experimental, and linguistically innovative.

With his first collection of poems, *Tiet etäisyyksiin* (1951; "The Roads That Lead Far Away"), Haavikko demonstrated a rare command of rhythm and image in his virtuoso handling of the language. In his next collection, *Tuuliöinä* (1953; "In Windy Nights"), he uses the wind as the central metaphor for contemporary anxiety and alienation, and in *Synnyinmaa* (1955; "Fatherland") and *Lehdet lehtiä* (1958; "Leaves are leaves") he explores the creative process and finds it is the task of the poet to interpret man's common suffering. His discussion of the art of poetry continues in the complex poems of *Talvipalatsi* (1959; *The Winter Palace*).

In the 1960s Haavikko turned away from the expression of aesthetic concerns and began to incorporate social criticism into his novels and plays. In *Yksityisiä asioita* (1960; "Private Matters"), he castigates the prevailing mentality during the civil war (1918) in Finland. His collected short stories, *Lasi Claudius Civiliksen salaliittolaisten pöydällä* (1964; "The Glass on the Table of the Claudii Civilii Conspirators"), constitute an important social document with stylistic links to the contemporary French new novel, and his collected stage works, *Näytelmät* (1978; "Plays") lean toward the theatre of the absurd. His later works include *Ikuisen rauhan aika* (1981; "Era of Eternal Peace"), *Viisi pientä draamallista tekstiä* (1981; "Five Small Dramatic Texts"), and *Rauta-aika* (1982; "Iron Age").

Hába, Alois (b. June 21, 1893, Vizovice, Moravia, Austria-Hungary [now in Czechoslovakia]—d. Nov. 18, 1973, Prague), Czech composer noted for his experiments with microtonal music.

Hába studied in Prague, Vienna, and Berlin, was influenced by the composer Arnold Schoenberg, and sought to free music from traditional formal and tonal constraints.

A striking innovator and an important teacher and writer, Hába gave enthusiastic support to new music in Czechoslovakia. In 1922 he attended the International Congress of Quarter-Tone Composers, and the following year he was appointed teacher of quarter-tone music at the Prague Conservatory. His *Neue Harmonielehre des diatonischen, chromatischen, Viertel-, Drittel-, Sechstel-, und Zwölftel-Tonsystems* ("New Harmonic Theory of the Diatonic, Chromatic, Fourth-, Third-, Sixth-, and Twelfth-Tone Systems") was published in 1927.

Quarter tones had been used as early as 1849 by the French composer Fromental Halévy, but Hába drew his inspiration from Moravian folk tunes and rhythms, music abounding in microtones. In 1919 he wrote a quarter-tone *String Quartet,* but his earliest mature work using microtones was the *Third String Quartet* (1922). His opera *Matka* (*The Mother*), first performed in 1931, was his crowning achievement; in it he uses nonthematic constructions characteristic of his work as a whole. Such music makes as little use as possible of repetition and variation of distinct melodies and themes. Another athematic opera, *Thy Kingdom Come* (1940), is written in a sixth-tone system.

Hába indicated that athematicism, like microtonality, was suggested to him as a possibility for composition by the sound of Moravian and other folk music. His scope gradually widened as instruments were built to his specifications (*e.g.,* microtonal pianos, harmoniums, trumpets, and clarinets). He also composed extensively in the traditional half-tone system, including several of his quartets (nos. 7, 8, and 9; 1951–52). His other works include chamber pieces, piano and choral pieces, and songs.

Ḥabad, Jewish movement and its doctrine, an offshoot of the religious and social movement known as Ḥasidism; its name derives from the initial letters of three Hebrew words that distinguish and characterize the movement: *ḥokhma* ("wisdom"), *bina* ("intelligence"), and *da'at* ("knowledge"). Ḥabad follows the common Ḥasidic themes of *devequt* ("attachment"), *ḥitlahavut* ("enthusiasm"), and *kawwana* ("devotion"), but it elevates the importance of the intellect in spiritual endeavours. Adherence to divine commandments (Torah) is encouraged, but excessive asceticism is discouraged. The leaders (*tzaddiqim*) of Ḥabad Ḥasidism tend to be teachers and spiritual guides rather than miracle workers. The strongest opposition to Ḥabad was based on the charge that it leaned toward pantheism.

The first leader of Ḥabad was Rabbi Shneur Zalman, a prolific writer of 18th-century Lyady, Russia, whose *Liqquṭe amarim* ("Collections of Sayings")—popularly known as *Tanya* ("There Is a Teaching") from its opening word—contains the theoretical doctrine of the movement and is an interpretation of Kabbala (esoteric Jewish mysticism). In addition, his five-volume version of Joseph Karo's legal code, *Shulḥan 'arukh,* attracted numerous followers and several outstanding leaders.

Shneur's descendants became the spiritual leaders of the Lubavitcher Ḥasidim, who migrated from Lyubavichi in Russia and set up headquarters in New York City. The group is noted for its missionary-like zeal in supporting schools, orphanages, and study groups and for various other activities that foster Jewish religious life in all its manifestations.

Habakkuk, The Book of, also called THE PROPHECY OF HABACUC, the eighth of 12 Old Testament books that bear the names of the Minor Prophets. The book betrays the influence of liturgical forms, suggesting that either Habakkuk was a cult prophet or that those responsible for the final form of the book were cult personnel.

It is difficult to fix the date of the book, but the mention of the Chaldeans as Yahweh's agent (1:6) suggests the period of Chaldean

power following their successful revolt against the Assyrians in 626 BC. A more precise date depends on the identity of "the wicked" and "the righteous" who are mentioned in the book. If "the wicked" are the Assyrians and "the righteous" are the Judaeans, then the book must be dated before 612 BC, when the Assyrian Empire finally fell.

According to this interpretation, Habakkuk announced the eventual collapse of the wicked oppressors (Assyrians) of the people of Judah. In the meantime, he consoled, "the righteous shall live by his faith" (2:4).

Chapter 3, a psalm complete with musical directions, does not appear in the Habakkuk commentary from Qumrān, but there is as yet no convincing reason to deny its authenticity.

Habara (India): *see* Howrah.

Ḥabash, Georges (b. 1925, Lydda, Palestine), Palestinian politician and leader of the Popular Front for the Liberation of Palestine (PFLP).

Ḥabash fled Palestine in 1948 and earned a medical degree at the American University in Beirut. In the early 1950s he was active in the "Youth of Vengeance" group, which advocated violent attacks on traditional Arab governments. Ḥabash founded the militant PFLP after his goal to destroy Israel through Arab unity proved unrealistic following the Arab nations' defeat by Israel in the Six-Day War of 1967. Under the leadership of Ḥabash, the Popular Front staged several airplane hijackings, including that of a U.S. jet blown up in September 1970, which triggered King Hussein's crackdown on Palestinian guerrillas in Jordan.

Ḥabash, a Marxist, visited China in 1970, finding Chinese leaders critical of the PFLP's "foreign operations," and Moscow in 1972. Following the Yom Kippur War of 1973, Ḥabash became the leading voice of the "Rejection Front," four Palestinian groups who opposed any diplomatic settlement to the conflict with Israel. He attacked the "defeatist" attitude of the Palestine Liberation Organization's leadership, whose attempts at reconciliation with King Hussein he sharply criticized. Under his leadership the PFLP successfully organized clandestine cells in the Israeli-occupied West Bank and Gaza. Ḥabash was the target of several assassination attempts, one of which partially paralyzed him.

Consult the INDEX *first*

Ḥabbānīyah, Hawr al-, English LAKE HABBANIYAH, lake in al-Anbār *muḥāfaẓah* (governorate), western Iraq. It is a shallow body of slightly saline water, 54 sq mi (140 sq km) in area, separated from the Euphrates River to the north by the Asibi and Zaban ridges. The lake has been used since antiquity for storing floodwater from the Euphrates; it now provides water for irrigation as well. A barrage at ar-Ramādī, at the lake's northwestern tip, diverts Euphrates water into it, and other channels carry water to a second storage basin, the Abū Dibs depression. During the long period of British military presence in Iraq, there was an important Royal Air Force base just north of the lake.

Habdalah (Jewish ceremony): *see* Havdala.

habeas corpus, an ancient common-law writ, issued by a court or judge directing one who holds another in his custody to produce the body of the person before the court for some specified purpose. Although there have been and are many varieties of the writ, the most important is that used to correct violations of personal liberty by directing judicial inquiry into the legality of a detention. The habeas corpus remedy is recognized in the countries of the Anglo-American legal system but is generally not found in civil-law countries, although some of the latter have adopted comparable procedures.

The origins of the writ cannot be stated with certainty. Before the Magna Carta (1215), a variety of writs performed some of the functions of habeas corpus. During the Middle Ages habeas corpus was employed to bring cases from inferior tribunals into the king's courts. The modern history of the writ as a device for the protection of personal liberty against official authority may be said to date from the reign of Henry VII (1485–1509), when efforts were made to employ it on behalf of persons imprisoned by the Privy Council. By the reign of Charles I, in the 17th century, the writ was fully established as the appropriate process for checking the illegal imprisonment of people by inferior courts or public officials.

Many of the procedures that made for effective assertion of these rights were provided by the Habeas Corpus Act of 1679, which authorized judges to issue the writ when courts were on vacation and provided severe penalties for any judge who refused to comply with it. Its use was expanded during the 19th century to cover those held under private authority. In 1960 legislation was enacted limiting the instances in which habeas corpus could be denied and establishing new lines of appeal.

In the British colonies in North America, by the time of the American Revolution, the rights to habeas corpus were popularly regarded as among the basic protections of individual liberty. The U.S. Constitution guarantees that the privilege "shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it." In England such suspension had occurred during the wars with France at the time of the French Revolution. In the United States, Pres. Abraham Lincoln suspended the writ by executive proclamation at the outbreak of the Civil War in 1861. The presidential act was challenged by Chief Justice Roger Taney who, in the case of *Ex parte Merryman,* vigorously contended that the power of suspension resided only in Congress. Lincoln ignored the order of the court, but the weight of modern opinion appears to support the view that suspension of the writ requires the consent of Congress.

The current uses of habeas corpus in the United States are quite varied. The Supreme Court's liberal interpretation of the constitutional rights of those accused of crime led in the mid-20th century to the filing of many habeas corpus petitions by prisoners, challenging their convictions. A writ frequently is requested on behalf of one in police custody for the purpose of requiring the police to either charge the arrested person with an offense or release him. Habeas corpus proceedings may be employed to obtain release of the accused prior to trial on the ground that the bail set is excessive. On occasion habeas corpus relief has been granted a prisoner who is unlawfully detained after expiration of his sentence. In cases of one arrested on a warrant of extradition, a proceeding in habeas corpus may be instituted to challenge the validity of the warrant.

The writ may also be employed in a wide variety of situations not involving criminal proceedings. Thus competing claims to the custody of a minor may be adjudicated in habeas corpus. One confined to a mental hospital may in some jurisdictions bring about his release by showing at a habeas corpus hearing that he has recovered his sanity.

Habeneck, François-Antoine (b. Jan. 22, 1781, Mézières, Fr.—d. Feb. 8, 1849, Paris), French violinist, conductor, and composer.

Habeneck studied violin first with his father, a military bandsman of German descent, and then with Pierre Baillot at the Paris Conservatory. In 1804 he won the institution's first prize for violin and took a position with the Opéra. Through a series of promotions, he attained the title of *premier chef,* his 22-year tenure covering one of the organization's finest periods. Generally conducting with a violin bow, he premiered works by Rossini, Giacomo Meyerbeer, Fromental Halévy, and Berlioz, drawing praise for the integrity of his interpretation and the uniform bowing of his string section. It was largely through his efforts that Beethoven's works were introduced into France: toward this end he organized special performances of the Opéra orchestra called *concerts spirituels* and in 1829 founded the Société des Concerts du Conservatoire, which built its programming around Beethoven's music until Habeneck's death. He published a violin method and composed primarily for that instrument.

Haber, Fritz (b. Dec. 9, 1868, Breslau, Silesia, Prussia—d. Jan. 29, 1934, Basel, Switz.), German physical chemist, winner of a Nobel Prize for Chemistry (1918) for his development of a method of synthesizing ammonia. With Carl Bosch, he invented a process for the large-scale production of ammonia for use in nitrogen fertilizer.

Early life. Haber was the son of a prosperous chemical merchant. After the usual classical education of the *Gymnasium* and student years in Berlin, Heidelberg, and Zürich, he entered his father's business, but his impatient spirit soon led to a break.

Haber
EB Inc.

Deciding on an academic career, he first took up organic chemical research at the University of Jena, but its orthodox methods gave him little satisfaction. Chance brought him at the age of 25 to a junior post at the Technische Hochschule of Karlsruhe, where he immediately threw himself with tremendous zest into the teaching of physical chemistry (a subject in which he was essentially self-taught) and into research. His intensive early researches in electrochemistry and thermodynamics soon gained him the position of professor of physical chemistry (1898); his reputation was much enhanced by his timely book *Grundriss der technischen Elektrochemie auf theoretischer Grundlage* (1898; "The Theoretical Basis of Technical Electrochemistry") and especially by *Thermodynamik technischer Gasreaktionen* (1905; *The Thermodynamics of Technical Gas Reactions,* 1908), a pioneering work that had considerable influence on teaching and research.

In the first decade of the 20th century the rapidly increasing demand for nitrogen fertilizer greatly exceeded the supply, which still came mainly from Chilean nitrate. The problem of utilizing atmospheric nitrogen for this purpose had become of worldwide concern. Haber developed a method for synthesizing ammonia from nitrogen and hydrogen, and by 1909 he had established conditions for the large-scale synthesis of ammonia. The process was handed over to Carl Bosch of Badische Anilin- & Soda-Fabrik for industrial development, leading to the Haber–

Bosch ammonia process. Haber was awarded the Nobel Prize for Chemistry in 1918.

World War I. In 1911, at the age of 42, he was appointed director of the Kaiser Wilhelm Institute for Physical Chemistry in Berlin, a new research establishment that was to become even more famous than the school he had built up in Karlsruhe. With the outbreak of World War I in 1914, he immediately placed himself and his laboratory at the service of the government, his first concern being to organize the supply of essential war matériel. After the development of trench warfare he was made head of the chemical-warfare service, and his institute became a major military establishment. He played a leading part in the development of poison gas as a weapon.

The war years were for Haber a period of intense effort motivated by his strong patriotism. He felt the outcome as a personal tragedy. When Germany was required to pay enormous reparations, Haber sought to find a way of extracting gold from seawater. Long efforts ended in 1926 with the conclusion that the gold content of seawater was far less than had been thought. The failure was a bitter disappointment to him, though it had positive results of much scientific value.

Postwar activities. After the war Haber's institute became the world's leading centre of research in physical chemistry, with a large and distinguished international staff. All his life he had been an advocate of close relations between science and industry, and he now became a recognized authority in this field; he was active in promoting the national organization of research and in fostering friendly relations with foreign scientists. He was much attracted to Japan and in 1930 established the Japan Institute, with headquarters in Berlin and Tokyo, to promote mutual understanding and cultural interests. He enjoyed the high title of privy councillor (*Geheimer Regierungsrat*) and was an honorary fellow of leading chemical societies.

The breakup of Haber's institute began in 1933, when, with the rise of the Hitler regime and its anti-Semitic policy, this great German chemist became the "Jew Haber." He resigned in 1933 and accepted an invitation to work at Cambridge. After four months he left to spend the winter in Italy, but on the way he suffered a heart attack in Basel and died there in January 1934.

A striking feature of Haber's life and work was his versatility. He and the institutions he directed contributed in a fundamental way to nearly all the important branches of physical chemistry. In fact, his scientific life reflected the main developments of physical chemistry over a period of 40 years. Furthermore, Haber was strongly imbued with the conviction that the basic purpose of science was the betterment of mankind. (J.E.Co.)

BIBLIOGRAPHY. A biography of Haber, as well as a survey of his scientific work, is J.E. Coates, "Haber Memorial Lecture," *J. Chem. Soc.*, pp. 1642–72 (1939). M. Goran, *The Story of Fritz Haber* (1967), contains an exhaustive bibliography of writings by and relating to Haber. Of the many works by German authors about Haber, probably the best is ch. 10 of Richard Willstatter, *Aus meinem Leben* (1949; *From My Life,* 1965). Of Haber's own writings, apart from his scientific books and articles, two relate to his life and ideas: *Fünf Vorträge aus den Jahren 1920–1923* (1924); and *Aus Leben und Beruf; Aufsätze, Reden, Vorträge* (1927).

Haber–Bosch process, also called HABER AMMONIA PROCESS, or SYNTHETIC AMMONIA PROCESS, method of directly synthesizing ammonia from hydrogen and nitrogen, developed by the German physical chemist Fritz Haber, for which he received the Nobel Prize for Chemistry in 1918. The method, which made the manufacture of ammonia economically feasible, was translated into a large-scale process using a catalyst and high-pressure methods by Karl Bosch, an industrial chemist who won a Nobel Prize in 1931 jointly with Friedrich Bergius for high-pressure studies.

The first industrial chemical process to use high pressure for a chemical reaction, the Haber–Bosch process employs extremely high pressure and moderately high temperature and a catalyst made mostly from iron. This method is the most economical for the fixation of nitrogen and with modifications continues in use as one of the basic processes of the chemical industry in the world. *See also* nitrogen fixation.

Haberlandt, Gottlieb (b. Nov. 28, 1854, Ungarisch-Altenburg, Hung.—d. Jan. 30, 1945, Berlin), Austrian botanist, pioneer in the development of physiological plant anatomy, and the first person to study plant tissue culture (1921).

Haberlandt's first botanical paper appeared in 1874, one year after he entered the University of Vienna, where he obtained his Ph.D. (1876). He went to the University of Tübingen (1877) to study under Simon Schwendener, who subsequently influenced Haberlandt's belief that structure and function should be studied together. He returned to Austria in 1880 to teach botany at the Technische Hochschule in Graz. In 1910 Haberlandt succeeded Schwendener in the chair of plant physiology at the University of Berlin, where he established the Institute for Plant Study.

Haberlandt decided that his students would profit from a system of classifying plants based on function. In his book *Physiologische Pflanzenanatomie* (1884; "Physiological Plant Anatomy") he distinguished 12 tissue systems based on function (mechanical, absorptive, photosynthetic, etc.). Although his system was not accepted by other botanists, the analysis of the relations between structure and environment has been useful in the study of plant adaptations to different habitats.

Haberler, Gottfried von (b. July 20, 1900, Purkersdorf, Vienna), Austrian-born American economist, writer, and educator whose major field of expertise was international trade.

Haberler graduated from the University of Vienna in 1923, receiving his doctorate in 1925. After studies in London and the United States, he taught economics and statistics at the University of Vienna from 1928 to 1936. He also served as consultant to the League of Nations during his last two years in Vienna. In 1936 he accepted a professorship of economics at Harvard University, a post he held until 1971, when he joined the American Enterprise Institute in Washington, D.C.

Haberler is famous chiefly as a writer on international trade, and his major work *The Theory of International Trade* (1937) is widely regarded as a classic. Particularly influential was his reformulation of the theory of comparative costs in terms of opportunity cost. Haberler also helped to revive the influence of the purchasing power parity doctrine, which states that relative price levels are major determinants of equilibrium exchange rates. He produced influential work on the flexibility and stability of exchange rates as well as on tariffs. His marked ability to synthesize the important elements in economic literature was also apparent in a classic study of business cycle theory that he wrote for the League of Nations, *Prosperity and Depression* (1937).

Ḥabībollāh Khān (b. 1872, Tashkent, Russian Turkistan—d. Feb. 20, 1919, Kalagosh, Afg.), ruler of Afghanistan from 1901 to 1919. Maintaining satisfactory relations with British India, he introduced needed reforms in Afghanistan and steered his country on a moderate political course.

The eldest son of 'Abdor Raḥmān Khān, Ḥabībollāh succeeded peacefully to the throne after his father's death in October 1901. At the time, British India was deeply involved in Afghan affairs, and Ḥabībollāh agreed to accept British guidance in foreign affairs in return for an annual subsidy of £160,000. He was able to retain full control of his country's internal affairs.

With the outbreak of World War I (1914–18), there was widespread support in Afghanistan of Ottoman Turkey against the British. Ḥabībollāh, however, was able to maintain a policy of noninvolvement throughout the war. He meanwhile moved to open Afghanistan to technology from the West, founding schools, a military academy, and a weekly newspaper. He also introduced electricity, automobiles, and Western medical methods to the country.

Ḥabībollāh's antiwar policy resulted in his unpopularity among the young anti-British elements in the population. In 1919 he was assassinated while on a hunting trip.

Habima, also spelled HABIMAH (Hebrew: Stage), Hebrew theatre company originally organized as Habima ha-'Ivrit (Hebrew: the Hebrew Stage) in Białystok, Pol., in 1912 by Nahum Zemach. The troupe travelled in 1913 to Vienna, where it staged Osip Dymov's *Hear O Israel* before the 11th Zionist Congress. In 1917, after the outbreak of World War I caused the ensemble to dissolve, Zemach established the group in Moscow, calling it Habima. Encouraged by Konstantin Stanislavsky, the director of the Moscow Art Theatre, and inspired by a fervent desire to overcome the tawdry and superficial Yiddish operettas and melodramas then in vogue, Habima opened in 1918 with a program of four one-act folk plays. The production was staged by Yevgeny Vakhtangov, a student of Stanislavsky, who remained Habima's chief director until his death in 1922. Vakhtangov's outstanding production was *The Dybbuk* (1922) of S. Ansky, a haunting play of Jewish mysticism, demoniac possession, and eternal love, which was an immediate success and established Habima as a theatre of the highest artistic excellence. It became one of four studios of the Moscow Art Theatre. In 1925, under the direction of B. Vershilov and V.L. Mchedelov, Habima staged *The Golem,* by H. Leivick, a play steeped in Jewish superstition, folklore, and mysticism. In 1926, after touring Europe, Habima went to the United States. After a division in its membership, the major part of the group left for Palestine without Zemach and in 1931 permanently established itself in Tel Aviv. Since settling in Israel, Habima has continued its policy of presenting Yiddish and biblical dramas in addition to an ever-increasing repertory, which includes Israeli, classical, and contemporary foreign plays. In 1958 Habima was designated the National Theatre of Israel and awarded an annual state subsidy.

habit, in psychology, any regularly repeated behaviour that requires little or no thought and is learned rather than innate. A habit—which can be part of any activity, ranging from eating and sleeping to thinking and reacting—is developed through reinforcement and repetition. Reinforcement encourages the repetition of a behaviour, or response, each time the stimulus that provoked the behaviour recurs. The behaviour becomes more automatic with each repetition. Some habits, however, may form on the basis of a single experience, particularly when emotions are involved. Habits, as discussed by William James in his *Principles of Psychology,* are useful as the means for conserving higher mental processes for more demanding tasks, but they promote behavioral inflexibility.

Five methods are commonly used to break unwanted habits: the replacement of the old response with a new response—*e.g.,* eating

fruit instead of candy to satisfy a craving for sweetness; the repetition of the behaviour until fatigue or another unpleasant response takes over—*e.g.,* being forced to smoke cigarettes until nauseated so that a repulsion for cigarettes replaces the desire to smoke; the change of environment to separate the individual from the stimulus that is prompting the response; the gradual introduction of the stimulus that is provoking the behaviour—*e.g.,* overcoming a child's fear of adult dogs by giving him a puppy; and punishment, which is probably the least effective method.

habitat, place where an organism or a community of organisms lives, including all living and nonliving factors or conditions of the surrounding environment. A host organism inhabited by parasites is as much a habitat as a terrestrial place such as a grove of trees or an aquatic locality such as a small pond. The smallest topographic unit of a habitat with a characteristic uniformity of plant and animal species and environmental conditions, such as a sandy beach, is called a biotope. Microhabitat is a term for the conditions and organisms in the immediate vicinity of a plant or animal.

habitual offender, criminal who has frequently been apprehended and convicted, who has manifested a settled practice in crime, and who is presumed to be a danger to the society in which he lives. Penal systems of most countries provide for more protracted imprisonment of such criminals than would normally be imposed upon first offenders. Because the purpose of long sentences for habitual offenders is primarily to segregate and only secondarily to deter and reform, however, administrators of European and English penal systems have endeavoured to ameliorate the penal conditions of such prisoners, particularly toward the ends of their terms.

Despite the concept's popularity, by the 1980s laws providing for additional punishment for "repeaters" had not accomplished the removal of dangerous criminals from society.

habituation, the waning of an animal's behavioral response to a stimulus, as a result of a lack of reinforcement during continual exposure to the stimulus. It is usually considered to be a form of learning involving the elimination of behaviours that are not needed by the animal. Habituation may be separated from most other forms of decreased response (not including changes caused by maturation or seasonal cycles) on the basis of permanence; the habituated animal does not resume its earlier reaction to the stimulus after a period of nonstimulation, or, if the normal reaction is resumed, it wanes, on reexposure to the stimulus, more quickly than before. In the latter case, repeated interruptions and resumptions of the stimulus are followed by increasingly rapid decreases in response, and eventually the stimulus elicits no response. Vital responses (*e.g.,* flight from a predator) cannot be truly habituated, although a temporary waning of the response may occur.

haboob, hot and moist, strong wind that occurs along the southern edges of the Sahara in The Sudan and is associated with large sandstorms and duststorms and may be accompanied by thunderstorms and small tornadoes. It usually lasts about three hours, is most common during the summer, and may blow from any direction. A haboob may transport huge quantities of sand or dust, which move as a dense wall that can reach a height of 900 metres (about 3,000 feet). Haboobs result from the northward summer shift of the intertropical front into North Africa, bringing moisture from the Gulf of Guinea.

The name haboob also is sometimes used for a cold, moist wind of the northern Sahara that accompanies Mediterranean low-pressure centres and carries large amounts of dust.

Habsburg, HOUSE OF, also spelled HAPSBURG, also called HOUSE OF AUSTRIA, royal German family, one of the principal sovereign dynasties of Europe from the 15th to the 20th century. Its name is derived from the ancestral Castle Habsburg in Aargau, Switz.

A brief account of the lives and works of the Habsburgs follows; for a full history and genealogical tables, *see* MACROPAEDIA: Habsburg, The House of.

Counts of Habsburg are known as early as the 11th century. One of their number became German king, as Rudolf I, in 1273; and in 1282 he bestowed Austria and Styria on his two sons, thus beginning the age-old identification of the Habsburgs with Austria, which they ruled without interruption until 1918, as dukes, archdukes, and emperors. Habsburgs ruled Hungary and Bohemia from 1526 and retained control over them until 1918; Habsburgs also ruled Spain and the Spanish Empire for almost two centuries (1504–06, 1516–1700).

In general, the Habsburgs successfully imposed a system of hereditary descent over a widening group of kingdoms that nominally functioned under elective monarchies. Frederick V, the Habsburg king of Germany from 1440, was crowned Holy Roman emperor as Frederick III in 1452; this title remained in the family until the dissolution of the empire in 1806. His son, Maximilian I, through a momentous marriage in 1477, acquired the Netherlands, Luxembourg, Burgundy, and eventually, through his descendants, Spain, Naples, Sicily, and Sardinia as well as New World possessions. The zenith of Habsburg power came under Charles I, king of Spain and emperor (as Charles V) in the 16th century. The dynastic division at Charles's death initiated the Spanish Habsburg line (ruling Spain until 1700) and the Austrian line (known after 1740 as the House of Habsburg-Lorraine), which ruled the Habsburg possessions in central Europe until 1918.

Ḥabshī, African and Abyssinian slaves in pre-British India. The name derives from the Arabic word Ḥabashī, meaning Abyssinian, through its Persian form. Such slaves, frequently employed by the chiefs of Muslim India, especially in the Deccan, were believed to have great physical prowess and ability and a lack of personal ties, which promoted loyalty.

Many Ḥabshī rose to high office and some became independent. The most famous of them was Malik 'Ambar of Ahmadnagar, who defied the Mughals for many years. Ḥabshī in western India, the Sidis of Janjira, commanded the fleet of the Bijāpur sultan and became independent chiefs. They defied the Marāthās and in 1670 transferred their allegiance to the Mughal emperor Aurangzeb. They accepted British supremacy and maintained their state until 1948, when it was integrated with the Bombay state of the new Indian Union.

Hachette, Louis-Christophe-François (b. May 5, 1800, Rethel, Fr.—d. July 31, 1864, Paris), French publisher who issued a wide range of textbooks, dictionaries, and numerous other publications that gave impetus to French education and culture.

After studying law in Paris, Hachette bought a small bookshop there (1826) and, following the revolution of 1830, began to publish textbooks for the new primary schools. His firm rapidly became a leading French publishing house. Publications included manuals in almost every branch of knowledge, scholarly editions of ancient and modern classics, a cheap railway library, guide books, and directories. He also founded several journals, wrote pamphlets on the conditions of the poor, and pressed for the establishment of an international copyright convention.

Hachijūrō (Japanese soldier): *see* Maebara Issei.

Hachiman (Japanese: Eight Banners), one of the most popular Shintō deities of Japan; the patron deity of the Minamoto clan and of warriors in general; often referred to as the god of war. Hachiman is commonly regarded as the deification of Ōjin, the 15th emperor

Hachiman, woodblock print
By courtesy of the Museum fur Volkerkunde, Vienna

of Japan. He is seldom worshipped alone, however, and Hachiman shrines are most frequently dedicated to three deities: Hachiman as Ōjin, his mother the empress Jingō, and the goddess Hime-gami.

The first shrine dedicated to Hachiman, the Usa Hachiman-gū in Ōita Prefecture, was established in AD 725. The deity is immensely popular throughout Japan, and half the registered Shintō shrines are estimated to be dedicated to him. During the Nara period (AD 710–784) Hachiman was accepted as a Buddhist divinity and came to be known as Hachiman Daibosatsu (Great Buddha-to-be). As the first Japanese divinity to be given the title Daibosatsu, Hachiman is a significant figure in Japanese mythology, exemplifying the blending of indigenous and foreign elements. He was consulted as an oracle before the building of the colossal Buddha image at Tōdai temple and, as guardian deity of Tōdai temple, has his own shrine within the temple compound.

Hachinohe, city, Aomori Prefecture (*ken*), Honshu, Japan, facing the Pacific Ocean. It was a castle town during the Tokugawa era (1603–1867) and served as a small commercial centre and port for the excellent fishing grounds off southeastern Hokkaido. The processing of marine products developed after the late 19th century, and industry (ammonium sulfate, steel, cement) was introduced after World War II. Hachinohe continues to be one of the main deep-sea fishing (cuttlefish, mackerel) ports of Japan. Parts of its coast are renowned for their scenic beauty. Pop. (1983 est.) 240,745.

Hachiōji, city, Tokyo Metropolis (*to*), Honshu, Japan, on the Chūō Line (railway), west of Tokyo. A castle town in the Middle Ages, it prospered as a market and post town during the Tokugawa era (1603–1867). Hachiōji has long been well known as a silk-weaving centre. After the late 19th century, the textile industry developed rapidly, and the city became one of the leading weaving centres of the Kantō Plain.

After World War II, Hachiōji also grew as a residential suburb of Tokyo. Industrial

products now include electrical machinery, precision instruments, and synthetic textiles. The city is the main commercial market for the western part of the Tokyo–Yokohama Metropolitan Area and neighbouring communities in other prefectures. Nearby Takao-yama (Mt. Takao; 1,968 ft [600 m]) is a holiday resort. Pop. (1983 est.) 413,612.

Haci Halife: *see* Kâtip Çelebi.

hacienda, in Spanish America, a large landed estate, one of the traditional institutions of rural life. Originating in the colonial period, the hacienda survived in many places late into the 20th century. Labourers, ordinarily Indians, who worked for *hacendados* (landowners) were theoretically free wage earners, but in practice their employers were able to bind them to the land, especially by keeping them in an indebted state; by the 19th century probably up to a half of the rural population of Mexico was thus entangled in the peonage system. The counterparts of the hacienda in the Río de la Plata (Argentina and Uruguay) region and in Brazil are the estancia and the fazenda, respectively. *Hacendados* constituted a squirarchy, in whose hands were the reins of local government. In Bolivia until 1952, *hacendados* had retained many of the privileges inherited from colonial times, and the same has been true in 20th-century Ecuador. In Mexico many of the great estates were broken up as a result of the Mexican Revolution of 1911.

hackberry, any of several trees of the genus *Celtis,* with about 70 species in the elm family (Ulmaceae), that are valued for their wood or for ornamental qualities. They are distributed primarily in temperate and tropical areas.

The eastern North American tree called hackberry, or nettle tree, is *C. occidentalis.* It has bright green elmlike leaves, which often have three prominent veins arising from the

Hackberry (*Celtis occidentalis*)
Walter Dawn

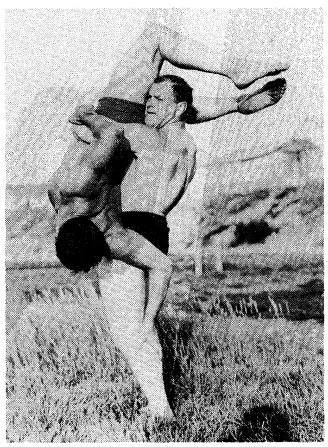
base of the blade, and edible pea-sized purplish-black fruits attractive to birds. The bark is sometimes covered with wartlike bumps. Of easy culture, it is often planted as a street tree, attaining heights of from 12 to 30 metres (40 to 100 feet). Mississippi hackberry, or sugarberry (*C. laevigata*), is a shorter tree native to moist soils of central North America.

The Mediterranean hackberry, or European nettle tree (*C. australis*), is an ornamental that has lance-shaped, gray-green leaves and larger edible fruit. Some West African species produce valuable timber.

hackbut (weapon): *see* harquebus.

Hackensack, city, seat (1713) of Bergen County, northeastern New Jersey, U.S., on the Hackensack River, just west of the Hudson River and Manhattan Island. Originally settled by the Dutch, who called it New Barbadoes, it fell to the English in 1688 but retained its Dutch imprint. In 1921 it was renamed Hackensack, the name supposedly derived from the Ackinchesacky, or Ackenack, Indians. During the American Revolution its village green became a camping ground for both British and American troops. Boatbuilding, pottery, and brickmaking were early industries. Diversified manufactures now include machinery and foundry products, clothing, food processing, and furniture. The Steuben House (1739; Washington's headquarters in 1780) and the New Jersey Submarine Memorial (USS "Ling") are in Hackensack. The Teaneck-Hackensack Campus of Fairleigh Dickinson University was opened in 1954. Inc. town, 1868; city, 1921. Pop. (1980) 36,039.

Hackenschmidt, George (b. 1877, Tartu, Estonia, Russia—d. Feb. 19, 1968, London), professional wrestler who ranked with Tom



Hackenschmidt (standing) versus Roller
Globe

Jenkins and Frank Gotch among the greatest in the history of freestyle, or catch-as-catch-can, wrestling. He also held several weight-lifting records.

In Vienna in 1898 Hackenschmidt won the world amateur championship in Greco-Roman wrestling. Turning to professional freestyle wrestling in 1900, he was undefeated until April 1908, when he lost to Gotch in Chicago. In 1911, again in Chicago, he was once more defeated by Gotch. Gentle outside the ring, he relied on the scientific use of his strength and disliked the brutal tactics employed by many wrestlers.

After his retirement Hackenschmidt became a mystical philosopher, writing *Man and Cosmic Antagonism to Mind and Spirit* (1936) and other books. He was naturalized as a French citizen after World War I and as a British subject in 1950.

Hackett, James Henry (b. March 15, 1800, New York City—d. Dec. 28, 1871, Jamaica, N.Y., U.S.), U.S. actor, important chiefly for his encouragement of native American drama.

Hackett left Columbia University because of ill health and tried various businesses. In 1825, after Hackett had lost his money in speculation, his wife, a former actress, returned to the stage; and the following year Hackett, who had achieved a social reputation for impersonations, began playing character parts. In 1828 his Falstaff, in *Henry IV,* Part I, was successful, remaining one of his most popular roles. His *Rip Van Winkle* (1830) was the best before Joseph Jefferson's. Hackett was successful in the U.S. and England as Nimrod Wildfire in James Kirke Paulding's *Lion of the West,* a satire of Davy Crockett, which was submitted in 1831 to a prize competition established by Hackett. He was manager of the Astor Place Opera House at the time of the riots that climaxed the feud between the actors Edwin Forrest and William Macready. In 1863 Hackett published his *Notes and Comments on Shakespeare,* which included a correspondence between himself and John Quincy Adams.

Hackney, inner borough of Greater London, south of the City of London and East End. The borough has an area of 8 sq mi (19 sq km). The eastern boundary is the River Lea. Shoreditch, near the City, is industrial and commercial in character, whereas the rest of Hackney is largely residential with pockets of industry, notably along the Lea. The formerly rural Lea Valley accommodated many mills.

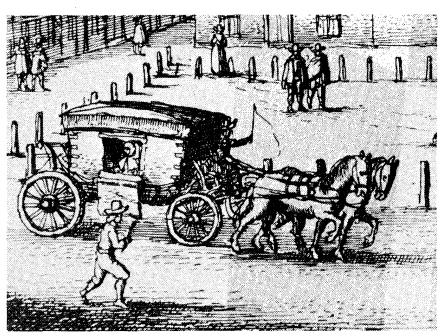
From the 16th century onward, many English notables had mansions in Hackney and, later, in Stoke Newington. The traditional associations of the borough with furniture and cabinetmaking and the clothing trades are reflected by the presence of the London College of Furniture and the Geffrye Museum's collection of period furniture and household utensils in the former Ironmongers' Company almshouses. The first Elizabethan playhouse was built in Shoreditch in 1576. Urban redevelopment is adding small open spaces to complement the existing Victoria parks. Pop. (1982 est.) 183,300.

Hackney, stylish carriage horse breed, now used primarily as a show horse. It was developed in the 18th century by crossing Thoroughbreds with the Norfolk trotter, a large-sized trotting harness horse originating in and around Norfolk. An important sire was the Shales horse (about 1760).

Hackneys are heavily muscled, with wide chests, deep bodies, and arched necks; they average 14.2 to 15.2 hands (58 to 62 inches, or 147 to 157 centimetres) high and weigh about 1,000 pounds (450 kilograms). Dark colours are commonest. Noted for their high-stepping, flashy trot, they are high-strung and nervous and must be carefully trained and handled.

The first Hackney was taken to the United States in 1822, and in 1891 the American Hackney Horse Society was organized. *See also* Hackney pony.

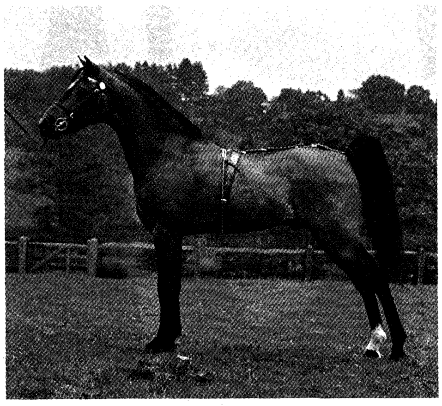
hackney, any carriage plying for hire, although hackney coach usually refers to a four-wheeled carriage drawn by two horses and holding six passengers. Hackneys were introduced into England early in the 17th century and may have been named for a section of London. In 1654 there were 300 licensed hackney coaches allowed in London and its environs, and by 1832 there were about 1,200.



Hackney carriage, detail of an engraving by W. Hollar, 1646; in the British Museum
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Hackneys were also in use in the United States in the 18th century. In France, a coach for hire, the fiacre, was introduced in Paris in the 1640s.

Hackney pony, heavy harness pony breed derived from the cross of a Hackney horse



Hackney pony
Sally Anne Thompson—EB Inc.

and a Welsh pony, used almost entirely as a show pony. It has the conformation and high-stepping action of the Hackney horse. Hackney ponies are shown in classes determined by height, which varies from 11.2 to 14.1 hands (about 46 to 57 inches, or 117 to 145 centimetres). They are registered in the same studbook as the Hackney horse in both Great Britain and the U.S. *See also* Hackney.

Hadad, also spelled HAD, HADDA, or HADDU, the Old Testament RIMMON, West Semitic god of storms, thunder, and rain. His attributes were identical with those of Adad (*q.v.*) of the Assyro-Babylonian pantheon. He was the chief *baal* ("lord") of the West Semites (including

Hadad, limestone relief sculpture from Ras Shamra (ancient Ugarit), Syria, *c.* 2000 BC; in the Louvre, Paris
Giraudon—Art Resource/EB Inc.

both sedentary and nomadic Aramaeans) in north Syria, along the Phoenician coast, and along the Euphrates River. As Baal-Hadad he was represented as a bearded deity, often holding a club and thunderbolt and wearing a horned headdress. The bull was the symbolic animal of Hadad, as of the Hittite deity Teshub, who was identical with him.

Hadamard, Jacques-Salomon (b. Dec. 8, 1865, Versailles, Fr.—d. Oct. 17, 1963, Paris), French mathematician who proved the prime-number theorem, which states that as n approaches infinity, the limit of the ratio of $\pi(n)$ and $n/\ln n$ is 1, where $\pi(n)$ is the number of positive prime numbers not greater than n. He served as a professor at the Collège de France (1897–1935), the École Polytechnique (1912–35), and the École Centrales des Arts et Manufactures (1920–35), all in Paris.

Hadamard's early work contained many important contributions to the theory of functions of a complex variable, in particular to the general theory of integral functions and to the theory of the singularities of functions represented by Taylor's series. In 1896 Hadamard proved the prime-number theorem, independently of the Belgian mathematician Charles Jean de la Vallée Poussin. He also obtained important results in connection with the partial differential equations of mathematical physics.

Hadamard's *Leçons sur le calcul des variations* (1910; "Lessons on the Calculus of Variations") helped to lay the foundations of the modern theory of functional analysis, in

Hadamard
H. Roger-Viollet

connection with which he introduced the term functional. Part of his work in determinants is important in the theory of integral equations.

Hadang language: *see* Sedang language.

Hadano, also spelled HATANO, city, Kanagawa Prefecture (*ken*), Honshu, Japan, stretching between Tanzawa-yama (Mt. Tanzawa; north; 5,141 ft [1,567 m]) and the Hadano basin (south). It was a regional commercial centre during the Tokugawa era (1603–1867), when the cultivation of tobacco was introduced. The city is now a tobacco-trading centre, containing a processing plant of the Japanese Monopoly Bureau. Because of its convenient road and rail connections to Tokyo, Hadano is included in the Keihin Industrial Region. It is the gateway to Tanzawa-Oyama Quasi-national Park; Tsurumaki Spa lies within the city boundary. Pop. (1983 est.) 134,766.

Hadar remains, hominid fossils found since 1973 near the Awash River, about 300 kilometres (185 miles) from Addis Ababa in Ethiopia. The remains, representing about 30 individuals, date from about 2,900,000 years ago. A complete skeleton, numerous jaws, and leg and arm bones indicate that this group had quite primitive skulls, almost like those of chimpanzees, curved fingers like those of apes, but pelvises and legs that suggest evolution toward modern man. The species is smaller, more slender and graceful than *Australopithecus robustus* found in South and East Africa and considered a creature not in a direct line to *Homo sapiens*. The Hadar fossils, considered a separate species called *Australopithecus afarensis*, are believed by their discoverers to be in the direct line of evolution to modern man, but older than *Australopithecus africanus*.

It is hypothesized that this species hunted and ate meat—unlike some of the earlier species that were vegetarian—slept in trees, and may have engaged in warfare, especially with slower, more clumsy, earlier forms. The stone artifacts found nearby are associated with a later form, *Homo habilis*. Recent work has shown, however, that *afarensis* was in fact partially arboreal and may in fact not be in direct line of evolution to modern man.

Hadda (god): *see* Hadad.

Haddad, Malek (b. July 5, 1927, Constantine, Alg.—d. June, 1978, Algiers), African poet, novelist, and cultural adviser. Haddad abandoned law studies in Aix-en-Provence to write for French and Algerian weeklies and magazines during the Algerian war. His first published book was a collection of poetry, *Le Malheur en danger* (1956). A second collection, *Écoute et je l'appelle* (1961), was preceded by an essay, "Les Zéros tournent en rond."

Haddad wrote four novels: *La Dernière Impression* (1958), *Je t'offrirai une gazelle* (1959), *L'Élève et la leçon* (1960), and *Le Quai aux fleurs ne répond plus* (1961). Following Algerian independence Haddad continued to write for several newspapers and reviews until 1968, when he became director of culture at the Ministry of Culture and Information. He held the post until 1972 and continued to serve as a cultural adviser in that ministry until his death. Themes of his works are the fatherland, exile, happiness, and engagement.

Haddeby (medieval city, Denmark): *see* Hedeby.

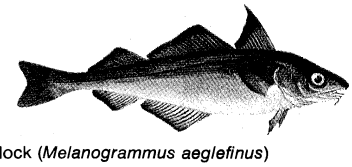
Haddington, royal burgh (1130) and administrative centre of the district of East Lothian, Lothian region, Scotland, on the left bank of the River Tyne. Lying in the direct route of English invaders from the south, the town was burned by forces from across the border in 1216 and again in 1244. Part of the 14th-century granite Abbey Church of St. Mary is now used as the parish church.

The present town, a centre for the fertile agricultural area of East Lothian, is closely associated with the 18th-century architect Robert Adam, who designed the fine Town House and many other buildings.

The chief industries are milling, malting, agricultural engineering, and textiles. The grain market, once the largest in Scotland, is still of considerable importance. Pop. (1981) 8,842.

Haddingtonshire (Scotland): *see* East Lothian.

haddock (*Melanogrammus aeglefinus*), valuable North Atlantic food fish of the cod family, Gadidae, that is often smoked and sold as "finnan haddie." The haddock is a bottom dweller and a carnivore, feeding on invertebrates and some fishes. It resembles the cod and, like its relative, has a chin barbel and two anal and three dorsal fins. It is identified, however, by a dark, rather than light, lateral line



Haddock (*Melanogrammus aeglefinus*)
Painting by Jean Helmer

and a distinctive dark spot on each shoulder. Colour is otherwise gray or brownish above, paler below. Size is to about 90 centimetres (3 feet) and 11 kilograms (24½ pounds).

Haddon, Alfred Cort (b. May 24, 1855, London—d. April 20, 1940, Cambridge, Cambridgeshire, Eng.), one of the founders of modern British anthropology. Virtually the sole exponent of anthropology at Cambridge for 30 years, it was largely through his work and especially his teaching that the subject assumed its place among the observational sciences.

Educated at Christ's College, Cambridge, he distinguished himself in comparative anatomy and zoology and in 1880 was appointed pro-

fessor of zoology at the Royal College of Science, Dublin. His first book, *Introduction to the Study of Embryology,* appeared in 1887, followed by many papers on marine biology.

In 1888 Haddon went to Torres Strait to study marine biology but instead found himself irresistibly drawn to the indigenous people; thereafter, his interests lay in the study of man. Having moved his home to Cambridge in 1893, he gave lectures in physical anthropology. In 1898 he organized and led the Cambridge anthropological expedition to the Torres Strait Islands, New Guinea, and Sarawak, in which were worked out some of the basic techniques of modern anthropological fieldwork, in particular, the use of genealogies. On his return, Cambridge recognized his services by a lectureship, and his college by a fellowship (1901). The Board of Anthropological Studies in Cambridge was instituted in 1904, and from 1909 to 1926 Haddon was reader in ethnology.

Haddon's publications, over 600 in number, include *Evolution in Art* (1895); *Head-Hunters, Black, White and Brown* (1901); *Wanderings of Peoples* (1911); and (with Sir J.S. Huxley) *We Europeans.*

Haddonfield, borough, Camden County, southwest New Jersey, U.S., southeastern residential suburb of Camden. It was named for Elizabeth Haddon, an English Quaker girl who settled there about 1701. The story of her romance with a Quaker missionary, John Estaugh, is told by Henry Wadsworth Longfellow in his *Tales of a Wayside Inn.* She lived to be 80, and her personal belongings are displayed in Greenfield Hall, headquarters of the Haddonfield Historical Society. The Indian King Tavern, meeting place in 1777 of the New Jersey Legislature and a station of the Underground Railroad for runaway slaves prior to the Civil War, was made a historic site in 1916. Inc. 1875. Pop. (1980) 12,337.

Haddu (god): *see* Hadad.

Hadejia, town and traditional emirate, eastern Kano State, northern Nigeria, on the northern bank of the Hadejia River (a seasonal tributary of the Komadugu Yobe, which flows into Lake Chad). The emirate's savanna area originally included seven small Hausa kingdoms (one of which, Hadejia, was named for a hunter of the Kanuri tribe) that paid tribute to the Kingdom of Bornu. About 1805, Umaru, a Fulani leader who held the title *sarkin* ("chief") *Fulanin Hadejia,* pledged allegiance to the Fulani *jihād* ("holy war") leader, Usman dan Fodio. Umaru's brother and successor, Amīr Sambo (reigned 1808–45), officially founded the Hadejia emirate in 1808, moved the Fulani headquarters to Hadejia town, established a market, and began to consolidate Fulani rule over the Hausa kingdoms.

Amīr Buhari (also Bohari, Bowari; reigned 1848–50, 1851–63) renounced Hadejia's allegiance to Sokoto (a town, 325 mi [523 km] west) in 1851, raided the nearby emirates of Kano, Katagum, Gumel, Bedde, and Jama'are, and enlarged Hadejia emirate. Hadejia was brought back into the Fulani Empire after Buhari's death, but wars with neighbouring Gumel continued until 1872. In 1906 the British installed an Amīr, Haruna, and incorporated the emirate into Kano Province. In later times the Hadejia Local Government Council, comprising Hadejia, Birniwa, Guri, Kiri-Kassama, and Mallam Madori, had its headquarters at Hadejia.

The town is a market centre, handling cotton, millet, sorghum, fish, and the rice grown in the river valley, and serves as an important collecting point for peanuts (groundnuts), an export crop which is trucked to Kano city (110 mi west-southwest) for shipment by rail. Cattle, goats, guinea fowl, sheep, and donkeys are kept by the local Hausa and Fulani peoples. Several small lime industries exist in scattered parts of the area. Hadejia town has a hospital (1935), and other health facilities. It is located on the secondary highway between Gumel and Nguru which links it to the main highway at Kano and the railway at Kano and Nguru. Pop. (1983 est.) town, 38,810.

Ḥadera, city, western Israel, on the Plain of Sharon midway between Tel Aviv–Yafo and Haifa, near the Mediterranean Sea. The first Jewish settlement on the northern coastal plain, Ḥadera (from Arabic *khadhīr,* "green") was founded in 1890 by Jewish immigrants from tsarist-ruled Poland and Lithuania. The seasonal watercourse Naḥal Ḥadera (then called by its Arabic name of Nahr Mufjir), flowing through the town, flooded the low-lying area annually during the winter rains and created malarial swamps. Many of the early settlers died from the disease. With the aid of the French-Jewish philanthropist Baron Edmond de Rothschild (1845–1934), eucalyptus trees were planted to help drain the swamps. After 1894 citrus groves flourished; their acreage was increased, and Ḥadera is now the centre of one of the chief citrus-producing regions of Israel.

The city developed as a rail hub with the construction of the eastern Sharon line (Lod–Ḥadera–Haifa), built by the British Army during World War I; this line has now yielded precedence to the coastal Tel Aviv–Yafo–Ḥadera–Haifa line, built in the 1950s. The stations are, respectively, to the west and east of the business district. Ḥadera received municipal council status in 1936 and was proclaimed a city in 1952. Its principal industries are a large paper mill, supplying most of Israel's needs, and a tire factory. There are also metalworking, citrus-processing, and vegetable-canning plants. A power plant capable of using either coal or oil was under construction in the late '70s. Pop. (1982 est.) 39,000.

Haderslev, city, Sønderjyllands *amtskommune* (county), southeastern Jutland, Denmark, on Haderslev Fjord 9 mi (14 km) from the Little Belt (strait). First recorded in 1228 and chartered in 1292, it suffered in the 15th-century wars between Slesvig (Schleswig) and Holstein and passed to Prussia with Slesvig in 1864. It was returned to Denmark with North Slesvig by a plebiscite in 1920. Two castles, built successively there on the same site, were favourite royal residences in the Middle Ages, the latter being destroyed in 1644. The magnificent early 15th-century Vor Frue Kirke (Church of Our Lady) incorporates an earlier Romanesque building.

Haderslev is now a commercial centre, seaport, and rail junction. Its industries include tanneries, machine shops, and breweries. Educational and cultural institutions include the grammar school (1567), the cathedral school, the teachers' college (1870), and the Haderslev Amts Museum. Pop. (1981) city, 19,374; (1982 est.) mun., 29,975.

Hades, Greek AĪDES (the Unseen), also called PLUTO, or PLUTON (the Rich), in Greek religion, son of the Titans Cronus and Rhea, brother of the deities Zeus and Poseidon. After Cronus was killed, the kingdom of the underworld fell by lot to Hades. There he ruled with his queen, Persephone, over the infernal powers and over the dead, in what was often called "the House of Hades," or simply Hades. Though he supervised the trial and punishment of the wicked after death, he was not normally one of the judges in the underworld; nor did he personally torture the guilty, a task assigned to the Furies (Erinyes). He was depicted as stern and pitiless, unmoved (like death itself) by prayer or sacrifice.

He was usually worshipped under a euphemistic epithet such as Clymenus (the Illustrious), or Eubuleus (the Giver of Good Counsel). He was often called Zeus, with the addition of a special title (*e.g., chthonios*). His title Pluto, or Pluton (the Wealthy One or the Giver of Wealth), may have originated through Hades' partial amalgamation with a god of the earth's fertility, or because he gathered all living things into his treasury at death.

Hades and Persephone in the underworld, interior of a red-figured cup, Greek, from Vulci, *c.* 430 BC; in the British Museum

By courtesy of the trustees of the British Museum

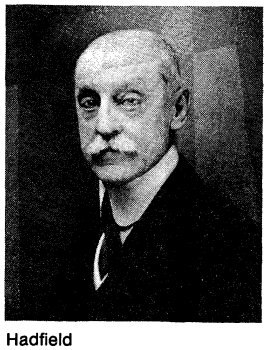
The word Hades is used in the Greek Old Testament to translate the Hebrew word *sheol,* denoting a dark region of the dead. Tartarus, originally an abyss far below Hades and the place of punishment in the lower world, later lost its distinctness and became almost a synonym for Hades.

Hades, in the Greek Old Testament, translation of the Hebrew Sheol, the dwelling place of the dead. *See* hell.

Hadfield, Sir Robert Abbott, BARONET (b. Nov. 28, 1858, Sheffield, Yorkshire, Eng.—d. Sept. 30, 1940, London), British metallurgist who developed manganese steel, an alloy of exceptional durability that found uses in the construction of railroad rails and rock-crushing machinery.

The son of a Sheffield steel manufacturer, Hadfield took an early interest in metallurgy and at the age of 24 became head of the family firm. In 1883 he took out a patent for his process of producing manganese steel. Earlier attempts to alloy steel with manganese were unsuccessful because they were very brittle. He also worked on the development of other steel alloys. He was knighted in 1908, became a Fellow of the Royal Society of London the following year, and was created a baronet in 1917. Hadfield's publications include more than 220 technical papers and *Metallurgy and Its Influence on Modern Progress: With a Survey of Education and Research* (1925), which became a standard reference work.

Hadfield married in 1894 but had no children, and the baronetcy lapsed.

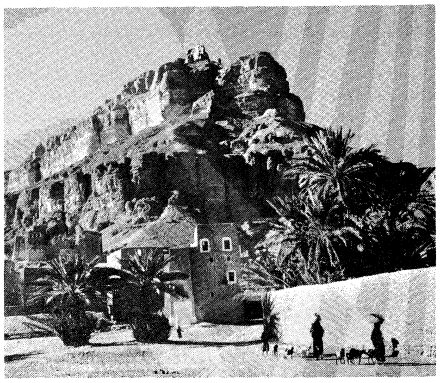


Hadfield

The Mansell Collection

Hadhramaut (South Arabian kingdom): *see* Ḥaḍramawt.

Hadhramaut, also spelled HADRAMOUT, Arabic ḤAḌRAMAWT, region in east central Yemen (Aden), on the Gulf of Aden. The region comprises a hilly area near the coast and an inland valley occupied by a seasonal watercourse, the Wādī Ḥaḍramawt, that runs parallel to the coast before turning southeastward to reach the sea. In its lower reaches this watercourse achieves a year-round flow and is called Wādī Masīlah. At higher elevations in the region there is alluvial soil that allows for an extensive agriculture, mainly of wheat and barley;



Village in the Hadhramaut *muḥāfaẓah* (governorate), Yemen (Aden)
Peter Schmid—Shostal/EB Inc.

other crops include fruits, dates, alfalfa, millet, and tobacco. Al-Mukallā is the chief town and seaport; of the numerous smaller towns, many are near the watercourse. The nation's traditional centres of learning are in Hadhramaut, most notably in the town of Tarīm. Fish products, honey, lime, and tobacco are exported from the region. Historically, large numbers of Hadhramaut's people have immigrated to East Africa, Indonesia, and Saudi Arabia to improve their living conditions. Besides al-Mukallā, the major towns in the region include Shibām, which has examples of multistoried tall buildings about 500 years old; Tarīm; and al-Ghuraf and ar-Riyān, both of which have airports.

Hādī, al-, in full AL HĀDĪ ILA AL ḤAQQ, also called MŪSĀ AL-HĀDĪ (d. 786), fourth caliph of the ʿAbbāsid dynasty (reigned 785–786). His persecution of the ʿAlids, representatives of the Shīʿī sect of Islām, precipitated revolts in Medina, Egypt, and Iraq, all of which were put down brutally. Throughout his short reign, he struggled with the question of succession, attempting to annul the rights of his brother, Hārūn ar-Rashīd, who was later to become one of the most famous rulers of the ʿAbbāsid dynasty. At the time of al-Hādī's death, which may have been a murder, ar-Rashīd was imprisoned and then later released to assume the caliphate.

Hadi, Sayyid Shaykh bin Ahmad, al- (b. Nov. 9, 1867, Malacca, Straits Settlements—d. Feb. 20, 1934, Penang, Straits Settlements), Malay Islāmic modernist writer and polemicist, journalist, and publisher who made significant contributions to modern Malay nationalism.

Taken when young to Pulau Penyengat, Riau (now in Indonesia), Sayyid Shaykh was adopted there by a half brother of the sultan and brought up in the intellectual climate of that centre of Malayo-Muslim thought and writing. After moving to Singapore in 1901, he joined with a group of other Malay-Arabs to start the noted Islāmic reform journal *al-Imam* (1906–08), which, modeled on *al-Manar* of Cairo, propounded the modernist ideas of Muḥammad ʿAbduh and his followers and played a prominent role in introducing reformist thought to Muslim Southeast Asia. From that time forward, Sayyid Shaykh, though not a profound religious scholar, was at the centre of the modernist cause in Malaya.

After starting and helping to run several *madrasas* (schools) in Singapore (1907), Malacca (1915), and Penang (1919), Sayyid Shaykh founded the Jelutong Press in Penang in 1927. For the next 14 years, until the Japanese invasion, Jelutong published a stream of books, journals, and other publications broadly reformist in general tendency but encompassing modern literature of all kinds, from popular journalism to the first Malay novels. Sayyid Shaykh himself wrote the novel *Faridah Hanum* (adapted from an Egyptian love story) in 1926; translated Qasim Amīn's *Tahrir al-Marʾāh,* on the emancipation of women (1930), into Malay; and edited and wrote extensively on religious, political, and social questions for his monthly journal *al-Ikhwan* ("The Brotherhood") from 1926 to 1930 and for his weekly (later biweekly) newspaper *Saudara* ("Brother") from 1928 until his death. Both publications, like most of his other writings, circulated widely throughout the peninsula and exerted a powerful literary and modernist influence.

Ḥadīth, also spelled HADĪT (Arabic: "news," or "story"), the spoken traditions attributed to the Prophet Muḥammad, which are revered and received in Islām as a major source of religious law and moral guidance. The development of Ḥadīth was a vital element during the first three centuries of Islāmic history, and its study provides a broad index to the mind and ethos of Islām.

A brief treatment of Ḥadīth follows. For full treatment, *see* MACROPAEDIA: Islām, Muḥammad and the Religion of.

Ḥadīth embodies the *sunnah* ("right custom") of the community of Muslims. Every complete Ḥadīth formulation consists of two parts, the text proper and the *isnād* ("chain of transmitters"), which precedes it, *e.g.,* "It has been related to me by Yahya on the authority of Malik on the authority of Nafi' on the authority of 'Abd Allāh ibn Omar that the Prophet said: 'If someone sells a palm tree which has been fertilized, its fruit belongs to the seller, unless the buyer stipulate it for himself.' "

This literary form came into being early in the 2nd century of the hijrah (soon after AD 720) and was at once put into writing. The emergence of such traditions was mainly due to the activity of the so-called traditionists, who tried to base the Islāmic way of life not on custom as it had developed in the centres of the Muslim world but on individual precedents going back to the Prophet. This led to a wholesale creation of traditions with ever more elaborate *isnāds.* As a result, most of the early opinions held on the religious law and dogma of Islām as well as on its early history (which provided legal and political precedents), not to mention prophecies expressing political and other expectations, were cast in the form of traditions, which often attempted to conceal their underlying tendencies.

The Muslim scholars were aware of this but, being bound, on principle, to accept any formally reliable statement of what the Prophet had said or done, had to restrict themselves to the scrutiny of *isnāds,* the truthfulness and orthodoxy of transmitters, etc., although their unavowed criterion was the acceptability to the majority of the traditions in question. The result of that scrutiny is represented by six collections of traditions recognized as authoritative in orthodox Islām: the works of Muḥammad ibn Ismāʿīl al-Bukhārī, Muslim ibn al-Ḥajjāj, Abū Dāʾūd al-Sijistāni, Abū ʿIsā Muḥammad at-Tirmidhī, Abūʿ Abd ar-Raḥmān an-Nasāʾī, and Abū Abdallāh ibn Mājā (all of the 3rd century AH). By that time, Islāmic law had already taken its final shape, so that the study of traditions became of antiquarian and edifying interest, but they have deeply influenced Muslim thought. In critical scholarship, Ḥadīth constitutes the main source for the study of doctrinal development during the first few centuries of Islām.

Hadj Omar ibn Saʿīd Tal, el- (Tukulor leader): *see* ʿUmar Tal.

ḥadjdj (Islām): *see* ḥajj.

Hadji Agus Salim: *see* Agus Salim, Hadji.

Hadley, George (b. Feb. 12, 1685, London—d. June 28, 1768, Flitton, Bedfordshire, Eng.), British physicist and meteorologist who first formulated an accurate theory describing the trade winds and the associated meridional circulation pattern now known as the Hadley cell.

Educated in law, Hadley preferred physics to legal work. A pamphlet describing the quadrant and a Latin translation of this work have been attributed to him. For seven years, perhaps longer, he was in charge of the meteorological observations prepared for the Royal Society of London. Having made the first really adequate study of the trade-wind currents, he explained their relation to the Earth's daily rotation and discussed the relevant atmospheric motions and their causes. He presented his ideas in a paper, "Concerning the Cause of the General Trade Winds," before the Society in 1735. His formulation, however, remained unacknowledged until recognized by the famed British scientist John Dalton in 1793.

Hadley, Henry (Kimball) (b. Dec. 20, 1871, Somerville, Mass., U.S.—d. Sept. 6, 1937, New York City), one of the most prominent American composers of his day.

Hadley studied in Boston and Vienna and in 1904 went to Germany, where in 1909 he conducted his one-act opera *Safié.* He conducted the Seattle Symphony Orchestra (1909–11), the San Francisco Symphony Orchestra (1911–15), and the Manhattan Symphony Orchestra (1929–32) and was associate conductor of the New York Philharmonic Orchestra (1920–27).

His music, which was heavily influenced by Wagner, is Romantic in style, with some

Henry Hadley
Brown Brothers

impressionistic touches. After the mid-20th century it was seldom performed. His works include the operas *Azora, the Daughter of Montezuma* (1917), *Bianca* (1918), and *Cleopatra's Night* (1920); five symphonies; symphonic poems and suites; chamber music; choral works; and songs.

Hadley, John (b. April 16, 1682, Hertfordshire, Eng.—d. Feb. 14, 1744, East Barnet, Hertfordshire), British mathematician and inventor who improved the reflecting telescope, producing the first such instrument of sufficient accuracy and power to be useful in astronomy.

His first Gregorian reflector telescope, built in 1721, had a mirror about 6 inches (15 centimetres) in diameter. The favourable response it evoked inspired him to build another equally large, with numerous improvements. His telescopes had a major part in bringing reflectors into general use by astronomers.

In 1730, independently of Thomas Godfrey of Philadelphia, Hadley invented a quadrant (actually a double-reflecting octant) for measuring the altitude of the Sun or a star above the horizon to find geographical position at sea. His double-reflecting principle made accurate determinations of location much easier. Hadley also fixed a spirit level to the instrument so that a meridian altitude at sea could be taken when the horizon was not visible. His device later evolved into the sextant.

Hadley cell, simple model of the Earth's atmospheric circulation that was proposed by George Hadley (1735). It consists of a single wind system in each hemisphere, with westward and Equatorward flow near the surface and eastward and poleward flow at higher altitudes. The tropical regions receive more heat from solar radiation than they radiate back into space, and the polar regions radiate more than they receive; because both areas have nearly constant temperatures, Hadley theorized that warm air must therefore rise near the Equator, flow poleward at high altitudes, and lose heat to the cold air present near the poles. This cooler and denser air then descends and flows Equatorward at low levels until it nears the Equator, where it is warmed and rises again.

Hadley devised this model in an attempt to explain the westward- and Equatorward-flowing trade winds, but he ignored the Coriolis effect of the Earth's rotation, which deflects moving objects (including air) sideways and precludes a simple north–south circulation. The Ferrel cell, a model with a circulation opposite to that of the Hadley cell, was subsequently proposed to account for the mid-latitude westerly winds. The tricellular theory (*q.v.*) includes two Hadley cells and one Ferrel cell.

Ḥaḍr, al- (city, ancient Iraq): *see* Hatra.

Ḥaḍramawt, also spelled HADHRAMAUT, ancient South Arabian kingdom that occupied what are now southern and southeastern Yemen and the present-day Sultanate of Oman (Muscat and Oman). Ḥaḍramawt maintained its political independence until late in the 3rd century AD, when it was conquered by the Kingdom of Saba'.

Ḥaḍramawt, also spelled HADRAMOUT (Yemen [Aden]): *see* Hadhramaut.

Hadria (Italy): *see* Adria.

Hadrian, also spelled ADRIAN, Latin in full CAESAR TRAIANUS HADRIANUS AUGUSTUS, original name (until AD 117) PUBLIUS AELIUS HADRIANUS (b. Jan. 24, AD 76, Italica, Baetica?—d. July 10, 138, Baiae [Baia], near Naples), Roman emperor (AD 117–138), the emperor Trajan's nephew and successor, who was a cultivated admirer of Greek civilization and who unified and consolidated Rome's vast empire.

Early life. The family of Hadrian came from southern Spain. They were not, however, of native Spanish origin but rather of settler stock. Hadrian's forebears left Picenum in Italy for Spain about 250 years before his birth. Hadrian himself may have been born in Rome. There is nothing particularly Spanish about Hadrian. He bears the stamp of education in cosmopolitan Rome.

Hadrian's father died in 85, and the son was entrusted to the care of two men: one, a cousin of his father, later became the emperor Trajan, and the other, Acilius Attianus, later served as prefect of the emperor's Praetorian Guard early in Hadrian's own reign. In 90, Hadrian visited Spain probably for the first time. At Italica he received some kind of military training and also developed a fondness for hunting that he kept for the rest of his life. Hadrian did not seem to care much for the life of Italica. He remained there for only a few years, and when he returned to Spain as emperor he avoided Italica altogether.

Hadrian, bust in the Museo Archeologico Nazionale, Naples

Anderson—Alinari from Art Resource/EB Inc.

Rise to power. When Trajan was consul in 91, Hadrian began to follow the traditional career of a Roman senator, advancing through a conventional series of posts. He was military tribune with three Roman legions. In about 95 he served with the Legio II Adjutrix in the province of Upper Moesia, on the Danube River, whence he transferred in the next year to Lower Moesia (with the Fifth Macedonica). Toward the end of 97 Hadrian was chosen to go west to Gaul to convey congratulations to Trajan, whom the aged emperor Nerva had just adopted and thereby designated his successor. Trajan's ward now belonged to the governing circles of the empire. Inevitably, hostility and envy awaited him. In 98 Julius Servianus, his brother-in-law, attempted unsuccessfully to prevent him from being the first to inform Trajan of Nerva's death. Thereafter, the two men were probably never on cordial terms, for Servianus posed a constant threat to Hadrian's position.

The greatest single political figure behind the emperor Trajan was the man who had masterminded his elevation, Lucius Licinius Sura. Hadrian enjoyed Sura's favour, and, as long as he was alive, Hadrian prospered. Trajan's wife, Plotina, seems also to have been close to Sura and a partisan of Hadrian. For a time Servianus could do no harm. Through Plotina's favour, Hadrian married Trajan's grand-niece, Vibia Sabina, in 100. In 101 Hadrian was quaestor and in 102 served as Trajan's companion in the Emperor's first war in Dacia on the Danube. In 105 Hadrian became tribune of the plebs and, exceptionally, advanced to the praetorship in 106. No less exceptional than the speed of promotion was the fact that Hadrian served as praetor while in the field with the Emperor during his second war in Dacia. In 107 he was briefly governor of Lower Pannonia. Then, in 108, Hadrian reached the coveted pinnacle of a senator's career, the consulate. In 107 Licinius Sura had held that office for the third time, an honour vouchsafed to very few. It was a cruel blow when Sura died at an unknown date immediately following Hadrian's consulate.

Hadrian's career apparently stopped for nearly 10 years. Other promising young Romans suffered a similar retardation at about the same time. It would appear that a new political influence, opposed to Sura, Plotina, and Hadrian, dominated Trajan's court after Sura's death. Perhaps Servianus played some role. One fact illuminates this otherwise obscure period of Hadrian's life: he was archon at Athens in 112, and a surviving inscription commemorating this office was set up in the Theatre of Dionysus. Hadrian's tenure is a portent of the philhellenism that characterized his reign, and it suggests that in a time of political inactivity Hadrian devoted himself to the nation and culture of his beloved Greeks. Somehow, however, Hadrian's star rose again, and he returned to favour before the Emperor died.

One source says that Hadrian was an officer under Trajan during the Parthian wars at the end of his reign. In 117, when Trajan began his journey westward, Hadrian was left in charge of the crucial army in Syria. Friends of Hadrian, whose careers had been held up, can also be discovered in sensitive commands at the same time, probably because Plotina and her associates had regained Trajan's confidence. On August 9 Hadrian learned that Trajan had adopted him, the sign of succession. On the 11th, it was reported that Trajan had died on the way to Rome, whereupon the army proclaimed Hadrian emperor. The sequence of events has always provoked suspicion of a conspiracy on Plotina's part, but the truth will never be known. Certainly, it was Trajan who had taken the fateful step of entrusting the army of Syria to Hadrian.

Policies as emperor. Hadrian wrote to the Senate requesting honours for his adoptive father and ratification of the army's proclamation; all this was granted. The new emperor began a slow return to Italy. He had to make sure of the crucial provincial commands; it was also expedient to have some dissidents rounded up at home before his return and (he would be able to argue) on someone else's orders. Trajan's conquests in Armenia and Mesopotamia were quickly abandoned.

Acilius Attianus, as prefect of the Praetorian Guard, directed affairs in Rome before Hadrian's return. He ordered the summary executions of four senators of exalted, consular rank, all (it would seem) threats to the security of Hadrian. This bloody prelude to the new regime was unsettling, and Hadrian affirmed it was contrary to his will; he laid the blame on Attianus, just as he often blamed instructions of the dead Trajan for other unpopular acts. When Hadrian reached Rome in the summer of 118, his position was reasonably stable. He courted popular sentiment by public largesse, gladiatorial displays, and a formal cancellation of debts to the state. Attianus, however, was replaced and his colleague in the prefecture, Sulpicius Similis, was also dismissed. Hadrian installed as prefects the distinguished Marcius Turbo, a general to whom the Emperor owed much, and Septicius Clarus, the patron of Suetonius the biographer. Before many years had passed, both of these men had fallen into disgrace. Hadrian was mercurial or possibly just shrewdly calculating in dispensing favours.

The new emperor remained at Rome for three years. In 121 he set forth on a tour of the empire, west and east, to inspect troops and examine frontier defenses. He went to Gaul and Germany, thence to Britain in 122. From there he moved on to Spain and spent the winter in Tarraco, where he made arrangements for coping with an uprising in Mauretania (Morocco). He next passed eastward, approaching Asia Minor (Anatolia) by the Aegean after an overland trip through the Balkans. He quickly negotiated some problems with the Parthians and then visited northwestern Asia Minor. Returning to the west coast in 124, he sailed to Athens and finally reached Rome again in 125. This pro-

longed absence from the capital of the empire had its administrative justifications. There had been disturbances in some provinces, and the Parthians had to be dealt with; there was a general need for imperial supervision. Nevertheless, another motive impelled the Emperor in his journeys, namely, an insatiable curiosity about everything and everybody. The Christian writer Tertullian called him rightly *omnium curiositatum explorator,* an explorer of everything interesting. That curiosity was bred of a keen intellect and an anguished spirit. These together drove him inexorably, and by a roundabout path, to the Greek East. After he left Spain early in 123, he never saw the western provinces again. Hadrian soon came to look upon his reign as a new Augustan age. In 123 he began to style himself Hadrianus Augustus, deliberately evoking the memory of his great predecessor; he announced a golden age on his coinage. The peace he so much cherished was a latter-day Augustan peace, and he bequeathed to posterity a public statement of his exploits that imitated the one left by Augustus.

Hadrian spent another three years in Rome, but in 128 he set forth again. After a visit to North Africa, he went to Athens, and from there he sailed to Asia Minor; he penetrated far eastward into Syria and Arabia. Crossing over into Egypt, he explored the Nile; then, for the third time, he went to Athens. It is not certain whether Hadrian returned to Rome in 132 or a little later; he was certainly there in May of 134, but by then a revolt in Judaea forced him abroad still another time. He went to Palestine, not as a tourist but as a commander. That journey was Hadrian's last.

The Emperor's travels show the man better than anything else and are marked by some of his most memorable achievements. In northern Britain he initiated the construction of the tremendous frontier wall that bears his name from Wallsend-on-Tyne to Bowness-on-Solway. At Lambaesis, in Algeria, his rigorous inspection of the troops and his severe standards of discipline can be seen in a long inscription preserving an address he made to the soldiers in 128. In Athens, the Emperor's benefactions were numerous. At the Athenians' request, he had their laws professionally redrafted, and he brought to completion the massive temple of Olympian Zeus that the Peisistratid tyrants had begun more than five centuries before. He created the Panhellenion, a federation of Greeks that was based at Athens, which gave equal representation to all Greek cities and thereafter played a conspicuous part in the history of Roman Greece. At the shrine of Delphi, Hadrian gave his support to a building renaissance. The impact of all this on Hadrian personally cannot be exaggerated. Like Augustus before him, he was initiated into the Greek mystery religion at Eleusis, and, after the temple of Olympian Zeus was dedicated, he assumed the title Olympius.

The irrational element in Hadrian was important. He was an adept in astrology, like many intelligent Romans of the time. He was also an aesthete who ascended Mt. Etna, in Sicily, and Jabal Agraʿ, near Syrian Antioch, simply to watch the sunrise. He had a lively sense of the past, preferring older writers to more recent ones, favouring archaism for its own sake. He revolutionized style in the empire by wearing a beard and setting a precedent for generations of emperors.

In Bithynium-Claudiopolis (modern Bolu) in northwestern Asia Minor, Hadrian encountered a languid youth, born about 110, by the name of Antinoüs. Captivated by him, Hadrian made Antinoüs his companion. When, as they journeyed together along the Nile in 130, the boy fell into the river and drowned, Hadrian was desolate and wept openly. A report circulated and was widely believed that Antinoüs had cast himself deliberately into the river as a part of some sacred sacrifice. Although Hadrian himself denied this, the sober 3rd-century historian Dio Cassius thought it was the truth. The religious character, if such there was, of the relation between Hadrian and the boy is totally elusive. The emotional involvement is, however, quite clear. Seeing Hadrian's grief, the Greek world strove to provide suitable consolation for the bereaved and honour for the deceased. Cults of Antinoüs sprang up all over the East and then spread to the West. Statues of the boy became a common sight. In Egypt the city of Antinoöpolis commemorated his death.

Artistic achievements. The artistic temperament of Hadrian manifested itself in his poetry, his architectural designs, his very style of life. Four complete poems of his composition survive; they illustrate an exceptional technical mastery of versification, although the manner of expression is often artificial and the subjects are slight. His most famous verses are the lines addressed to his soul and reportedly uttered as he lay dying. In architecture, the Emperor had a notorious quarrel with a leading contemporary architect, Apollodorus of Damascus, whom it is even alleged Hadrian had put to death. His ultimate artistic achievement was undoubtedly the villa he created for himself at Tivoli, outside Rome. Here the Emperor surrounded himself with elegant evocations of his travels; by landscaping and superior reproductions, he re-created the sights he most loved and thereby managed in his last years to experience the satisfactions of travel without ever leaving the shores of Italy.

Hadrian was not the best of patrons. Latin literature did not progress during his reign. The greatest Hadrianic authors, Suetonius the biographer, Juvenal the satirist, and Tacitus the historian, were all, in a sense, only survivors of the Trajanic age. They had no immediate literary heirs. Suetonius, although elevated to the important literary post of *ab epistulis* in the court during Hadrian's first years, was summarily dismissed about 122. Probably there had been a literary quarrel. Of two eminent orators, Dionysius of Miletus and Favorinus of Arelate (in Gaul), Hadrian openly favoured and advanced the former; he then tried to overthrow him. Favorinus was living in exile toward the end of Hadrian's reign. The Emperor's tastes dominated the world.

In Rome itself, during his brief sojourns there, Hadrian left his memorial in several imposing buildings. Designs for the Temple of Rome and Venus provoked the conflict with Apollodorus. He completely rebuilt the Pantheon, which had been destroyed by fire in the reign of his predecessor. His own great tomb (the modern Castel Sant'Angelo) was inspired by an Augustan precedent, the Julio–Claudian mausoleum, at Rome.

Last years. When Hadrian left Rome in 134 for his final journey abroad, it was to resolve a problem of serious proportions in Judaea. Under the leadership of Bar Kokhba (known also as Bar Koziba), the Jews were in open revolt. What had moved them is not altogether clear. Rabbinical literature alludes to a Hadrianic persecution that caused fear and apostasy. The probable explanation of this kind of reference is a universal ban on circumcision that Hadrian issued in, it seems, the early 130s. The Emperor had an abhorrence of physical mutilation and even went so far as to declare that castration was no less a crime than murder. In the same spirit he denounced and forbade circumcision, which he viewed as mutilation. There is no reason to imagine that Hadrian intended by his measure to punish or provoke the Jews. The uprising came swiftly and understandably. Hadrian's visit to Athens in 131–132 and his residence at Rome until the summer of 134 suggest a reluctance to deal personally with the disturbance in Judaea. He first placed an able general, Sextus Julius Severus, in charge of the problem. In the year after Hadrian's arrival in the Near East, the revolt was over. Recent discoveries have shown that several measures connected with the close of the revolt and often cited as indications of imperial severity have to be dated at least six years earlier and, very probably, well before that. Hadrian meted out no savage punishments in 135.

In 134 Hadrian's aged rival, Julius Servianus, held the consular office for the third time, which was a great but empty honour, for the man was too old. Servianus and others may, however, have seen in his young grandson, Pedanius Fuscus, a successor to Hadrian. In 136 both Servianus and Fuscus were executed. The Emperor had realized that it was time to face the issue of succession, and he wanted it resolved in his own way. With Fuscus eliminated, Hadrian adopted the profligate Lucius Ceionius Commodus, aged about 36. The extravagant life of Ceionius, later renamed Lucius Aelius Caesar, portended a disastrous reign. Fortunately, he died two years later, and Hadrian, close to death himself, had to choose again. This time he picked an 18-year-old boy named Annius Verus, the future emperor Marcus Aurelius.

In 138 Hadrian arranged for the succession to pass to the young Verus. His arrangements were clever. An estimable and mature senator, Antoninus, was adopted by Hadrian and designated to succeed him. The Emperor, however, required that Antoninus adopt both the young Verus and the eight-year-old son of the recently deceased Ceionius. Thus, the family of his first choice was remembered, whereas an early succession for the older boy seemed assured. No one expected that Antoninus would last very long. Hadrian's scheme of imposing a double adoption upon his immediate successor looks like another imitation of the first emperor, Augustus, who had made a similar demand of Tiberius. By an irony of fate, Hadrian's expectations about the future were confounded. Antoninus, like Tiberius, lived far longer than anyone would have thought possible. He did not die until 161.

When Hadrian died at the seaside resort of Baiae, death came to him slowly and painfully. He wrote a letter in which he said how terrible it was to long for death and yet be unable to find it. His reign concluded two years after a double execution; it had begun with a quadruple one. The dead man was not widely mourned. He was someone to propitiate like a god, wrote a person who knew him, but he was not one to evoke affection.

(G.W.Bo./Ed.)

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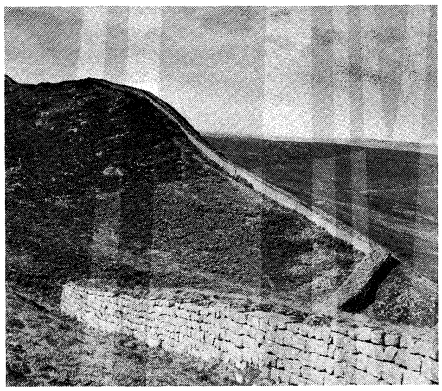
Hadrianople (Turkey): *see* Edirne.

Hadrianopolis, Battle of: *see* Adrianople, Battle of.

Hadrian's Villa, country residence built (*c.* AD 125–134) at Tivoli near Rome by the emperor Hadrian. This villa is considered the epitome in architecture of the opulence and elegance of the Roman world. Covering approximately 7 square miles (18 square kilometres),

the complex was more an imperial garden city than a traditional villa. Its buildings were designed to follow the natural lay of the land and included baths and bath buildings, libraries, sculpture gardens, theatres, alfresco dining halls, pavilions, and private suites. Significant portions of the complex survived to modern times.

Hadrian's Wall, continuous Roman defensive barrier that guarded the northern frontier of the province of Britain from barbarian invaders. The wall extended from coast to coast across the width of Britain; it ran for 73½ miles (118 km) from Wallsend (Segedunum) on the Tyne River in the east to Bowness on the Solway Firth in the west. Erected by order of the Roman emperor Hadrian, the wall's construction was begun by the gover-



Hadrian's Wall west of Housesteads, Northumberland
Reece Winstone

nor of Britain, Aulus Platorius Nepos (served AD 122–126). It was completed in 136 after various fortifications had been added. Parts of the wall that had originally been built in turf were gradually rebuilt in stone in the decades following completion.

For most of its length Hadrian's Wall was 20 feet (6 m) high and 8 to 10 feet (2.5 to 3 m) thick. It was protected by many small towers, or milecastles, so-called because one of these was built along the wall every Roman mile (1,620 yards [1,480 m]). Seventeen larger forts were built at intervals of 3–7 miles (5–11 km) along the wall. Running along the northern side of the wall was a deep and wide ditch, and on the wall's southern side ran a smaller ditch as well as a military road for the Roman defenders' use. Hadrian's Wall was destroyed twice by northern barbarian tribes (197 and 296) and again in 367–368. It was evacuated after 383. Considerable sections of the wall and its stone forts still exist, forming one of the largest and most impressive Roman remains in modern Britain.

hadron, in physics, any of the subatomic particles that react by the force of strong interaction (the short-range nuclear force that binds together protons and neutrons in atomic nuclei). The hadrons embrace mesons (*e.g.,* pions and kaons), baryons (*e.g.,* protons, neutrons, sigma particles), and their many resonances. All observed subatomic particles except bosons (photons, *W* particles, and *Z* particles) and leptons (electrons, muons, and neutrinos) are hadrons. Except for protons and for neutrons that are bound in nuclei, all hadrons have short lives and are produced when high-energy hadrons (moving at almost the speed of light) collide with other hadrons. The other three basic forces of nature also affect hadron behaviour: all are subject to gravitation; charged hadrons obey electromagnetic laws; and some hadrons break up by way of the force of weak interaction (as in radioactive decay), while others decay via the strong and electromagnetic forces.

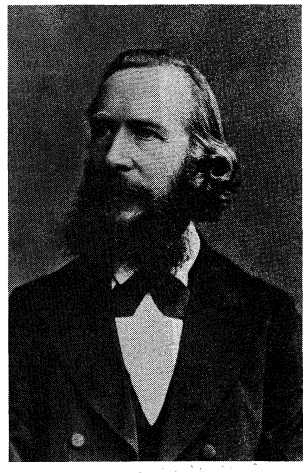
Hadrumetum, modern SŪSAH, SOUSA, or SOUSSE, ancient Phoenician colony on the east coast of what is now Tunisia and one of the most important communities within the Carthaginian territory in northern Africa. In the Third Punic War (149–146 BC) Hadrumetum sided with Rome, and its citizens were rewarded with partial Roman citizenship. It later received colonial rank from either Augustus or Trajan. The city was a centre for the administration of imperial estates in what is now the eastern part of Tunisia and became the capital of the province of Byzacenia, formed by Diocletian about AD 300. It was again important after the reconquest of Africa by Justinian I in 533, receiving the name Justinianopolis. Before the Arab conquest, the modern town of Sūsah (*q.v.*) arose on the site.

Haeckel, Ernst (Heinrich Philipp August) (b. Feb. 16, 1834, Potsdam, Prussia [Germany]—d. Aug. 9, 1919, Jena, Ger.), German zoologist and evolutionist who was a strong proponent of Darwinism and who proposed new notions of the evolutionary descent of man. He declared that ontogeny (the embryology and development of the individual) briefly, and sometimes necessarily incompletely, recapitulated, or repeated, phylogeny (the developmental history of the species or race).

Early years. He was the younger son of Carl and Charlotte Sethe Haeckel and grew up at Merseburg, where his father, a lawyer, was a government official. It was eventually decided that he would enter medicine. He studied at Würzburg and at the University of Berlin, where his professor, the physiologist and anatomist Johannes Müller, took him on a summer expedition to observe small sea creatures off the coast of Heligoland in the North Sea.

Such experiences in marine biology strongly attracted Haeckel toward zoology, but dutifully he took his medical degree, as his family wished, at Berlin in 1857. For a time he practiced medicine; his father then agreed to his traveling to Italy, where he painted and even considered art as a career. At Messina he studied the one-celled protozoan group Radiolaria, which are strikingly crystalline in form; not surprisingly, Haeckel later maintained that the simplest organic life had originated spontaneously from inorganic matter by a sort of crystallization.

The turning point in Haeckel's thinking was his reading of Charles Darwin's 1859 work, *On the Origin of Species by Means of Natural Selection.* Meanwhile, he completed a dissertation in zoology in 1861 at Jena and became *Privatdozent,* or lecturer. In 1862 he



Haeckel, *c.* 1870
The Bettmann Archive

was appointed extraordinary (that is, associate) professor of zoology, and that year, when he published his monograph on the Radiolaria, he expressed in it his agreement with Darwin's theory of evolution; from that time he was a proponent of Darwinism and soon was lecturing to scientific and lay audiences on the descent theory, incurring both admiration and opposition. Darwin had described evolution through the natural selection of accumulated favourable variations that in time formed new species; to Haeckel, however, this was only a beginning, with consequences to be pursued further. In 1865 he was appointed full professor, and he remained at Jena until his retirement in 1909.

Haeckel's views on evolution. Haeckel saw evolution as the basis for a unified explanation of all nature and the rationale of a philosophical approach that denied final causes and the teleology of the church. His *Generelle Morphologie der Organismen* (1866; "General Morphology of Organisms") presented many of his evolutionary ideas, but the scientific community was little interested. He set forth his ideas in popular writings, all of which were widely read, though deplored by many of Haeckel's scientific colleagues.

Enthusiastically attempting to explain both inorganic and organic nature under the same physical laws, Haeckel portrayed the lowest creatures as mere protoplasm without nuclei; he speculated that they had arisen spontaneously through combinations of carbon, oxygen, nitrogen, hydrogen, and sulfur. In those days of great interest in protoplasm it was believed for a while that certain deep-sea dredgings had brought up such structureless organisms; when scientists found this to be in error, Haeckel continued to insist, throughout the years, that "monera" existed. From them he traced one-celled forms with nuclei and three kingdoms—animal, vegetable, and the neutral, borderline "protista." His artistic leanings toward ideal symmetries led him to outline numerous genealogical trees, sometimes to supply missing links or branches; and he reconstructed the human ancestral tree, to show man's descent from the lower animals.

Haeckel tended to speculate and for some years pondered over the problem of heredity. Interestingly, though it was only on a theoretical basis, he suggested as early as 1866 that the cell nucleus was concerned with inheritance. He had long been thinking of "vital molecular movement" when, in 1876, he attempted to place heredity on a molecular basis in a work entitled *Die Perigenesis der Plastidule* ("The Generation of Waves in the Small Vital Particles"). Here again, he traced a branching scheme, this time to illustrate the mechanism of heredity and to show the influence of outer conditions on the inherited undulatory motion he attributed to the "plastidules," the term he adopted for the molecules making up protoplasm.

Though his concepts of recapitulation were in error, Haeckel brought attention to important biological questions. His gastraea theory, tracing all multicellular animals to a hypothetical two-layered ancestor, stimulated both discussion and investigation. His propensities to systematization along evolutionary lines led to his valuable contributions to the knowledge of such invertebrates as medusae, radiolarians, siphonophores, and calcareous sponges.

Haeckel was the teacher of noted zoologists and a member of learned societies. He was not one to change his ideas and was often involved in controversy. While extending his arguments into the theological, political, and social fields, he attracted disciples, yet alienated friends. Building the collections around his own, Haeckel founded both the Phyletic Museum in Jena and the Ernst Haeckel Haus; the latter contains his books and archives, and in it many mementos of his life and work are preserved. (G.Ro.)

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Haedo Ridge, Spanish CUCHILLA DE HAEDO, range of hills, north-central Uruguay. With the Cuchilla Grande, to the east, it defines the basin of the Negro River, Uruguay's major river. The range extends southward from a rugged highland area near the Brazilian border for approximately 125 miles (200 km), terminating at the confluence of the Negro and Uruguay rivers, the Rincón de las Gallinas. It separates a basalt upland to its west from the Negro River basin, frequently as an escarpment exhibiting interbedded basalts and red sandstones. Its geologic structure is different from that of the Cuchilla Grande. Maximum elevations, which are nowhere very great, approach 1,300 feet (400 m) at the hills of Lunarejo and Virgen.

Haeju, city, southwestern North Korea. Situated on Haeju Bay, facing the Yellow Sea, it is the only port on the west coast of North Korea that does not freeze over in winter. Haeju was the centre for trade with China until the Kyŏng-Ui rail line, constructed in 1906 from Seoul to Sinŭiju, on the border with Manchuria, bypassed it. With the Chaeryŏng plain (a granary area) nearby and Yŏnp'yŏng Island (a fishing ground for yellow corbina) facing the city, Haeju has developed as a market centre for agricultural and marine products. The most important industries are cement manufacturing and chemicals. The city has several technical schools. Pop. (1980 UN est.) 213,000.

haem-, haema-, haemo- (combining form, "blood"): *see under* hem-, hema-, hemo-, except as below.

Haemophilus, genus of very small rod-shaped bacteria of uncertain affiliation. All species are strict parasites occurring in the respiratory tracts of warm-blooded animals, including humans, and in certain cold-blooded animals. All *Haemophilus* are microbiologically characterized as gram-negative, facultative anaerobes (not requiring oxygen), nonmotile, and requiring some component of blood. They are minute in size, *H. influenzae* being 0.3 micrometre across and up to 2 micrometres long.

H. gallinarum causes infectious coryza in fowl. *H. suis* (itself not disease-causing), together with a virus (*Tarpeia suis*), causes swine influenza. *H. ducreyi* causes a venereal disease in humans known as chancroid, or soft chancre. *H. influenzae,* once thought to cause human influenza, is now known to act sometimes as a source of secondary infections in persons suffering from influenza, now known to be a viral disease.

Haemus (ancient Europe): *see* Balkan Mountains.

Haendel, Georg Friedrich (composer): *see* Handel, George Frideric.

Haerbin (China): *see* Harbin.

Haey (Scotland): *see* Hoy.

Ḥāfeẓ, also spelled ḤĀFIZ, in full MOḤAMMAD SHAMS OD-DĪN ḤĀFEẒ (b. 1325/26, Shīrāz, Iran—d. 1389/90, Shīrāz), one of the finest lyric poets of Persia.

Ḥāfeẓ received a classical religious education, lectured on Qur'ānic and other theological subjects ("Ḥāfeẓ" designates one who has learned the Qur'ān by heart), and wrote commentaries on religious classics. As a court poet he enjoyed the patronage of several rulers of Shīrāz.

About 1368–69 Ḥāfeẓ fell out of favour at the court and did not regain his position until 20 years later, just before his death. In his poetry there are many echoes of historical events as well as biographical descriptions and details of life in Shīrāz. One of the guiding principles of his life was Ṣūfism, the mystical movement that demanded of its adherents complete devotion to the pursuit of union with the Ultimate Reality.

Ḥāfeẓ, detail of an illumination in a Persian manuscript of the *Divān* of Ḥāfeẓ, 18th century; in the British Library

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Ḥāfeẓ's principal verse form, one that he brought to a perfection never achieved before or since, was the ghazel, a lyric poem of 6 to 15 couplets linked by unity of subject and symbolism rather than by a logical sequence of ideas. Traditionally the ghazel had dealt with love and wine, motifs that, in their association with ecstasy and freedom from restraint, lent themselves naturally to the expression of Ṣūfi ideas. Ḥāfeẓ's achievement was to give these conventional subjects a freshness and subtlety that completely relieves his poetry of tedious formalism. An important innovation credited to Ḥāfeẓ was the use of the ghazel instead of the qasida (ode) in panegyrics. Ḥāfeẓ also reduced the panegyric element of his poems to a mere one or two lines, leaving the remainder of the poem for his ideas. The extraordinary popularity of Ḥāfeẓ's poetry in all Persian-speaking lands stems from his simple and often colloquial though musical language, free from artificial virtuosity, and his unaffected use of homely images and proverbial expressions. Above all, his poetry is characterized by love of humanity, contempt for hypocrisy and mediocrity, and an ability to universalize everyday experience and to relate it to the mystic's unending search for union with God. His appeal in the West is indicated by the numerous translations of his poems. Ḥāfeẓ is most famous for his *Dīvān;* Eng. prose trans., H. Wilberforce Clarke, *Hafiz Shirazi. The Divan* (1891, reprinted 1971). There is also a translated collection: A.J. Arberry, *Fifty Poems of Hafiz* (1947).

Ḥāfiẓ Ibrāhīm, Muḥammad (b. 1872, Dayrut, Egypt—d. July 21, 1932, Cairo), Egyptian poet known as the "poet of the Nile."

Ḥāfiẓ was a lawyer and later a lieutenant in the Egyptian army, from which he retired in 1901. During the next 10 years he wrote his well-known odes denouncing imperialism and wrote his nationalistic poems. His superb skill as a reciter of poetry won him a prominent place in society, and he became director of literature (1911–31) in the national library at Cairo. Ḥāfiẓ's true talent may have been in prose, as can be seen from his unfinished work *Al-Bu'asā'* (1903; "The Miserable Ones").

Ḥāfiẓ-i Abrū, in full 'ABD ALLĀH IBN LUTF ALLĀH IBN 'ABD AR-RASHĪD AL-BIHDĀDĪNĪ ḤĀFIẒ-I ABRŪ (b. Herāt, Khorāsān [now in Afghanistan]—d. 1430, Zanjān, Azerbaijan), Persian historian, and one of the most important historians of the Timurid period (1370–1506).

Ḥāfiẓ-i Abrū was apparently educated in the city of Hamadān. Later he became an extensive traveler and went with Turkic conqueror Timur on a number of campaigns, including those in the Middle East against Aleppo and Damascus in 1400–01. After the ruler's death, Ḥāfiẓ-i Abrū entered the service of Timur's son, Shāh Rokh (1405–46), and his grandson, Prince Baysunqur (d. 1433), as court historian and thus settled in Herāt. He died on the return from Shāh Rokh's second campaign in Azerbaijan in 1430.

Among his major works is the *Majmū'a* ("Collected Work"), which was commissioned by Shāh Rokh; it is mainly a collection of three older well-known historical works with continuations and an introduction and index by Ḥāfiẓ-i Abrū. His *Majma' al-tavārīkh* ("The Compendium of History") is a world history divided into four volumes (*arbā',* "quarters") that cover the pre-Islāmic prophets and ancient Iran, a history of Muḥammad and the caliphate up to 1258, Iran during the Seljuq and the Mongol periods, and, finally, Iran under the Timurid rulers. The last section was dedicated to Prince Baysunqur and has a separate title, *Zubdat at-tavārīkh-i Bāysunghurī* ("Baysunqur's Cream of History"). He also translated a geographic work from Arabic, the *Masālik al-mamālik wa suwar al-akālīm* ("The Roads of the Kingdoms and the Forms of the Climes"), in which he included historical sections dealing with various provinces of Iran.

Hafnarfjördhur, town, southwestern Iceland, on the southwestern shore of Faxa Bay. In the 20th century it has become a southern suburb of Reykjavík, the capital of Iceland. A fishing community built on an extensive lava field, it grew rapidly in the late 20th century as a result of the expansion of the capital. The town has a sanatorium as well as one of the island's first technical high schools. Electrical appliances are manufactured there. Pop. (1988 est.) 14,197.

Hafner ware, glazed earthenware made in Germany as early as 1350, originally as stove tiles molded in relief. The name *Hafnergeschirr* ("stove-maker vessel") came to be applied to other pottery objects, usually melon-shaped or ovoid mugs or jugs, manufactured by

Polychrome glazed Hafner jug made by Paul Preuning of Nürnberg, *c.* 1550; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

the stove makers in the 16th century. The earliest stove tiles had a green lead glaze. By 1500 tin glazes were used; and in the mid-16th century Paul and Kunz Preuning, potters of Nürnberg, introduced a polychrome style. The large stoves made of these tiles, which are decorated with religious or allegorical subjects, are handsome works of art, as well as functional objects. Although the centre of Hafner ware manufacture was Nürnberg, the industry also spread to other places in Germany, as well as to Austria and Switzerland.

hafnium (Hf), chemical element, metal of Group IVb of the periodic table, chemically similar to zirconium (atomic number 40). The Dutch physicist Dirk Coster and the Hungarian-Swedish chemist George Charles de Hevesy discovered (1923) this element in Norwegian and Greenland zircons by analyzing their X-ray spectra and named it for Copenhagen (in New Latin, Hafnia), the city in which it was discovered. The moderately scarce element is dispersed in the Earth's crust to the extent of five grams per ton and is invariably found in zirconium minerals up to a few percent compared with zirconium. Altered zircons, like some alvites and cyrtolites, products of residual crystallization, show greater percentages of hafnium (up to 17 percent hafnium oxide in cyrtolite from Rockport, Mass.). Commercial sources of hafnium-bearing zirconium minerals are found in beach sands and river gravel in the United States (principally Florida), Australia, Brazil, western Africa, and India. Hafnium vapour has been identified in the Sun's atmosphere.

Ion-exchange and solvent-extraction techniques have supplanted fractional crystallization and distillation as the preferred methods of separating hafnium from zirconium. The metal itself is prepared by magnesium reduction of hafnium tetrachloride (Kroll process) and by the thermal decomposition of the tetraiodide (de Boer–van Arkel process). The metal is hard and looks like stainless steel.

Hafnium is used for fabricating nuclear-reactor control rods because it is relatively opaque to thermal neutrons and has excellent mechanical properties and high corrosion resistance. Hafnium is alloyed with other transition metals such as iron, titanium, niobium, and tantalum. A mixture of four moles of tantalum carbide to one of hafnium carbide is the most refractory substance known, melting at 4,215 K (7,128° F).

Hafnium is passive in air (because of the formation of a protective film of oxide or nitride) and does not dissolve in weak acids. Its most common oxidation state is +4, though a few trivalent compounds are known. Hafnium is chemically similar to zirconium because of similar electronic configurations and nearly identical ionic and atomic radii. The radius of hafnium is brought in line with that of zirconium by the lanthanide contraction (*q.v.*). Natural hafnium is a mixture of six stable isotopes: hafnium-174 (0.2 percent), hafnium-176 (5.2 percent), hafnium-177 (18.5 percent), hafnium-178 (27.1 percent), hafnium-179 (13.8 percent), and hafnium-180 (35.2 percent).

atomic number	72
atomic weight	178.49
melting point	2,150° C (3,902° F)
boiling point	5,400° C (9,752° F)
specific gravity	13.31 (20° C)
valence	4
electronic config.	2-8-18-32-10-2 or $(Xe)4f^{14}5d^{2}6s^{2}$

Hafren (river, England–Wales): *see* Severn.

Ḥafṣid DYNASTY, also called BANŪ ḤAFṢ, Berber dynasty of the 13th–16th centuries in Ifrīqīyah (Tunisia and eastern Algeria), founded by the Almohad governor Abū Zakarīyyā' Yaḥyā *c.* 1229. In the 20 years of his rule, Abū Zakarīyyā' kept the various tribal disputes and intrigues under control, ensured Ḥafṣid economic prosperity by trade agreements with Italian, Spanish, and Provençal communities, and expanded his power into northern Morocco and Spain. His son, al-Mustanṣir (1249–77), assumed the title of caliph and raised the prestige of the kingdom to its highest point. A period of internal dissension followed al-Mustanṣir's rule, Ḥafṣid unity being temporarily restored by Abū Ḥafṣ (1284–95), then by Abū Yaḥyā Abū Bakr (1318–46). Plagued by periodic Marīnid invasions, the Ḥafṣid kingdom regained some of the lustre of al-Mustanṣir's era under Abū al-'Abbās (1370–94), who managed to pacify the country, though Ḥafṣid pirate activity continued to threaten international relations. Ḥafṣid power retained its vigour under 'Uthmān (1435–88), despite a rebellion (1435–52), but after his reign dynastic struggles heralded the decline of Ḥafṣid power. The country fell into Arab hands, and Spaniards later established themselves on the coast. Finally a struggle for control between Spanish and Turkish forces ended with Turkish supremacy and the designation of Tunis as a *paşalik* in 1574.

Hafstein, Hannes (b. Dec. 4, 1861, Módruvellir, Ice.—d. Dec. 13, 1922, Reykjavík), Icelandic statesman and poet, a pioneer of literary realism in Iceland.

The son of a provincial governor in northern Iceland, Hafstein studied law in Copenhagen, propagated the new literary ideals of Ibsen, Bjørnson, and Georg Brandes, and campaigned for Iceland's political independence. In 1886 he went back to Iceland, became a member of the Althing (parliament), and in 1904 was appointed Icelandic minister of state to the Danish crown, the first Icelander to hold the post. He was a tough and dynamic fighter for Iceland's political freedom and backed it with farsighted work for the improvement of social conditions and educational opportunities for the ordinary Icelander.

Most of his poetry was written when he was a young man; it is filled with the vigour and joy of life, his love of country, and his admiration for the heroic, as exemplified in *Heimdallur* (1884), a potrait of Brandes. He also wrote many delicate love lyrics and drinking songs.

Haftarah, also spelled HAFṬARA, HAPHṬARAH, HAFṬORAH, or HAPHṬORAH (Hebrew: Conclusion), plural HAFTAROT, HAFTAROTH, or HAFTARAHS, selective reading from Old Testament prophets recited in Jewish synagogues during the morning service on the sabbath and on festivals (but during the afternoon service on fast days). Though Haftarot vary with various rites and no longer follow recommendations of the Mishna (the lawbook section of the Talmud), selections are generally chosen that relate to the Torah reading that immediately precedes. A benediction, praising God, who sent true prophets, introduces the Haftarah reading, and four benedictions follow, the last of which is omitted on fast days. Jewish boys often chant the Haftarah in the synagogue on the sabbath of their Bar Mitzvah. Of very ancient origin, Haftarot implicitly affirm the sanctity of the prophetic books, a view long rejected by Samaritans, who hold that the Pentateuch (first five books of the Bible) alone is the inspired word of God.

hag, in European folklore, an ugly and malicious old woman who practices witchcraft, with or without supernatural powers; hags are often said to be aligned with the devil or the dead. Sometimes appearing in the form of a beautiful woman, a succubus is a hag believed to engage in sexual intercourse with sleeping men, causing severe nightmares and leaving the victim exhausted. Although viewed in most lore as the antithesis of fertility, the hag is believed by some scholars to be a remnant of primitive nature goddesses.

Hagalín, Gudmundur G(íslason) (b. Oct. 10, 1898, Arnarfjördur, Ice.), Icelandic novelist, short-story writer, and essayist. His works constitute a social history of Iceland from World War I to the post-World War II period.

He was born in northwestern Iceland, where men live by fishing in wild weather and farming the half-barren land. As a young man, he worked on the fishing boats and read widely. At 18 he went to the Latin School in Reykjavík but left after a year. He disliked "having learning stuffed into him like hay into a sack." He turned to journalism, spent three years in Norway, travelling and lecturing on Iceland. In 1927 he went back to Ísafjördur as librarian, where he worked and wrote for many years.

The men and women around him were Hagalín's personae. They were rough, forthright characters. Inevitably, he developed a strong prose style to interpret them. His short stories are models of economy in words. In his novels the characters in their natural setting dictate the action. Hagalín was one of the first Icelanders to write fictional biographies based on real people (though the form had its ancestry in the sagas). One deals with the life and adventures of a shark fisherman; another portrays the career of a ship's master. They are not only good stories; they are documents of a passing generation.

Hagalín's best-known novels include *Kristrún í Hamravík* (1933), *Sturla í Vogum* (1938), and *Módir Ísland* (1945, "Mother Iceland"). His autobiographical works include *Ég veit ekki betur* (1951, "I Know No Better") and *Hér er kominn Hoffinn* (1954, "Here Hoffin is Come").

Haganah (Hebrew: Defense), Zionist military organization representing the majority of the Jews in Palestine from 1920 to 1948. Organized to combat the revolts of Palestinian Arabs against the Jewish settlement of Palestine, it early came under the influence of the Histadrut (General Federation of Labour). Although it was outlawed by the British Mandatory authorities and was poorly armed, it managed effectively to defend Jewish settlements.

The Haganah's activities were moderate, at least until the end of World War II, in accord with the organized Jewish community's policy of *havlaga* ("self-restraint"); it opposed the political philosophy and terrorist activities of the Irgun Zvai Leumi and the Stern Gang. The general membership of the Haganah served on a part-time basis; in 1941, a full-time commando force, the Palmach (Hebrew acronym for Pluggot Machatz, Shock Companies) was organized. After World War II, when the British refused to open Palestine to unlimited Jewish immigration, the Haganah turned to terrorist activities, bombing bridges, rail lines, and ships used to deport "illegal" Jewish immigrants.

After the United Nations' decision to partition Palestine (1947), the Haganah came into the open as the defense force of the Jewish state; it clashed openly with British forces and successfully overcame the military forces of the Palestinian Arabs and their allies. By the time of the creation of the State of Israel (1948) the Haganah controlled not only most of the settled areas allocated to Israel by the partition but also such Arab cities as 'Akko (Acre) and Yafo (Jaffa). By order of the provisional government of Israel (May 31, 1948) the Haganah as a private organization was dissolved and became the national army of the state. Its name is perpetuated in the official name of the Israel armed services, Tzva Haganah le-Yisra'el (Israel Defense Forces).

Hagar, also spelled AGAR, in the Old Testament (Gen. 16:1–16; 21:8–21), Abraham's concubine and the mother of his son Ishmael.

Purchased in Egypt, she served as a maid to Abraham's childless wife, Sarah, who gave her to Abraham to conceive an heir. When Hagar became pregnant, her meek manner changed to arrogance; with Abraham's reluctant permission, Sarah treated her so harshly that she fled into the wilderness. There, by a spring of water, she was found by an angel of the Lord, who told her to return home and who promised her that she would have many descendants through a son, Ishmael; he would grow up to be a "wild ass of a man," in constant struggle with all other men. Hagar returned home to bear her child.

About 14 years after the birth of Ishmael, Isaac, Abraham's son with whom God had promised to make a covenant, was born to Sarah. One day Sarah saw Isaac and Ishmael playing together and, fearing that Ishmael would also become an heir, sent the son and mother into the desert. There God sustained them and was with Ishmael until he grew up. The Jews believed that Ishmael was the ancestor of a number of Bedouin peoples dwelling in southern Palestine. There are also legends stating that Ishmael was an ancestor of Muḥammad.

Hagedorn, Friedrich von (b. April 23, 1708, Hamburg [Germany]—d. Oct. 28, 1754, Hamburg), poet who introduced a new lightness and grace into German poetry and was highly esteemed by his contemporaries.

Hagedorn's father was the Danish ambassador in Hamburg, and the young Hagedorn

Hagedorn, detail of an engraving by J.C.G. Fritzsch
Bavaria-Verlag

in 1729 became an unpaid private secretary to the Danish ambassador in London. He returned to Hamburg in 1731 and two years later was appointed secretary to the English trading company Englischer Hof, a position that gave him a great deal of leisure.

Although he is usually grouped with the German Anacreontic poets, his model was Horace, rather than the Greek poet Anacreon, and his poetry was not limited to the love and drinking songs characteristic of the Anacreontics. His best and most popular works appeared in *Versuch in poetischen Fabeln und Erzählungen* (1738; "Attempt at Poetic Fables and Tales") and *Oden und Lieder,* 3 vol. (1742–52; "Odes and Songs"). These fables and tales in verse, influenced by the French poet Jean de La Fontaine, are characterized by neatness of form, graceful lightness of touch, and a feeling for rhythm that sets Hagedorn apart from other poets of his time.

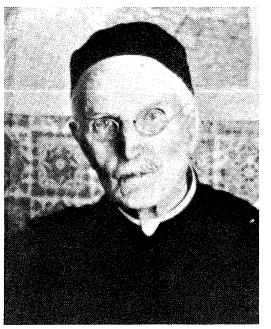
Hagen, also called HAGANO, or HOGNI, mythological Germanic hero who plays a variety of roles in a number of northern European legends. In the *Nibelungenlied,* he appears as a vassal of the Burgundian king Gunther and is a grizzled warrior, loyal and wary. He plays a principal role in the epic as the slayer of Siegfried, who becomes the chief object of hatred and revenge of Siegfried's widow, Kriemhild. The last of the Nibelungen to be killed, Hagen is decapitated by Kriemhild. The Latin heroic epic *Waltharius,* in which he is called Hagano, treats of his youth as a hostage and his escape and subsequent attachment to King Guntharius. In Old Norse poems he is Hogni, the brother of Gunnar; both brothers meet their death at the hands of Atli (Attila). *See* Atli, Lay of.

Hagen, city, North Rhine-Westphalia *Land* (state), western Germany, south of Dortmund, at the confluence of the Ennepe and Volme rivers just south of the Ruhr. It lies on the eastern edge of the industrial Ruhr district and is bordered on the south by the Sauerland, a mountainous area of forests and lakes. First mentioned in the 8th century, Hagen continued as an agricultural village until the late medieval period, when iron-ore mining and iron founding became important and when varied crafts were established. Cutters and armourers from Solingen were settled there by Great Elector Frederick William of Brandenburg in 1661; these were followed by paper millers and, in the 18th century, by cloth makers from Berg and Jülich. Civic rights were granted in 1746.

Industrial development began in the 19th century, and, prior to World War II, Hagen absorbed the neighbouring towns of Haspe, Boele, and Vorhalle. Largely destroyed during the war, the city was rebuilt in modern style with many parks, a theatre, and museums of art and local history. Industries include ironworking and steelworking, die-casting, and the manufacture of machinery, chemicals, paper, and textiles. Pop. (1989 est.) 210,640.

Hagen, Johann Georg (b. March 6, 1847, Bregenz, Austria—d. Sept. 5, 1930, Rome, Italy), Jesuit priest and astronomer who is noted for his discovery and study of dark clouds of tenuous, interstellar matter sometimes known as Hagen's clouds.

Hagen served as director of the Georgetown College Observatory, Washington, D.C., from 1888 to 1906, when Pope Pius X appointed him director of the Vatican Observatory. In 1893, while compiling a general catalog of bright and dark nebulae, Hagen began an intensive study of dark nebulae. Over a period of several decades, he became convinced that he sometimes observed dark interstellar matter through the telescope, although he failed to detect it photographically, presumably because of its faint luminosity. Modern astronomers tend to discount the existence of Hagen's clouds and attribute his observations

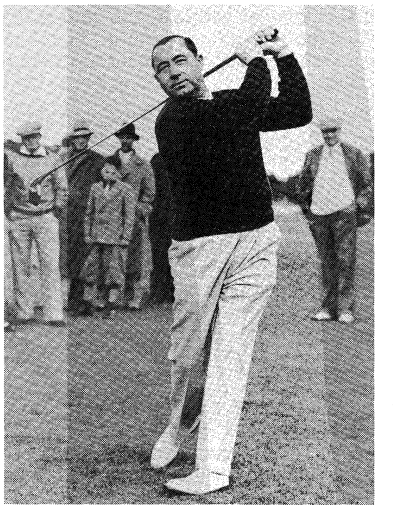


Johann Georg Hagen, *c.* 1920
Archiv fur Kunst und Geschichte, Berlin

to other causes, such as inconsistencies in the reaction of the human eye.

Hagen is also noted for his work on variable stars (stars whose intensity changes cyclically). His studies on variable stars appear in *Atlas Stellarum Variabilium* (1890–1908; "Atlas of Variable Stars"), and his observations of Hagen's clouds are summarized in a paper that appeared in *Specola Astronomica Vaticana 14* (1931; "Vatican Astronomical Observatory").

Hagen, Walter (Charles), byname THE HAIG (b. Dec. 21, 1892, Rochester, N.Y., U.S.—d. Oct. 5, 1969, Traverse City, Mich.), American professional golfer, one of the most colourful sports personages of his time, who is credited with doing more than any other golfer to raise the social standing of his profession. He was exceptionally self-confident; he



Walter Hagen, 1936
UPI—EB Inc.

dressed stylishly, lived extravagantly, played more than 2,500 exhibition matches throughout the world, and always insisted that he be received as a gentleman, a concession rarely accorded to earlier professional golfers.

A caddie from the age of 9, Hagen was 21 when he won the first of his 11 major championships—the U.S. Open in 1914. He won this tournament again in 1919; the British Open in 1922, 1924, 1928, and 1929; and the U.S. Professional Golfers' Association (PGA) tournament in 1921 and 1924–27. He was playing captain of the U.S. Ryder Cup team in 1927, 1929, 1931, 1933, 1935, and 1937.

In retirement Hagen spent most of his time on an estate in Michigan. His autobiography, *The Walter Hagen Story,* was published in 1956. "I never wanted to be a millionaire," he once said. "I just wanted to live like one."

Hagenbeck, Carl (b. June 10, 1844, Hamburg [Germany]—d. April 14, 1913, Hamburg), internationally known German animal dealer and trainer who controlled animals by befriending them, emphasizing for spectators their intelligence and tractability over their ferocity.

Hagenbeck's father had maintained a small show menagerie, and the young Hagenbeck began his career as an animal dealer, hiring hunters and taking orders from zoos and circuses. He assumed ownership of his father's enterprise in 1866 and soon was the leading dealer in Europe. When the animal trade declined in the 1870s, he began to produce and travel with "ethnographical shows," spectacles featuring people and animals from remote regions. One scene, for example, included a Lapp family with reindeer and sledge. In 1884 he toured with 67 Ceylonese, 25 elephants, and a herd of cattle.

In 1887 Hagenbeck began to experiment with animal training with the aim of demonstrating that the beatings and hot irons then used to train animals were both cruel and unnecessary. In 1889 he introduced a lion act in which, as a finale, three lions pulled him around the cage in a chariot. After this success, the Hagenbeck system gradually replaced harsher training methods in circuses and expositions in Europe and America. During a trip to the United States in 1906, he sold his traveling animal show to Benjamin Wallace, who renamed it the Hagenbeck-Wallace Cir-

cus. The following year, Hagenbeck opened a zoological garden at Stellingen, near Hamburg, where he exhibited animals in uncovered, barless pits. He developed panoramas for animals like polar bears and tigers that imitated their native habitats. His zoological garden was the prototype for future open-air zoos and a source of animals for zoos and circuses.

Hagenbeck Zoo, in full CARL HAGENBECK ZOO, German CARL HAGENBECK TIERPARK, zoological park in Hamburg, W.Ger., which pioneered the use of moated, barless, open-air enclosures that resemble the animals' natural habitats. The zoo was founded in 1907 by Carl Hagenbeck, who originated the type of wild-animal acts characteristic of modern circus performances. Circuses and zoos the world over continue to purchase trained animals from the zoo, which maintains more than 2,000 specimens of about 300 species. The animals are exhibited on a geographic basis in the 67-acre (27-hectare) park. The zoo is privately owned by the Hagenbeck family.

Hagerstown, city, seat (1776) of Washington county, north-central Maryland, U.S. It lies in the Cumberland River valley between the Blue Ridge and Allegheny mountains, 72 miles (116 km) northwest of Baltimore. In 1762 the town was laid out by Jonathan Hager and named Elizabeth Town for his wife, but it was incorporated as Hager's Town in 1814. Hager's House (*c.* 1740) has been restored as a museum. During the American Civil War it was loyal to the Union; near to some of the bloodiest battlefields (Gettysburg, Harpers Ferry, Antietam), it changed hands several times. Construction of a spur of the Baltimore and Ohio Railroad in 1867 revived the town economically. It subsequently became a major transportation centre for the surrounding agricultural area and manufactures a variety of products including aircraft, textiles, furniture, pipe organs, and blast-cleaning equipment.

Hagerstown Junior College was founded in 1946. Several thousand Confederates killed at Antietam and South Mountain are buried in Rose Hill Cemetery. Inc. city, 1839. Pop. (1988 est.) city, 34,995; MSA 117,800.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Hägerström, Axel (Anders Theodor) (b. Sept. 6, 1868, Vireda, Swed.—d. July 7, 1939), Swedish philosopher who founded the Uppsala school of philosophy, which espoused phenomenological and conceptual analysis and rejected metaphysical suppositions and subjectivism.

Raised in a religious home, Hägerström commenced studies in theology (1886) but received his degree in philosophy from the University of Uppsala, where he remained as a lecturer and then professor (1893–1933). He was originally influenced by the idealism and then the Kantianism of his contemporaries; and his early works, *Das Prinzip der Wissenschaft* (1908; "The Principle of Science") and *Botanisten och filosofen* (1910; "The Botanist and the Philosopher"), discussed the role of "ego" in determining individual reality. Not subscribing to any philosophical system, he later concentrated on the theory of reality while criticizing legal, religious, and moral ideology. Key works are *Social teleologi i marxismen* (1909; "Social Teleology in Marxism"), *Om Moraliska Föreställningars Sanning* (1911; "On the Truth of Moral Ideas"), and *Der römische Obligationsbegriff im Lichte der allgemeinen römischen Rechtsanschauung,* 2 vol. (1927–41; "The Roman Notion of Obligation in the Light of the General Roman View of Law").

hagfish, also called SLIME EEL, any of about 20 species of marine, fishlike vertebrates placed with the lampreys in the class Agnatha. Hagfishes can be divided into two families: Myxinidae, represented in every ocean, and Eptatretidae, represented everywhere but the North Atlantic.

Eellike in shape, hagfishes are scaleless, soft-skinned creatures with several thick barbels on the end of the snout. Depending on the species, they grow to about 40 to 80 cm (16 to 32 inches) long. Primitive vertebrates, hagfishes have a tail fin (but no paired fins) and no jaws or bones. Their skeletons are cartilaginous, and their mouths are slitlike, sucking openings provided with horny teeth. The poorly developed eyes are buried under the skin, and there is a single nostril at the end of the snout. Five to 15 pairs of gills are used for respiration. They share a common opening on each side in members of the family Myxinidae but open separately on the surface in those of the family Eptatretidae.

Hagfishes are found in cold seawater, to depths of about 1,300 m (4,260 feet). They live on soft bottoms, in burrows, and habitually lie buried except for the tip of the head. The diet includes marine invertebrates and dead or crippled fishes. Sometimes, to the detriment of fishermen, hagfishes attack fish caught on lines or in nets, boring their way into the bodies and eating the fish from the inside. Because hagfishes secrete extraordinary amounts of slime when handled, they are sometimes known as slime eels.

Hägg, Gunder (b. Dec. 31, 1918, Sörbygden, Sweden), Swedish middle-distance runner who broke a total of 15 world records during his career. He set 10 of them within a three-month period in 1942.

On July 1, 1942, Hagg set a world record for the mile run of 4 min 6.2 s, which he again broke on September 4 with a time of 4 min 4.6 s. On July 3 he set a world record for the two-mile run of 8 min 47.8 s. On July 17 he set a world record for the 1,500-metre race of 3 min 45.8 s; and on July 21 he set a world record for the 2,000-metre race of 5 min 16.4 s, which he broke on August 23 with a time of 5 min 11.8 s (unbroken until 1948). On August 28 he set a world record for the 3,000-metre race of 8 min 1.2 s (unbroken until 1949). On September 11 he set a world record for the three-mile run of 13 min 35.4 s, which he broke on September 20 with a time of 13 min 32.4 s (unbroken until 1954). On that date as well, he set a record for the 5,000-metre race of 13 min 58.2 s (unbroken until 1954).

Hägg gained attention as a runner in 1938, when he was second in the 3,000-metre steeplechase in the Swedish national meet. In 1943, on a tour of the United States, he was undefeated in eight races. He was an early proponent of Fartlek, a system of endurance training that alternates strenuous running with periods of easygoing activity.

Haggadah (Hebrew: "Narration"), also spelled HAGGADA, or AGGADA, plural HAGGADOT, HAGGADOTH, or AGGADOT, in Judaism, a form of nonlegal, rabbinical literature that includes such things as legends and proverbs; more narrowly, Haggadah is the story of the biblical Exodus as it must be retold at the beginning of the seder dinner on Passover (Pesaḥ). Although the Exodus story is only part of the seder ritual, Haggadah frequently refers to the entire ritual or even to the ritual book itself. Commentaries supplement the modified biblical story, and answers are given to traditional questions proposed by children. *See also* seder.

Haggai, The Book of, also called THE PROPHECY OF AGGEUS, the 10th of 12 Old Testament books that bear the names of the Minor Prophets. Haggai (fl. 6th century BC) helped mobilize the Jewish community for the rebuilding of the Temple of Jerusalem (516 BC) after the Babylonian Exile and prophesied the glorious future of the messianic age.

The book consists of four prophecies delivered over a four-month period in the second year of the reign of the Persian king Darius I the Great (521 BC). Although attributed to Haggai, the book must be credited to someone other than the prophet; it was probably compiled soon after the occurrence of the events, however.

Haggai's oracles show his concern for the immediate reconstruction of the Temple in Jerusalem. He believed that the economic distress of the people was caused by their negligent delay in starting the construction and that Zerubbabel, the governor of Judah under Darius, was God's chosen Davidic representative.

Haggard, Sir H(enry) Rider (b. June 22, 1856, Bradenham, Norfolk, Eng.—d. May 14, 1925, London), English novelist best known for his romantic adventure *King Solomon's Mines* (1885).

The son of a barrister, Haggard was educated at Ipswich grammar school and by private tutors. In 1875, at age 19, he went to southern Africa as secretary to the governor of Natal, Sir Henry Bulwer. Then he served on Sir Theophilus Shepstone's staff and himself hoisted the flag at the annexation of the Transvaal in 1877. He then became master of the high court there. In 1881 he returned to England, wrote a history of recent events in southern Africa, *Cetywayo and His White Neighbours* (1882), and read for the bar.

He published two novels, then unsuccessful, but captured the public with his African adventure story, *King Solomon's Mines.* He followed this with *She* (1887) and further stories of Africa, notably *Allan Quatermain* (1887), *Nada the Lily* (1892), *Queen Sheba's Ring* (1910), *Marie* (1912), and *The Ivory Child* (1916). He also wrote memorably of ancient Egypt in several novels, beginning with *Cleopatra* (1889).

Haggard was also a practical farmer; he served on several government commissions concerning agriculture and was knighted in 1912 and 1919 for these services. *A Farmer's Year* (1899) and *Rural England,* 2 vol. (1902), are works of some importance. His autobiography, *The Days of My Life; An Autobiography by Sir H. Rider Haggard* (1926), was edited by C.J. Longman and published posthumously.

haggis, a national dish of Scotland. A haggis is actually a large spherical sausage made of the liver, heart, and lungs of a sheep, all chopped and mixed with beef or mutton suet and oatmeal and seasoned with onion, cayenne pepper, and other spices. The mixture is packed into a sheep's stomach and boiled. Haggis is usually accompanied by turnips and mashed potatoes; Scotch whisky is customarily drunk with it.

Haggis is served on Burns Night (January 25, the birthday of the poet Robert Burns, who wrote "Ode to a Haggis") and at the Scottish New Year's celebration Hogmanay, when it is ceremonially presented to the accompaniment of bagpipes.

Hägglund, Joel Emmanuel (radical leader): *see* Hill, Joe.

Hagi, city, Yamaguchi *ken* (prefecture), Honshu, Japan, on the delta of the Abu River, facing the Sea of Japan. Hagi was founded as a castle town in 1600 and prospered as the capital of both Suō and Nagato provinces (now Yamaguchi prefecture). Economic growth since the Meiji Restoration (1868) has been slow. The manufacture of pottery and bamboo work remains important. Hagi is well known for its

historic sites, including the Sho Temple and the ruins of Hagi Castle. Pop. (1985) 52,740.

Hagia Sophia, also called CHURCH OF THE DIVINE WISDOM, Turkish AYASOFYA, cathedral built at Constantinople under the direction of the Byzantine emperor Justinian I. It is a unique building and one of the world's great monuments, despite time's ravages. The structure, a domed basilica, was built in the amazingly short time of about six years, being completed in AD 537. The architects were Anthemius of Tralles and Isidore of Miletus. For an illustration and floor plan of Hagia Sophia, *see* MACROPAEDIA: Architecture, History of Western.

Hagiographa (division of Bible): *see* Ketuvim.

hagiology, branch of historical study dealing with the lives of the saints and the devotion paid to them. This specialized study was inspired by the special nature of the documents concerned: acts of the martyrs; biographies of saintly monks, bishops, princes, or virgins; and accounts of miracles connected with their tombs, relics, icons, or statues.

The importance of hagiology derives from the vital role that the veneration of the saints played throughout medieval civilization in both eastern and western Christendom. Second, this literature preserves much valuable information not only about religious beliefs and customs but also about daily life, institutions, and events in periods for which other evidence is either imprecise or nonexistent.

The hagiographer, or writer of hagiology, has a threefold task: to collect all the material relevant to each particular saint, to edit the documents according to the best methods of textual criticism, and to interpret the evidence by using literary, historical, and any other pertinent criteria. Among the noted early hagiographers are Eusebius of Caesarea in the 4th century, Gregory I the Great in the 6th, and Venerable Bede in the 8th. Modern critical hagiography began with the Bollandists in 17th-century Belgium.

hagioscope, also called SQUINT, in architecture, any opening, usually oblique, cut through a wall or a pier in the chancel of a church to enable the congregation—in transepts or chapels, from which the altar would not otherwise be visible—to witness the elevation of the host (the eucharistic bread) during mass. Similar openings are sometimes furnished to enable an attendant to see the altar in order to ring a small bell at the appropriate intervals of the elevation of the Eucharist in preparation for communion or to permit someone in a vestry to notify the bell ringer. Hagioscopes are more common in England than in continental Europe.

Hagiwara Sakutarō (b. Nov. 1, 1886, Maebashi, Japan—d. May 11, 1942, Tokyo), Japanese poet whose attempt to express his perceptions directly in concrete, often unpretty images, rather than in amorphous descriptions, represented a revolutionary trend in Japanese literature.

Hagiwara began to write while still in high school. He was deeply influenced by the new style of the poet Yosano Akiko, whose *Midaregami* ("Tangled Hair") appeared in 1901. He left high school without graduating and went to Tokyo to work on the poetry magazine of the established poet Kitahara Hakushū. Hagiwara's own style developed slowly; support from his father relieved him of financial worries and enabled him to work at his own pace. In 1916 he started his own magazine and in 1917 brought out his first book of poetry, *Tsuki ni hoeru* ("Barking at the Moon"). His difficult style was not immediately understood, although one of the leaders of the Japanese literary world, the novelist Mori Ōgai, was impressed by his mode of expression. *Atarashiki yokujo* (1922; "New Desires") expressed Hagiwara's sensual philosophy in poetic aphorisms. A collection of Hagiwara's poetry, translated as *Face at the Bottom of the World and Other Poems,* appeared in 1969.

Hagiwara Sakutarō
By courtesy of the Nippon Kindai Bungaku-kaṅ, Tokyo

Hague, The, Dutch 's-GRAVENHAGE, or DEN HAAG, French LA HAYE, seat of government of The Netherlands and capital of the *provincie* of Zuid-Holland (South Holland), situated 4 miles (6 km) from the North Sea. The city's name recalls the hunting lodge and principal residency of the counts of Holland, which were located in a woodland area called Haghe, or "hedge" (whence 's-Gravenhage, "the counts' private dominion"). Count William II built a castle there in 1248, around which several buildings—including the Knight's Hall (1280)—came to be clustered. Together they form the Binnenhof (Inner Courtyard) in the heart of the city. About 1350 an artificial lake, the Hofvijver, was dug on the north side and still forms one of the many attractions of the city. On the west side is the Buitenhof (Outer Courtyard). The main gateway of the courtyard, *gevangenpoort* ("prison gate"), once used as a prison, formed the entrance.

A commercial district grew up around the court area in the 13th and 14th centuries. In 1585 the States-General, along with other bodies of the central government, established themselves in the Binnenhof. The government of the province of Holland also returned, and Prince Maurice of Orange took up residence there. It was at his instance that in 1616 The Hague was defended by a web of canals that remained the city's borders to the mid-19th century.

In the 17th century, when the Dutch Republic played a leading role in Europe, The Hague became a centre of diplomatic negotiation. During French rule (1795–1813), The Hague declined into a poor provincial town, but with liberation from the French it became the seat of government of the Kingdom of The Netherlands. After 1850, when the revenues from the Dutch East Indies started to pour in, the city prospered. The arts flourished, and The Hague school of landscape painters became world famous. As a result of the Hague Peace Conferences held in 1899 and 1907, The Hague became a permanent centre of international law. The American steel magnate Andrew Carnegie endowed the Peace Palace, completed in 1913.

In the early 20th century, industry in the city increased and harbours were constructed. During World War II the city suffered heavily from the German occupation, but afterward there was considerable reconstruction and expansion.

There is little heavy industry in The Hague. Most of the city's business firms are engaged in trade, banking, insurance, or services. The Hague is also a leading centre of international conferences. Several large oil firms have their international headquarters in the city.

The numerous museums in the city comprise a wide range of collections. The Mauritshuis Royal Art Gallery has a remarkable collection of the works of the Dutch masters: Rembrandt, Jan Vermeer, Jan Steen, and others. The Haags Commune Museum has the largest collection of paintings by Piet Mondrian in the world. Other notable museums are The Netherlands Costume Museum, the Mesdag Museum, the Mesdag Panorama, the Coin and Medal Cabinet, and the Postal Museum. There are several art academies, and musical life is dominated by The Hague Philharmonic orchestra.

Important historical landmarks include the Great Church of St. James or St. Jacobs (1399), the Protestant New Church (1654), the Noordeinde Palace, and the 16th-century town hall. Among the more interesting structures of the postwar period are the U.S. embassy (1961) and The Netherlands Congress Centre (1969). Pop. (1989 est.) city, 443,845; metropolitan area, 683,631.

Hague Agreement, also called ROUND TABLE CONFERENCE AGREEMENT (Nov. 2, 1949), treaty between The Netherlands and the Republic of Indonesia that attempted to end the Dutch-Indonesian conflict following the proclamation of Indonesian independence in 1945. After prolonged disagreement over its provisions, the treaty was revoked in 1956. According to the treaty, the Dutch agreed to transfer, by Dec. 30, 1949 (transfer was made on Dec. 27, 1949), their political sovereignty over the entire territory of the former Dutch East Indies, with the exception of West New Guinea (West Irian), to the Republic of the United States of Indonesia, which was to be a federal government formed of the republican state and the 15 autonomous states created by the Dutch. This new republic together with The Netherlands established a Netherlands-Indonesian Union, which was intended to work for the common interest. In return for Dutch political concessions, the new republic gave a guarantee to Dutch investors in the region and accepted the debt of 4,300,000,000 guilders. The status of West New Guinea was to be settled in discussions to take place the following year.

The Hague Agreement apparently benefited The Netherlands, but the Indonesian nationalists were dissatisfied with certain articles in the agreement, especially those dealing with the nature of the state, the dominant role of the autonomous Dutch states, the debt, and the West New Guinea problem. The dissatisfied nationalists drafted a provisional constitution in 1950 and established Indonesia as a unitary state. The conflict between the Dutch and the Indonesian nationalists continued, and on April 21, 1956, the Indonesian parliament revoked the Hague Agreement.

Hague Convention, any of a series of international treaties that issued from international conferences held at The Hague in The Netherlands in 1899 and 1907.

The first conference was convened at the invitation of Count Mikhail Nikolayevich Muravyov, the minister of foreign affairs of Tsar Nicholas II of Russia. In his circular of Jan. 11, 1899, Count Muravyov proposed specific topics for consideration: (1) a limitation on the expansion of armed forces and a reduction in the deployment of new armaments; (2) the application of the principles of the Geneva Convention of 1864 to naval warfare; and (3) a revision of the unratified Brussels Declaration of 1874 regarding the laws and customs of land warfare. The conference met from May 18 to

July 29, 1899; 26 nations were represented. Only two American states participated, the United States and Mexico.

Although the conference of 1899 failed to achieve its primary objective, the limitation on armaments, it did adopt conventions defining the conditions of a state of belligerency and other customs relating to war on land and sea. Further, three declarations were accepted—one prohibiting the use of asphyxiating gases, another prohibiting the use of expanding bullets (dumdums), and another prohibiting the discharges of projectiles or explosives from balloons. Last, and most important, was the adoption of the Convention for the Pacific Settlement of International Disputes, creating the Permanent Court of Arbitration.

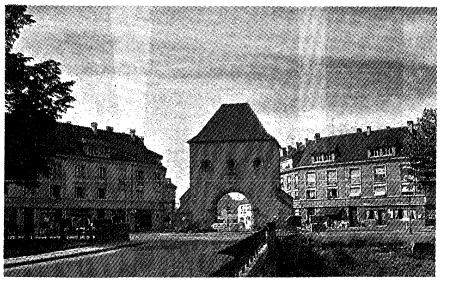
The conference of 1907, though first proposed by U.S. President Theodore Roosevelt, was officially convened by Nicholas II. This conference sat from June 15 to Oct. 18, 1907, and was attended by the representatives of 44 states. Again the proposal for the limitation of armaments failed of acceptance. The conference did, however, adopt several conventions relating to such matters as the employment of force for the recovery of contract debts; the rights and duties of neutral powers and persons in war on land and sea; the laying of automatic submarine contact mines; the status of enemy merchant ships; bombardment by naval forces in wartime; and the establishment of an international prize court. The conference of 1907 renewed the declaration prohibiting the discharge of projectiles from balloons but did not reaffirm the declarations prohibiting asphyxiating gas and expanding bullets. The final acts of the conference were the unanimous acceptance by the delegates of the principle of compulsory arbitration and the stating of a number of *voeux* (resolutions), the first of which was the recommendation that another conference be summoned in eight years, thus establishing the concept that the best way to handle international problems was through a series of successive conferences. Although the conference scheduled for 1915 failed to meet because of the outbreak of World War I, the conference idea strongly influenced the creation of the more highly organized League of Nations after the war.

Articles are alphabetized word by word, not letter by letter

Hague Rules, in maritime law, international code defining the rights and liabilities of a carrier. Introduced at the International Law Association meeting in Brussels in 1921, they were adopted first as clauses in bills of lading and after 1923 as the Brussels Convention on Limitation of Liability.

Hague school, Dutch painters who worked in The Hague between 1860 and 1900, producing realistic renderings of local scenes. The group included Jozef Israëls (*q.v.*); Hendrik Willem Mesdag; Hendrik Weissenbruch; Jacob, Matthijs, and Willem Maris (*q.v.*); Johannes Bosboom; and Anton Mauve (*q.v.*).

Haguenau, town, Bas-Rhin *département,* Alsace *région,* northeastern France, lying along the Moder River just south of the Forest of Haguenau, north of Strasbourg. It developed in the 12th century around a castle on an island in the river and was a favourite residence of the Holy Roman emperor Frederick I. In 1257 Haguenau was made an imperial city. In the 14th century it led the Decapolis, a union of Alsatian cities. Annexed by France in 1648, Haguenau suffered heavily in 17th-century wars. It retains two 13th-century gates, the Wissembourg and Fishermen's. The 12th-century Church of Saint-Georges and the



The Wissembourg Gate, Haguenau, Fr.
Editions "La Cigogne"—Hachette

Gothic Church of Saint-Nicolas (14th century) survive. There is some light manufacturing and a noted hop market with a yearly festival. Pop. (1982) 23,990.

Hahn, Otto (b. March 8, 1879, Frankfurt am Main, Ger.—d. July 28, 1968, Göttingen, W.Ger.), German chemist who, with the radiochemist Fritz Strassmann, is credited with the discovery of nuclear fission. He was awarded the Nobel Prize for Chemistry in 1944 and shared the Enrico Fermi Award in 1966 with Strassmann and Lise Meitner.

Otto Hahn
Landesbildstelle Berlin

Early life. Hahn was the son of a glazier. Although his parents wanted him to become an architect, he eventually decided to study chemistry at the University of Marburg. Life at home was simple and abstemious, but at Marburg Hahn developed a taste for beer and cigars, and his student days were not without romantic episodes. He worked hard at chemistry, though he was inclined to absent himself from physics and mathematics lectures in favour of art and philosophy, and he obtained his doctorate in 1901. After a year of military service, he returned to the university as chemistry lecture assistant, hoping to find a post in industry later on.

In 1904 he went to London, primarily to learn English, and worked at University College with Sir William Ramsay, who was interested in radioactivity. While working on a crude radium preparation that Ramsay had given to him to purify, Hahn showed that a new radioactive substance, which he called radiothorium, was present. Fired by this early success and encouraged by Ramsay, who thought highly of him, he decided to continue with research on radioactivity rather than go into industry. With Ramsay's support he obtained a post at the University of Berlin. Before taking it up, he decided to spend several months in Montreal with Ernest Rutherford (later Lord Rutherford of Nelson) to obtain further experience of radioactivity. Shortly after returning to Germany in 1906, Hahn was joined by Lise Meitner, an Austrian physicist, and five years later they moved to the new Kaiser Wilhelm Institute for Chemistry at Berlin-Dahlen. There Hahn became head of a small but independent department of radiochemistry.

Feeling that his future was more secure, Hahn married Edith Junghans, the daughter of the chairman of Stettin City Council, in 1913; but World War I broke out the next year, and Hahn was posted to a regiment. In 1915 he became a chemical-warfare specialist, serving on all the European fronts.

After the war, Hahn and Meitner were among the first to isolate ^{231}Pa, an isotope of the recently discovered radioactive element protactinium. Because nearly all of the natural radioactive elements had then been discovered, he devoted the next 12 years to studies on the application of radioactive methods to chemical problems.

Discovery of nuclear fission. In 1934 Hahn became keenly interested in the work of the Italian physicist Enrico Fermi, who found that, when the heaviest natural element, uranium, is bombarded by neutral subatomic particles called neutrons, several radioactive products are formed. Fermi supposed these products to be artificial elements similar to uranium. Hahn and Meitner, assisted by the young Strassmann, obtained results that at first seemed in accord with Fermi's interpretation but that became increasingly difficult to understand. Meitner fled from Germany in July 1938 to escape the persecution of Jews by the Nazis, but Hahn and Strassmann continued the work. By the end of 1938, they obtained conclusive evidence, contrary to previous expectation, that one of the products from uranium was a radioactive form of the much lighter element barium, indicating that the uranium atom had split into two lighter atoms. Hahn sent an account of the work to Lise Meitner, who, in cooperation with her nephew Otto Frisch, formulated a plausible explanation of the process, to which they gave the name nuclear fission.

The tremendous implications of this discovery were realized by scientists before the outbreak of World War II, and a group was formed in Germany to study possible military developments. Much to Hahn's relief, he was allowed to continue with his own researches. After the war, he and other German nuclear scientists were taken to England, where he learned that he had been awarded the Nobel Prize for 1944 and was profoundly affected by the announcement of the explosion of the atomic bomb at Hiroshima in 1945. Although now aged 66, he was still a vigorous man; a lifelong mountaineer, he maintained physical fitness during the enforced stay in England by a daily run.

On his return to Germany he was elected president of the former Kaiser Wilhelm Society (renamed the Max Planck Society for the Advancement of Science) and became a respected public figure, a spokesman for science, and a friend of Theodor Heuss, the first president of the Federal Republic of Germany. He campaigned against further development and testing of nuclear weapons. Honours came to him from all sides; in 1966 he, Meitner, and Strassmann shared the prestigious Enrico Fermi Award. This period of his life was saddened, however, by the loss of his only son, Hanno, and his daughter-in-law, who were killed in an automobile accident in 1960. His wife never recovered from the shock. Hahn died in 1968, after a fall; his wife survived him by only two weeks. (R.Sp.)

BIBLIOGRAPHY. William R. Shea (ed.), *Otto Hahn and the Rise of Nuclear Physics* (1983), contains a collection of 10 essays discussing the work by Hahn and others on radioactivity and nuclear physics.

Hahn, Reynaldo (b. Aug. 9, 1874, Caracas, Venez.—d. Jan. 28, 1947, Paris, Fr.), Venezuelan-born French composer, remembered chiefly for his art songs.

Hahn went to Paris as a child and later studied at the Conservatoire under Jules Massenet. He was music critic of *Le Figaro* from 1934 and in 1945 became director of the Paris Opéra. His operettas, which were developments of the style established by Jacques Offenbach, include *L'Île du rêve* (1898) and *Ciboulette* (1923). He also wrote incidental music for plays by Edmond Rostand, Sacha Guitry, and others, as well as ballets, notably *La Fête chez Thérèse* (1910) and *Le Dieu bleu* (1912). His piano suite *Portraits de peintres* was inspired by poems of Marcel Proust, who portrayed Hahn in his novel *Jean Santeuil*. Several of his exquisite art songs, such as "Si mes vers avaient des ailes" ("If my verse had wings"), remain in the concert repertory. Hahn's music is melodious and graceful. His memoirs are valuable sources for the musical and literary life of the time.

Hahn-Hahn, Ida (Marie Luise Gustave), Gräfin von (countess of) (b. June 22, 1805, Tressow, Mecklenburg-Schwerin—d. Jan. 12, 1880, Mainz, Ger.), German author of poetry, travel books, and novels which, though written in an artificial, aristocratic style, often show acute psychological insight.

Daughter of the theatrical producer Graf (Count) Karl Friedrich von Hahn, she acquired her hyphenated dual name by marrying a cousin, Graf Adolf von Hahn, in 1826. Three years later this unhappy marriage ended in divorce, and in subsequent years the countess became involved in several other unsuccessful relationships with men. She incorporated many of her own experiences into the

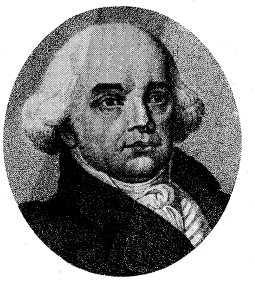
Ida, Gräfin von Hahn-Hahn, portrait by an unknown artist

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

sentimental plots of her novels. These novels, collected in *Aus der Gesellschaft,* 8 vol. (1835–46; "From Society"), deal with noblemen of strong, passionate natures who are involved in tragic conflicts with their circumstances. The best of her novels, *Gräfin Faustine* (1841; "Countess Faustine"), deals with the "freedom of feeling" associated with the Young Germany movement that strongly influenced her. Her style was parodied by a rival, Fanny Lewald, in *Diogena* (1847). In 1850 Gräfin von Hahn-Hahn converted to Roman Catholicism and began publishing pious stories and poems. Her *Von Babylon nach Jerusalem* (1851; "From Babylon to Jerusalem") was a justification of her conversion.

Hahnemann, (Christian Friedrich) Samuel (b. April 10, 1755, Meissen, Saxony—d. July 2, 1843, Paris), German physician, founder of the system of therapeutics known as homeopathy (*q.v.*).

Hahnemann studied medicine at Leipzig and Vienna, taking the degree of M.D. at Erlangen in 1779. After practicing in various places, he settled in Dresden in 1784 and then moved to Leipzig in 1789. In the following year, while translating William Cullen's *Lectures on the Materia medica* into German, he was struck by the fact that the symptoms produced by quinine on the healthy body were similar to those of the disordered states that quinine was used to cure. This observation led him to assert the theory that "likes are cured by likes," *similia similibus curantur; i.e.,* diseases are cured (or should be treated) by those drugs that produce in healthy persons symptoms similar to the diseases. He promulgated his principle in a paper published in 1796; and, four years later, convinced that drugs in small doses effectively exerted their curative powers, he advanced his doctrine of their "potentization



Hahnemann, engraving by Anton Wachsmann, *c.* 1812

Archiv fur Kunst und Geschichte, West Berlin

of dynamization." His chief work, *Organon der rationellen Heilkunst* (1810; "Organon of Rational Medicine"), contains an exposition of his system, which he called *Homöopathie,* or homeopathy. His *Reine Arzneimittellehre,* 6 vol. (1811; "Pure Pharmacology"), detailed the symptoms produced by "proving" a large number of drugs—*i.e.,* by systematically administering them to healthy subjects.

In 1821 the hostility of apothecaries forced him to leave Leipzig, and at the invitation of the grand duke of Anhalt-Köthen he went to live at Köthen. Fourteen years later he moved to Paris, where he practiced with great popularity until his death.

hahnium (Ha), also called NIELSBOHRIUM (Ns), an artificially produced radioactive transuranium element in Group Vb of the periodic table. The discovery of hahnium (element 105), like that of rutherfordium, has been a matter of dispute between Soviet and American scientists. The Soviets may have synthesized a few atoms of element 105 in 1967 at the Joint Institute for Nuclear Research in Dubna by bombarding americium-243 with neon-22 ions, producing isotopes of element 105 having mass numbers of 260 and 261 and half-lives of 0.1 second and 3 seconds, respectively. Because the Dubna group did not propose a name for the element at the time they announced their preliminary data—a practice that has been customary following the discovery of a new element—it was surmised by American scientists that the Soviets did not have strong experimental evidence to substantiate their claims. Soviet scientists contended, however, that they did not propose a name in 1967 because they preferred to accumulate more data about the chemical and physical properties of the element before doing so. After completing further experiments, they proposed the name nielsbohrium.

In 1970 a group of investigators at the Lawrence Radiation Laboratory of the University of California at Berkeley announced that they had synthesized isotope 260 of element 105, whereupon they proposed the name hahnium for the element in honour of Otto Hahn, the discoverer of nuclear fission. The American team could not duplicate the Soviet experiment; but, when its members bombarded californium-249 with the nuclei of nitrogen-15 atoms, they produced hahnium-260, which had a half-life of about 1.6 seconds. As further evidence of their discovery, the scientists at Berkeley measured the amount of energy emitted by hahnium-260 as it decayed, as well as the elements produced in the process; these characteristics were quite different from those of previously known elements in the periodic system.

atomic number	105
mass of most stable isotope	260
electronic configuration	2-8-18-32-32-11-2 or (Rn)$5f^{14}6d^{3}7s^{2}$

Hai ben Sherira (b. 939—d. March 23, 1038), last outstanding Babylonian gaon, or head, of a great Talmudic academy, remembered for the range and profundity of the exceptionally large number of responsa (authoritative answers to questions concerning interpretation of Jewish law) he wrote.

Though the office of gaon was not necessarily hereditary, Hai, whose family traced its origin back to the Davidic dynasty, was fourth in a direct line to occupy the gaonate of Pumbedita (Babylonia), situated in Baghdad from the late 9th century on. He assisted his father, Sherira ben Ḥanina, in teaching and later as chief of court of the academy. A false accusation to the caliph by Jewish adversaries caused them both to be imprisoned briefly (997). When they were freed, Hai's father appointed him gaon (998).

Close to a thousand responsa written by Hai, equaling the number of extant responsa written by all other geonim, are extant. He couched them in the same languages (Hebrew, Aramaic, or Arabic) in which the questions were written. The extent of his fame is evident in questions that reached him from such faraway places as Ethiopia, Turkey, and Spain. On occasion, when no Talmudic citation can be found, his answers employ non-Jewish authorities. Hai steered a middle course between rationalism and more esoteric doctrines, allowing the Kabbala, the influential body of Jewish mystical writings, validity insofar as its components are Talmudic but castigating it when it proposes miracle-making formulas by using the names of God. He died at the age of 99 on the eve of the last day of Passover, 1038. He was eulogized by the famous Judeo-Spanish poets Solomon ibn Gabirol and Samuel ha-Nagid as one who left no children but countless disciples in all countries of the world.

Hai Duong, town, northern Vietnam. The town is located along the Thai Binh River in the Red River delta. It lies on the Haiphong railway and is a market centre for a rich rice-growing region; litchi, watermelons, jute, rushes, potatoes, and tomatoes are also raised in the area. Hai Duong stands in one of the most densely populated and intensively cultivated areas of the country. The town is located about midway between Hanoi and Haiphong.

Hai-k'ou, Pinyin HAIKOU, conventional HOI-HOW, city in Hainan *sheng* (province), southern China. Hai-k'ou is the provincial capital of Hainan *sheng.* It is situated on the north coast of Hainan Island, facing the Luichow Peninsula, across the Hainan Strait (9½ miles [15 km] wide). Hai-k'ou originally grew up as the port for Ch'iung-shan, the ancient administrative capital of Hainan Island, which is situated some 3 miles (5 km) inland. It became a military post in the 13th century and was fortified under the Ming dynasty (1368–1644). The port is situated to the west of the mouth of the Nan-tu, Hainan's chief river. Although it has no good natural harbour, it has always been the principal port of the island. After Ch'iung-shan was opened to foreign trade under the Treaty of Tientsin (1876), Hai-k'ou began to rival the old administrative city. Hai-k'ou was created a separate administrative county in 1926; it overtook Ch'iung-shan in population

in the 1930s. Hai-k'ou was much developed as a port during the Sino-Japanese War (1937–45) when the Japanese occupied Hainan Island from early 1939 to 1945. Since 1949, Hai-k'ou has retained its position as Hainan's main port, handling more than half of its total trade; it has replaced Ch'iung-shan as the island's administrative capital. It exports great quantities of agricultural produce and livestock. There is a small amount of industry, including canning, textiles, rice hulling, and light engineering. Pop. (1985 est.) 198,900.

Hai River, Wade–Giles romanization HAI HO, Pinyin HAI HE, river in Hopeh province, China. The name Hai properly belongs only to the short stream from Tientsin that discharges into the Po Hai (Po Gulf) at T'ang-ku some 43 miles (70 km) away. It is, however, also used as the general name for the extensive system of tributary streams that discharge into the sea through this channel. The system has a drainage area of some 80,500 square miles (208,500 square km), including almost the whole of Hopeh, the eastern slopes of the T'ai-hang Mountains in Shansi province, and the northeastern corner of Honan province. The principal tributaries are the Ch'ao River, rising in the mountains north and northeast of Peking; the Yung-ting River, flowing southeastward from around Chang-chia-k'ou to the south of Peking; the Ta-ch'ing River, flowing eastward from the T'ai-hang Mountains to join the Hai at Tientsin; and the Tzu-ya River, flowing northeastward from southwestern Hopeh toward Tientsin, with its further important tributary, the Hu-t'o River, from the T'ai-hang Mountains west of Shih-chia-chuang in western Hopeh.

The area of the Hopeh Plain drained by the Hai River system is flat. The rivers have low gradients and are often built up above the level of the surrounding land by the silt they have carried down from the T'ai-hang uplands. The depth of the rivers is variable because the area is one of seasonal variations in rainfall, with dry winters (during which many of the streams dry up to a trickle) and heavy summer and autumn rainfall; rains in the T'ai-hang Mountains particularly produce serious flooding in the lower plains. The Hai River's channel itself is quite inadequate to carry the amount of floodwater discharged. In recent centuries floods have been almost an annual occurrence. In 1939 Tientsin itself was submerged for a month. These floods not only have caused loss of life, crops, and property but have also raised the alkali content of the soils of frequently inundated regions in much of Hopeh, thereby greatly reducing their productivity.

Since 1963 the Hai River Basin has been the subject of a comprehensive water-control project. On the upper courses of the tributary streams, 1,400 retention dams have been constructed, several of them (such as the Kuan-t'ing Dam on the Yung-ting River, west of Peking) of considerable size and designed as dual-purpose installations for irrigation and for the production of hydroelectricity. These works have been allied with afforestation, soil conservation, and field-terracing programs in the uplands. In the plain itself, the major rivers have been embanked to give protection against flooding, and their channels have been cleared and canalized using the massive mobilization of local labour. As a result, many of the Hai River's principal tributaries have been canalized or directed into new channels and given separate outlets. The Hai River thus no longer has to carry the entire flow of all these rivers in flood. These major works have been integrated with a large-scale construction program of subsidiary drainage and irrigation works that is designed to reduce the incidence of flooding and to ameliorate the consequences of drought. To improve irrigation facilities still further, a huge number of wells have been dug and pumping stations constructed to supplement the irrigation system with subterranean water.

Hai San, Chinese secret society that was influential in commerce and tin mining in 19th-century Malaya. The Hai San had its origins in southern China and was transmitted to Malaya by immigrant labourers. Cantonese originally dominated the society, but, between 1845 and 1860, Hakka immigrants gained preeminence. The society itself was a semilegal organization, internally controlled by impressive rituals, oath taking, and harsh penalties for infractions of rules. These rules included helping fellow members in times of need, keeping society affairs secret, and aiding members in quarrels. The Hai San was primarily centred in the Larut tin-mining district of Perak. Its disruptive activities, particularly its feud with the Ghee Hin society over the Perak tin mines, aroused the British authorities, who mediated a settlement between the two groups (*see* Chinese Engagement). By 1890 the Hai San had been absorbed into the Toh Peh Kong society, known as the Sa Tiam Hui in present-day Malaysia.

Hai Thu: *see* Phan Boi Chau.

Haida, Indians of the Queen Charlotte Islands, British Columbia, and the southern part of Prince of Wales Island, Alaska (the Alaskan Haida are called Kaigani) who speak Haida, a language believed to be related to Athabascan. Numbering only about 2,000 in the late 20th century, they are culturally related to the Tlingit and Tsimshian (*qq.v.*).

Among the Haida there were two major subdivisions, or moieties, assigned at birth and based on maternal affiliation. Each moiety consisted of many local segments, or lineages, which owned rights to economically important lands, occupied separate villages of one or more houses each, and had their own chiefs (the highest ranking member) and lesser house chiefs. Each lineage waged war, made peace, held ceremonies, and functioned economically independently of the others.

Haida economy was based on fishing (especially of salmon, halibut, and cod) and hunting; their technology was one of skillful woodworking. They were particularly noted for the fine craftsmanship of their canoes. The Haida were also widely known for their art; they decorated utilitarian objects with depictions of supernatural beings in a highly conventionalized style. They produced elaborate "totem poles" carved with crests representing important events in family histories. These were used as housepoles outside and sometimes inside the house and as memorial and mortuary poles. The Haida potlatches, or ceremonial distributions of goods, were held to confer, validate, or uphold political rank, such as chieftainship, or social status. Potlatches were also given to mark events such as house building, totem-pole raising, and funerals; and for purposes such as vengeance or face saving. A person achieved status not with his own potlatches but with those given by his parents.

Haidar Ali: *see* Hyder Ali.

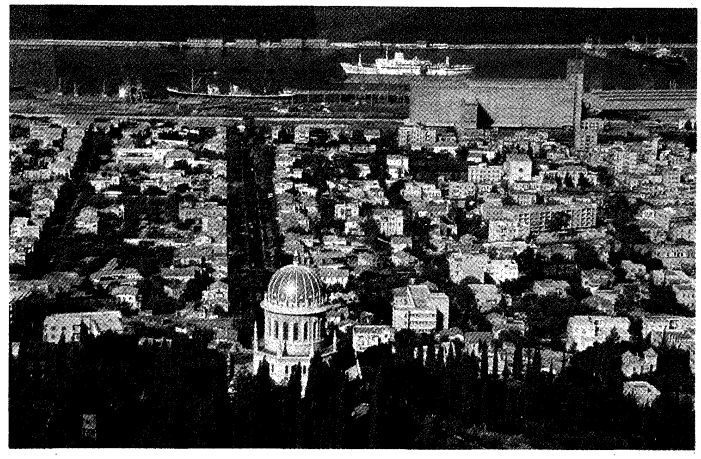
Haifa, Hebrew ḤEFA, city, northwestern Israel. The principal port of the country, it lies along the Bay of Haifa overlooking the Mediterranean Sea. Haifa is first mentioned in the Talmud (*c.* 1st–4th century AD). Eusebius, the early Christian theologian and biblical topographer, referred to it as Sykaminos. The town was conquered in 1100 by the crusaders, who called it Caiphas. In later times it was taken by Napoleon in 1799. Ibrāhīm Pasha, the Egyptian general and viceroy, captured Haifa in 1839 but was compelled to surrender it to Turkey in 1840 under the pressure of the fleets of the European powers, led by Britain. In 1918 British forces occupied the town, and it subsequently (1922) became part of mandated Palestine.

Haifa, with its key port and industries, was of great concern to the combatants in the Palestine war of 1948–49. The Arabs and the Haganah, the Jewish defense forces, fought for control of the city, and on April 22, 1948, the Arabs surrendered. Of more than 50,000 Arabs living in Haifa before the war, only about 3,000 subsequently chose to remain under Israeli rule. Despite this, Haifa is still cosmopolitan, with admixtures of Muslim and Christian Arabs (the latter mainly Maronites) and Bahā'īs.

The city is situated on the northern slopes of Mount Carmel, except for the port section on the bay; residential and business districts are on the slopes, and finer residences and many resort hotels on the mountaintop, commanding scenic views of the entire bay area. The lower and upper cities are linked by an underground railway.

The deepwater port, developed under the British mandate, was opened in 1933 and expanded extensively after Israel achieved statehood. Principal industries in the area include steel foundries, food processing, shipbuilding (small naval craft, fishing boats), and the production of chemicals, textiles, and cement. Haifa's petroleum refineries date from 1939 and its steam-driven power plant (the first of its kind in Israel) from 1934. Haifa also has the only subway in Israel, the Carmelit, dating from 1959.

On the slopes of Mount Carmel are the new campuses of the Israel Institute of Technology (Technion; founded 1912 and opened 1924)



Port of Haifa, Israel, from Mount Carmel; in foreground, Persian Garden with Bahā'ī shrine

E. Orel—Photo Researchers

and the University of Haifa (1964). The city has a large maritime museum (1954) and has many fine parks and gardens; outstanding are the Persian Gardens, containing the tomb of 'Abd al-Bahā', son of the founder of the Bahā'ī faith. Haifa is the world headquarters of the Bahā'ī movement. Pop. (1987 est.) 223,400.

Haig, Douglas Haig, 1st Earl, VISCOUNT DAWICK, BARON HAIG OF BEMERSYDE (b. June 19, 1861, Edinburgh—d. Jan. 29, 1928, London), British field marshal, commander in chief of the British forces in France during most of World War I. His strategy of attrition (tautly summarized as "kill more Germans") resulted in enormous numbers of British casualties but little immediate gain in 1916–17 and made him a subject of controversy.

Haig, portrait by John Singer Sargent; in the Scottish National Portrait Gallery, Edinburgh

By courtesy of the Scottish National Portrait Gallery, Edinburgh

A graduate of the Royal Military College at Sandhurst, Haig fought in the Sudan (1898) and in the South African War (1899–1902) and held administrative posts in India. While assigned to the War Office as director of military training (1906–09), he helped the war minister, Richard Burdon Haldane, establish a general staff, form the Territorial Army as a useful reserve, and organize an expeditionary force for a future war on the European mainland.

On the outbreak of World War I in August 1914, Haig led the 1st Corps to northern France, and, early in 1915, he became commander of the 1st Army. On December 17 of that year, he succeeded Sir John French (afterward 1st Earl of Ypres) as commander in chief of the British Expeditionary Force. In July–November 1916, he committed great masses of troops to an unsuccessful offensive on the Somme River, which cost 420,000 British casualties. The next year, when the French decided to stand on the defensive until forces from the United States (which had entered the war April 6) could arrive in quantity, Haig resolved to try to defeat the Germans by a purely British offensive in French and Belgian Flanders. In the resulting Third Battle of Ypres (July–November 1917), also called the Passchendaele Campaign, the total of casualties shocked the British public, as the Somme death toll had done. But, although he failed to reach his objective—the Belgian coast—he did weaken the Germans and helped prepare the way for their defeat in 1918.

Promoted to field marshal late in 1916, Haig was steadfastly supported by King George V, but not by David Lloyd George, prime minister from December of that year. From that month to May 1917, Haig was an unwilling subordinate of the French general Robert Nivelle, supreme Allied commander on the western front. In March 1918, Haig secured the appointment of another French general, Ferdinand Foch, as Allied generalissimo; the two men worked well together, and Haig exercised full tactical command of the British armies, which had not been the case under Nivelle. After helping to stop the last German offensive of the war (March–July 1918), Haig showed perhaps his best generalship in leading the victorious Allied assault beginning August 8.

After the war, Haig organized the British Legion and traveled throughout the British Empire collecting money for needy former servicemen. He was created an earl in 1919. His biographies include *Field Marshal Earl Haig* (1929), by John Charteris, and *Haig,* 2 vol. (1935–36), by (Alfred) Duff Cooper (afterward 1st Viscount Norwich). Robert Blake edited *The Private Papers of Douglas Haig, 1914–19* (1952).

Haig, The (golfer): *see* Hagen, Walter (Charles).

haiku, also called HOKKU, Japanese poetic form consisting of 17 syllables arranged in three lines of 5, 7, and 5 syllables each. Originating in the first three lines of the traditional 31-syllable tanka, or short poem, haiku began to rival the older form in the Tokugawa period (1603–1867), when the great master Matsuo Bashō elevated haiku to a highly refined and conscious art. It has since remained the most popular poetic form. Many of Bashō's haiku were actually the hokku (initial verse) of a *renga* (linked verse). The term haiku is derived from the first element of the word haikai (a comical verse of 17 syllables) and the second of hokku; for centuries the two terms haikai and hokku were used as synonyms of haiku. Originally, the form was restricted in subject matter to an objective description of nature suggestive of one of the seasons, evoking a definite, though unstated, emotional response. Later its subject range was broadened, but it remained an art of expressing much and suggesting more in the fewest possible words. Other outstanding haiku masters are Buson in the 18th century, Kobayashi Issa in the 18th and 19th centuries, and Masaoka Shiki in the latter 19th century.

In English, the Imagists (1912–30) and a few other poets have written haiku or imitated the form. Reginald H. Blyth's *History of Haiku,* 2 vol. (1963–64), is both a history and an anthology of haiku in English translation; his *Haiku,* 4 vol. (1976–77), expands the anthology.

Ḥā'il, town, northwestern Saudi Arabia. It is situated between Mount Shammar on the north and Mount Salma on the south and is on one of the main pilgrimage routes from Iraq to Mecca. Hā'il superseded the former administrative centre of the region, Fayd, in about the mid-19th century after the establishment of the local dynasty of Ibn Rashīd. Hā'il subsequently grew as a result of its direct contact with the Ottoman government and its control of the principal pilgrim route from the east until it rivaled Riyadh in importance and influence. In the 1890s the town was the undisputed capital of all desert Arabia. The family feuds of the local Ibn Rashīd dynasty and its constant wars with its neighbours led to the town's collapse in 1921 under attack by Ibn Sa'ūd, founder of the Kingdom of Saudi Arabia. Now of lesser importance, Ḥā'il is primarily a regional market and oasis, producing dates, fruit, and grain. Pop. (1974) 40,502.

hail, precipitation of balls or pieces of ice with a diameter of 5 mm to 10 cm (about 0.2 to 4 inches). Small hail (also called sleet, or ice pellets) has a diameter of less than 5 mm. Because the formation of hail usually requires cumulonimbus or other convective clouds with strong updrafts, it often accompanies thunderstorms.

Large hailstones are often characterized by alternating layers of clear and opaque ice, caused by irregular rates of freezing. In areas where the temperature is not far below 0° C (32° F), freezing occurs slowly, allowing trapped air to escape and producing clear ice. When the hailstone then moves into a much colder area, freezing occurs quickly, trapping air and producing a layer of white ice.

Hail is extremely destructive to buildings and crops; if large enough, it may be dangerous to animals exposed to it. Hailstones about 15 cm (6 inches) in diameter have fallen during thunderstorms in the Middle Western United States. Hailstorms are most common in the middle latitudes and usually last around 15 minutes. They ordinarily occur in middle to late afternoon. *See also* sleet.

Hail Mary, Latin AVE MARIA, also called ANGELIC SALUTATION, a principal prayer of the Roman Catholic Church, comprising three parts addressed to the Virgin Mary. The following are the Latin text and an English translation:

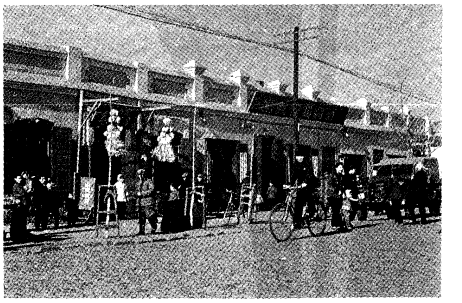
Ave Maria, gratia plena;
Dominus tecum:
Benedicta tu in mulieribus et benedictus fructus ventris tui [Jesus].
Sancta Maria, Mater Dei,
Ora pro nobis peccatoribus, nunc et in hora mortis nostrae. Amen.

Hail Mary, full of grace;
The Lord is with thee:
Blessed art thou among women and blessed is the fruit of thy womb, Jesus.
Holy Mary, Mother of God,
Pray for us sinners, now and at the hour of our death. Amen.

The first part, the words of the Archangel Gabriel (Luke 1:28), appears in liturgies as early as the 6th century. The second part, the words of Elizabeth (Luke 1:42), was added to the first part by about AD 1000, the appositive "Jesus" being added some two centuries later, possibly by Pope Urban IV (reigned 1261–64). The closing petition came into general use during the 14th or 15th century and received its official formulation in the reformed Breviary of Pope Pius V in 1568.

Of the many musical settings of the prayer, the *Ave Maria* of Franz Schubert is perhaps the most widely known.

Hailar, Wade–Giles romanization HAI-LA-ERH, also called HU-LUN, Pinyin HAILAR, or HULUN, city, Inner Mongolia autonomous *ch'ü* (region), China. It lies on the south bank of the Hai-la-erh River, which flows west into the Argun River at its junction with the I-min River.



Street in Hailar, Inner Mongolia autonomous region, China

Richard Harrington—Miller Services Ltd.

The area was occupied by the Chinese in the 7th century AD under the early T'ang dynasty, when it was part of the Hei-shui protectorate general. Chinese occupation, however, was short-lived and never very effective. During the Mongol domination in the 13th century, there was a walled settlement on the river's north bank, traces of which survive. In late Ming times (16th–17th centuries) the area was occupied by the Solon (Tungus) and Daghor (Mongolian) peoples. After 1644, under the Ch'ing dynasty, the Manchus gave a

considerable degree of autonomy to the local Mongol tribes, who established Hailar as their seat. The city's development was greatly stimulated in 1899 with the arrival of the Chinese Eastern Railway, built by the Russians under the Sino-Russian treaty of 1896. In 1901, during the Boxer Rebellion of Chinese against foreigners, Hailar was occupied by Russian forces. In 1905 it was opened as a river port for foreign commerce. The Chinese government abolished its autonomous status in 1910, renamed the city Hu-lun, and established a regular Chinese local administration.

In 1912, however, the local Mongol population, particularly the Bargut, began a series of rebellions, with Russian encouragement, that forced the Chinese to restore some measure of autonomy. After many Chinese had settled along the railway to the east of Hailar, the Chinese government again canceled (1919) the Bargut's autonomy and incorporated the whole area into adjacent Heilungkiang province. Constant pressure and exploitation by the Chinese settlers and merchants brought about a serious Mongol uprising in 1928. The rebellious Mongols established an autonomous region of Hu-lun-pei-erh, the independence of which was recognized by the Japanese in Manchuria. After the establishment (1931) in Manchuria of the Japanese puppet state of Manchukuo, the Mongolian border area was again organized into an autonomous region, Hsing-an, with Hailar as the northern provincial capital. In 1947 it was incorporated into Inner Mongolia.

The city's primary role has always been that of a market and commercial centre. In earlier times it was the terminus of caravan routes from central Mongolia and the site of great annual horse fairs. Now a railway city and the focus of an extensive road network, it stands between the areas colonized by Chinese settlers and the Mongolian border pasturelands. It trades in meat, hides, and dairy products. Pop. (1987 est.) 158,819.

Haile Selassie, original name TAFARI MAKONNEN (b. July 23, 1892, near Harer, Eth.—d. Aug. 27, 1975, Addis Ababa), emperor of Ethiopia from 1930 to 1974 who sought to modernize his country and who steered it into the mainstream of post-World War II African politics. He brought Ethiopia into the League of Nations and the United Nations and made Addis Ababa the major centre for the Organization of African Unity.

Lij Tafari (*lij* is a title given to children of the Amhara nobility) was a great-grandson of Sahle Selassie of Shewa (Shoa) and a son of Ras Makonnen, a chief adviser to Emperor Menelik II. Educated at home by French missionaries, Tafari at an early age impressed the emperor with his intellectual abilities and was promoted accordingly. As governor of Sidamo and then of Harer provinces, he followed progressive policies, seeking to break the feudal power of the local nobility by increasing the authority of the central government—for example, by developing a salaried civil service. He thus came to represent politically progressive elements of the population. In 1911 he married Wayzaro Menen, a great-granddaughter of Menelik II.

Haile Selassie, 1967
AP/Wide World Photos

When Menelik II died in 1913, his grandson Lij Yasu succeeded to the throne, but the latter's unreliability and his close association with Islām made him unpopular with the majority Christian population of Ethiopia. Tafari became the rallying point of the Christian resistance, and he deposed Lij Yasu in 1916. Zauditu, Menelik II's daughter, thereupon became empress in 1917, and Ras (Prince) Tafari was named regent and heir apparent to the throne.

While Zauditu was conservative in outlook, Ras Tafari was progressive and became the focus of the aspirations of the modernist younger generation. In 1923 he had a conspicuous success in the admission of Ethiopia to the League of Nations. In the following year he visited Rome, Paris, and London, becoming the first Ethiopian ruler ever to go abroad. In 1928 he assumed the title of *negus* ("king"), and two years later, when Zauditu died, he was crowned emperor (Nov. 2, 1930) and took the name of Haile Selassie ("Might of the Trinity"). In 1931 he promulgated a new constitution, which strictly limited the powers of Parliament; by the mid-1930s it had become defunct. From the late 1920s on, Haile Selassie in effect was the Ethiopian government, and, by establishing provincial schools, strengthening the police forces, and progressively outlawing feudal taxation, he sought to both help his people and increase the authority of the central government.

When Italy invaded Ethiopia in 1935, Haile Selassie led the resistance to the invaders, but in May 1936 he was forced into exile. He appealed for help from the League of Nations in a memorable speech that he delivered to that body in Geneva on June 30, 1936. With the advent of World War II, he secured British help in forming an army of Ethiopian exiles in the Sudan. British and Ethiopian forces invaded Ethiopia in January 1941 and recaptured Addis Ababa several months later. Although reinstated as emperor, Haile Selassie had to recreate the authority he had previously exercised. Once again he began to implement social, economic, and educational reforms in an attempt to modernize Ethiopian government and society on a slow and gradual basis.

The Ethiopian government continued to be largely the expression of Haile Selassie's personal authority. In 1955 he granted a new constitution giving him as much power as the previous one. Overt opposition to his rule surfaced in December 1960, when a dissident wing of the army secured control of Addis Ababa and was dislodged only after a sharp engagement with loyalist elements.

Haile Selassie played a major role in the establishment of the Organization of African Unity in 1963. His rule in Ethiopia continued until 1974, when famine, worsening unemployment, and the political stagnation of his government prompted segments of the army to mutiny. They deposed Haile Selassie and established a provisional military government. Haile Selassie spent the remainder of his life a prisoner in his own palace. He died at the age of 83. The official report, which attributed his death to natural causes, was without medical or legal confirmation and led some political observers to suspect the possibility of murder.

Hailsham (of Hailsham), Douglas McGarel Hogg, 1st Viscount: *see* Hogg, Douglas McGarel.

Hainan, Wade–Giles romanization HAI-NAN TAO, Pinyin HAINAN DAO, *sheng* (province) and island of China. Hainan *sheng* includes the Paracel Islands and the Spratly Islands (*qq.v.*).

Hainan, the largest Chinese island except for Taiwan, lies to the south of the Luichow Peninsula, from which it is separated by the Hainan Strait. The island is about 160 miles (260 km) from east to west and 130 miles (210 km) from north to south and has a total land area of 12,962 square miles (33,572 square km). Hainan province has an area of 13,200 square miles (34,300 square km). The provincial captial is Hai-K'ou.

A brief treatment of Hainan follows. For full treatment, *see* MACROPAEDIA: China.

The island has a generally mountainous terrain that is surrounded by a maritime plain much broader in the north than in the south. The southern third of the island consists of a number of mountain chains, the highest of which is Mount Wu-chih in the southeast, reaching an elevation of 6,125 feet (1,867 m) above sea level. To the west stretch the Ying-ke and Ya-chia-ta ranges, averaging from 1,600 to 3,300 feet (490 to 1,000 m). The north of the island is hilly, with alluvial basins and small maritime plains.

The major rivers are the Nan-tu (193 miles [311 km] long), flowing northeastward; the Wan, flowing eastward; and the Ch'ang-hua, flowing westward. There is no real winter, the average temperature for January being 64° F (18° C), that for June 84° F (29° C). Rainfall is heavy, amounting to about 70 inches (1,800 mm) annually in the mountainous south and 60 inches (1,500 mm) in the north.

The tropical vegetation includes many palms, bamboos, rattans, and tropical hardwoods, though tribal shifting cultivation has reduced the original plant cover in many areas. The mountain belt, especially in the east, is covered with dense tropical rain forest up to an elevation of about 2,600 feet (790 m). The west of the island is also forested, and the western and northern lowlands are covered with a tropical savanna. The island's rich and varied animal life includes deer, gibbons, and blind snakes, and its streams and offshore waters abound in fish.

Hainan has been under Chinese control since the end of the 2nd century BC, when two commanderies were set up to rule the island. There were, however, constant rebellions by the aboriginal population, and the Chinese withdrew in the 1st century BC. Although it remained nominally under Chinese sovereignty, effective government was not reintroduced until the T'ang dynasty (618–907). Even then, the island remained firmly in the hands of the indigenous peoples, and the coastal settlements established by the Chinese became a dreaded place of banishment for those who had lost favour at court on the mainland. Under the Sung dynasty (960–1279) the island was placed under the administration of Kwangsi province. In the 12th and 13th centuries the Chinese settled in the northern uplands and plains, and the indigenous Li peoples were gradually forced into the forested mountain interior. Today people from southern Fukien province predominate around Wen-ch'ang in the northeast. The northwest has a largely Hakka community; Tan-hsien has a large settlement of Hunanese.

The name Hainan derives from a short-lived province set up on the island under the Yüan (Mongol) dynasty (1206–1368). Under the Ming dynasty (1368–1644) the island was transferred back to the control of Kwangtung province. Hai-k'ou, the island's chief port, and Ch'iung-shan, the largest town, were opened to foreign trade in 1858. In 1912 Hainan was again made independent, under the name Ch'iung-yai Island, but this status was abolished in 1921. In 1950 it was taken by communist forces and organized into an autonomous unit, the Hainan administrative district of Kwangtung province. In 1988 Hainan Island became a separate province of China.

During the Japanese occupation (1939–45) the island's production of rubber and other tropical goods was expanded, and its mineral wealth was exploited. Roads and short railway lines were built to extract the iron ore of Ch'ang-chiang and T'ien-tu in the southwest, bauxite from Yai-hsien, and alluvial tin from the north coast at Tan-hsien.

Given its year-round growing season, fertile soils, rich tropical vegetation, mineral deposits, and abundant fish resources, Hainan's lack of development in the past is striking. The island's aboriginal inhabitants for centuries practiced only shifting cultivation, hunting and gathering, and some wet-rice cultivation. Moreover, Hainan's distance from the mainland, the prevalence of coastal piracy, malignant malaria, and frequent tribal rebellions all discouraged sizable Chinese immigration and settlement there. Thus, Hainan long remained a backward and neglected frontier region. Although the development of its mineral resources and the expansion of its tropical agriculture have been undertaken by the Chinese government, the island remains one of China's less prosperous regions. Hainan's potential as a source of tropical commercial crops remains largely unexploited.

Some progress has been made, however. Since 1949 rubber production has been greatly expanded, and processing plants have been constructed. Rice, coconut, oil palm, sisal, tropical fruits, black pepper, pineapples, coffee, tea, cashews, and sugar are also cultivated, and lumbering is a major industry. The local iron-mining operations have also been extended, and an iron and steel industry has been established. The Ying-ko-hai salt fields are the largest in southern China. The island's historic sites and tropical beaches held promise that a substantial tourist industry might be developed. In 1988 Hainan was designated a special (capitalist) economic zone by the Chinese government in an experiment designed to hasten the island's development. Pop. (1987 est.) 6,150,000.

Hainaut, Flemish HENEGOUWEN, *province,* southwestern Belgium. Hainaut extends northeastward from the French border. It has an area of 1,462 square miles (3,787 square km) and is drained by the Scheldt (Schelde), Dender, and Sambre rivers. It is divided into seven administrative *arrondissements* (Ath, Charleroi, Mons, Mouscron, Soignies, Thuin, and Tournai) with the capital at Mons (*q.v.*).

Occupied since prehistoric times, Hainaut bears traces of the oldest Stone Age industry of the area, namely flint extraction and cutting, especially at Spiennes. Under the Romans, Hainaut enjoyed some three centuries of calm and witnessed the construction of numerous roads which converged at Bavai. The Romans were succeeded by Merovingian royalty whose capital was Tournai. By 925 the region was part of the future German Empire.

Mainly French-speaking except in the north, the centre of the *province* was once part of the old and great county of Hainaut, which was considerably larger than the modern Belgian *province.* The county was bounded north by Flanders, east by Brabant and by part of the bishopric of Liége, southeast by the French Rethelois and Thiérache, southwest by the bishopric of Cambrai and by the county of Artois, and west by the district of Tournai. This territory, inhabited in ancient times by the Celto-German tribe of the Nervii, was included in the kingdom of Austrasia under the Merovingian Franks and in those of Lotharingia (Lorraine) and then of East Francia (Germany) under the Carolingians. The county emerged as a unit at the end of the 9th century under Rainier (or Regnier) I. Rainier, who in his latter years was in control of Lower Lorraine, had two sons: the elder, Giselbert, eventually became duke of Lorraine; the younger, Rainier II, succeeded his father in Hainaut in 916. The latter's great-grandson, Rainier V, count from 1013 to *c.* 1029, left a daughter, Richildis (d. 1086), whose second marriage, to the future Baldwin VI of Flanders (Baldwin I of Hainaut), led to a temporary union of Hainaut and Flanders; but this was dissolved on Baldwin's death (1070), Hainaut being reserved for Baldwin II, second son of Richildis. His great-grandson Baldwin V, however, became Baldwin VIII of Flanders in 1191. Baldwin VI (Baldwin IX of Flanders) became Latin emperor of Constantinople as Baldwin I. His second daughter, Margaret, agreed, however, in 1246 to leave Hainaut to the son of her first marriage and Flanders to the son of her second; on her death (1280) John of Avesnes, her elder son's heir from 1257, became count of Hainaut. John became count of distant Holland in 1299. Thenceforward Hainaut was linked with Holland under the house of Avesnes, the Wittelsbachs, the Burgundians, and finally the Habsburgs.

The Spanish Habsburgs had to cede Le Quesnoy, Landrecies, and Avesnes to France under the Treaty of the Pyrenees (1659) and Valenciennes, Condé, Bavay, and Maubeuge to France under the Treaty of Nijmegen (1678): Valenciennes then became the capital of French Hainaut (now part of Nord *département*). The rest of Hainaut was annexed to France during the French Revolutionary and Napoleonic Wars and formed into the *département* of Jemappes, but it was given to the Kingdom of the Netherlands in 1814, whence it passed to Belgium in 1831.

The valley of the upper Scheldt River, in the western part of the *province,* near Tournai, is part of the Flanders clay plain. A small portion of the Ardennes with heath, moorland, and coniferous plantations extends into the southeastern sector of the *province,* near Chimay. Most of the *province,* however, forms the low Hainaut Plateau, an alluvial area of rich sand and clay loams that is hilly in the north and slopes up to flat tableland in the south. A well-farmed region with varied agriculture, it produces wheat, oats, barley, sugar beets, fodder crops, chicory (in the west), and some flax. Pigs, beef and dairy cattle, and heavy Belgian draft horses are raised.

Three of the main districts of the southern Belgian coalfields lie in Hainaut: the Mons basin, including the Borinage industrial region, the Centre basin around La Louvière, and the Charleroi basin. Many of the coalfields are abandoned. The region has coke ovens, blast furnaces, steelworks, and machinery factories. The glass and ceramic industries are important; and chalk deposits near Mons, the Centre, and Tournai are used for cement. The textile industry of the Flanders plain extends into western Hainaut, centred on Tournai. Electrical equipment and chemicals are manufactured near Charleroi (*q.v.*). Limestone, granite, and porphyry are quarried. Hainaut is served by several railway lines and numerous canals, including the Charleroi-Brussels, Centre, Nimy-Blaton, Haine, and Blaton-Ath canals.

There are more than 100 castles in the *province,* notably at Beloeil, Mariemont, Chimay, Le Roeulx, and Écaussines. The famous annual carnival at Binche commemorates a feast given by Mary of Hungary (sister of the Holy Roman emperor Charles V) in honour of Francisco Pizarro's victories (1531–33) over the Incas in Peru. Casteau, within the Mons region, has been the Supreme Headquarters, Allied Powers in Europe (SHAPE), since 1967. Pop. (1986 est.) 1,277,939.

Haines, city, southeastern Alaska, U.S. It lies on the Chilkoot Peninsula, just south of Skagway (the former gold rush centre at the head of the Lynn Canal), 90 miles (145 km) northnorthwest of Juneau. The city (with Skagway) is the terminus of the Alaska Marine Highway (Inside Passage) and is linked by road with the Alaska Highway 160 miles (255 km) north. Located on the site of a Chilkat Indian village, it became a North West Trading Company post in 1878 and later was a gold rush supply centre, an outlet for the Porcupine mining district, and a frontier fort. After the establishment of a mission there in 1881, the community was named to honour Francina Electra Haines of the Presbyterian Board of Home Missions. Haines has acquired a reputation as a Chilkat Indian cultural centre, known particularly for carving and weaving crafts and for ceremonial dances. Its economy, aside from crafts and tourism, depends on wood products and fisheries. Pop. (1984 est.) 1,154.

Haines, Jackson (b. 1840, New York City—d. January 1876, Finland), American skater known as the father of figure skating. He was a ballet dancer who adapted ballet style and techniques to a sport that had previously comprised a limited number of figures executed in a tight, awkward manner.

Having won the U.S. men's championship, he went to Europe in 1865. Although his style of skating was rejected in England, he became a great popular success in Sweden, Austria, and elsewhere on the Continent. In Vienna, the world "waltz capital" in the 19th century, he astutely offered instruction in waltzing on ice. Skating schools founded or inspired by Haines sprang up in numerous countries. On a journey by sled from St. Petersburg (now Leningrad) to Stockholm, he contracted pneumonia and died.

Hainisch, Michael (Arthur Josef Jakob) (b. Aug. 15, 1858, Aue, near Gloggnitz, Austria—d. Feb. 26, 1940, Vienna), Austrian economist and statesman who served as first president of the federal republic of Austria (1920–28).

A liberal scholar and political-social activist with many public interests, he vigorously supported universal and female suffrage and popular education during the last years of the Habsburg empire. Throughout World War I and thereafter, he also advocated Anschluss (the incorporation of German Austria into a greater Germany). Despite his sombre postwar hopes for the fledgling Austrian republic, he was elected its first federal president in December 1920, when the major political parties could produce no commonly acceptable candidate. He incurred the wrath of his Anschluss cosupporters for his part in the negotiation of the Treaty of Lana with Czechoslovakia (1922), an agreement primarily directed against the possibilities of a Habsburg restoration but that also was seen as a barrier to Austrian–German union. Prohibited constitutionally from seeking a third presidential term in 1928 (he had previously been reelected in 1924), he subsequently served briefly (1929–30) as federal minister of commerce. In 1938, when the Anschluss between the two nations finally occurred, he endorsed it.

Haiphong, city, northern Vietnam. It lies on the northeastern edge of the Red River delta, beside a distributary of the Thai Binh River, 10 miles (16 km) from the Gulf of Tonkin. It is the outport of the capital, Hanoi, 37 miles (60 km) west, and is the nation's third largest city. It became a seaport in 1874, and through the French colonial period it developed commercially as a port and as the southeastern terminus of the railway coming through K'un-ming (in southwestern China), Lao Cai, and Hanoi. It became a leading industrial centre powered by coal from the mines across the Gulf of Tonkin at Quang Ninh. Since 1954, many new industrial plants have been built there with aid given by Soviet-bloc countries and by China. Haiphong

sustained heavy damage from U.S. bombing raids in the early 1970s but was subsequently rebuilt. Pop. (1979) 330,755.

hair, in mammals, the characteristic threadlike outgrowths of the outer layer of the skin (epidermis) that form an animal's coat, or pelage. Hair is present in differing degrees on all mammals. On adult whales, elephants, sirenians, and rhinoceroses body hair is limited to scattered bristles. In most other mammals the hair is abundant enough to form a thick coat, while humans are among the most hairless of all mammals.

The most important function of hair in mammals is that of insulating against cold by conserving body heat. The differing colours and colour patterns in hair coats can also serve purposes of camouflage and of sexual recognition and attraction among the members of a species. Specialized hairs called vibrissae, or whiskers, serve as sensory organs for certain nocturnal animals. The specially modified hairs of the porcupine are called quills and serve defensive purposes.

Human beings have several different types of hairs. The first to develop is the lanugo, a layer of downy, slender hairs that begin growing in the third or fourth month of fetal life and are entirely shed either before or shortly after birth. During the first few months of infancy there grow fine, short, unpigmented hairs called down hair, or vellus. Vellus covers every part of the body except the palms of the hands, the soles of the feet, undersurfaces of the fingers and toes, and a few other places. At and following puberty, this hair is supplemented by longer, coarser, more heavily pigmented hair called terminal hair that develops in the armpits, genital regions, and, in males, on the face and sometimes on parts of the trunk and limbs. The hair of the scalp, eyebrows, and eyelashes are of separate types from these others and develop fairly early in life. On the scalp, where hair is usually densest and longest, the average total number of hairs is between 100,000 and 150,000. Human hair grows at a rate of about 0.5 inch (13 mm) per month.

The typical mammalian hair consists of the shaft, protruding above the skin, and the root, which is sunk in a pit (follicle) beneath the skin surface. Except for a few growing cells at the base of the root, the hair is dead tissue, composed of keratin and related proteins. The hair follicle is a tubelike pocket of the epidermis that encloses a small section of the dermis at its base. The human hair is formed by divisions of cells at the base of the follicle. As the cells are pushed upward from the follicle's base, they become keratinized (hardened) and undergo pigmentation.

Hair is continually shed and renewed by the operation of alternating cycles of growth, rest, fallout, and renewed growth. The average life of different varieties of hair varies from about 4 months for downy hairs to 3 to 5 years for long scalp hairs. Each human follicle follows this cycle independently of others, so the total amount of hair remains constant; some animals' hair follicles have synchronous cycles, causing periodic shedding, or molts.

hair-cap moss, also called PIGEON WHEAT, any of the plants of the genus *Polytrichum* (order Bryales) with more than 100 species; it often forms large mats in peat bogs, old fields, and areas with high soil acidity. About 10 species are found in North America. The most widely distributed species is *P. commune,* which often attains a height of 15 cm (6 inches) or more and may form large tussocks or wide beds, especially in peat bogs. The reddish brown or dark green phyllids (leaves), often 12 mm (0.4 inch) long, have sheathed bases and pointed tips.

Hair-cap moss (*Polytrichum commune*)
Hugh Spencer

Male and female reproductive organs are borne on separate plants. The top of the male shoot forms a flowerlike structure each year, and elongation of the shoot results in a series of "flowers" over a period of several years. Each capsule (spore case), resembling a grain of wheat, has a light-brown, hoodlike covering (calyptra) with long hairs covering its surface. The capsules of *P. commune* are box shaped, and a prominent white membrane that covers the "mouth" can be seen after the lid falls. Hair-cap moss often grows from underground rhizoids (filaments). It has been used in stuffing bedding and in the manufacture of brooms, dusters, and baskets.

hair seal: *see* harbour seal.

hairdressing, custom of cutting and arranging the hair, practiced by men and women from ancient times to the present. Early records indicate that the ancient Assyrians wore elaborate curly hair styles; by contrast, the ancient Egyptians, men and women alike, shaved their heads and wore wigs. Whether ornate or simple, hairdressing has been employed by very nearly every society. In 400 BC some Greek women dyed their hair; in the Roman period dying and bleaching were common. Japanese women used lacquer (a precursor of modern-day hair spray) to secure their elaborate coiffures. The wig has come in and gone out of vogue throughout history.

Beginning with the crude curling iron used by women of ancient Rome in creating their elaborate hair styles, hairdressing came to be associated with a variety of technological accoutrements, ranging from simple combs and hairpins to hold the hair in place to complex electrical appliances for drying and grooming the hair and chemical processes to tint, wave, curl, straighten, and condition the hair. By the 20th century, hairdressing itself and the manufacture of materials and equipment had become an occupation and practical art of large proportions. *See also* barber; wig.

hairstreak, any member of the insect subfamily Theclinae, belonging to the widely distributed Lycaenidae family of common butterflies (order Lepidoptera). Adult lycaenids, sometimes known as gossamer-winged butterflies, are small and delicate, with an 18- to 38-millimetre (0.75- to 1.5-inch) wingspan. They are rapid fliers and are usually distinguished by iridescent wings. Hairstreaks are usually brown or gray with delicate stripes on the bottoms of the wings. The male's forelegs are reduced, but the female's are fully developed.

Hairstreak larvae are short, broad, and slug-like. Some species eat plant material; many are cannibalistic; and still others secrete honeydew, a sweet by-product of digestion that attracts ants. The ants stroke, or "milk," the larva with their legs to stimulate honeydew secretion.

The hairstreaks, found in open areas, are usually gray or brown and distinguished by hairlike markings on the underside of the wings. They frequently have one or more thin, taillike extensions on the hindwings. These erratic fliers occur on every continent but are most abundant in the New World tropics. The only hairstreak of economic significance is the green or reddish brown born larva of the North American gray hairstreak (*Strymon melinus*), which bores into fruit and seeds.

hairworm: *see* horsehair worm.

hairy fungus beetle, any member of the approximately 200 species of the insect family Mycetophagidae (order Coleoptera). They are small, oval, hairy beetles found on fungi or under bark. Hairy fungus beetles are black or brown and often have orange or red markings. They range between 1.5 and 5.5 mm (0.06 and 0.2 inch) in length.

hairy hedgehog (Asian mammal): *see* gymnure.

Haise, Fred W(allace), Jr. (b. Nov. 14, 1933, Biloxi, Miss., U.S.), American astronaut, participant in the Apollo 13 mission (April 11–17, 1970), in which an intended Moon landing was canceled because of a rupture in a fuel-cell oxygen tank in the Service Module. The crew, consisting of Haise, John L. Swigert, Jr., and James A. Lovell, Jr., returned safely to Earth, however, making use of the life-support system in the Lunar Module.

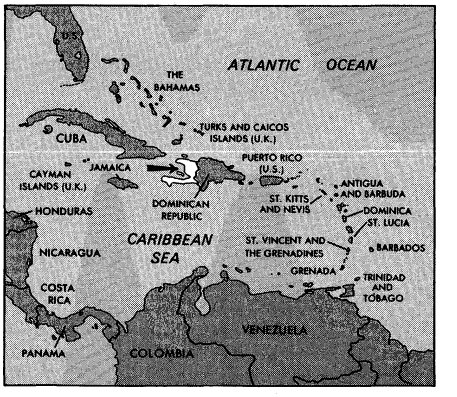
Haise became a naval-aviation cadet in 1952 and served as a fighter pilot in the U.S. Marine Corps (1954–56). After obtaining a bachelor's degree (1959) from the University of Oklahoma, Norman, Haise joined the National Aeronautics and Space Administration as a test pilot; he was selected for the manned space program in 1966.

After Project Apollo was closed in 1977, Haise was assigned to the space shuttle program for two years. He then accepted an executive position with the Grumman Aerospace Corporation, Bethpage, N.Y.

Haithabu (Denmark): *see* Hedeby.

Haithon (king of Little Armenia): *see* Hayton.

Haiti, officially REPUBLIC OF HAITI, Haitian Creole REPIBLIK DAYTI, French RÉPUBLIQUE D'HAÏTI, island country of the West Indies, the only independent French-speaking republic in the Americas, occupying the western third of the island of Hispaniola and several nearby small islands. It is situated about 600 miles (970 km) southeast of Florida in the Atlantic Ocean and has a total land area of 10,579 square miles (27,400 square km). The capital is Port-au-Prince. The country comprises two



Haiti

peninsulas separated by the Gulf of Gonaïves. Haiti is bordered on the north by the Atlantic Ocean, on the east by the Dominican Republic, and on the south and west by the Caribbean Sea. The population in 1990 was estimated to be 5,590,000.

A brief treatment of Haiti follows. For full treatment, *see* MACROPAEDIA: West Indies.

For current history and for statistics on Haiti's society and economy, *see* BRITANNICA WORLD DATA ANNUAL.

The land. Haiti is a mountainous country; about two-fifths of the total land area is above 1,600 feet (490 m) in elevation. The principal

mountain system, the Massif du Nord (average elevation 4,000 feet [1,200 m]), extends eastward into the Dominican Republic, where it is called the Cordillera Central. La Selle Peak in the southeast is the highest point (8,773 feet [2,674 m]) in the country. The mountain ranges alternate with fertile but heavily overpopulated lowlands, the largest (150 square miles [390 square km]) being the Plaine du Nord (Northern Plain). The Artibonite River, with a length of 174 miles (280 km) and a drainage basin of 2,600 square miles (6,700 square km), is the principal river. The alluvial plain of the Artibonite joins the northwestern and the southern peninsulas. Lake Saumâtre in the southeast is the largest lake. Frequent but minor earthquakes occur in the east-west rift valley region in the south near Port-au-Prince.

Haiti's mountainous terrain and proximity to the sea modify its humid tropical climate. Daily maximum temperatures at Port-au-Prince range between averages of 94° F (34° C) in July to 87° F (31° C) in January. Average nighttime temperatures are near 70° F (21° C) year-round. The country lies in the rain shadow of the mountains of the Dominican Republic, which block the westward movement of the moisture-laden trade winds into Haiti. The annual rainfall varies from 20 inches (500 mm) in the northwest to more than 100 inches (2,500 mm) on the highlands in the east and south. The country is subject to periodic droughts, which occasionally lead to extensive crop damage and famine. Hurricanes often occur between August and November, and one caused numerous deaths and destroyed more than half of the coffee crop in 1980.

The virgin-forest vegetation that once covered the country now occupies less than one-tenth of the total land area and consists chiefly of some pine forests at high elevations and some scattered stands of tropical rain forest (mahogany, cedar, and rosewood). Coconut palms, coffee, cacao, avocado, mango, lime, and orange trees grow wild; mangroves are found along the tidal coasts. Native fauna includes caimans, lizards, ducks, wild pigeon, and flamingo.

Haiti's known mineral resources are limited to small deposits of gold, copper, bauxite, silver, coal, and manganese. The hydroelectric-power potential of the Artibonite River, on which several hydroelectric dams have been built, is considerable, but silting of some reservoirs due to soil erosion has severely reduced the river's electrical generating capacity.

The people. Nearly all Haitians are descendants of the 480,000 African slaves who won their freedom at the time of Haiti's independence in 1804. Mulattoes comprise about 5 percent of the population, and whites (mostly British, American, and French) are a much smaller minority. Roman Catholicism is the major religion. Voodoo (*vaudou*), a syncretic folk religion in which a Christian God rules over an African pantheon, is widely practiced. French and Haitian Creole are the official languages. More than one-fourth of the population lives in urban areas.

Nearly two-fifths of Haiti's population is younger than 15 years of age. The birth rate and death rate are both high by Latin-American standards. The estimated annual rate of population growth is one of the greatest in the Caribbean despite Haiti's high emigration rate.

The economy. Haiti is the poorest country in the Americas. It has a developing market economy that is based in large part on agriculture and light industries. The gross national product (GNP) is among the lowest in the world.

Agriculture accounts for nearly one-third of the GNP and employs about three-fifths of the work force. Subsistence farming predominates. Arable land is in short supply (about one-quarter of the rural populace have no land), and rice, corn (maize), and sweet potatoes, the chief staples, are double-cropped. Production of most foodstuffs falls short of domestic demand. As much as four-fifths of the country's food is imported. Coffee is the principal cash crop and ordinarily accounts for about one-fourth of Haiti's export revenue; sugarcane, sisal, and cacao are also widely cultivated. There has been limited success in crossing domestic cattle with imported breeds. In the early 1980s the country's entire pig population was killed off under a program to eradicate African swine fever. Reintroduction of new breeds of pigs has been slow and irregular.

Mineral industries are limited to the production of building materials for local use; the production and export of bauxite ceased in 1983. Manufacturing accounts for about one-sixth of the GNP and employs about one-twentieth of the work force. Manufacturing industries are concentrated around Port-au-Prince and specialize in assembling imported components such as baseballs, clothing and footwear, electronic equipment, and cassettes. Other manufactures include flour, cement, cigarettes, and electronic goods. Electricity is generated primarily by hydroelectric plants; less than one-third is generated from imported fuels. Tourism, traditionally a major source of foreign exchange, was adversely affected in the late 20th century because of publicity about political repression and poverty.

Haiti is heavily dependent on foreign aid, which finances a major share of the country's public expenditures. External trade is dominated by the United States, which ordinarily supplies about half of Haiti's imports and receives about half of its exports.

Government and social conditions. From the late 1950s to 1986, all political power in Haiti rested with the Duvalier family. The Constitution, adopted in 1957 and revised in 1964 and 1971, vested absolute power in the president, who would hold office for life. In 1987 a new constitution was approved by popular referendum. It prohibited the president from serving consecutive terms, provided for a bicameral legislature and an independent judiciary, and gave additional power to local authorities.

Health conditions in Haiti are extremely poor. Large numbers of people suffer from nutritional deficiencies. Tetanus, tuberculosis, malaria, and gastroenteritis are common health problems. There is a severe shortage of doctors and medical facilities, especially in rural areas. The country's infant mortality rate is the highest in the Americas, and life expectancy, at 54 years for males and 56 years for females, is by far the lowest in the Caribbean region.

Education is free and officially compulsory for children between the ages of 7 and 13 years. Because of a lack of trained teachers and adequate facilities, however, a large majority of Haitian children cannot attend primary school.

History. Much of the history of Haiti prior to the 1492 voyage of Columbus to the island of Hispaniola is unknown. By the end of the 16th century, most of Haiti's native Arawak Indians had disappeared—worked to death, slaughtered outright by Spaniards, or killed by disease. Spanish settlement was thin and restricted mainly to the eastern end of the island. French pirates based in the Cayman Islands had an almost unimpeded run of the western end of Hispaniola; they began to establish plantations there and in 1644 founded Port-de-Paix in the northwest, which the French West India Company subsequently claimed. In 1697 the French renamed the western portion of Hispaniola Saint-Dominique.

The colony achieved a high degree of economic prosperity during the 18th century, but the former slaves of the island rebelled against French rule and declared their country's independence in 1804 under the original Arawak name of Haiti. The rebels had difficulty establishing a stable regime, however, and during the following century the country experienced frequent government changes marked by assassination and revolution. The exception to this trend was the period of rule by Jean-Pierre Boyer (1818–43). After Boyer's overthrow, coups and assassinations resumed. By the early 20th century the United States had gained extensive commercial privileges in Haiti. From 1915 to 1934, U.S. Marines occupied the country. After these troops were withdrawn, Haiti was troubled by hostilities with the Dominican Republic, as well as by domestic political instability. After François ("Papa Doc") Duvalier was elected president in 1957, he organized a private military force, the Tontons Macoutes, to subdue his opponents and had himself elected president for life. Despite an economic decline, continued internal discord, and poor relations with the Dominican Republic, the elder Duvalier ruled as dictator until his death in 1971 and was succeeded by his son, Jean-Claude ("Baby Doc") Duvalier.

Under the latter's rule, Haiti's gross economic inequalities, political repression, and corrupt government administration continued unabated. In 1986, however, increasing popular unrest in the form of antigovernment demonstrations prompted Jean-Claude to go into exile. The country remained under military rule, however, until March 1990, when civilians regained some measure of power.

Haitian Creole, French-based creole language spoken on the island of Hispaniola, in the Caribbean Sea. An official language of Haiti since 1987, Creole is spoken by more than 90 percent of the population; only 10 percent speak French, which is Haiti's other official language. Although probably 90 percent or more of Haitian Creole vocabulary is French in origin (the remainder is mostly of African origin, with a few Spanish words), the pronunciation of Creole differs from that of French, and the grammar and syntax are also somewhat modified. A set of verbal "prefixes," for example, has been derived from French auxiliary verbs or modifying phrases, replacing or changing standard French methods of verb conjugation. This new use of verb prefixes to mark tense and aspect was probably a result of the influence of African grammatical structures.

Haitian Creole orthography was not fixed until recently because Creole was not recognized as a standard language of Haiti. The language is written, however, and a number of different spelling systems have been devised. The general tendency was to make use of spellings that emphasized the language's French origin, thereby giving confusing or incorrect reflections of Haitian pronunciation. A Gallicized adaptation of a reasonably straightforward orthography, the McConnell-Laubach-Pressoir orthography, invented by a Protestant missionary, was officially recognized by the Haitian government in 1961.

Several other French creoles are spoken in the Caribbean area, among them Louisiana Creole and several Antilles creoles, including those of Martinique, Trinidad and Tobago, and French Guiana. These are usually mutually intelligible.

Examples of Haitian Creole (in phonemic transcription; the tilde marks nasalized vowels) are *Li tõbe nã dlo,* French *Il tombait dans l'eau,* "He fell in the water"; and *Li pa-t-isit,* French *Il n'etait pas ici,* "He was not here." From Louisiana Creole is *T-ale reste kushe,* French *Tu vas rester couché,* "You are going to remain lying down."

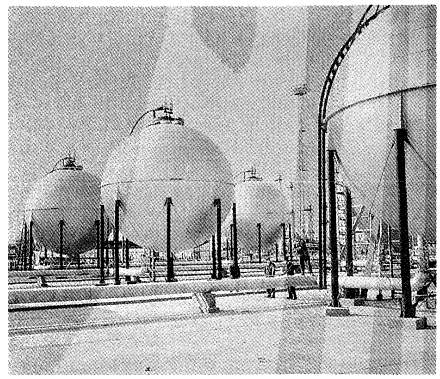
Haitink, Bernard (b. March 4, 1929, Amsterdam), Dutch conductor best known for his interpretations of Gustav Mahler, Anton Bruckner, Ludwig van Beethoven, and Franz Liszt. His conducting, which continued the tradition of Willem Mengelberg, was noted for its careful attention to detail combined with an uncommon strength of character and conviction.

After studying at the Amsterdam Conservatory, Haitink joined The Netherlands Radio Philharmonic as a violinist. He studied conducting with Ferdinand Leitner at The Netherlands Radio Union's annual conductor's courses, 1954–55, and became their second conductor in 1955. His association with the Concertgebouw Orchestra of Amsterdam began in 1956, and he was appointed its coconductor in 1961 and permanent conductor in 1964. He also served as artistic adviser (from 1967) and artistic director (1970–79) of the London Philharmonic Orchestra. In 1972 Haitink turned his attention to opera, which led to his appointment in 1978 as music director of the Glyndebourne Festival in East Sussex, Eng. He became music director of the Royal Opera House, Covent Garden, in London in 1986. His many recordings include cycles of the symphonies of Mahler, Bruckner, and Beethoven and the tone poems of Liszt.

Ḥajar, al-, mountain chain in northern Oman, paralleling the coast of the Gulf of Oman and stretching in an arc southeastward from the Musandam Peninsula almost to Ra's (cape) al-Ḥadd on the extreme northeastern tip of the Arabian Peninsula. From northwest to southeast, the al-Ḥajar (The Stone) range includes the Ru'ūs al-Jibāl overlooking the Strait of Hormuz, the al-Gharbī al-Ḥajar (Western Hajar), the vast massif of al-Jabal Al-Akhḍar (Green Mountain), the Jabal Nakhl, the ash-Sharqī al-Ḥajar (Eastern Hajar), and the Jabal Banī Jābir. This range, with its steeper slopes to seaward, reaches its greatest height at al-Jabal (mount) al-Akhḍar (10,089 feet [3,075 m]); its average elevation is about 4,000 feet (about 1,220 m). Al-Ḥajar is generally bleak except on al-Jabal al-Akhḍar, where greater rainfall permits the growth of some alfalfa, date palms, lime bushes, and fruit trees.

Geologically the chain is mostly limestone and is drained by many wadis, such as Wādī al-Ḥawāsinah, Wādī Samā'il, and Wādī al-'Udayy. There are many species of wildlife, including leopard and the Arabian tahr, a wild goat not found in the rest of the country. Bowl-like valleys are carved into the northern face of al-Ḥajar by northward-flowing wadis and contain tiny agricultural settlements connected with the coast by graded tracks. The inhabitants are predominatly Ibāḍī and were involved in the unsuccessful Jabal War of the 1950s against the Omani Sultanate.

Hajdú-Bihar, *megye* (county), eastern Hungary. It occupies an area of 2,398 square miles (6,212 square km) in the Tiszántúl, a part of the Great Hungarian Plain, and consists mainly of sandy soils where most of the natural vegetation cover has been depleted. Summers are hot and winters very cold. Debrecen (*q.v.*), the *megye* seat, but administratively independent, with county rank of its own, is at the southwestern edge of the sandy plain. In the 19th century the Tisza River was regulated through the construction of the Tiszalök Dam and the 60-mile (100-kilometre) Main Canal, which supplies water to the Hortobágy (*q.v.*) steppe and the Hajdúság, which is a low tableland covered by fertile black soil. Rice, wheat, corn (maize), tobacco, sunflowers, and lentils all flourish in the county wherever recurring drought has been eliminated by irrigation projects. The Hortobágy steppe is associated with the legendary Hungarian herdsmen and cowboys (*gulyás*). Hajdúszoboszló, a spa town with curative mineral waters, lies in the centre of a natural gas field. Nyírbátor has two historic churches built in the 1480s, one of which has a large arcaded timber belfry. Pop. (1986 est.) 551,000.



Natural gas processing plant at Hajdúszoboszló in Hajdú-Bihar county, Hungary

Interphoto—FPG/EB Inc.

Hajdúböszörmény, town, Hajdú-Bihar *megye* (county), northeastern Hungary. It is one of the traditional nucleated village-towns of the Great Alföld (Great Hungarian Plain) and in particular of the Hortobágy (*q.v.*) steppe. Hajdúböszörmény was the capital of the Hajdúság (*q.v.*) until 1876, when the area was incorporated in Hajdú-Bihar *megye.*

The productivity of the surrounding steppe countryside increased with the success of irrigation from the upper Tisza River, and the discovery of natural gas in the area made the development of industry possible. Hajdúböszörmény serves as a market town for the surrounding area and its light industries include hosiery, bricks, and tiles. It is a junction for several secondary roads and is linked by rail with Debrecen, 9 miles (15 km) southeast. Pop. (1986 est.) 31,000.

Hajdúság, region in Hajdú-Bihar *megye* (county), northeastern Hungary. The region lies between the Hortobágy (*q.v.*) steppe on the south and the Nyírseg on the east, and the rivers east and south of the Tisza. Nearby are several towns with the same prefix (Hajdúnánás, Hajdúdorog, Hajdúvid, Hajdúhadház, Hajdúszoboszló, Hajdúsámson, Hajdúszovát, and the largest, Hajdúböszörmény [*q.v.*]). The modern inhabitants of the Hajdúság are descendants of peoples who fled the westward expansion of the Ottomans in the 15th century. Some are descended from local herdsmen (Hungarian *hajtó*) of the region, and some from Magyar and Slav foot soldiers (*hajdus*) who fought for István (Stephen) Bocskay (1557–1606), prince of Transylvania. This militarized population, called *haiduk* ("brigand," or "bandit") by the Turks, were granted lands, privileges, and title exemptions by Bocskay. The region's fortified towns and their citizens played a role in the struggles against both the Turks and the Habsburgs. Hajdúböszörmény was the capital of these military settlements until 1876, when the area was incorporated into Hajdú-Bihar *megye* and the privileges were terminated.

Haji, Raja (d. June 1784, Malacca), Buginese soldier and statesman under whose leadership Buginese adventurers spread throughout the Malay Peninsula. The power of the Buginese (a people originally from the southern Celebes) dated from the early 1700s, when Buginese adventurers, cut off from their homeland by the Dutch, established a dynasty in the Malay state of Selangor, became the power behind the throne of the state of Johore, and were powerful influences in the states of Kedah and Perak.

Raja Haji took part in military actions in Sumatra and in 1770 seized and occupied the capital of the north Malay state of Kedah. Seven years later he inherited the powerful office of under-king of Johore and proceeded with the development of the port of Riau (south of modern Singapore) as a major trade centre, seriously undermining the economic position of Dutch-controlled Malacca. Conflicts with the Dutch soon arose, and in 1784 Raja Haji attacked Malacca. The arrival of Dutch reinforcements was decisive, however, and Raja Haji was killed in battle.

Haji ware, Japanese earthenware developed in the 4th century AD (during the Tumulus period) from the Yayoi ware of the preceding period. Great amounts of this everyday ware were produced into the Heian period (794–1185). A rust-red earthenware, Haji ware is baked in oxidizing fires. Production began in the provinces of Yamato and Kochi and spread throughout western Japan, eventually reaching the eastern provinces. Haji ware resembles Yayoi pottery in its colour, shape, and lack of decoration. Shapes unknown to the Yayoi culture appeared in Haji ware, however, such as small, globular jars and wide-rimmed pots. By the end of the 5th century, Haji pottery was imitating Sué forms.

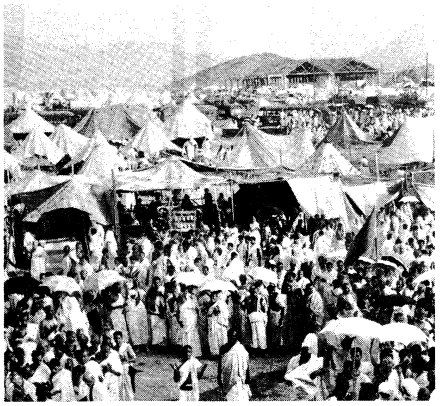
Although the surfaces of Haji pieces are finely finished, both their form and firing lack the refinement of Yayoi pottery, so that some Haji pieces appear heavy and clumsy by comparison.

ḥājib, in Muslim Spain and Mamlūk Egypt, a high government official. The term originally designated a chamberlain, but under the Spanish Umayyads (756–1031) the *ḥājib* functioned as a chief minister, paralleling the position of vizier (*wazīr*) in the eastern caliphates. He was the chief representative of the caliph and directed the central secretariat in Córdoba. In 978 effective control of the caliphate was taken over by Ibn Abū 'Āmir, known as al-Manṣūr (Almanzor in Spanish sources), who was *ḥājib* to Hishām II. The so-called 'Āmirid dictatorship, which was continued by al-Manṣūr's sons and by the *ḥājib*s, lasted until the outbreak of civil war in Muslim Spain in 1008. In this period of numerous petty kingdoms (1008–91), most rulers, not daring to claim the sacred office of caliph, assumed the title *ḥājib* instead.

Many other Muslim dynasties had ministers bearing this title, but their functions varied widely—from war minister to chief of finances to superintendent of the palace. Under the Mamlūks in Egypt (1250–1517), the *ḥājib* arbitrated disputes between *amīr*s and soldiers. Eventually he became head of the military courts and from this strictly civil position slowly assumed authority in religious questions, generally the domain of *qāḍī*s (religious judges). In the provinces, the Mamlūks maintained *ḥājib*s as officers second or third in command after the governors and authorized to take their place in their absence or death.

Hājīpur, town, north-central Bihār state, northeastern India. Hājīpur lies in the northern Bihār Plains, which are part of the Middle Ganges Plains. It is located on the land route from Vaishali, which was the capital of one of the states in northern India during Buddha's lifetime, to Nālanda, which was the seat of a celebrated Buddhist monastic university in the 5th–12th century. The town's industries include engineering products, glass, and metal and steel containers. There are four colleges, all affiliated with the University of Bihār at Muzaffarpur. The town is connected by railway and road to Patna, the state capital. Pop. (1981) 62,520.

hajj, also spelled ḤADJDJ, or HADJ, in Islām, the pilgrimage to the holy city of Mecca in Saudi Arabia, which every adult Muslim of either sex must make at least once in his or her lifetime. The hajj is the fifth of the fundamen-



Pilgrims on the way to Mecca
Middle East Features—Black Star/EB Inc.

tal Muslim practices and institutions known as the Five Pillars of Islām. The pilgrimage rite begins on the 7th day of Dhū al-Ḥijjah (the last month of the Islāmic year) and ends on the 12th day.

The hajj is incumbent on every Muslim who is physically and financially able to make the pilgrimage, but only if his absence will not place hardships on his family. A person may perform the hajj by proxy, appointing a relative or friend going on the pilgrimage to "stand in" for him or her.

The pattern of pilgrimage rites was established by the Prophet Muḥammad, but variations have arisen in it, and the stringent formal itinerary is not strictly adhered to by the mass of pilgrims, who frequently visit the various Meccan sites out of their proper order.

When the pilgrim is about 6 miles (10 km) from Mecca, he enters the state of holiness and purity known as ihram (*q.v.*) and dons the ihram garments, consisting of two white seamless sheets that are wrapped around the body. The pilgrim cuts neither his hair nor his nails until the pilgrimage rite is over. He enters Mecca and walks seven times around the sacred shrine called the Kaʿbah, in the Great Mosque, kisses or touches the Black Stone (Ḥajar al-Aswad) in the Kaʿbah, prays twice in the direction of the Maqām Ibrāhīm and the Kaʿbah, and runs seven times between the minor prominences of Mount Ṣafā and Mount Marwah. On the 7th of Dhū al-Ḥijjah the pilgrim is reminded of his duties. At the second stage of the ritual, which takes place between the 8th and the 12th days of the month, the pilgrim visits the holy places outside Mecca—Jabal ar-Raḥmah, Muzdalifah, Minā—and sacrifices an animal in commemoration of Abraham's sacrifice. The pilgrim's head is then usually shaved, and, after throwing seven stones at each of the three pillars at Minā on three successive days (the pillars exemplify various devils), he returns to Mecca to perform the farewell *ṭawāf,* or circling, of the Kaʿbah before leaving the city.

About 2,000,000 persons perform the hajj each year, and the rite serves as a unifying force in Islām by bringing followers of diverse background together in religious celebration. Once a believer has made the pilgrimage he may add the title *ḥājjī* to his name. *Compare* ʿumrah.

Hajj Amīn, al-: *see* Ḥusaynī, Amīn al-.

Ḥajjah, town, northwestern Yemen (Ṣanʿā'). It is situated in the eastern section of the Yemen Highlands and functions as a market centre for the tribesmen and farmers of the surrounding area. The Wadi Maur permits some agricultural activity in the region. The main crops are sorghum, millet, sesame, corn (maize), vegetables, fruits, cotton, coffee, and *qāt* (a narcotic plant). Cattle, camels, donkeys, sheep, and goats are raised. Ḥajjah is connected by secondary roads to ʿAmrān (east) and al-Kushm (west). Pop. (1986) 15,878.

Ḥajjāj (ibn Yūsuf ath-Thaqafī), al- (b. 661, aṭ-Ṭā'if, Hejaz, Arabia—d. June 714, Wāsiṭ, Iraq), one of the most able of provincial governors under the Umayyad caliphate (661–750). He played a critical role in consolidating the administrative structure of the Umayyad dynasty during its early years.

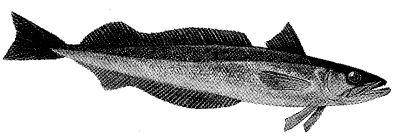
Al-Ḥajjāj was a schoolteacher in his native town as a young man, but little else is known of his earlier years. He first became publicly active when, in the reign of the caliph ʿAbd al-Malik, he restored discipline among troops being used to repress a rebellion in Iraq. In 692 he personally led troops in crushing the rebellion of ʿAbd Allāh ibn az-Zubayr in Mecca. The brutality with which he secured his victory was to recur during the rest of his public life.

For several years he was governor of the provinces that surrounded Mecca, but in 694 he was made governor of Iraq, which, because of its location and because of the intrigues by various sects there, was the most demanding and the most important of the administrative posts in the Islāmic empire. Al-Ḥajjāj was completely devoted to the service of the Umayyads, and the latter were never fearful of his great power. He was instrumental in persuading the caliph ʿAbd al-Malik to allow the succession to pass to al-Walīd, who, as caliph, allowed al-Ḥajjāj complete freedom in the administration of Iraq. Al-Ḥajjāj did much to promote prosperity in his province. He began to strike a purely Arab coinage that soon replaced older currencies. He stopped the migration of the rural population to the towns in an effort to improve agricultural production, and he saw to it that the irrigation system was kept in good repair.

Ḥājjī Khalīfa: *see* Kâtip Çelebi.

hake (*Merluccius*), any of several large marine fishes of the cod family, Gadidae. They are sometimes classed as a separate family, Merlucciidae, because of skeletal differences in the skull and ribs. Hakes are elongated, large-headed fishes with large, sharp teeth. They have two dorsal fins, the second long and slightly notched near the middle. The anal fin is also long and notched, and the pelvic fins are placed far forward, ahead of the pectorals.

Hakes are swift, carnivorous fishes and, though rather soft-fleshed, are used as food.



Silver hake (*Merluccius bilinearis*)
Painting by Jean Helmer

They are found throughout the Atlantic, in the eastern Pacific, and along New Zealand. Species include the European and Mediterranean *Merluccius merluccius,* which grows to about 1.1 m (3½ feet) long; the silver hake (*M. bilinearis*) of the American Atlantic; and the stockfish (*M. capensis*) of South Africa.

In eastern North America, the name hake is also applied to several marine food fishes related to *Merluccius* but placed in the genus *Urophycis.* These fishes resemble *Merluccius* but are distinguished by long, slim pelvic fins and by a small barbel at the tip of the chin. Economically important members of this genus include the white hake (*U. tenuis*) and the red hake (*U. chuss*).

Ḥākim, al-, in full AL-ḤĀKIM BI-AMR AL-LĀH (Arabic: "Ruler by God's Command"), called by Druzes AL-ḤĀKIM BI-AMRIH ("Ruler by His Own Command"), original name ABŪ ʿALĪ AL-MANṢŪR, byname THE MAD CALIPH (b. 985—d. 1021?), sixth ruler of the Egyptian Shīʿite Fāṭimid dynasty, noted for his eccentricities and cruelty, especially his persecutions of Christians and Jews. He is held by adherents of the Druze religion to be a divine incarnation.

Al-Ḥākim was named caliph in 996 and depended at first on the Berber regiments in his army for his power. When he took control of government, his policies proved to be arbitrary and harsh. He ordered, for example, the sacking of the city al-Fusṭāṭ (near present-day Cairo), the killing of all dogs (whose barking annoyed him), and bans on various kinds of vegetables and shellfish. His religious persecutions affected Sunnite Muslims as well as Jews and Christians. At times, however, his administration was tolerant. During famines he distributed food and tried to stabilize prices. He also founded mosques and patronized scholars and poets. In 1017 he began to encourage the teachings of some Ismāʿīlī missionaries (members of the radical Shīʿite sect to which his dynasty belonged), who held that he was the incarnation of divinity. The Druze religion developed from the teaching of these men.

Al-Ḥākim mysteriously vanished while taking a walk on the night of Feb. 13, 1021.

Ḥakīm, Tawfīq (Ḥusayn) al- (b. Oct. 9, 1898, Alexandria—d. July 26, 1987, Cairo), founder of contemporary Egyptian drama and a leading figure in modern Arabic literature.

Al-Ḥakīm was born into a well-to-do family. After studying law at Cairo University, he went to Paris to continue his legal studies but instead devoted most of his time to the theatre. On his return to Egypt four years later (1930), he worked for the Ministry of Justice in a rural area and for the Ministry of Education in Cairo. However, in 1936 he resigned to devote himself entirely to writing.

Al-Ḥakīm won fame as a dramatist with *Ahl al-kahf* (1933; "The People of the Cave"), which was ostensibly based on the story of the Seven Sleepers of Ephesus but which was actually a study of man's struggle against time. This introduced his series of "dramas of ideas," or of "symbolism." They include *Shahrazād* (1934), based on *The Thousand and One Nights,* as well as the plays *Al-Malik Udib* (1939; "King Oedipus"), *Pijmalīyūn* (1942; "Pygmalion"), and *Sulaymān al-Ḥakim* (1934; "Solomon the Wise"). His output of more than 50 plays also includes many on Egyptian social themes, such as *Sirr al-muntahirah* (1937; "The Secret of the Suicide Girl") and *Ruṣāṣah fī al-Qalb* (1944; "A Bullet in the Heart"). His boldest drama was the lengthy *Muḥammad* (1936), which was not intended for performance.

Al-Ḥakīm made drama a respected Arabic literary genre. Prior to him, prose plays had been primarily lightweight comedy or farce, while verse had been used by such noted poets as Aḥmad Shawqī for heroic drama. Al-Ḥakīm, however, wrote only in prose—a flexible, high-quality prose, often interspersed with colloquial Arabic. His autobiographical novel, *Yawmīyāt nāʾib fī al-aryāf* (1937; *The Maze of Justice*), is a satire on Egyptian officialdom.

Hakka, group of North Chinese who migrated to South China, especially Kwangtung and Fukien provinces, during the Southern Sung dynasty (1127–1279), when North China was occupied by Inner Asian tribesmen. The name Hakka is a Cantonese pronunciation of the Mandarin word *k'o-chia* ("guest people"), which the northerners were called to distinguish them from the *pen-ti,* or natives.

Having settled in South China in their own communities, the Hakka never became fully assimilated into the native population. Unlike most other Chinese before the 20th century, they never allowed their women to bind their feet, and they speak a language that has affinities with both Cantonese, the language of the people of Kwangtung Province, and Mandarin, the language of much of northern and

central China; many of the Hakka tongue's initial sounds are a bridge between the two dialects.

An extremely industrious, shrewd people, the Hakka tend to be very clannish. During the 18th and 19th centuries, when conditions in South China became very bad and land quite scarce, the Hakka often were involved in land feuds with the *pen-ti*. The Taiping Rebellion (1850–64), which is said to have resulted in the death of more than 20,000,000 people and completely shattered South China, initially grew out of these local conflicts. Although the *pen-ti* eventually joined the revolt, Taiping leadership was mainly of Hakka origin.

After the rebellion, the Hakka continued to be involved in little skirmishes with their neighbours, as a result of which many migrated to other areas. Today many Hakka live in such widely scattered locations as Taiwan, Hong Kong, Malaysia, Singapore, Thailand, Sabah, Sarawak, and even Jamaica. In South China they continue to dwell mainly in the less fertile upland areas.

Hakka language: *see* Kan-Hakka languages.

Hakkâri, formerly ÇÖLEMERİK, city, capital of Hakkâri *il* (province), southeastern Turkey. It lies at an altitude of about 5,500 ft (1,700 m), surrounded by mountains and overlooked by a medieval fortress, the former residence of its Kurdish rulers. A market for local livestock and livestock products, Hakkâri has road links to Van to the north and Siirt to the west.

Hakkâri *il*, with an area of 3,817 sq mi (9,885 sq km), is drained by the Great Zab River (Büyükzap Suyu). Iran borders it on the east and Iraq on the south. Mostly mountainous, it is the most sparsely populated and isolated *il* in Turkey. East of Hakkâri city rise the high ranges of the Cilo (13,700 ft) and Sat (12,500 ft) mountains. Cropland is scarce, and the proportion of land under cultivation is among the nation's lowest. Livestock raising is the main activity. The largely Kurdish population is semi-nomadic, moving to higher summer pastures in season. Although the region was annexed to the Ottoman Empire in 1515–16, it was ruled largely by local Kurdish *amīrs* under nominal Ottoman suzerainty until the mid-19th century. Pop. (1980) city, 18,009; (1983 est.) *il*, 174,200.

Hakluyt, Richard (b. *c.* 1552, London?—d. Nov. 23, 1616, England), British geographer noted for his political influence, his voluminous writings, and his persistent promotion of Elizabethan overseas expansion, especially the colonization of North America. His major publication, *The principall Navigations, Voiages and Discoveries of the English nation*, provides almost everything known about the early English voyages to North America.

Hakluyt's family was of some social standing in the Welsh Marches and held property at Eaton. His father died when Richard was five years old, leaving his family to the care of a cousin, another Richard Hakluyt, a lawyer who had many friends among prominent city merchants, geographers, and explorers of the day. Because of these connections, and his own expertise in overseas trade and economics, the man was well placed to assist young Richard in his life work.

With the help of various scholarships, Hakluyt was educated at Westminster School and Christ Church, Oxford, entering in 1570 and taking his M.A. degree in 1577. His interest in geography and travel had been aroused on a visit to the Middle Temple, one of the four English legal societies, while in his early teens. As he writes in the "Epistle dedicatorie" to *The principall Navigations,* his cousin spoke to him of recent discoveries and of the new opportunities for trade and showed him "certeine bookes of Cosmographie, with an universall Mappe." His imagination thus stirred, the schoolboy had thereupon resolved to "prosecute that knowledge and kinde of literature" at the university. Some time before 1580 he took holy orders, and, though he never shirked his religious duties, he spent considerable time reading whatever accounts he could find about contemporary voyages and discoveries.

Hakluyt also gave public lectures—he is regarded as the first professor of modern geography at Oxford—and was the first to display

> both the olde imperfectly composed, and the new lately reformed Mappes, Globes, Spheares, and other instruments of this Art for demonstration in the common schooles.

He made a point also of becoming acquainted with the most important sea captains, merchants, and sailors of England. This was the time when English attention was fixed on finding the northeast and northwest passages to the Orient, and on Francis Drake's circumnavigation of the world. Hakluyt was concerned with the activities of Sir Humphrey Gilbert and Martin Frobisher, who were both searching for a passage to the East; was consulting Abraham Ortelius, compiler of the world's first atlas, and Gerardus Mercator, the Flemish mapmaker, on cosmographical problems; and was gaining approval for future overseas exploration from such politically prominent men as Lord Burghley, Sir Francis Walsingham, and Sir Robert Cecil. He thus embarked upon his career as a "publicist and a counsellor for present and future national enterprises across the ocean." His policy, constantly expounded, was the exploration of temperate North America in conjunction with the search for the Northwest Passage, the establishment of England's claim to possession based on the discovery of North America by John and Sebastian Cabot, and the foundation of a "plantation" to foster national trade and national well-being. These views are first set out in the preface he wrote to John Florio's translation of an account of Jacques Cartier's voyage to Canada, which he induced Florio to undertake, and are further developed in his first important work, *Divers voyages touching the discouerie of America* (1582). In this he also pleaded for the establishment of a lectureship in navigation. In 1583 Walsingham, then one of the most important secretaries of state, sent Hakluyt to Paris as chaplain to Sir Edward Stafford, the English ambassador there. He served in Paris also as a kind of intelligence officer, collecting information on the fur trade of Canada and on overseas enterprises from French and exiled Portuguese pilots. In support of Walter Raleigh's colonizing project in Virginia, he prepared a report, known briefly as *The Discourse on the Western Planting* (written in 1584), which set out very forcefully the political and economic benefits from such a colony and the necessity for state financial support of the project. This was presented to Queen Elizabeth I, who rewarded Hakluyt with a prebend (ecclesiastical post) at Bristol cathedral but took no steps to help Raleigh. *The Discourse,* a secret report, was not printed until 1877. In Paris, Hakluyt also edited an edition of the *De Orbe Novo* of Pietro Martire so that his countrymen might have knowledge of the early successes and failures of the Spaniards in the New World.

Hakluyt returned to London in 1588. The outbreak of war with Spain put an end to the effectiveness of overseas propaganda and the opportunity for further exploration so he began work on a project that he had had in mind for some time. This was *The principall Navigations, Voiages and Discoveries of the English Nation* . . . , which, by its scholarship and comprehensiveness, transcended all geographical literature to date; the first edition, in one volume, appeared in 1589. About this time he married Duglesse Cavendish, a relative of Thomas Cavendish, the circumnavigator, and was appointed to the parish of Wetheringsett in Suffolk. Until after the death of his wife in 1597, little is heard of any geographical work, but he then completed the greatly enlarged second edition of the *Voyages,* which appeared in three volumes between 1598 and 1600. Shortly before its completion, he was granted by the Queen the next vacant prebend at Westminster so that he might be at hand to advise on colonial affairs. He gave information to the newly formed East India Company and continued his interest in the North American colonizing project; he was one of the chief promoters of the petition to the crown for patents to colonize Virginia in 1606 and at one point contemplated a voyage to the colony. Nor did his belief in the possibility of Arctic passages to the East fade, for he was also a charter member of the Northwest Passage Company of 1612. In 1613 appeared the *Pilgrimage* of Samuel Purchas, another clergyman fascinated with the new discoveries of the age; in spirit, it was a continuation of Hakluyt's own work, and the two editors probably became acquainted. Purchas procured some of Hakluyt's manuscripts after his death and used them in *Hakluytus Posthumus or Purchas his Pilgrimes* of 1625.

Works by Hakluyt in addition to those mentioned above include translations of Antonio Galvano's *Discoveries of the World* . . . (1601), and of Hernando de Soto's account of Florida, under the title *Virginia richly valued by the description of* . . . *Florida* . . . (1609). But it is the *Voyages* that remain his memorial. This, the prose epic of the English nation, is more than a documentary history of exploration and adventure; with tales of daring it mingles historical, diplomatic, and economic papers to establish British right to sovereignty at sea and to a place in overseas settlement. Its overriding purpose was to stimulate, guide, and encourage an undertaking of incalculable national import. Hakluyt was not blind to the profits arising from foreign trade. It has been asserted that the income of the East India Company was increased by £20,000 through a study of Hakluyt's *Voyages.* (G.R.C.)

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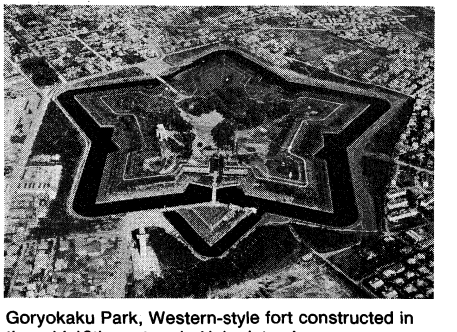
Hakodate, city, southern Hokkaido Prefecture (*ken*), Japan, on the Tsugaru-kaikyō (Tsu-



Goryokaku Park, Western-style fort constructed in the mid-19th century in Hakodate, Japan

Photos Pack—EB Inc.

garu Strait) between Hokkaido and Honshu. The city is built along the northwestern base of a rocky promontory that forms the eastern boundary of a spacious, naturally sheltered harbour. Until the mid-18th century, Hakodate remained in the hands of the Ainu in spite of various attempts by the Japanese government to gain control of the port. In 1789 it was made a base for Japanese deep-sea fishing, which led to its prosperity. Goryokaku, a Western-style fort that has been converted to a park, was built soon after Hakodate opened to international trade in the 19th century. Russians built a Byzantine-style church in 1859. Hakodate-yama (Mt. Hakodate) towers to the southwest; on its eastern slope are a municipal library and museum, the latter devoted to the Ainu and Gilyak peoples. In the east are Yunokawa Spa, one of the oldest hot-spring resorts on the island, and the site of the only Trappist convent for women in Japan (1898).

Hakodate was long regarded as the capital of Hokkaido. It has declined since World War II but remains an important point of air and ferry transit between Hokkaido and Honshu. During the early 1980s the Seikan Tunnel was under construction beneath the Tsugarukaikyō, linking Hakodate with Homori on Honshu. The principal industries are fishing, shipbuilding, and seaweed processing. Pop. (1983 est.) 320,220.

Håkon (Norwegian personal name): *see under* Haakon.

Hakone, town (*machi*), Kanagawa Prefecture (*ken*), Honshu, Japan, on the southern bank of Ashino-ko (Lake Ashino), within the caldera of the extinct volcano Hakone-yama (Mt. Hakone). The town, a post station during the Tokugawa era (1603–1868), is now the tourist base for Fuji-Hakone-Izu National Park. A favourite hot-spring and sight-seeing resort of both Japanese and foreign tourists, Hakone is well served by roads and railways. Pop. (1980) 19,882.

Hakp'o: *see* Yi Sang-cha.

Hakuin, also called HAKUIN EKAKU (b. Jan. 19, 1686, Hara, Suruga Province, Japan—d. Jan. 18, 1769, Hara), priest, artist, and writer who helped revive Zen Buddhism in Japan.

After undergoing a mystical experience in 1708, Hakuin joined the Rinzai Zen sect. In 1716 he settled at the Shōin-ji (*ji,* "temple"), in his native Suruga province in central Japan, which remained his base until his death. In contrast to the haughty priests who served the shogunate, or ruling feudal government, he lived in great poverty among his peasant parishioners; his spirituality, humility, and contentment attracted a large following that became a new foundation for Zen in Japan.

Hakuin taught that direct knowledge of the truth is available to all, even the lowliest, and that a moral life must accompany religious practice. His chief writings are *Keisō dokozui* ("Poisonous Stamens and Pistils of Thorns"), written in Chinese and intended for advanced students of Zen; *Orate-gama* (*The Embossed Tea Kettle,* 1963), practical advice for ordinary people; *Hogo-roku* ("Record of Talks on the Law"), doctrines for the peasants in which he "accommodates" Zen doctrines to local conditions; and *Yasen kanwa* ("A Chat on a Boat in the Evening"), a warning not to treat the body too harshly in meditation.

Hakuin is also well known as an artist and calligrapher. He belongs to the Zen tradition of Japanese art, in which the thing represented in a painting is not so important as what it evokes in the spectator's mind.

ḥāl (Arabic: "condition"), plural AḤWĀL, in Ṣūfī Muslim mystical terminology, a spiritual state of mind that comes to the Ṣūfī from time to time during his journey toward God. The *aḥwāl* are graces of God that cannot be acquired or retained through an individual's own efforts. When the soul is purified of its attachments to the material world, it can only wait patiently for those spiritual gifts of God, which, when they come, fill the Ṣūfī with the desire to continue his journey with new energy and higher expectations.

The *aḥwāl* are distinguished by most Ṣūfīs from the *maqāms* (stages) in two main aspects. First, the *aḥwāl* are usually transitory; like flashes of lightning they come into the heart and disappear. Second, while *aḥwāl* denote a gratuitous favour of God, *maqāms* are granted solely on merit and efforts.

Though the Ṣūfīs spoke of hundreds of *aḥwāl,* the following are among those most often referred to. (1) The *ḥāl* of *murāqabah* (watching) fills the Ṣūfī with either fear or joy according to the aspect of God revealed to him. (2) The *ḥāl* of *qurb* (nearness) is a state that enables the Ṣūfī to become unconscious of his own acts and to see God's acts and bounties toward him. (3) The *ḥāl* of *wajd* (ecstasy) is a state described by the Ṣūfī as a sensation that encounters the heart and produces such varied effects as sorrow or joy, fear or love, contentment or restlessness. (4) In the *ḥāl* of *sukr* (intoxication) the Ṣūfī, while not totally unaware of the things that surround him, becomes half dazed because his association with God dims his sight of other things. The overpowering sense of the beloved in this state destroys the mystic's ability to distinguish between physical pain and pleasure. *Ṣaḥw* (sobriety) immediately follows *sukr,* but the memories of the previous experience remain vivid in the mind and become a source of immense spiritual joy. (5) The *ḥāl* of *wudd* (intimacy) is characterized by "the removal of nervousness, together with the persistence of awe." The Ṣūfī becomes calm, contented, and reassured, but the overwhelming sense of the divine presence fills his heart with the kind of awe that is free from fear.

Ḥalab, *muḥāfaẓah* (governorate), northern Syria, centred on the city of Aleppo. It is a mountainous region with an area of 7,146 sq mi (18,507 sq km) that is dominated to the west by Jabal (mountain) Sim'an and to the east by the Euphrates River and the western part of Lake Asad. The governorate borders Turkey on the north and northeast and is located between the Orontes and Euphrates rivers. A seasonal saline lake, the Mamlahat al-Jabbul, lies southeast of Aleppo. Although the governorate is primarily an agriculturally oriented region producing grains, fruits, cotton, and olives (particularly in the north), Aleppo, the governorate capital, is a trade and light industry centre rivalling Damascus. Ḥalab governorate has a distinct character from the rest of Syria because of the different ethnic groups living in it. Other major settlements include Maskanah on the Euphrates River, Manbij on the Nahr (river) Sājūr, and al-Bāb north of Aleppo. Pop. (1981 prelim.) 1,869,249.

Ḥalabī, al- (Muslim scholar): *see* Ibn Abī 'Aṣrūn.

Ḥalabī, al-, byname of BURHĀN AD-DĪN IBRĀHĪM IBN MUḤAMMAD IBN IBRĀHĪM (b. *c.* 1460, Ḥalab, Mamlūk Sultanate—d. 1549), jurist who maintained the traditions of Islāmic jurisprudence in the 16th century.

Personal details of his life are obscure, except that after studying in Ḥalab (modern Aleppo) and Cairo, he spent more than 40 years in Istanbul, the capital of the Ottoman Empire, where he became a preacher in the Mosque of Mehmed II, at that time one of the most important mosques of Istanbul.

Al-Ḥalabī's writings include a treatise on ritual prayer and polemics against the mystical doctrines of a famous Ṣūfī (mystical) writer, Ibn al-'Arabī (died 1240). Al-Ḥalabī's major work, however, was the *Multaqa al-abḥur* (1517), a handbook of Ḥanafī jurisprudence based on the works of four earlier jurists. It was immediately successful, and many commentaries on it were written. The work, translated later into Ottoman Turkish, became a major source for Ḥanafī doctrines and their applications in the Ottoman Empire. The *Multaqa al-abḥur* was partially translated into French by H. Sauvaire (1882).

Ḥalaf, Tall, also spelled TELL HALAF, archaeological site of ancient Mesopotamia, on the headwaters of the Khābur River near modern Ra's al-'Ayn, Syria. It is the location of the first find of a Neolithic culture characterized by pottery with a shiny surface painted with geometric and animal designs, sometimes called Halafian ware.

The site was excavated by German archaeologists between 1899 and 1927. It was a flourishing city from *c.* 5050 to *c.* 4300 BC, sometimes referred to as the Halaf Period. Although probably continuously occupied, it was little known again until 808 BC, when Adad-nirari III of Assyria sacked the city and reduced the surrounding district to a province of the Assyrian Empire. In the 8th century BC the city prospered under its Assyrian governors; it was the Old Testament Gozan to which the Israelites were deported in 722 after the capture of Samaria.

Halakha, also spelled HALAKHAH, HALAKAH, or HALACHAH (Hebrew: the Way), plural HALAKHAS, HALAKHOT, HALAKHOTH, or HALACHOT, in Judaism, the totality of laws and ordinances that have evolved since biblical times to regulate religious observances and the day-to-day life and conduct of the Jewish people. Quite distinct from the Law of the Pentateuch, the first five books of the Bible, Halakha purports to preserve and represent oral traditions stemming from the revelation on Mt. Sinai or evolved on the basis of it. The legalistic nature of Halakha also sets it apart from those parts of rabbinic, or Talmudic, literature that include history, fables, and ethical teachings (Haggada). That Halakha existed from ancient times is confirmed from nonpentateuchal passages of the Bible, where, for example, servitude is mentioned as a legitimate penalty for unpaid debts (II Kings 4:1).

Oral traditions concerning Jewish law passed from generation to generation, and eventually it became apparent that they required organization. The work of gathering opinions and interpretations was begun by Rabbi Akiba in the 1st–2nd century AD and carried on by his disciples such as Rabbi Meïr. Early in the 3rd century, this new compilation, the Mishna, was complete, arranged in its final form by Judah ha-Nasi. Though the Mishna contained the most comprehensive collection of Jewish laws up to that time, it was not meant to settle issues involving contradictory interpretations. Almost immediately, however, Jewish scholars in Palestine and Babylonia began to elaborate extensive interpretations of the Mishna that were called Gemara. When the work was completed several centuries later, the Mishna and the Gemara, taken together, were called the Talmud.

With the continued passage of time, sociological and economic changes presented new problems of interpretation and required new applications of the law. This gave rise to new compilations of Halakha by such outstanding scholars as Maimonides (1135–1204), Joseph Karo (1488–1575), and Abraham Danzig (1748–1820).

Though Judaism acknowledges a continuous development of Halakha, the law is always viewed as an explication or extension of the original Law given on Mt. Sinai. Conservative rabbis tend to adapt certain Halakhot to fit conditions in the modern world, as, for instance, the Halakha regarding observance of the sabbath. Reform Jews tend to disregard

Halakha, though some of them adhere to certain of its precepts.

Interpretations and discussions of law directly related to Old Testament texts are referred to as Midrash Halakha.

Halăng language, also called HALENG, ALANG, KƠYONG, or SELONG, language spoken in the western part of the Kontum Province in Vietnam. The number of speakers is estimated at approximately 10,000.

Halăng is one of the North Bahnaric languages of the Mon-Khmer grouping of the Austro-Asiatic language family. Other North Bahnaric languages spoken in the region are Bahnar, Sedang, Rengao, Kayơng, Mơnơm, and Jeh.

Halas, George Stanley (b. Feb. 2, 1895, Chicago—d. Oct. 31, 1983, Chicago), founder, owner, and head coach of the Chicago Bears in the professional National Football League (NFL). Halas revolutionized U.S. football strategy in the late 1930s when he revived the T formation and added to it the man in motion. His 1942 team is by some considered to be the greatest team in the history of U.S. professional football.

After graduation from the University of Illinois in 1918, Halas served in the U.S. Navy and, in 1919, played major league baseball with the New York Yankees. In 1920 he organized the Bears (originally the Decatur [Illinois] Staleys) and helped to found the NFL. He moved the team to Chicago in 1921. As a Bears' player he was an exceptional defensive end and set a league record by running 98 yards with a recovered fumble.

In 1930 he retired both as a player and as a coach, but he returned as a full-time coach in 1933. From 1943 to 1945 he served in the Navy once more. He returned to coach the Bears from 1946 through 1955 and from 1958 through 1967. Under his coaching the Bears won seven league championships and four divisional titles.

He again retired as coach in 1968, but he remained the chief executive officer of the Bears until his death. Halas was a charter member of the National Professional Football Hall of Fame.

Halas, John; and Batchelor, Joy (respectively b. April 16, 1912, Budapest; b. May 12, 1914, Watford, Hertfordshire, Eng.), British husband-and-wife motion-picture director-producer team.

Halas was educated in Hungary and Paris and apprenticed to George Pal; he moved to England as an animator in 1936. After art school Batchelor became a commercial artist and while working on *Music Man* (1936) met Halas. They married and by 1940 established Halas & Batchelor, which became the largest cartoon film studio in Great Britain.

The collaborators co-directed and co-produced *Animal Farm* (1954), England's first full-length colour feature cartoon; *History of the Cinema* (1956); *Automania 2000* (1963); *What Is a Computer?* (1970); and more than 500 other films. Many of their later cartoons, documentaries, and educational shorts were commissioned specifically for television.

Halász, Gyula: *see* Brassaï.

halberd, also spelled HALBERT, or HALBARD, weapon consisting of an axe blade balanced by a pick with an elongated pike head at the end of the staff. It was usually about 5 or 6 feet (1.5 to 1.8 metres) long. The halberd was an important weapon in middle Europe in the 15th and early 16th centuries. During that time the blades of halberds took on a variety of shapes, often being engraved or inlaid and exquisitely finished as works of art. Concurrently with the disuse of armour and the development of firearms, the pike, or thrusting element, gradually displaced the cleaving element in such weapons. The halberd is still retained today as the symbol of authority borne before the magistrates on public occasions in some of the burghs of Scotland.

Halberstadt, city, Saxony-Anhalt *Land* (state), central Germany, on the Holtemme River in the foreland of the northern Harz Mountains, southwest of Magdeburg. It became a bishopric *c.* 814 and was granted market rights in 989. It was one of the most important German trading cities in the 13th–14th century. The bishopric was suppressed and the town granted to Brandenburg by the Peace of Westphalia in 1648. Part of the Kingdom of Westphalia from 1807 to 1814, it reverted to Prussia in 1815.

Despite heavy bombing in World War II, it is still rich in old, timber-framed buildings. Notable landmarks include the Gothic cathedral (begun in 1230; consecrated 1491) and the Church of Our Lady (1146–60). A rail junction, Halberstadt has sugar-refining, metal-processing, and engineering plants; it also manufactures machinery, rubber and woven goods, and foodstuffs (notably sausage). Pop. (1989 est.) 47,492.

Halcyon Island (Pacific Ocean): *see* Wake Island.

Haldane, Elizabeth Sanderson (b. May 27, 1862, Edinburgh—d. Dec. 24, 1937, Auchterarder, Perth, Scot.), Scottish social welfare worker and reformer who also was a versatile author and translator.

The younger sister of the statesman Richard Burdon Haldane (afterward Viscount Haldane of Cloan) and the physiologist John Scott Haldane, she was educated privately. For much of her adult life she served on various advisory and regulatory boards for nursing. Influenced by the English housing reformer Octavia Hill, Haldane founded in Edinburgh (1884) an organization for slum reconstruction and housing-project management. During the pre-World War I period of extremism in the British women's rights movement, she remained a mild but persistent advocate of opportunities for women to secure advanced education and to practice the learned professions. She was the first female (from 1914) of Andrew Carnegie's United Kingdom Trust, which she induced to rescue the Sadler's Wells Theatre and Ballet (London) from penury. In addition, she was the first woman to be justice of the peace in Scotland (appointed 1920).

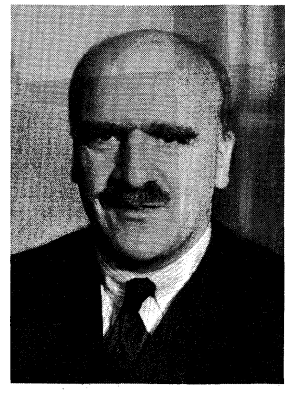
Elizabeth Haldane

By courtesy of Mrs. Campbell Fraser; photograph, the Wykeham Studios Ltd.

Haldane translated philosophical works by Hegel and Descartes and wrote biographies of Descartes (1905) and of the English authors George Eliot (1927) and Mrs. (Elizabeth Cleghorn Stevenson) Gaskell (1930). Among her other books are *The British Nurse in Peace and War* (1923) and a volume of reminiscences, *From One Century to Another* (1937).

Haldane, J(ohn) B(urdon) S(anderson) (b. Nov. 5, 1892, Oxford—d. Dec. 1, 1964, Bhubaneswar, India), British geneticist, biometrician, physiologist, and popularizer of science and the philosophy of biology who opened new paths of research in population genetics and evolution.

Son of the noted physiologist John Scott Haldane, he began studying science as assistant to his father at the age of eight and later received formal education in the classics at Eton and at New College, Oxford. After World War I he served as a fellow of New College and then taught at Cambridge (1922–32); the University of California, Berkeley (1932); and the University of London (1933–57).



J.B.S. Haldane

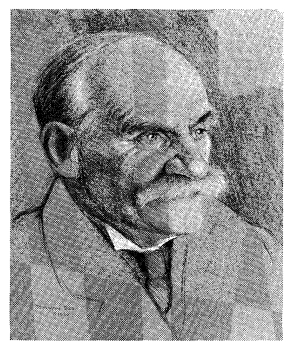
Bassano and Vandyk Studios

Haldane announced himself a Marxist in the 1930s and for several years was editor of the Communist *Daily Worker* (London). He later became disillusioned with the official party line and with the rise of the controversial Soviet biologist Trofim D. Lysenko. In 1957 Haldane immigrated to India, where he took Indian citizenship and became head of the government Genetics and Biometry Laboratory in Orissa.

Haldane was widely decorated and honoured in academic circles. He possessed an unusual combination of analytic powers, literary abilities, a wide range of knowledge, and a force of personality that produced numerous discoveries in several scientific fields and proved stimulating to an entire generation of research workers.

His major works include: *Animal Biology* (with British evolutionist Julian Huxley, 1927); *Science and Ethics* (1928); *The Inequality of Man* (1932); *The Causes of Evolution* (1933); *Heredity and Politics* (1938); *The Marxist Philosophy and the Sciences* (1939); *New Paths in Genetics* (1941); *Science Advances* (1947); and *The Biochemistry of Genetics* (1954).

Haldane, John Scott (b. May 3, 1860, Edinburgh—d. March 14/15, 1936, Oxford), British physiologist and philosopher chiefly noted for his elucidation of gas exchange during respiration. Many of his studies were based on problems connected with coal mining.



John Scott Haldane, drawing by Tom van Oss, 1930; in a private collection

By courtesy of Lady Mitchison; photograph, Gordon Hunter

Haldane developed several procedures for studying the physiology of breathing and the physiology of the blood and for the analysis of gases consumed or produced by the body. Among his most widely used devices were the hemoglobinometer, an apparatus for the analysis of blood gas, and an apparatus for the analysis of mixtures of gases.

In 1905 Haldane reported his fundamental discovery that the regulation of breathing is usually determined by the effect of the tension of carbon dioxide in the blood on the respiratory centre in the brain. In 1911 he led an expedition to Pikes Peak, Colo., where he studied the physiological effects of low barometric pressure. He investigated the action of gases that caused suffocation in coal miners and the pathological effects of carbon monoxide present after a mine explosion. His report in 1896 on the causes of death resulting from mine explosions and fires was an important contribution to mine safety. In 1907 he developed a method of stage decompression that made it possible for a deep-sea diver to ascend to the surface safely. Haldane was also a notable thinker who throughout his life tried to clarify the philosophical basis of biology, its relation to physics and chemistry, and the problems of mechanism and personality.

Haldane, Richard Burdon, 1ST VISCOUNT HALDANE OF CLOAN (b. July 30, 1856, Edinburgh—d. Aug. 19, 1928, Cloan, Perthshire, Scot.), lawyer, philosopher, and statesman whose greatest importance lay in the military

Lord Haldane, oil painting by P.A. de László, 1928; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

reforms he instituted while serving as British secretary of state for war (1905–12).

Educated at the universities of Göttingen and Edinburgh, Haldane was called to the English bar in 1879 and became a queen's counsel in 1890. He sat in the House of Commons from 1885 until his elevation to the peerage in 1911. As a member of the imperialist wing of the Liberal Party, he supported the British effort in the South African War (1899–1902), thereby differing from the party leader, Sir Henry Campbell-Bannerman. In 1905 he joined the future prime minister H.H. Asquith and others in an unsuccessful attempt to force Campbell-Bannerman into accepting a peerage and leading the government from the House of Lords. Campbell-Bannerman's appointment of Haldane to the War Office (effective Dec. 11, 1905) proved fortunate for Great Britain. Although the Territorial Force that he created was nominally a reserve organization for protecting the British Isles, many of its units volunteered to fight in continental Europe in World War I. The speedy mobilization of the Expeditionary Force in August 1914 was largely the result of his planning. He also took the lead in forming a national general staff (from 1904) and an imperial general staff (from 1909); for this purpose, Emperor William II allowed him to study German general staff operations at first hand in 1906. As Anglo-German relations were deteriorating, Haldane went to Berlin in February 1912 on a well-publicized but ineffectual mission concerning British neutrality and the relative naval strength of the two countries.

On June 10, 1912, Haldane became lord chancellor in Asquith's Liberal government. He soon increased the number of lords of appeal and otherwise worked to hasten the judicial process. In May 1915, however, when Asquith formed a wartime coalition ministry, he excluded Haldane, who was accused of being pro-German. By the end of the war his political orientation had shifted to the left. In Ramsay MacDonald's first Labour Party government (January–November 1924), he once more served as lord chancellor.

Long interested in education, Haldane was associated with the Fabian Socialists Sidney and Beatrice Webb in founding the London School of Economics in 1895. As a philosopher he expounded a kind of neo-Hegelianism. In *The Reign of Relativity* (1921) he dealt with the philosophical consequences of Albert Einstein's theories of physics. His *Autobiography* was published posthumously in 1929. Subsequent biographies include Sir Frederick Maurice's *Lord Haldane,* 2 vol. (1937–39) and Dudley Sommer's *Haldane of Cloan* (1960).

Haldefjäll (Finland): *see* Haltiatunturi.

Haldeman, H(arry) R(obbins) (b. Oct. 27, 1926, Los Angeles), U.S. chief of staff during the Richard M. Nixon administration (1969–73). He is best known for his involvement in the Watergate Scandal.

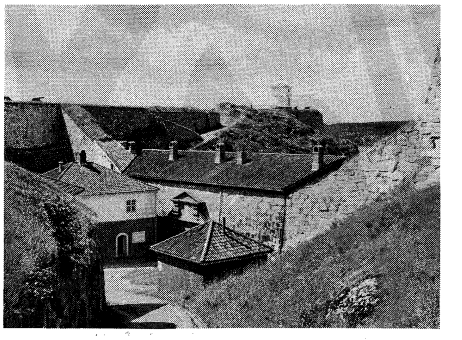
Haldeman attended the University of Redlands in Redlands, Calif., and the University of Southern California in Los Angeles, and was graduated from the University of California at Los Angeles in business administration (1948). After a brief stint with a prominent advertising agency, Haldeman joined a rival firm in 1949. He became an account executive and then, in 1959, vice president of the firm's Los Angeles office.

He worked in a number of Nixon's campaigns, managing Nixon's ill-fated attempt to become governor of California in 1962 and managing Nixon's second campaign for the presidency in 1968. During Nixon's first term, Haldeman served as chief of staff, determining access to the President and running the White House in such an efficient manner as to earn the nickname "the Iron Chancellor."

Following the June 17, 1972, break-in at Democratic National Headquarters at the Watergate complex, Haldeman participated in the White House cover-up of official involvement in that event as well as other "dirty tricks" employed during the 1972 campaign. When the White House became implicated in the spring of 1973, Haldeman resigned. He returned to his home in California but in 1975 was convicted of perjury, conspiracy, and obstruction of justice for his role in the scandal.

Sentenced to 2½ to 8 years in jail, Haldeman actually served 18 months at a federal minimum security facility. He was released in late 1978, and his autobiographical *The Ends of Power* was published that same year.

Halden, formerly FREDRIKSHALD, town, Østfold *fylke* (county), southeastern Norway, on Iddefjorden at the mouth of the Tistedalselva (river). The site was settled in ancient times, and the modern town, founded in 1661, was known as Fredrikshald from 1665 to 1928. Its 17th-century Fredriksten Fort was a strategic border stronghold that withstood many attacks by the Swedes; during the siege of Fredrikshald in 1718 King Charles XII of Sweden was killed there. The fort was demilitarized in 1905 after the separation of Norway from Sweden. Halden has light industries, chiefly the manufacture of wood and paper products, footwear, and textiles. Granite and marble are quarried nearby. Notable features include the National War Memorial on Rødsberget (hill) and the medieval Berg Church. Svinesund Bridge, linking Norway and Swe-



Inside the Fredriksten Fort, Halden, Nor.

Mittet Foto A/S

den, is a few miles west of Fredriksten Fort. Pop. (1983 est.) mun., 26,233.

Haldi, the national god of the kingdom of Urartu, which ruled the plateau around Lake Van, now eastern Turkey, from about 900 to about 600 BC. Haldi was represented as a man, with or without wings, standing on a lion; in the absence of religious texts his attributes are otherwise unknown. A Urartian temple at ancient Muṣaṣir dedicated to Haldi and to the goddess Bagbartu, or Bagmashtu, was captured and plundered by Sargon II of Assyria in 714 BC; it is shown on a relief from his palace as a gabled building with a colonnade—one of the oldest known buildings to make use of that architectural form.

Haldīghāt, Battle of: *see* Gogūnda, Battle of.

Haldimand, Sir Frederick (b. Aug. 11, 1718, Yverdon, Switz.—d. June 5, 1791, Yverdon), British general who served as governor of Quebec province from 1778 to 1786.

Haldimand entered British service in 1756 as a lieutenant colonel in the Royal American Regiment. He served in Sir Jeffrey Amherst's expedition (1760) against Montreal during the Seven Years' War between Great Britain and France (1760), then stayed there as second in command after the French capitulation. In 1762 he became military lieutenant governor of Trois-Rivières and in 1767 commander at Pensacola, Fla.

Haldimand served as commander in chief of the British Army in North America at Boston in 1773–74, then was recalled to England and denied higher command because of his foreign birth. In 1778, however, during the U.S. War of Independence, he succeeded Sir Guy Carleton as governor in chief of Quebec province. Haldimand conducted no major operations during the war but helped settle Loyalist refugees and initiated reunion negotiations between Vermont and Great Britain. His severity toward rebel sympathizers and resistance to political pressure made him unpopular with both the French and English in Quebec. He returned to England in 1784 and was knighted in 1785.

Hale, Edward Everett (b. April 3, 1822, Boston—d. June 10, 1909, Roxbury, Mass., U.S.), U.S. clergyman and author best remembered for his short story "The Man Without a Country."

A grandnephew of the Revolutionary hero Nathan Hale and a nephew of Edward Everett, the orator, Hale trained on his father's newspaper, the *Boston Daily Advertiser,* and turned early to writing. For 70 years newspaper articles, historical essays, short stories, pamphlets, sermons, and novels poured from his pen in such journals as the *North American*

Review, The Atlantic Monthly, and *Christian Examiner.* From 1870 to 1875 he published and edited the Unitarian journal *Old and New.* "My Double and How He Undid Me"

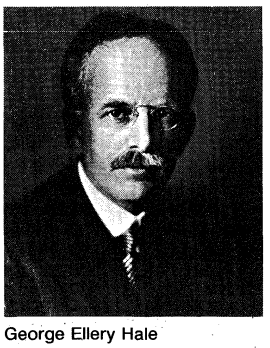
Edward Everett Hale

By courtesy of the Bostonian Society, Old State House, Boston

(1859) established the vein of realistic fantasy that was Hale's forte and introduced a group of loosely related characters figuring in *If, Yes, and Perhaps* (1868), *The Ingham Papers* (1869), *Sybaris and Other Homes* (1869), *His Level Best* (1872), and other collections. "The Man Without a Country," which appeared first in *The Atlantic Monthly* in 1863, was written to inspire greater patriotism during the Civil War. *East and West* (1892) and *In His Name* (1873) were his most popular novels.

Hale's ministry, which began in 1846, was characterized by his forceful personality, organizing genius, and liberal theology, which placed him in the vanguard of the Social Gospel (*q.v.*) movement. Many of his 150 books and pamphlets were tracts for such causes as the education of blacks, workmen's housing, and world peace. A moralistic novel, *Ten Times One Is Ten* (1871), inspired the organization of several young people's groups. The reminiscent writings of his later years are rich and colourful: *A New England Boyhood* (1893), *James Russell Lowell and His Friends* (1899), and *Memories of a Hundred Years* (1902). His *Works,* in 10 volumes, appeared in 1898–1900. In 1903 he was named chaplain of the United States Senate.

Hale, George Ellery (b. June 29, 1868, Chicago—d. Feb. 21, 1938, Pasadena, Calif., U.S.), American astronomer known for his development of important astronomical instruments, including the Hale telescope (com-



George Ellery Hale

By courtesy of the Niels Bohr Library, American Institute of Physics, New York

pleted 1948), a 200-inch reflecting telescope at the California Institute of Technology's Palomar Mountain Observatory near Pasadena. He is known also for his researches in solar physics, particularly his discovery of magnetic fields in sunspots.

Following education and research in Massachusetts and Berlin, Hale organized (1888–91) the Kenwood Observatory in Chicago, where he invented and developed the spectroheliograph, an instrument for photographing the Sun in the light of a very small range of wavelengths (monochromatic light). In 1892 he joined the faculty of the University of Chicago and began organizing the Yerkes Observatory, Williams Bay, Wis., of which he was director until 1904. There he built the 40-inch refracting telescope, which remains the largest of its type in the world. He established the *Astrophysical Journal,* an international review of spectroscopy and astronomical physics, in 1895. In 1904 he organized the Mt. Wilson Observatory, near Los Angeles, under the auspices of the Carnegie Institution of Washington, D.C., and was its director until 1923. There he built solar apparatus of great power as well as the huge 60-inch and 100-inch stellar telescopes, both of the reflecting type. He began work on the Hale telescope on Palomar mountain in 1928.

Hale was an excellent fund-raiser, an ability that helped in the establishment of the Yerkes Observatory and the observatories on Mt. Wilson and Palomar Mountain. He also helped organize the National Research Council (1916). The recipient of many honours, he was also elected to most of the world's leading academies of science.

Hale, Horatio (Emmons) (b. May 3, 1817, Newport, N.H., U.S.—d. Dec. 28, 1896, Clinton, Ont., Can.), American anthropologist who made valuable linguistic and ethnographic studies of North American Indians. His major contribution is the influence he exerted on the development of Franz Boas, whose ideas came to dominate U.S. anthropology for about 50 years.

While a student at Harvard University (1833–37), Hale studied the language of some Algonkian-speaking Indians who camped on college land. His published results placed his linguistic research in an ethnological setting, thus establishing the pattern of his later work. Following graduation he joined Charles Wilkes's surveying and charting expedition that went around the world (1838–42). Reaching Oregon Territory near the end of the voyage, he studied the languages of Indians of the Northwest. He also gathered a substantial amount of linguistic data in Polynesia, which appears in his *Ethnology and Philology: United States Exploring Expeditions* (1846).

In 1856 Hale entered legal practice at Clinton, Ont., and for the next 20 years was engaged primarily with his practice. In the late 1860s, however, he began collecting traditional Iroquois literature from the Six Nations Reserve, Brantford, Ont. Those collections are the basis of his major contribution to the literature of anthropology. Hale considered linguistic evidence to be superior to racial data for establishing ethnological relations among existing groups. Among his linguistic achievements was a demonstration that the Wyandot Huron language is the oldest form of Iroquoian. His most important work, *The Iroquois Book of Rites* (1883), summarizes much of his research and reconstructs the later prehistory of the tribes of the Six Nations.

In the early 1890s Hale chose Franz Boas to conduct fieldwork among the Northwest Coast Indians for the British Association for the Advancement of Science. He not only provided Boas with material support but also corresponded with him regularly, offering guidelines and advice that Boas incorporated into his field approach to general anthropology.

Hale, John Parker (b. March 31, 1806, Rochester, N.H., U.S.—d. Nov. 19, 1873, Dover, N.H.), American lawyer, senator, and reformer who was prominent in the antislavery movement.

Educated at Phillips Exeter Academy and Bowdoin College, Hale went on to study law and was admitted to the bar in 1830. He became a successful jury lawyer in Dover, N.H., and was known for his oratory and his frequently radical democratic principles.

After a term in the state legislature, Hale was in 1834 appointed U.S. district attorney, a position he held until 1841. The following year he won a seat in the U.S. House of Representatives as a Democrat. In the House, Hale came to prominence as a champion of the antislavery forces. In 1846, running as an independent, Hale won a seat in the U.S. Senate. While he maintained his antislavery activity, his major achievement as a senator was the passage of a bill abolishing flogging in the Navy. But it was his prominence in the antislavery movement that led to his receiving the presidential nomination of the Liberty Party in 1847. Hale withdrew his candidacy the following year, when the Free Soil Party absorbed the Liberty Party and ran Martin Van Buren for president. In 1852, however, Hale was the Free Soil candidate and garnered 150,000 votes.

From 1852 to 1855 Hale returned to private law practice. In 1855 he was elected to fill the unexpired term of a deceased New Hampshire senator, and in 1858 he won reelection to a full term in the Senate. By this time he had switched to the new Republican Party and was regarded as one of its leaders.

Shortly before his assassination, Pres. Abraham Lincoln appointed Hale minister to Spain. Hale did not do well as a diplomat, however, and he was recalled in 1869.

Hale, Lucretia Peabody (b. Sept. 2, 1820, Boston—d. June 12, 1900, Belmont, Mass., U.S.), American novelist and writer of books for children.

Her family's financial misfortunes forced Hale to take up writing in the 1850s, and she produced her first novel, *Struggle for Life,* in 1861. From 1868 to 1883 Hale wrote about the bumbling but endearing Peterkin family. These tales were eventually gathered into *The Peterkin Papers* (1880), the first American nonsense classic, and *The Last of the Peterkins, with Others of Their Kin* (1886). The success of these stories arose from Hale's skill in combining a realistic depiction of contemporary Bostonian society with a silliness that charmed youngsters. The cohesive, traditional structure of the Peterkin family also served as a role model in an era of changing values.

Hale, Sir Matthew (b. Nov. 1, 1609, Alderley, Gloucestershire, Eng.—d. Dec. 25, 1676, Alderley), one of the greatest scholars on the history of English common law, well known for his judicial impartiality during England's Civil War (1642–51). He also played a major role in the law-reform proposals of the Convention Parliament and in promoting Charles II's restoration.

Hale was the son of Robert Hale, a barrister. Orphaned at the age of five, he was educated according to Puritan principles under the direction of his guardian, until he enrolled

Sir Matthew Hale, detail of an oil painting after John Michael Wright; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

at Magdalen College, Oxford, in 1626, with the intention of taking holy orders. He soon changed his mind and began to devote most of his time to fencing, gambling, and other diversions; at one time he considered enlisting as a soldier in the service of Frederick Henry, prince of Orange. A consultation with an eminent lawyer on family business so impressed him that he chose the law as his profession. In 1628 he was admitted to Lincoln's Inn, where he studied under the guidance of John Selden, one of the leading jurists and scholars of his age, who extended his studies to include Roman law, English history, mathematics, and natural philosophy. Called to the bar in 1637, he soon had a flourishing practice.

Hale remained aloof from the Long Parliament's opposition in the 1640s to King Charles I and avoided taking sides during the Civil Wars between the king and Parliament. Nevertheless, he defended many Royalists, most notably Archbishop William Laud, who had persecuted Puritan churchmen; and he probably advised Thomas Wentworth, 1st Earl of Strafford, who was impeached by the House of Commons on charges of high treason, and later Charles I during his trial. In spite of his support of the Royalists, in 1649 he took the oath of fidelity to the republican Commonwealth and, later in 1654, was persuaded by his Royalist friends to accept a judgeship from Oliver Cromwell, now lord protector. In 1651 and 1652, he was active in the law-reform movement and contributed much to the work of the committee that advised Parliament on far-reaching improvements in the law and legal system of the time. On Cromwell's death he refused to continue as judge and was returned to Parliament as member for Oxford. He took a prominent part in the proceedings of the Convention Parliament, called after the dissolution of the Long Parliament, and in promoting the restoration of Charles II.

In 1660 Hale was appointed chief baron of the Exchequer, the court principally concerned with matters of crown revenue, and in the same year he was knighted. Between 1666 and 1672 he spent much time on the statutory tribunal that resolved disputes between owners and tenants of property destroyed in the Great Fire of London in 1666. In 1671 he became chief justice of the King's Bench, an office he relinquished in 1676 when his health began to fail.

Hale's work on the Bench—in an age when these attributes were not common even among judges—was characterized by singular personal integrity and impartiality. He acted, moreover, with scrupulous fairness toward prisoners. The one point on which he was criticized by later writers was his belief in witchcraft, and he once permitted the execution of two women accused as witches. Hale was tolerant in religious matters and on numerous occasions mitigated the rigours of the law against dissenters from the Church of England. Throughout his life he retained his Puritan sympathies and numbered among his intimate friends prominent nonconformists. Evenhanded also in his friendships, he maintained ties with Anglican bishops as well.

Lord Chancellor Nottingham (the other outstanding legal figure of Hale's generation) wrote of him that

> as great a lawyer as he was, he would never suffer the strictness of the law to prevail against conscience; as great a chancellor as he was, he would make use of all the niceties and subtleties of law when it tended to support right and equity.

But Hale is principally remembered not as a judge but as a jurist. He was a prodigious searcher of legal records and formed an extensive collection of manuscripts and transcripts. The bulk of this collection is now deposited in the library of Lincoln's Inn. On the basis of these manuscripts and transcripts he wrote numerous books and treatises, though he published little of his own legal work during his lifetime; some of his treatises were printed posthumously, others still remain unpublished. The published work by which he is perhaps best known is his *History of the Pleas of the Crown* (the House of Commons directed in 1680 that it be printed, though it was not published until 1736). This work remains one of the principal authorities on the common law of criminal offenses. But he also wrote widely on topics of constitutional and civil law, as his editorial talent enabled him to analyze and rearrange the jumbled collection of 17th-century and earlier law materials. When Sir William Blackstone wrote his classic *Commentaries on the Laws of England* (1765–69), he found that he could not do better than adopt Hale's "Analysis of the Civil Part of the Law."

Hale's literary talent was enhanced by his considerable critical faculty. He was both a historian and a critic of the law, and his writings take stature from his talents as historian and critic. His place is undoubtedly among the principal figures in the history of English common law. (D.E.C.Y.)

BIBLIOGRAPHY. The principal authority for Hale's life is Gilbert Burnett, *The Life and Death of Sir Matthew Hale* (1682, reprinted 1972). Edmund Hale, *Matthew Hale* (1972), is a modern treatment.

Hale, Nathan (b. June 6, 1755, Coventry, Conn. [U.S.]—d. Sept. 22, 1776, Manhattan Island, N.Y.), American Revolutionary officer who attempted to spy on the British and was hanged.

A graduate of Yale University (1773) and a schoolteacher, Hale joined a Connecticut regiment in 1775, served in the siege of Boston, and was commissioned a captain (1776). He went to New York with William Heath's brigade and is said to have participated in the capture of a provision sloop from under the guns of a British man-of-war. Hale was captured by the British while attempting to return to his regiment, having penetrated the British lines on Long Island to obtain information. He was hanged without trial the next day.

Hale is regarded by American Revolutionary tradition as a hero and a martyr. He is supposed to have said before his death that his only regret was that he had but one life to lose for his country, a remark similar to one in Joseph Addison's play *Cato*.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Hale, Sarah Josepha, *née* BUELL (b. Oct. 24, 1788, Newport, N.H., U.S.—d. April 30, 1879, Philadelphia, Penn.), American writer who, as the first female editor of a magazine, shaped many of the attitudes and thoughts of women of her period.

Hale turned to writing in 1822 as a widow trying to support her family. Within several years she was invited to edit the *Ladies' Magazine* (1828–37). When the magazine was bought by Louis A. Godey in 1837, Hale was retained as editor for the new *Lady's Book,* later called *Godey's Lady's Book,* or *Godey's Magazine and Lady's Book* (1837–77). Hale's sense of tasteful, discreet literature helped the magazine to flourish.

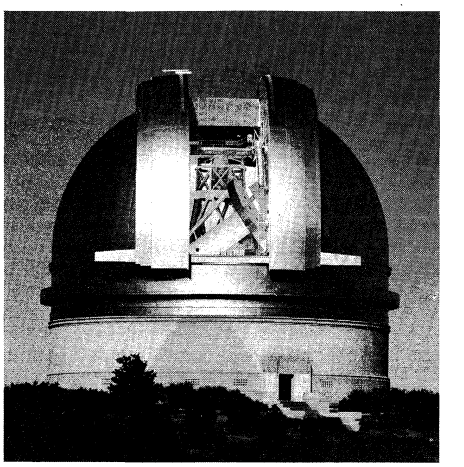
One of Hale's important books is *The Ladies' Wreath* (1837), a collection of poetry by English and American women, which had a wide sale. Her most significant work is *Woman's Record: Or, Sketches of All Distinguished Women from "the Beginning" till A.D. 1850* (1853). The 2,500 entries contain valuable, orderly biographical information.

Hale is also remembered as a proponent of the national Thanksgiving celebration and as the author of the children's verse "Mary Had a Little Lamb" (1830).

Hale Observatories, astronomical research unit that included the Palomar Observatory of the California Institute of Technology and the Mount Wilson Observatory of the Carnegie Institution of Washington, Washington, D.C. Both observatories were established under the guidance of the American astronomer George Ellery Hale.

The Palomar and Wilson observatories were operated jointly by the two institutions as the Hale Observatories from 1948 until 1980, when their administration was separated.

Hale Telescope, in full GEORGE ELLERY HALE TELESCOPE, one of the world's largest and most powerful reflecting telescopes, located at the Palomar Observatory, Mount Palomar, Calif. Having a diameter of 5 m (200 inches), it is second only to the 6-metre (236-inch) reflector of the Special Astrophysical Observatory, Zelenchukskaya, Russian S.F.S.R. Financed by the Rockefeller Foundation, the telescope at Palomar was completed in 1948



Hale reflector dome with shutter open
By courtesy of Palomar Observatory

and named in honour of the noted American astronomer George Ellery Hale, who supervised the designing of the instrument.

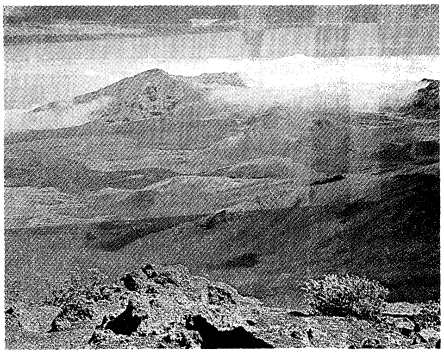
The main mirror of the Hale Telescope measures 5 m across and weighs 14.5 tons. It is made of Pyrex (a borosilicate glass with a lower coefficient of expansion), carefully ground and polished to the correct curvature and coated with aluminum to give a durable, highly reflective surface. The entire movable part of the telescope weighs more than 500 tons, yet it is so smoothly supported and delicately balanced on hydrostatic bearings that a 1/12-horsepower motor can turn it to follow the apparent rotation of the sky. The tube, of open-girder construction, is 18 m (60 feet) long. Near its upper end, at the prime focus of the great mirror, is a capsule-type cage in which an astronomer may ride while observing or exposing photographic plates. Alternatively, secondary mirrors allow the use of other viewing and photographic arrangements.

Hale White, William: *see* Rutherford, Mark.

Haleakala, volcanic mountain, eastern Maui Island, Hawaii, U.S., central feature of Haleakala National Park. The mountain has the world's largest dormant volcanic crater, measuring 20 miles (32 km) in circumference. In several places the rim of the crater rises more than 2,500 feet (760 m) above the crater floor. Haleakala was last active in the mid-18th century.

The name Haleakala (Hawaiian: "House of the Sun") derives from the legend that the demigod Maui imprisoned the sun there in order to lengthen the day. Haleakala's western

slopes, which are crossed by intermittent rain-fed streambeds, rise gently to the Haleakala summit (10,023 feet [3,055 m]). The heavily eroded terrain of the mountain's eastern flank



Haleakala crater, Maui, Hawaii
Ray Atkeson—EB Inc.

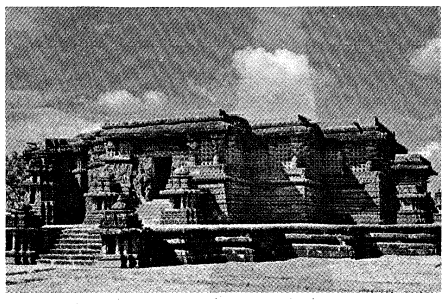
has deep valleys and gorges. From the volcano's rim, lava poured down its flanks to the sea, following the paths of the Keanae and Kaupo valleys.

The crater floor, covering more than 19 square miles (49 square km), has areas of forest, desert, and meadow and a lake. Its northern and eastern portions are used as grazing lands; its southern and western sections, however, are arid and have varicoloured conical cinder deposits up to 1,000 feet (305 m) high that were formed by secondary eruptions. Trade-wind rain clouds drift in over the volcano's low eastern rim, often accumulating in the crater's centre. This phenomenon leaves the high northern rim, Hanakauhi, above the clouds and can produce the unusual spectre (known as Brocken bow) of an observer's greatly magnified shadow thrown on the bank of clouds.

Haleakala National Park was created in 1960. The 28,655-acre (11,597-hectare) park includes the crater, Kipahulu Valley, and the Oheo Pools area on the eastern slope. Feral goats and pigs, petrels, and the rare nene (Hawaiian goose) inhabit the crater. Silverswords, rare yuccalike plants that take as long as 20 years to flower once and then die, grow on the walls within the crater, usually on the barren cinder slopes. Horseback riding and hiking are popular on the 30 miles (50 km) of trails inside the crater.

Located on the crater rim is "Science City," a research-observatory complex for astrophysical studies operated by the U.S. Department of Defense and the universities of Hawaii and Michigan. The Smithsonian Institution, the Air Force, and the Federal Aviation Agency also have facilities there.

Halebīd, historic site and modern village, south-central Karnataka (formerly Mysore) state, southwestern India. It is situated north-northwest of the town of Hassan. It grew up beside a large artificial lake, known as Dō-



Hoysaleśvara temple, Halebīd
Colour Library International, Ltd.

rasamudra (Dvārasamudra), which was probably built by the Rāṣṭrakūṭas in the 9th century. In the early 12th century the Hoysaḷas made it their capital, and for about two centuries it was renowned for its wealth and splendour. It was twice sacked by the Muslims—in 1311 and 1326—and thereafter declined.

The city was surrounded by a great stone wall and moat, the ruins of which survive, but little excavation has been done in the interior. Apart from surviving temples, there are numerous ruins and leveled areas awaiting investigation. The principal temple is the Hoysaleśvara, built *c.* 1121 and decorated with a profusion of sculptures. The Kedāreśvara temple, built about a century later, is of equal excellence. The area also has a number of Jaina monuments and other temples of interest.

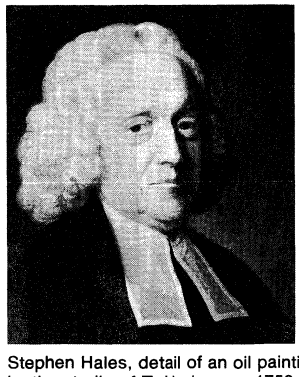
Haleng language: *see* Halăng language.

Halepa, Pact of, also called TREATY OF HALEPA, Halepa also spelled KHALÉPA, convention signed in October 1878 at Khalépa, a suburb of Canea, by which the Turkish sultan Abdülhamid II (ruled 1876–1909) granted a large degree of self-government to Greeks in Crete as a means to quell their insurrection against Turkish overlords. It supplemented previous concessions to the Cretans—*e.g.,* the Organic Law Constitution (1868) and the Cyprus Convention (July 4, 1878), which had been consummated as part of the Treaty of Berlin after the Russian defeat of the Turks in 1878.

Specifically, the Halepa treaty broadened the rights of Christians in Crete by granting them preference for official posts and a majority in the General Assembly. Greek was declared the official language of the assembly and courts, insular revenues were reduced, and provisions for public works were made. The Greek governor-general, Photiádes Pasha, administered the reforms, which marked the apex of liberal Turkish rule.

Insurrections recurred in 1889, causing the sultan to nullify the treaty. He tried to reinstate it in 1896, but to no avail, because the Cretans had by then decided to agitate for union with Greece.

Hales, Stephen (b. Sept. 7/17, 1677, Bekesbourne, Kent, Eng.—d. Jan. 4, 1761, Ted-



Stephen Hales, detail of an oil painting by the studio of T. Hudson, *c.* 1759; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

dington, near London), English botanist, physiologist, and clergyman who pioneered quantitative experimentation in plant and animal physiology.

While a divinity student at Corpus Christi College, Cambridge, he studied science, particularly botany and chemistry. Ordained in 1703, he was appointed in 1709 to the parish of Teddington, where he remained until his death.

Hales introduced new techniques of measurement to the study of plant physiology. One of the best-known of these concerned the measurement of water vapour emitted by plants. He measured this emission, known as transpiration, finding that it was the leaves that transpired and that this process encouraged a continuous upward flow of water and dissolved nutrients from the roots. He determined the direction in which sap flows in plants (it flows upward), and he measured the sap's pressure. He also measured the rates of growth of shoots and leaves and the pressure roots exert on sap, and he investigated plant respiration.

Hales devised several apparatuses which he used to collect the gases that were produced by various chemical reactions; these instruments were forerunners of the pneumatic trough, now used for the same purpose. His research in plant physiology was published in *Vegetable Staticks* (1727) and reappeared in 1733 as volume 1 of his *Statical Essays.* Volume 2, *Hæmastaticks,* was the most important contribution to the physiology of blood circulation since that of William Harvey. Hales was the first to quantitatively measure blood pressure, which he did by inserting a tube into a blood vessel and allowing the blood to rise up the tube. In addition, he measured the capacity of the left ventricle of the heart, the output of the heart per minute, and the speed and resistance to flow of blood in the vessels. As an inventor, he developed an artificial ventilator (a modified organ bellows) that could convey fresh air into prisons, ships' holds, and granaries.

Halévy, Élie (b. Sept. 6, 1870, Étretat, Fr.—d. Aug. 21, 1937, Sucy-en-Brie), French historian, author of the best detailed general account of 19th-century British history, *Histoire du peuple anglais au XIX^e siècle,* 6 vol. (1913–47; *A History of the English People in the Nineteenth Century*). This great work traces the political, economic, and religious developments in Britain after 1815.

Halévy was particularly concerned with the rise of nonconformity, and he sought to show that what was basic to the British conception of liberty was a spirit of voluntary obedience. After completing three volumes dealing with the years 1815–41, he turned to the end of the century in his two-volume *Épilogue,* covering the period 1895–1914. He projected a further three volumes for the period 1841–95 but died before completing them; a volume dealing with the years 1841–52 was later prepared from his notes. The English translation was published as follows: *England in 1815* (1949), *The Liberal Awakening, 1815–1830* (1949), *The Triumph of Reform, 1830–1841* (1950), *Victorian Years, 1841–1895* (1951; a translation of Halévy's posthumous volume augmented by a long essay written by the English historian R.B. McCallum), *Imperialism and the Rise of Labour, 1895–1905* (1951), and *The Rule of Democracy, 1905–1914* (1952).

Halévy, (Jacques-François-) Fromental (-Élie), original name ELIAS LEVY (b. May 27, 1799, Paris—d. March 17, 1862, Nice, Fr.), French composer whose five-act grand opera *La Juive* (1835; "The Jewess") was, with Giacomo Meyerbeer's *Les Huguenots,* the prototype of early French grand opera.

Halévy studied at the Paris Conservatoire from the age of 10 and won the Prix de Rome in 1819 for his cantata *Herminie.* His first opera performed was *L'Artisan* (1827), but it was not until *Le Dilettante d'Avignon* (1829) and the ballet *Manon Lescaut* (1830) were staged that he achieved popular success. In 1835 he wrote *La Juive* with a libretto by Eugène Scribe. This opera held its place in the French operatic repertoire for more than a century, though it now sounds outdated.

Halévy began teaching at the Conservatoire in 1827 and advanced to professor of composition, teaching Charles Gounod, Georges Bizet, and Camille Saint-Saëns. He also became chorus master at the Opéra, a member of the Institute of France, and secretary to

the Académie des Beaux-Arts and was created chevalier of the Legion of Honour. Others of his more significant operas were *Clari* (1828), *L'Éclair* (1835; "The Lightning Flash"), *La Fée aux roses* (1849; "The Rose Fairy"), *La Dame de pique* (1850; "The Spiteful Lady"), and *L'Inconsolable* (1855).

Halévy, Ludovic (b. Jan. 1, 1834, Paris—d. May 8, 1908, Paris), French librettist and novelist who, in collaboration with Henri Meilhac, wrote the librettos for most of the operettas of Jacques Offenbach and who also wrote satirical comedies about contemporary Parisian life.

The son of the writer Léon Halévy and the nephew of the operatic composer Fromental Halévy, Ludovic began writing for the stage while still a member of the French civil service. His first real success was his anonymous collaboration on the libretto for Offenbach's operetta *Orphée aux enfers* (1858). In 1861 he began a literary partnership with Meilhac that lasted 20 years and that would produce a series of gay and witty works that epitomized the spirit and mores of the Second Empire even while making fun of them. Together the two men wrote the librettos for Offenbach's operettas *La Belle Hélène* (1864), *Barbe bleue* (1866), *La Vie Parisienne* (1866), and *La Grande-Duchesse de Gérolstein* (1867), all highly popular works in their day. These works' scripts are characterized by buffoonery, farce, and the light and ironic mockery of society. Halévy and Meilhac also wrote the libretto for Georges Bizet's opera *Carmen* (1875). Among the best of their entertaining drawing-room comedies are *Fanny* (1868) and *Froufrou* (1869).

Halévy himself was also a skilled writer of novels and short stories; the best of his fiction includes *La Famille Cardinal* (1883), a study of lower-class Parisian life during the early years of the Third Republic; and the sentimental novel *L'Abbé Constantin* (1882), which was a huge success with the public. He was elected to the Académie Française in 1884.

Haley, Alex (Palmer) (b. Aug. 11, 1921, Ithaca, N.Y., U.S.), American writer whose works of historical fiction and reportage depicted the struggles of American blacks.

Although his parents were teachers, Haley was an indifferent student. He began writing while serving in the U.S. Coast Guard (1939–59), to avoid boredom during voyages. His first major work, *The Autobiography of Malcolm X* (1965), was an authoritative and widely read narrative based on Haley's interviews with the Black Muslim spokesman. The work is recognized as a classic of black American autobiography.

Haley's greatest success was *Roots: The Saga of an American Family* (1976). This well-researched genealogy—born of the history recited by Haley's maternal grandmother—covers seven American generations, from the enslavement of Haley's African ancestors to his own genealogical quest. The work forcefully shows relationships between generations and between races. *Roots* was adapted as a multi-episode television program, which, when broadcast in 1977, became one of the most popular shows in the history of American television. That same year Haley won a special Pulitzer Prize.

Roots spurred much interest in family trees, and Haley created the Kinte Foundation (1972) to store records that aid in tracing black genealogy.

Haley, Sir William (John) (b. May 24, 1901, Jersey, Channel Islands—d. Sept. 6, 1987, Jersey), director general of the British Broadcasting Corporation (BBC) from 1944 to 1952, editor of *The Times* of London from 1952 to 1966, and editor in chief of the *Encyclopædia Britannica* from 1968 to 1969.

Haley grew up on the island of Jersey and attended Victoria College there. In 1918 he began to study journalism and in 1921 secured his first newspaper employment on *The Times,* being eventually stationed in Brussels. He joined the editorial staff of the Manchester *Evening News* in 1922 and eight years later became director of Manchester Guardian and Evening News, Ltd. He held this post from 1930 to 1939. He was then its joint managing director from 1939 to 1943, during which period he was also a director of the Press Association and of Reuters, Ltd.

In 1943 he joined the BBC as editor in chief and became its director general a year later. There he became especially known for his promotion of the Third Program, the cultural-intellectual station.

In 1952 he became editor of *The Times,* a position that, since the days of John Thadeus Delane (editor from 1841 to 1877), had been considered by far the most important and influential in British journalism. Haley continued as editor until 1966; and, when *The Times* was acquired by R.H. Thomson, Baron Thomson, he was appointed (Jan. 1, 1967) chairman of the newly formed Times Newspapers, Ltd. At *The Times* Haley was largely responsible for modernizing the format; in particular, he removed the classified advertisements from the first page, where they had been traditionally and somewhat eccentrically placed, and used the first page for prominent news, as in other newspapers.

In 1967 he was appointed editor in chief of the *Encyclopædia Britannica* and assumed his duties the following year, becoming involved in some of the early work on the 15th edition. Thereafter he entered semiretirement, serving as Commissioner of Appeal for Income Tax, Jersey, from 1971.

In 1946 he was created a knight commander of St. Michael and St. George and in 1948 a chevalier of the French Legion of Honour.

half-life, in radioactivity, the interval of time required for one-half of the atomic nuclei of a radioactive sample to decay (change spontaneously into other nuclear species by emitting particles and energy), or, equivalently, the time interval required for the number of disintegrations per second of a radioactive material to decrease by one-half.

The radioactive isotope cobalt-60, which is used for radiotherapy, has, for example, a half-life of 5.26 years. Thus after that interval, a sample originally containing 8 g of cobalt-60 would contain only 4 g of cobalt-60 and would emit only half as much radiation. After another interval of 5.26 years, the sample would contain only 2 g of cobalt-60. Neither the volume nor the mass of the original sample visibly decreases, however, because the unstable cobalt-60 nuclei decay into stable nickel-60 nuclei, which remain with the still-undecayed cobalt.

Half-lives are characteristic properties of the various unstable atomic nuclei and the particular way they decay. Alpha and beta decay are generally slower processes than gamma decay. Half-lives for beta decay range upwards from one-hundredth of a second and, for alpha decay, upwards from about one one-millionth of a second. Half-lives for gamma decay may be too short to measure (around 10^{-14} second), though a wide range of half-lives for gamma emission has been reported.

The term half-life also is applied to other temporal phenomena. In pharmacology the half-life of a drug is defined as the time required for elimination from the body of half the amount present at any instant. In chemical kinetics the half-life of a reaction is the time required for it to proceed halfway to completion.

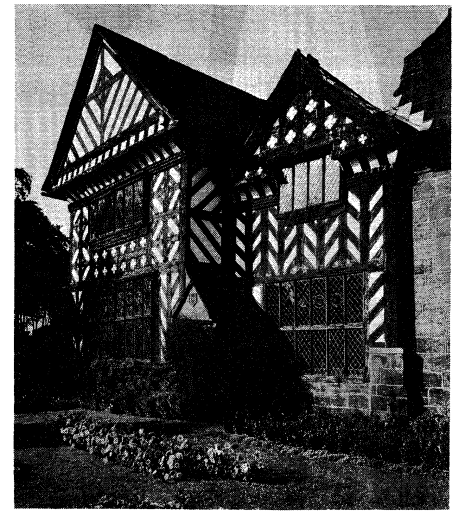
half-timber work, method of building in which external and internal walls are constructed of timber frames and the spaces between the structural members are filled with such materials as brick, plaster, or wattle and daub. Traditionally, a half-timbered building was made of squared oak timbers joined by mortises, tenons, and wooden pegs; the building's cagelike structural skeleton is often strengthened at the corners with braces. This method of timber framing has been adapted to both low, rambling country homes and six- or seven-storied buildings in crowded towns. In the 20th century a modified version of the method was still being used, in which light sills, studs, and joists only 2 inches (5 cm) thick are nailed together to make the house's frame in place of the old pegged girts, beams, and braces. Where only the decorative effect of half-timber work is desired, boards are applied to a wall surface in a sham version of the old structural pattern.

Half-timber work was common in China and, in a refined form, in Japan and was used for domestic architecture throughout northern continental Europe, especially Germany and France, until the 17th century. In England it was popular in regions that lacked stone as a building material. It was used in England in the southern counties and the West Midlands, especially, from *c.* 1450 to *c.* 1650.

Many domestic buildings done in half-timber work have a characteristic second-story overhang. This projection gains a small amount of space on the upper levels. The main advantage, however, is structural: the cantilevers at the ends of the beams partially counterbalance the load carried by their spanning portions.

The wooden frames of 13th- and 14th-century half-timber structures were often elaborately ornamented. Exposed ground-floor posts were frequently carved with the images of patron saints, whereas other framing elements were enriched with delicate running patterns. In France the latter emphasized the vertical elements, and in England the tendency was to stress the horizontal lines of the structure.

During the 15th and 16th centuries, the decorative contrast between the dark timber and the lighter filling was fully exploited. Panels between the studs were made of brick in herringbone patterns or of plaster molded or incised with floral forms or with inlays of slate, tile, or marl. Carved ornament was lavish and fanciful and showed classical motifs. Many wooden members were added without structural necessity. These were often crisscrossed under windows, and in England, where more timber work was exposed, they were assem-



Half-timber work, 15th–16th century, Speke Hall, Merseyside, England

By courtesy of the Liverpool Corporation; photograph, Elsan, Mann, and Cooper

bled in cusped shapes or chevrons to create the striking patterns of the "black and white" manor houses of Cheshire and Lancashire.

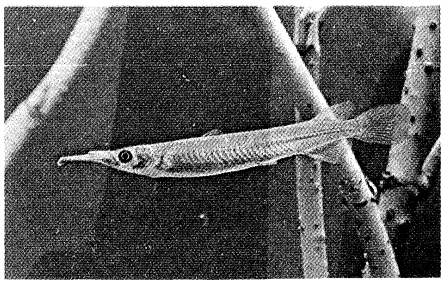
In Germany a bolder and cruder effect was obtained by using fewer elements and emphasizing angle bracing. English inhabitants of the American colonies found it expedient to use an insulating layer of wood siding (clapboards or weatherboarding), and half-timbering was not visible from outside. In the French and German American settlements, however, the buildings were faithful copies of the European models.

Consult the INDEX *first*

Half-Way Covenant, religious-political solution adopted by 17th-century New England Puritans that allowed the children of baptized but unconverted church members to be baptized and thus become church members and have political rights. Early Puritans had become members of the church after they could report an experience of conversion. Their children were baptized as infants, but before these children were admitted to full membership in the church and permitted to partake of the Lord's Supper, they were expected to also give evidence of a conversion experience. Many never reported a conversion experience, but as adults were considered church members because they had been baptized, although they were not admitted to the Lord's Supper. They were only "half-way" in the covenant of the church.

Whether the children of these baptized, but unconverted, church members should be accepted for Baptism became a matter of controversy. In 1657 a ministerial convention suggested that such children should be accepted for Baptism and church membership, and in 1662 a synod of the churches accepted the Half-Way Covenant. This step increased the diminishing minority of church members in the colonies, the only ones accepted as voters and officeholders. This solution continued into the 18th century, when it was again accepted that church membership could only be given to convinced believers.

halfbeak, any of about 70 species of marine and freshwater fishes of the family Exocoetidae (order Atheriniformes), sometimes placed in the family Hemirhamphidae. Halfbeaks are named for their unusual jaws—the



Halfbeak (*Dermogenys*)
Jane Burton—Bruce Coleman Ltd.

upper is short and triangular, and the lower is long, slim, and beaklike. The fish are silvery, slender, and up to about 45 centimetres (18 inches) long. They can skip across the water to escape from danger, and some are able to make short, gliding flights like the related flying fish (*q.v.*). Many halfbeaks are egg layers; the others bear live young.

Halfdan (fl. late 9th century), founder of the Danish kingdom of York (875/876), son of Ragnar Lodbrok, the most famous Viking of the 9th century.

After participating in raids on Anglo-Saxon lands to the south, Halfdan and his followers invaded the mouth of the Tyne (874) and engaged in warfare with both Picts and the Britons of Strathclyde. In 876 he distributed the large region of York among his men and may then have left to join Viking campaigns in northern Ireland; he may be the Danish king "Albann" who was slain near Strangford Lough in 877. By another account he remained in York until 883.

halfmoon (*Medialuna californiensis*), edible Pacific fish of the family Kyphosidae (order Perciformes). Some authorities place it in the family Scorpididae, as distinct from the other Kyphosidae, which are known as sea chubs. Halfmoons are grayish in colour, with darker fins. They normally reach a length of about 30 centimetres (1 foot). They inhabit Pacific coastal areas from Oregon to the Gulf of California and are caught in large numbers by commercial fishermen.

halftone process, in printing, a technique of breaking up an image into a series of dots so as to reproduce the full tone range of a photograph or tone art work. Breaking up is usually done by a screen inserted over the plate being exposed. The screens are made with a varying number of lines per inch, depending on the application; for newspapers, the range is 50 to 85, and for magazines, 100 to 120. The highest quality reproduction requires 120 to 150 lines per inch.

Haliburton, Thomas Chandler (b. Dec. 17, 1796, Windsor, Nova Scotia—d. Aug. 27, 1865, Isleworth, Middlesex, Eng.), Canadian writer best known as the creator of Sam Slick, a resourceful Yankee clock peddler and cracker-barrel philosopher whose encounters with a variety of people illuminated Haliburton's view of human nature.

Haliburton was admitted to the bar in 1820 and, as a member of the Nova Scotia Legisla-

Haliburton, lithograph by M. Gaucci after a portrait by E.U. Eddis
By courtesy of the Public Archives of Canada

tive Assembly (1826–29), led a popular movement for liberal reform. He later reverted to his early Tory convictions and resigned from the Assembly. As a judge of the Supreme Court (1841–54), he maintained the strongly conservative political and social views that inform his writings. In 1856 he moved to England, where he was a member of the House of Commons from 1859 until his death.

The escapades of Sam Slick were first revealed serially in the newspaper *Nova Scotian* (1835) but subsequently published in book form (1836, 1838, 1840) as *The Clockmaker; or, The Sayings and Doings of Samuel Slick of Slickville.* The dialogues between Sam Slick and the squire are satirical attacks on the shiftlessness of the Nova Scotians, mobocracy, and the levelling tendencies of the age. They are enriched by the tremendous vitality of Sam's colloquial speech and by his fund of anecdotes and tall tales. Many of Sam Slick's sayings, such as "This country is going to the dogs" and "barking up the wrong tree," have become commonplace in English idiom. Haliburton shifted his attacks to a variety of other topics in his subsequent works: *The Attaché; or, Sam Slick in England,* 4 vol. (1843–44), *Sam Slick's Wise Saws and Modern Instances; or, What He Said, Did, or Invented* (1853), and *Nature and Human Nature* (1855).

halibut, any of various flatfishes (order Pleuronectiformes), especially the large and valuable Atlantic and Pacific halibuts of the genus *Hippoglossus.* Both, as flatfishes, have the eyes and colour on one side of the body, and both, as members of the family Pleuronectidae, usually have these features on the right side.

Halibut (*Paralichthys*)
Tom Myers

The Atlantic halibut (*H. hippoglossus*) is found on both sides of the North Atlantic. The largest flatfish, it may reach a length of about 2 metres (7 feet) and a weight of 325 kilograms (720 pounds). It is brown, blackish, or deep green on the eyed side and, like most other flatfishes, usually white on the blind side. In some areas, it has become scarce because of overfishing. The Pacific halibut (*H. stenolepis*) is smaller and slimmer than the Atlantic form and is found on both sides of the North Pacific. A greenish-brown fish, it may reach a weight of about 213 kilograms.

Other edible flatfishes known as halibut include the Greenland halibut, also of the family Pleuronectidae, and the California halibut, of the family Bothidae. The Greenland halibut (*Reinhardtius hippoglossoides*) inhabits Arctic and near-Arctic parts of the Atlantic. It grows to about 100 centimetres (40 inches) long and is brownish or blackish but, unlike most other flatfishes, is almost the same colour on both sides. The California halibut (*Paralichthys californicus*) is found along the California coast and is gray brown with a maximum length of about 1.5 metres and weight of 27 kilograms. Other members of its family are normally left-sided, but *P. californicus* may have its eyes and colour on either side.

Halicarnassus, ancient Greek city of Caria, situated on the Gulf of Cerameicus. According to tradition, it was founded by Dorian Troezen in the Peloponnese. Herodotus, a Halicarnassian, relates that in early times the city participated in the Dorian festival of Apollo at Triopion, but its literature and culture appear thoroughly Ionic. The city, with its large sheltered harbour and key position on the sea routes, became the capital of the small despotate, the most famous ruler of which was a woman, Artemisia, who served under Xerxes in the invasion of Greece in 480 BC. Under Mausolus, when it was the capital of Caria (*c.* 370 BC), it received a great wall circuit, public buildings, and a secret dockyard and canal, while its population was swollen by the enforced transference of the neighbouring Lelegians. On the death of Mausolus in 353/352, a monumental tomb, the Mausoleum, considered one of the Seven Wonders of the World, was built by his widow in the city.

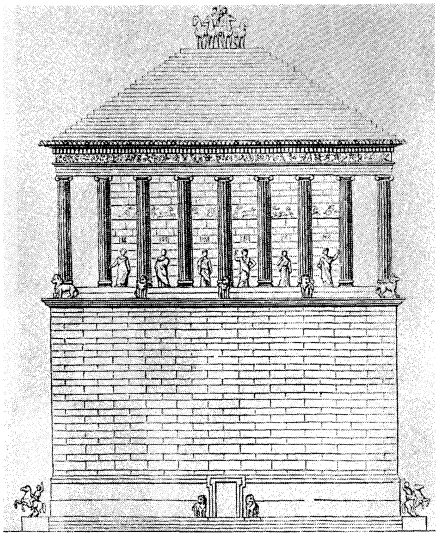
Under Memnon of Rhodes, a commander in Persian service, the city resisted Alexander the Great in 334 BC. It was subject to Antigonus I (311), Lysimachus (after 301), and the Ptolemies (281–197), but thereafter was independent until 129 BC, when it came

under Roman rule. In early Christian times it was a bishopric.

The site, extensively excavated in 1856–57 (by C.T. Newton) and 1865 (by A. Biliotti), retains much of its great wall, remnants of the gymnasium, a late colonnade, a temple platform, and rock-cut tombs. The ancient remains are somewhat overshadowed by the spectacular pile of the castle of the Knights of St. John, founded *c.* AD 1400. The site is occupied by the modern town of Bodrum, Tur.

Halicarnassus, Mausoleum of, one of the Seven Wonders of the World. The monument was the tomb of Mausolus, the tyrant of Caria in southwestern Asia Minor, and was built between *c.* 353 and *c.* 351 BC by Mausolus' sister and widow, Artemisia. The architect was Pythius (or Pytheos), and the sculptures were the work of four leading Greek artists: Scopas, Bryaxis, Leochares, and Timotheus.

According to the description of the Roman author Pliny the Elder (AD 23–79), the monument was almost square, with a total periphery of 411 feet (125 m). It was bounded by



Reconstruction drawing of the Mausoleum of Halicarnassus, constructed *c.* 353–*c.* 351 BC, destroyed between the 11th and the 15th century AD
Historical Pictures Service, Chicago

36 columns, and the top formed a 24-step pyramid surmounted by a four-horse marble chariot. Fragments preserved in the British Museum include a frieze of battling Greeks and Amazons and a statue 10 feet (3 m) long, probably of Mausolus. The mausoleum was probably destroyed by an earthquake between the 11th and the 15th century AD, and the stones were reused in local buildings.

Halid Ziya Ushakligil (Turkish author): *see* Uşaklıgil, Halid Ziya.

Halide Edib Adıvar (Turkish novelist): *see* Edib Adıvar, Halide.

halide mineral, any of a group of naturally occurring inorganic compounds that are salts of the halogen acids (*e.g.*, hydrochloric acid). Such compounds, with the notable exceptions of halite (rock salt), sylvite, and fluorite, are rare and of very local occurrence.

Compositionally and structurally, three broad categories of halide minerals are recognized; these categories, also distinguishable in modes of occurrence, include the simple halides, the halide complexes, and the oxyhydroxy-halides.

The simple halides are salts of the alkali, alkaline earth, and transition metals. Most are soluble in water; the transition metal halides are unstable under exposure to air. Halite, sodium chloride (NaCl), is the most familiar example; it often occurs with other evaporite minerals in enormous beds resulting from the accumulation of brines and trapped oceanic water in impermeable basins and their evaporation. Minor amounts of sylvite, potassium chloride (KCl), also are present in such beds.

Fluorite, or calcium fluoride (CaF_2), another simple halide, is found in limestones that have been permeated by aqueous solutions containing the fluoride anion. Noteworthy deposits of fluorite occur in Mexico; Cumberland, Eng.; and Illinois, Missouri, Kentucky, and Colorado in the United States.

Other simple halides such as sal-ammoniac, ammonium chloride (NH_4Cl); lawrencite, ferrous chloride ($FeCl_2$); and molysite, ferric chloride ($FeCl_3$) occur in fumarolic vents and are highly unstable in air. A few hydrothermal vein minerals in silver deposits, such as chlorargyrite and calomel, serve as minor and occasional ores of silver and mercury, respectively. A few double salts (*e.g.*, carnallite and tachyhydrite) included among the simple halides have formed under conditions similar to the formation of halite.

In the halide complexes, halide anions are tightly bound to a cation, usually aluminum; the resulting unit behaves as a single negative ion. The most common examples are the fluoroaluminates cryolite, cryolithionite, thomsenolite, and weberite. Enormous quantities of cryolite formerly were mined at Ivigtut, Greenland, to be used for flux in the recovery of aluminum from bauxite.

Most oxyhydroxy-halides are rare and highly insoluble compounds. Many have formed by the action of halide-bearing waters upon the oxidation products of previously existing sulfides; atacamite, matlockite, nadorite, and diaboleite are examples. A few compounds such as a fiedlerite, laurionite, and penfieldite have formed through the action of sea water upon ancient lead slags from the historic deposits at Laurium, Greece.

For a table of halide minerals, *see* page 636.

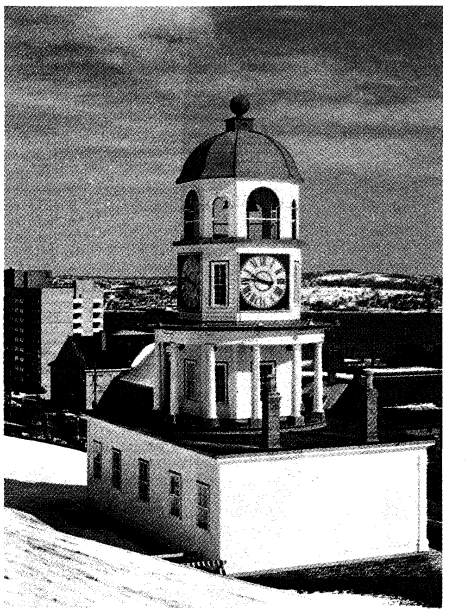
Halidon Hill, Battle of, (July 19, 1333), major engagement in Scotland's protracted struggle for political independence from England. The battle ended in a complete rout of Scottish forces attempting to relieve Berwick-upon-Tweed, which was besieged by the English under Edward III. Edward was acting on behalf of his vassal Edward de Balliol, who had revolted against the Scottish king David II.

Berwick's defenders agreed to capitulate unless relieved by July 20, 1333. At Halidon Hill, Edward blocked the approach of a relief force under Sir Archibald Douglas, regent for David II. Edward's three dismounted divisions, each protected with wings of archers, riddled the Scots with arrows as they approached across swampy ground and then uphill. Those who reached the English lines were soon overcome. The next day Berwick surrendered.

Halifax, city, capital of Nova Scotia, Canada, and seat (1759) of Halifax County, on Halifax Harbour, an inlet of the Atlantic Ocean, in the central part of the outer (south) shore of the province. It occupies a rocky peninsula, 4.5 miles (7.2 km) long and 2 miles (3.2 km) wide, that protrudes into the inlet, dividing the harbour into an inner (Bedford) and outer basin.

First visited by Samuel de Champlain about 1605, the site was occupied in the early 18th century by a French fishing station. Permanent British settlement did not begin until 1749, when Edward Cornwallis founded and fortified the town as a counterbalance to Louisbourg, the French stronghold in Cape Breton, naming it after the 2nd earl of Halifax (George Montagu Dunk), president of the Board of Trade and Plantations. Halifax continually served as an imperial army and navy base, one of the most heavily fortified outside Europe, until its dockyard and defenses were taken over by the Canadian government in 1906. Although never besieged, the city suffered from a disastrous munitions ship explosion in 1917 that killed nearly 2,000 people and devastated much of the city's north side. During World Wars I and II, Halifax was Canada's largest and most important naval base.

The city is Nova Scotia's leading commercial and industrial centre. Its ice-free harbour, one of the busiest in Canada, exports fish, lumber, and agricultural products. Halifax is



The Old Town Clock on Citadel Hill, Halifax, Nova Scotia
John de Visser

an Atlantic terminus of two major railways; it is linked to other parts of the province by freeway and to Dartmouth, on the opposite side of the harbour, by ferry and the Angus L. Macdonald and A. Murray MacKay suspension bridges. An international airport is 20 miles (32 km) northeast of the city. Industries include foundries, oil refining, shipbuilding, fish processing, and the manufacture of automobiles, food products, rope and twine, paint and varnish, clothing, and furniture.

As the largest city in the Maritime Provinces, Halifax is also an important cultural centre. Its educational institutions include Dalhousie University (founded 1818); University of King's College (Anglican, 1789); St. Mary's University (Roman Catholic, 1841); Mount St. Vincent University for women (Roman Catholic, 1925); and Nova Scotia Technical College (1909). Its Nova Scotia Museum has historical, geographical, and marine exhibits. Historic buildings include St. Paul's Church (built 1750), the oldest Protestant church in Canada; the Old Dutch Church (1756), Canada's first Lutheran church; Government House (1800–05), official residence of the lieutenant governor; Province House (completed 1818), Canada's oldest parliament building and a notable example of Georgian architecture; Memorial Tower, commemorating the first Canadian elective assembly in 1758; and Historic Properties, a restoration of 19th-century waterfront buildings. The city's military past is reflected in the Citadel (a hilltop fortress, built 1828–50 on the site of earlier fortifications and now within a national historic park), and Martello Tower and the York Redoubt (restored 18th-century fortifications guarding the sea approaches). Inc. 1842. Pop. (1981) city, 114,594; (1985 est.) metropolitan area, 290,600.

Halifax, locality, Calderdale district, county of West Yorkshire, England. An old market

Halide minerals

name formula	colour	lustre	Mohs hardness	specific gravity	habit or form	fracture or cleavage	refractive indices	crystal system space group	remarks
atacamite $Cu_2(OH)_3Cl$	various bright-green shades; dark emerald-green to blackish	adamantine	3–3½	3.8	brittle, transparent to translucent tabular to slender prismatic crystals	one perfect cleavage	$\alpha = 1.831$ $\beta = 1.861$ $\gamma = 1.880$	orthorhombic Pmcn	
calomel Hg_2Cl_2	colourless, white, grayish, yellowish, brown	adamantine	1½	7.15	tabular crystals; drusy crusts; earthy masses	one good cleavage	$\omega = 1.956–1.991$ $\varepsilon = 2.601–2.713$	tetragonal $I\frac{4}{m}mm$	sweet taste; plastic, sectile
carnallite $KMgCl_3 \cdot 6H_2O$	milk-white; sometimes reddish (from included hematite)	greasy, dull to shining	2½	1.6	granular, massive	conchoidal fracture	$\alpha = 1.465–1.466$ $\beta = 1.474–1.455$ $\gamma = 1.444–1.446$	orthorhombic Pnna	deliquesces atmospheric moisture; bitter taste
cerargyrite AgCl	colourless when pure and fresh; usually gray; becomes purple or violet-brown on exposure to light (cerargyrite)	hornlike	2½	5.6 (AgCl) to 6.5 (AgBr)	crusts; waxy coatings; hornlike masses	uneven to subconchoidal fracture	cerar bromyr $n = 2.071–2.253$	isometric Fm3m	forms complete solid solution series with bromyrite in which bromine replaces chlorine; sectile and ductile
cryolite Na_3AlF_6	colourless to white, brownish, reddish, brick red	vitreous to greasy	2½	3.0	coarsely granular masses	no cleavage	$\alpha = 1.338$ $\beta = 1.338$ $\gamma = 1.339$	monoclinic $P\frac{2_1}{n}$	weakly thermoluminescent
fluorite CaF_2	variable	vitreous	4	3.2	brittle, transparent or translucent cubes and two-cube penetration twins	perfect octahedral cleavage	$n = 1.432–1.437$	isometric Fm3m	strongly fluorescent (the word fluorescent being derived from fluorite's behaviour); electrical nonconductor; variety chlorophane emits a strong green light on being heated
halite NaCl	colourless when pure, often splotched blue or purple	vitreous	2	2.2	transparent cubic (often cavernous or stepped) crystals; granular masses	perfect cubic cleavage	$n = 1.544$	isometric Fm3m	salty taste, highly soluble in H_2O; transparent to heat waves; paramagnetic; its structure was the first to be studied by X-rays
sal ammoniac NH_4Cl	colourless, white, grayish, yellow	vitreous	1–2	1.5	skeletal aggregates	conchoidal fracture	$n = 1.639$	isometric Pm3m	salty taste; very soluble in H_2O
sylvite KCl	colourless, white, grayish, bluish, or red (from included hematite)	vitreous	2	2.0	transparent cubes or granular masses	perfect cubic cleavage	$n = 1.490$	isometric Fm3m	bitter salty taste; highly soluble in H_2O; transparent to heat waves

town for grain, wool, and cloth trades of a large parish, it lost its preeminence to Bradford in the 19th century.

Halifax lies in a hilly district on the Hebble, a tributary of the Calder that forms the southern boundary. Beacon Hill, rising sharply to 850 feet (260 m), overlooks the town. Road and railway bridges span the valley. The main part of the town is situated on the slope of a long declivity facing east on the right bank of the stream. After World War II extensive suburban development took place on the northern side of the town.

In Saxon times Halifax formed part of the extensive manor of Wakefield held by King Edward the Confessor. After the Norman Conquest the manor of Halifax (Feslei in Domesday Book) was granted to William, earl of Warenne and Surrey, who made a gift of Yorkshire churches, including Halifax, to the Cluniac priory at Lewes in Sussex. The church was dedicated to St. John the Baptist, patron saint of wool weavers. The cloth trade has been plied in Halifax from an early date—the first record of a weaver being in 1275. In the account books for 1473–75 Halifax parish had the largest cloth production in the West Riding (*i.e.*, West Yorkshire), a position it retained for three centuries.

Built largely in the 19th century, modern Halifax is a development of the industrial era, though some older buildings remain. The parish church is in the Perpendicular style, and two earlier churches are traceable—the first of Norman origin and the second of the Early English period. Features of the church are the western tower completed in 1482, unique commonwealth windows of plain glass with beautifully designed leading, and some fine woodwork. Among the public buildings are the town hall in the Palladian style, designed by Sir Charles Barry, opened in 1863; and the central library and Bankfield museum, both of which are housed in Victorian mansions.

Halifax, an industrial town, is a centre of the woolen and worsted industries, other textile products being cotton, silk, and synthetics. The manufacture of carpets is important, and other industries include iron and steel, wire drawing, brewing, and confectionery. Halifax specializes in the production of machine tools. There are literary and artistic associations with Sir Thomas Browne, Daniel Defoe, Laurence Sterne, and the Brontës. Pop. (1981) urban area subdivision, 77,354.

Halifax, town, seat of Halifax County, northeastern North Carolina, U.S., on the Roanoke River. Settled *c.* 1723, it was made a colonial borough in 1760 and named for George Montague, 2nd earl of Halifax. It thrived as a river port and between 1776 and 1791 was an important political and social centre and a site of the Provincial Assembly. It was there that the "Halifax Resolves," the first formal sanction of American independence, were adopted, April 12, 1776. Political activity declined after 1783, when the Assembly moved to Hillsborough. Constitution House, where tradition holds that the state constitution was drafted, and other colonial structures have been restored. The town was designated a state historic site in 1965. Pop. (1982 est.) 240.

Halifax, MARQUESSES, EARLS, AND VISCOUNTS OF, titled British nobility of several creations, notably in the families Savile, Montagu, and Wood, grouped below chronologically and indicated by the symbol •.

• Halifax, George Savile, 1st marquess of, also called (1644–68) SIR GEORGE SAV-

George Savile, 1st marquess of Halifax, detail of an oil painting attributed to Mary Beale; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

ILE, 4TH BARONET, or (1668) VISCOUNT HALIFAX, BARON SAVILE OF ELAND (b. Nov. 11, 1633, Thornhill, Yorkshire, Eng.—d. April 5, 1695, London), English statesman and political writer known as "The Trimmer" because of his moderating position in the fierce party struggles of his day. Although his conciliatory approach frequently made him a detached critic rather than a dynamic politician, the principles he espoused have appealed to many 20th-century political thinkers.

Savile sat in the Convention Parliament that restored King Charles II to the throne in 1660, and in 1668 he became Viscount Halifax. Admitted to the Privy Council in 1672, he opposed Charles's covert pro-French and pro-Roman Catholic policies. Nevertheless, he balanced this opposition by fighting the anti-Catholic Test Act of 1673. In 1676 Halifax was dismissed from the Council for repeatedly showing hostility to the King's chief minister, Thomas Osborne, earl of Danby; he regained his seat, however, in 1679 and in the same year was created marquess of Halifax. Adhering to his principles of moderation, he successfully led the fight in the House of Lords (Nov. 15, 1680) against a bill that would have excluded Charles's Roman Catholic brother James, duke of York, from succession to the throne. In October 1682 he became lord privy seal. But upon the accession of the Duke of York as James II in February 1685, Halifax was demoted to lord president of the council, from which office he was summarily dismissed on October 21. He spent the next three years writing political pamphlets. His *Character of King Charles the Second* was written during this period, and *The Character of a Trimmer,* a statement of his political creed, was published in 1688.

When James's enemy William of Orange invaded England in November 1688, Halifax tried, at the behest of James, to arrange a compromise between the two men. After he failed, he sided with William. It was largely as a result of his efforts that the Convention Parliament of 1689 accepted William and Mary as joint sovereigns of England. In the new regime, Halifax was lord privy seal and chief minister of the crown until his enemies in both the Whig and Tory parties forced him to resign in February 1690. H.C. Foxcroft's biography of Halifax, *A Character of the Trimmer,* was published in 1946.

• Halifax, Charles Montagu, 1st earl of, VISCOUNT SUNBURY, also called (1700–14) BARON HALIFAX OF HALIFAX (b. April 16, 1661, Horton, Northamptonshire, Eng.—d. May 19, 1715, London), Whig statesman, a financial genius who created several of the key elements of England's system of public finance.

Charles Montagu, 1st earl of Halifax, oil painting by Sir Godfrey Kneller; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

He was elected to Parliament in 1689 and appointed a lord of the Treasury three years later. By devising a system of guaranteed government loans, Montagu financed British participation in the War of the Grand Alliance with France (1689–97) and initiated the national debt. With another set of loans he established the Bank of England in 1694. Shortly thereafter he became chancellor of the Exchequer and a member of the small group of Whig leaders known as the Junto. Elected to Parliament in 1695, he at once pushed through a controversial scheme of national recoinage. In 1697 he became first lord of the Treasury and leader of the House of Commons. He resigned under pressure from a Tory-dominated Parliament in 1699, and in 1700 he was made Baron Halifax. When George I assumed the crown in 1714, Montagu was appointed first lord of the Treasury and created an earl, but he died (without issue) after only seven months in office.

Halifax was a minor poet and a literary patron; with Matthew Prior he wrote *The Country Mouse and the City Mouse* (1687), a witty parody of *The Hind and the Panther* by Dryden.

• Halifax, George Montagu Dunk, 2nd earl of (b. Oct. 5/6, 1716—d. June 8, 1771), English statesman, after whom the city of Halifax, Nova Scotia, is named.

He was the son of George Montagu, 1st earl of Montagu, to whose title he succeeded in 1739. He assumed the name of his wealthy wife, Anne Dunk, whom he married in 1741.

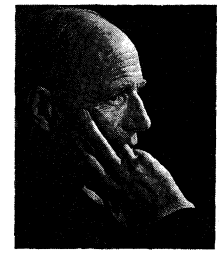
He became president of the Board of Trade in 1748 and took an active interest in colonial development, helping to found Halifax, N.S., and in several ways rendering good service to trade, especially with North America. He was lord lieutenant of Ireland from March 1761 to March 1763 and for a time concurrently first lord of the Admiralty, from June to October 1762, in Lord Bute's administration; he then became secretary of state for the northern department, transferring to the southern department in 1763. Halifax was lord privy seal during 1770 in the ministry of his nephew, Lord North, and was again secretary of state for the northern department during 1771 from January until his death in June.

• Halifax, Edward Frederick Lindley Wood, 1st earl of, also called (1925–34) BARON IRWIN, or (1934–44) VISCOUNT HALIFAX (b. April 16, 1881, Powderham Castle, Devonshire, Eng.—d. Dec. 23, 1959, Garroby Hall, near York, Yorkshire), British viceroy of India (1925–31), foreign secretary (1938–40), and ambassador to the United States (1941–46).

The fourth son of the 2nd Viscount Halifax, a well-known churchman and a leader of the Anglo-Catholic movement in Yorkshire, Wood was born with an atrophied left arm that had no hand. He was educated at Eton and Christ Church, Oxford, being elected a fellow of All Souls College, Oxford, in 1903.

Wood entered Parliament as Conservative member for Ripon, Yorkshire, in January 1910, and for the next 30 years had a most successful career in politics. During World War I he served for a time with the Yorkshire dragoons in France and was assistant secretary to the ministry of national service from 1917 to 1918. After the war he was successively undersecretary of state for the colonies (1921–22), president of the Board of Education (1922–24), and minister of agriculture (1924–25).

In 1925 he was appointed viceroy of India and raised to the peerage as Baron Irwin. His term of office in India (1925–29) coincided with a period of intense nationalist ferment among Hindus and Muslims alike, but his own deep concern with religious faith (like his father, he was a devout high churchman) enabled him to work on terms of understanding



Edward Frederick Lindley Wood, 1st earl of Halifax, photograph by Yousuf Karsh

© Karsh

with Gandhi, the most powerful figure among Indian nationalists at that time. Halifax accelerated the processes of constitutional advance by using his great influence to that end both during his viceroyalty and after.

On his return from India he again became president of the Board of Education (1932–35). He succeeded to his father's viscountcy in 1934. Thereafter he was lord privy seal (1935–37), leader of the House of Lords (1935–38), and lord president of the council (1937–38), before being appointed foreign secretary on Feb. 25, 1938, on Anthony Eden's resignation from Neville Chamberlain's government. His tenure of the foreign office was the most controversial period of his career, for by accepting this appointment he identified himself with Chamberlain's policy of "appeasement" toward Adolf Hitler. As lord privy seal he had visited Hitler and Hermann Göring in November 1937, and he accompanied Chamberlain on a visit to Benito Mussolini in Rome in January 1939.

Halifax had been close to Chamberlain long before becoming foreign secretary, and when Chamberlain resigned in May 1940 he hoped Halifax would succeed him as prime minister. In fact, the issue was decided otherwise at a meeting between Chamberlain, Halifax, and Churchill. Halifax remained foreign secretary for the first seven months of Churchill's ministry, but in December 1940 he was named British ambassador to the United States.

In that post he gave great service to the Allied cause during World War II, in recognition of which he was created earl of Halifax in 1944. Named British delegate to the San Francisco Conference in March 1945, he attended the first sessions of the United Nations. His resignation as ambassador became effective on May 1, 1946. In 1957 he published a volume of recollections, *Fullness of Days.*

Halil, Patrona, Halil also spelled KHALIL (d. 1730), Turkish bath waiter, who, after a Turkish defeat by Persia, led a mob uprising (1730) that replaced the Ottoman sultan Ahmed III (ruled 1703–30) with Mahmud I (ruled 1730–54). This was the only Turkish rising not originating in the army. Patrona Halil was assassinated soon after.

Halim Paşa, Said (b. 1863, Cairo—d. Dec. 6, 1921, Rome), Ottoman statesman who served as grand vizier (chief minister) from 1913 to 1916.

The grandson of Muḥammad ʿAlī Pasha, a famous viceroy of Egypt, Said was educated in Turkey and later in Switzerland. In 1888 he was appointed a member of the state judicial council. In 1911 he became the foreign minister in Mahmud Şevket's Cabinet. After Mahmud Şevket's death Said was made grand

vizier. Although he signed the treaty of alliance with Germany in 1914, he was known to oppose Ottoman participation in World War I. He was ready to resign at the outset of war, but he remained at his post at the insistence of the ruling Committee of Union and Progress. In 1916, however, he did resign, and then he became a member of the Senate. After the armistice signed at Mudros (Oct. 30, 1918), he was banished to Malta by British authorities. On his release he went to Rome, where he was assassinated by an Armenian.

A prolific essayist, Said Paşa wrote on constitutional monarchy, bigotry, the crises in Islām, and the social, political, and intellectual problems of the Ottoman Empire.

Hālisahar, formerly KUMARHATA, town, southeastern West Bengal state, northeastern India, just east of the Hooghly River. Hālisahar is a noted home of Sanskrit scholars, or pandits. It was constituted a municipality in 1903 when separated from Naihāti municipality and includes Kānchrāpāra town. A part of the Calcutta urban agglomeration, it is a major paper-milling centre. Pop. (1981) 95,579.

halite, naturally occurring sodium chloride (NaCl), common or rock salt. Halite occurs on all continents in beds that range from a few metres to more than 300 m (1,000 feet) in thickness. Termed evaporite deposits because they formed by the evaporation of saline water in partially enclosed basins, they characteristically are associated with beds of limestone, dolomite, and shale. Halite also occurs as a sublimation product in volcanic regions, an efflorescence in arid regions, and an evaporation product near salt springs. Deformation of halite beds sometimes results in the extrusion of plugs of salt through overlying sediment, as in salt domes and diapirs. Halite is found in large deposits in the southeastern Soviet Union; Dax, Fr.; Punjab, India; Ontario, Canada; and western and central New York, U.S. For detailed physical properties, *see* halide mineral (table). *See also* sodium chloride.

Consult the INDEX *first*

halitza, also spelled ḤALITZAH (Hebrew: "drawing off"), Jewish ritual whereby a widow is freed from the biblical obligation of marrying her brother-in-law (levirate marriage) in cases where her husband died without issue. To enable a widow to marry a "stranger," the ritual of *ḥalitza* had to be performed in the prescribed manner. The widow was to approach her brother-in-law "in the presence of the elders, and pull his sandal off his foot, and spit in his face; and she shall answer and say, 'So shall it be done to the man who does not build up his brother's house' " (Deuteronomy 25:9). As the words and actions indicate, the man was meant to be disgraced. Removal of the shoe apparently expressed the man's intention not to take possession of his "property," for normally one took possession of real property by walking on the land.

Long before the Common Era, the rabbis had come to prefer *ḥalitza* to levirate marriage and to recommend it as the only proper course to follow. When the deceased's brother was already married it avoided problems of polygamy, and it took notice of the prohibition in the Law of Moses regarding relations with a brother's wife (Leviticus 18:16).

Today *ḥalitza* is a requirement of law in the State of Israel, and, where the conditions for a levirate marriage exist, no Orthodox rabbi will perform a marriage until the *ḥalitza* ceremony has been completed. Because Reform Jews dismiss the notion of levirate marriages as outdated, they disregard *ḥalitza* altogether.

Hall (Austria): *see* Solbad Hall.

Hall, Asaph (b. Oct. 15, 1829, Goshen, Conn., U.S.—d. Nov. 22, 1907, Annapolis, Md.), American astronomer who discovered the two moons of Mars, Deimos and Phobos, in 1877 and calculated their orbits.

Hall came from an impoverished family and was largely self-taught, though he did study briefly at Central College, McGrawville, N.Y., and at the University of Michigan. By 1858 he had acquired a minor position at the Harvard University observatory, where he did research and wrote papers. In 1863 he was appointed professor of mathematics at the U.S. Naval Observatory, in Washington, D.C., a position he held until his retirement in 1891. There he was chiefly concerned with planetary astronomy, the orbits of double stars, and determinations of stellar parallax. From 1896 to 1901 he was professor of astronomy at Harvard.

Hall, Basil (b. Dec. 31, 1788, Dunglass, Haddingtonshire, Scot.—d. Sept. 11, 1844, Gosport, Hampshire, Eng.), British naval officer and traveler remembered for noteworthy accounts of his visits to the Orient, Latin America, and the United States.

The son of geologist Sir James Hall, the younger Hall joined the navy in 1802. In 1815 he commanded the escort ship that accompanied William Pitt Amherst (Earl Amherst),

Basil Hall, detail from an engraving
BBC Hulton Picture Library

the English ambassador to China, who was to present himself to the emperor at Peking. Hall published a description of his explorations conducted in the course of his mission, *Account of a Voyage of Discovery to the West Coast of Corea, and the Great Loo-Choo Island* (1818). He put to sea for service in South America (1820) and described his experiences in *Extracts from a Journal Written on the Coasts of Chili, Peru and Mexico, in the Years 1820, 1821, 1822*, 2 vol. (1824). After leaving the navy he went to the United States, and upon returning to England he published a work attacked by the American press, *Travels in North America in the Years 1827 and 1828*, 3 vol. (1829). From 1842 until his death he was confined as a mental patient in Haslar Naval Hospital, Gosport.

Hall, Carl Christian (b. Feb. 25, 1812, Copenhagen, Den.—d. Aug. 14, 1888, Copenhagen), Danish politician whose policies led Denmark into a disastrous war with Germany.

Hall was educated in the law, and in 1848 he became a leader of the National Liberal Party. He served as minister of public worship in 1854–57. He supported his party's old Eider policy favouring the incorporation of the duchy of Schleswig into the Danish state. As prime minister, from 1857 (and also as foreign minister from 1858) he tried to draw Schleswig closer to Denmark, despite Prussian objections. Hall pushed through the November constitution of 1863, which incorporated Schleswig into Denmark and which soon led to war with the German states. He declined participation in a new government led by his fellow National Liberal Ditlev Gothard Monrad, which was formed in December 1863.

Carl Christian Hall, detail of an oil painting by J.V. Gertner, 1864; in Frederiksborg Castle, Denmark
By courtesy of the Nationalhistoriske Museum paa Frederiksborg

The war proved disastrous for Denmark in the next year, and Hall urged and won acceptance of humiliating peace terms, which separated Schleswig and Holstein from the Danish monarchy and ceded them to Prussia and Austria.

Hall again was minister of public worship in 1870–74, and he was elected speaker of the Conservative Party in the lower house of parliament in 1879.

Hall, Charles Francis (b. 1821, Rochester, N.H., U.S.—d. Nov. 8, 1871, Thank God Harbor, Greenland), American explorer who made three Arctic expeditions.

Hall spent his early life in Ohio, where he held such various jobs as those of blacksmith, journalist, stationer, and engraver, before taking an interest in exploration. In 1860 he landed alone from a whaleboat at Frobisher Bay on the southern end of Baffin Island (now in the Northwest Territories, Canada) and spent two years exploring in the bay area, which the English navigator Martin Frobisher had reached in 1578. Hall's purpose was to locate survivors from Sir John Franklin's expedition of 1845, but, though he did not succeed in this endeavour, he did find many remains from Frobisher's expedition. After returning home (1862), he wrote *Arctic Researches, and Life among the Esquimaux* (1865).

In 1864 Hall returned again to search for survivors from Franklin's voyage. From the north end of Hudson Bay, he began five years and 3,000 miles (4,830 km) of journeying by sledge, in the course of which he learned much about the fate of Franklin's expedition and found a number of relics of the party.

His final venture was to command a U.S. government-sponsored expedition attempting to reach the North Pole. On June 29, 1871, he sailed from New York City aboard the naval steamer *Polaris*. Hall passed through the Kennedy and Robeson channels, which separate northwestern Greenland from the northeastern Canadian Arctic, charted both coasts, and reached 82°11′ N, then the northernmost limit of exploration by a ship. The *Polaris* turned southward and anchored off Greenland at 81°37′ N. From a land base, Hall sledged to 83° N but died suddenly on the return trip.

Hall, Charles Martin (b. Dec. 6, 1863, Thompson, Ohio, U.S.—d. Dec. 27, 1914, Daytona Beach, Fla.), American chemist who discovered the electrolytic method of producing aluminum, thus bringing the metal into wide commercial use.

While a student at Oberlin (Ohio) College Hall became interested in producing aluminum inexpensively. He continued to use the college laboratory after his graduation in 1885, discovering his method eight months later. Paul-Louis-Toussaint Héroult of France

independently discovered the identical process at about the same time.

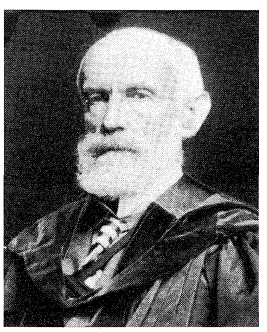
After several failures to interest financial backers, Hall obtained the support of the Mellon family, and the Pittsburgh Reduction Company (later the Aluminum Company of America) was formed. In 1890 he became its vice president. By 1914 his process had brought the cost of aluminum down to 18 cents a pound. Hall was a generous benefactor of his college, bequeathing Oberlin more than $5,000,000.

Hall, Chester Moor (b. Dec. 9, 1703, Leigh, Essex, Eng.—d. March 17, 1771, Sutton, Surrey), English jurist and mathematician who invented the achromatic lens, which he utilized in building the first refracting telescope free from chromatic aberration (colour distortion).

Convinced from study of the human eye that achromatic lenses were feasible, Hall experimented with different kinds of glass until he found (1729) a combination of crown glass and flint glass that met his requirements. In 1733 he built several telescopes with apertures of 2.5 inches (6.5 cm) and focal lengths of 20 inches (50 cm).

John Dollond of London received the Copley Medal of the Royal Society in 1758 for the invention, but his right was contested by yet another inventor in 1766. It was Hall, however, who was established as the originator of the achromatic lens, although he was largely indifferent to priority claims.

Hall, G(ranville) Stanley (b. Feb. 1, 1844, Ashfield, Mass., U.S.—d. April 24, 1924, Worcester, Mass.), psychologist who gave early impetus and direction to the development of psychology in the United States. Frequently regarded as the founder of child psychology and educational psychology, he also did much to direct into the psychological currents of his time the ideas of Charles Darwin, Sigmund Freud, and others.



G. Stanley Hall

By courtesy of Clark University, Worcester, Mass.

Originally intending to enter the ministry, Hall left Union Theological Seminary, New York City, after a year (1867–68) to study philosophy in Germany (1868–71). He became a lecturer at Antioch College in Ohio in 1872. His decision to adopt psychology as his life's work was inspired by a partial reading of *Physiological Psychology* (1873–74), by Wilhelm Wundt, generally considered the founder of experimental psychology. He resigned his post at Antioch in 1876 and returned to Germany for further study, becoming acquainted there with Wundt and the German physicist and physiologist Hermann von Helmholtz. There Hall discovered the value of the questionnaire for psychological research. Later he and his students would devise more than 190 questionnaires, which were largely instrumental in stimulating the upsurge of interest in the study of child development.

Upon his return to the United States, Hall in 1878 earned from Harvard the first Ph.D. degree in psychology granted in America. He then gave special lectures on education at Harvard, and he utilized questionnaires from a study of the Boston schools to write two significant papers; one dealt with children's lies (1882) and the other with the contents of children's minds (1883).

A lectureship in philosophy (1883) and a professorship in psychology and pedagogics (1884) at Johns Hopkins University, Baltimore, followed. There he was given space for one of the first psychological laboratories in the United States. The philosopher-psychologist-educator John Dewey was one of the first to use it. In 1887 Hall founded the *American Journal of Psychology,* the first such American journal and the second of any significance outside Germany.

Hall was entering the most influential period of his life. The following year (1888), he helped to establish Clark University, Worcester, and, as the university's president and professor of psychology, he became a major force in shaping experimental psychology into a science. A great teacher, he inspired research that reached into all areas of psychology. By 1893 he had awarded 11 of the 14 doctorates in psychology granted in the United States. The first journal in the fields of child and educational psychology, the *Pedagogical Seminary,* later the *Journal of Genetic Psychology,* was founded by Hall in 1893.

Hall's theory that mental growth proceeds by evolutionary stages is best expressed in one of his largest and most important works, *Adolescence* (1904). Despite opposition, Hall, as an early exponent of psychoanalysis, invited Sigmund Freud and Carl Jung to the conferences celebrating Clark University's 20th anniversary (1909). A leading spirit in the founding of the American Psychological Association, he was its first president (1892). He published 489 works covering most of the major areas of psychology, including *Senescence, the Last Half of Life* (1922) and *Jesus, the Christ, in the Light of Psychology* (1917). *Life and Confessions of a Psychologist* (1923) was his autobiography.

BIBLIOGRAPHY. Lorine Pruette's *G. Stanley Hall* appeared in 1926.

Hall, James (b. Aug. 19, 1793, Philadelphia—d. July 5, 1868, Cincinnati, Ohio, U.S.), one of the earliest U.S. authors to write of the American frontier.

Hall was a soldier in the War of 1812, a lawyer and circuit judge, a newspaper and magazine editor, state treasurer of Illinois (1827–31), a banker in Cincinnati, Ohio, and a writer of history and fiction. In 1828 he compiled the first western literary annual, the *Western Souvenir,* and he edited the *Illinois Monthly Magazine* (1830–32), which he continued at Cincinnati until 1836 as the *Western Monthly Magazine.* He consistently encouraged western contributors. Hall wrote an interesting travel book, *Letters from the West* (1828); one novel, *The Harpe's Head* (1833); a readable survey of western exploration, *The Romance of Western History* (1857); and several volumes of short stories. Such tales as "Pete Featherton" and "A Legend of Carondelet," which found a place in many anthologies, early established Hall as a short-story writer of distinction. He was particularly successful in sketching life in the French settlements of the Illinois country and in interpreting such authentic figures as the backwoodsman, voyageur, and Indian hater. His best stories appear in *Legends of the West* (1832) and *Tales of the Border* (1835).

Hall, James (b. Sept. 12, 1811, Hingham, Mass., U.S.—d. Aug. 7, 1898, Bethlehem, N.H.), American geologist and paleontologist who contributed to the geosynclinal theory of mountain building. According to this theory, sediment buildup in a shallow basin causes the basin to sink, thus forcing the neighbouring area to rise.

Even as a student, Hall spent his summers and limited finances doing fieldwork, including the collection and identification of more than 900 species of plants. He became an assistant professor at Rensselaer Polytechnic Institute, Rensselaer, N.Y., in 1832 and later professor of chemistry, natural science, and geology. While at Rensselaer he made extensive explorations in the St. Lawrence Valley.

In 1836 he was appointed state geologist for the Geological Survey of New York. Assigned to the western district, he conducted studies that culminated in his massive report *Geology of New York* (part 4, 1843), a classic in American geology. Although he could not explain the uplifting of the sediment beds that formed the Appalachians, his observations were instrumental in forming the geosynclinal theory.

Hall became director of the Museum of Natural History, Albany, N.Y., in 1871. His 13-volume *The Palaeontology of New York* (1847–94) contained the results of his exhaustive studies of the Silurian and Devonian (345 million to 430 million years old) fossils found in New York.

He was state geologist of Iowa from 1855 to 1858 and of Wisconsin from 1857 to 1860. His publications included more than 260 scientific papers and 35 books dealing with numerous phases of the geology and paleontology of the United States and Canada. He was a charter member of the National Academy of Sciences.

Hall, Sir James, 4TH BARONET (b. Jan. 17, 1761, Dunglass, East Lothian, Scot.—d. June 23, 1832, Edinburgh), Scottish geologist and physicist who founded experimental geology by artificially producing various rock types in the laboratory.

Hall succeeded to his father's baronetcy in 1776 and thereafter studied at Christ's College, Cambridge, and the University of Edinburgh. He later became president of the Royal Society of Edinburgh.

For many years he rejected the belief of his friend, the noted Scottish geologist James Hutton, that many rocks have an igneous origin, but eventually he came to believe that Hutton's views might be subject to experimental testing. By melting minerals and cooling them at a controlled rate, Hall found that he could obtain different kinds of rocks. Later, he found that by heating calcium carbonate under pressure he could produce a rock closely resembling natural marble. He experimented extensively with igneous rocks from Scotland and showed that they were produced by intense heat.

Hall, Sir John (b. Dec. 18, 1824, Hull, Yorkshire, Eng.—d. June 25, 1907, Christchurch, N.Z.), farmer, public official, and politician who as prime minister of New Zealand (1879–82) skillfully formed and maintained a government in a period of change and instability.

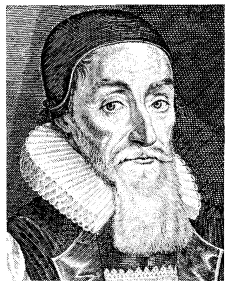
As a young civil servant in London, Hall decided to emigrate to New Zealand (1852). He bought land in Canterbury, was elected to the provincial council (1853), and continued to use his administrative skills in local and national public offices, including that of the first mayor of Christchurch (1863). Elected to Parliament (1855), Hall served twice as colonial secretary (1856, 1872–73) and as postmaster general (1866–69). Asked to form a ministry with a very small majority, Hall took the cabinet posts of colonial secretary, post and telegraph, and customs in addition to the premiership, and, by refusing to interrupt government business, he avoided a want-of-confidence vote until he had negotiated four more members over to his side. He inherited several bills from previous governments to adopt and pass, including the act granting voting rights, without property restrictions, to all men. He also reluctantly ordered the arrest of a prominent Maori leader when negotiation failed.

Knighted in 1882, Hall continued to sit in

the House from 1887, and his last public act was to successfully pilot the bill granting women's suffrage (1893) through the House.

Hall, Joseph (b. July 1, 1574, Ashby-de-la-Zouch, Leicestershire, Eng.—d. Sept. 8, 1656, Higham, Norfolk), English bishop, moral philosopher, and satirist, remarkable for his literary versatility and innovations.

Hall's *Virgidemiarum: Six Books* (1597–1602; "A Harvest of Blows") was the first English satire successfully modeled on Latin satire, and its couplets anticipated the satiric heroic couplets of John Dryden in the late 17th century. Hall was also the first writer in English to emulate Theophrastus, an ancient Greek philosopher who wrote a book of characters, with *Characters of Vertues and Vices* (1608). As a moral philosopher he achieved a European reputation for his Christianization of Stoicism.



Joseph Hall, detail of an engraving by John Payne, 1628

By courtesy of the Master and Fellows of Emmanuel College, University of Cambridge

Educated under Puritan influences at the Ashby School and the University of Cambridge (from 1589), he was elected to the university lectureship in rhetoric. He became rector of Hawstead, Suffolk, in 1601 and concentrated chiefly on writing books for the money "to buy books." *Mundus Alter et Idem* (*c.* 1605; "The World Different and the Same"), an original and entertaining Latin satire that influenced Jonathan Swift's *Gulliver's Travels* (1726), dates from this period, as does *Heaven upon Earth* (1606), a book of moral philosophy. Hall later became domestic chaplain to Prince Henry (James I's eldest son). He was made dean of Worcester in 1616 and accompanied King James to Scotland in 1617. He was a royal representative at the Synod of Dort (1618–19), an assembly of the Reformed Church of the Netherlands, and became bishop of Exeter in 1627. Suspected of Puritan leanings by William Laud, archbishop of Canterbury, he counterattacked Puritans on episcopacy's behalf.

Hall took part in the literary campaign between Anglicans and Puritans at the opening (1642) of the English Civil War. John Milton, poet and Puritan, wrote *Animadversions* against a *Defence* of Hall's, but amid the ensuing exchange of invective Hall pleaded for unity and tolerance among Christians. In 1641 Hall was given the bishopric of Norwich but was imprisoned for four months by an anti-episcopalian House of Commons before arriving at his new see. Deprived of his episcopal revenues in 1643, he was finally ejected from his palace and retired to Higham.

Hall, Joyce C(lyde) (b. Dec. 29, 1891, David City, Neb., U.S.—d. Oct. 29, 1982, Leawood, Kan.), American businessman, cofounder and chief executive (1910–66) of Hallmark Cards, Inc., the largest greeting-card manufacturer in the world.

Using $3,500 that he had earned during high school, Hall established a wholesale greeting-card business in Kansas City, Mo., in 1910. Hall's brother Rollie (d. 1968) later joined him, and the two began printing their own cards in 1916. A third brother, William (d. 1971), joined the firm in 1921. In many respects the Halls helped create the modern greeting-card industry, pioneering the sale of the inexpensive card-plus-envelope to replace the postcards and elaborate Valentines common prior to World War I. Other innovations by the Hall Brothers Co. (the "Hallmark" brand name, introduced in 1923, did not become part of the company's name until 1954) included eye-catching display stands and radio and television advertising. The firm had achieved a national reputation by the 1920s, although it experienced its greatest growth after World War II.

The Hallmark company sponsored the much-praised "Hallmark Hall of Fame" television program for many years and established the Hallmark Gallery in New York City in 1963. Although Hall retired from active business in 1966, he remained chairman of the board until his death.

Hall, Marshall (b. Feb. 18, 1790, Basford, Nottinghamshire, Eng.—d. Aug. 11, 1857, Brighton, East Sussex), English physiologist who was the first to advance a scientific explanation of reflex action.

While maintaining a highly successful private medical practice in London (1826–53), Hall conducted physiological research that gained him renown on the European continent and derision from established medical organizations in England. He denounced the practice of bloodletting in *Observations on Blood-Letting* (1830). In his *Experimental Essay on the Circulation of the Blood* (1831), he was the first to show that the capillaries bring the blood into contact with the tissues.

Hall's discovery that a headless newt moves when its skin is pricked led to a series of experiments that he summarized in his paper entitled "On the Functions of the Medulla Oblongata and Medulla Spinalis, and on the Excito-motory System of Nerves" (1837). This research served as the basis for his theory of reflex action, which stated that the spinal cord consists of a chain of units and that each of these units functions as an independent reflex arc; that the function of each arc arises from the activity of sensory and motor nerves and the segment of the spinal cord from which these nerves originate; and that the arcs are interconnected, interacting with one another and the brain to produce coordinated movement.

The Royal Society refused to publish the paper and several others on the subject, denouncing the theory as absurd. Yet the acclaim Hall's work received on the European continent led to studies that demonstrated the validity of his ideas. He also introduced (1855) a method of artificial respiration that was widely applied in cases of drowning.

Marshall Hall, detail of an engraving by J. Holl, 1839, after a portrait by J.Z. Bell

Reproduced by courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Hall, Sir Peter (Reginald Frederick) (b. Nov. 22, 1930, Bury Saint Edmonds, Suffolk, Eng.), English theatrical manager and director who held notably successful tenures as director of the Royal Shakespeare Company and the National Theatre.

Hall produced and acted in amateur productions at the University of Cambridge before receiving his M.A. degree there in 1953. He staged his first professional production in 1953 at the Theatre Royal, Windsor, and subsequently served as assistant director and then director at the Arts Theatre, London (1954–56), where he staged the London premieres of Samuel Beckett's *Waiting for Godot* and Jean Anouilh's *The Waltz of the Toreadors,* as well as the first play by Eugene Ionesco to be performed in England, *The Lesson.* He went on to direct plays at various theatres in London and New York City, and in 1960 he became managing director of the Royal Shakespeare Company. In 1960 he oversaw the opening of the company's Aldwych Theatre in London, where his productions included the London premiere of Anouilh's *Becket* (1962) and the opening of Harold Pinter's *The Homecoming* (1965). He resigned as managing director of the company in 1968 but continued to direct plays for it.

Hall succeeded Sir Laurence Olivier as managing director of the National Theatre in 1973, and three years later he guided the company's move from the Old Vic theatre to its new home on London's South Bank. Among the many plays he directed for the National Theatre were the premieres of Pinter's *No Man's Land* (1975) and Peter Shaffer's *Amadeus* (1979). After leaving the directorship of the National Theatre in 1988, Hall formed his own theatrical production company.

Hall directed more than 80 professional stage productions and was especially renowned for his productions of Shakespeare. He was also a longtime operatic director in Britain and the United States, and he directed several motion pictures, including *The Homecoming* (1973). He was knighted in 1977.

Hall, Radclyffe, byname of MARGUERITE RADCLYFFE-HALL (b. Aug. 12, 1880, Bournemouth, Hampshire, Eng.—d. Oct. 7, 1943, London), English writer whose novel *The Well of Loneliness* created a scandal and was banned for a time in Britain for its treatment of lesbianism.

Hall was educated at King's College, London, and then attended school in Germany. She was a lifelong lesbian. She began her literary career by writing verses, which were later collected into four volumes of poetry. *The Blind Ploughman,* one of her best-known poems, was set to music by Conigsby Clarke. By 1924 she had written her first two novels, *The Forge* and *The Unlit Lamp.* The latter book was her first to treat homosexual love. Two years later Hall's *Adam's Breed* (1926), a sensitive novel about the life of a restaurant keeper, won for her the coveted Prix Fémina and the 1927 James Tait Black Memorial Prize for fiction. But it was *The Well of Loneliness* (1928) that was destined to become her best-known book. In it she explored in detail the attachment between a young girl and an older woman. The intense and earnest love story was condemned by the British, and a London magistrate, Sir Chartres Biron, ruled that although the book was dignified and restrained, it presented an appeal to "decent people" to not only recognize lesbianism but also understand that the person so afflicted was not at fault. He judged the book an "obscene libel" and ordered all copies of it destroyed. Later, a decree handed down in a U.S. court disagreed with Biron. In finding the book not obscene, the American judge said that discussion of homosexuality was not in itself obscene. The British ban on

The Well of Loneliness was eventually overturned on appeal after Hall's death.

Although Radclyffe Hall was vindicated by the American verdict, she did not write any other controversial novels. Among her major works are *Twixt Earth and Stars: Poems* (1906), *Songs of Three Counties and Other Poems* (1913), *The Master of the House* (1932), and *The Sixth Beatitude* (1936). A novel on which she was working in her declining years was destroyed, at her request, after her death.

Hall, Robert (b. May 2, 1764, Arnesby, near Leicester, Leicestershire, Eng.—d. 1831), English Baptist minister, writer, social reformer, and an outstanding preacher.

In 1790 Hall became pastor of a church at Cambridge, where he remained for 15 years and acquired a reputation for his fine, often outspoken sermons. He advocated freedom of the press, was influenced by the French Revolution to speak against corrupt government, and in 1791 defended the reformer and scientist Joseph Priestley in his criticism of institutional Christianity.

Hall, Samuel (b. 1781, Basford, Nottinghamshire, Eng.—d. Nov. 21, 1863, London), English engineer and inventor of the surface condenser for steam boilers.

The son of a cotton manufacturer, in 1817 Hall devised a method for removing loose fibres from lace by passing the fabric swiftly through a row of gas flames. His process was widely adopted and earned him a fortune, much of which he lost on other inventions.

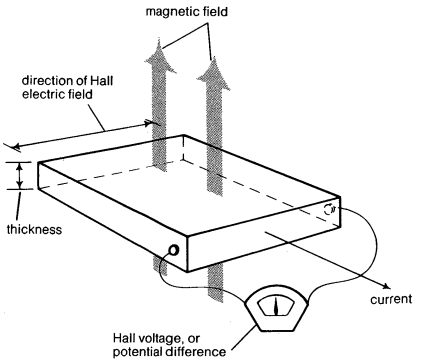
In subsequent years Hall attempted to find a means by which steamships could charge their boilers with fresh water at the beginning of their voyage and use it over and over again, so as to avoid the use of corrosive salt water. In 1838 he patented a surface condenser in which the steam passed through a number of small condensing tubes cooled on the outside. Although his invention received extensive trials in 1839–41, it proved unsuccessful. The principle of the tubular condenser survived, however, and is now used mostly in cooling devices. Hall held more than 20 patents, mostly for devices relating to steam engines and boilers.

hall church, German HALLENKIRCHE, or DREISCHIFFIGE KIRCHE, church in which the aisles are approximately equal in height to the nave. The interior is typically lit by large aisle windows, instead of a clerestory, and has an open and spacious feeling, as of a columned hall. Hall churches are characteristic of the German Gothic period. There are a few examples from as early as the 11th century, but the mature works date from the 14th century, from such builders as Heinrich Parler and Hans Stethaimer.

Hall churches originated in Westphalia and the north of Germany. They spread to the east, where an early example is the Frankfurt Blackfriars (*c.* 1240), and to southern Germany where many important examples are found. In Austria the form appears in the hall chancels of abbeys such as Lilienfeld (1230) and Heiligenkreuz (1295).

Special features of German hall churches include lofty nave arcades and immense roofs, covering both the nave and the aisles. They generally have a single western tower, or apse, instead of the elaborate western portal characteristic of French Gothic cathedrals. St. Elizabeth, Marburg (*c.* 1257–83), is an archetypal hall church. The form has been revived from time to time. A significant modern example is Auguste Perret's church of Notre-Dame (1922–23), at Le Raincy, Fr., one of the first buildings and the first church to display the expressive structural possibilities of reinforced concrete.

Hall effect, development of a transverse electric field in a solid material when it carries an electric current and is placed in a magnetic field that is perpendicular to the current. This phenomenon was discovered in 1879 by the U.S. physicist Edwin Herbert Hall. The electric field, or Hall field, is a result of the force that the magnetic field exerts on the moving positive or negative particles that constitute the electric current. Whether the current is a movement of positive particles, negative particles in the opposite direction, or a mixture of the two, a perpendicular magnetic field displaces the moving electric charges in the same



Hall effect

direction sideways at right angles to both the magnetic field and the direction of current flow. The accumulation of charge on one side of the conductor leaves the other side oppositely charged and produces a difference of potential. An appropriate meter may detect this difference as a positive or negative voltage. The sign of this Hall voltage determines whether positive or negative charges are carrying the current.

In metals, the Hall voltages are generally negative, indicating that the electric current is composed of moving negative charges, or electrons. The Hall voltage is positive, however, for a few metals such as beryllium, zinc, and cadmium, indicating that these metals conduct electric currents by the movement of positively charged carriers called holes. In semiconductors, in which the current consists of a movement of positive holes in one direction and electrons in the opposite direction, the sign of the Hall voltage shows which type of charge carrier predominates. The Hall effect can be used also to measure the density of current carriers, their freedom of movement, or mobility, as well as to detect the presence of a current on a magnetic field.

The Hall voltage that develops across a conductor is directly proportional to the current, to the magnetic field, and to the nature of the particular conducting material itself; the Hall voltage is inversely proportional to the thickness of the material in the direction of the magnetic field. Because various materials have different Hall coefficients, they develop different Hall voltages under the same conditions of size, electric current, and magnetic field. Hall coefficients may be determined experimentally and may vary with temperature.

Hall-Jones, Sir William (b. Jan. 16, 1851, Folkestone, Kent, Eng.—d. June 19, 1936, Wellington, N.Z.), politician and respected administrator who served for a short time as prime minister of New Zealand (1906) and who later was appointed High Commissioner for New Zealand in the United Kingdom.

A carpenter by trade, Hall-Jones emigrated to New Zealand (1873) and, enfranchised by the 1879 electoral reform, served in local government. Elected to Parliament (1890), he was at first aligned with the newly-formed Liberal Party, but after a policy disagreement he sat as an Independent (1893–96). The Liberal prime minister Richard Seddon asked Hall-Jones to join his cabinet (1896) and later to serve as acting prime minister while Seddon visited Australia. Seddon died while at sea and Hall-Jones remained in office only seven weeks (June 21 to Aug. 6, 1906). He became High Commissioner (1908), was knighted (1910), and served on the Legislative Council (1913) until his death.

Ḥallāj, al-, in full ABŪ AL-MUGHĪTH AL-ḤUSAYN IBN MANṢŪR AL-ḤALLĀJ (b. *c.* 858, Ṭūr, Iran—d. March 26, 922, Baghdad), controversial writer and teacher of Islāmic mysticism (Ṣūfism). Because he represented in his person and works the experiences, causes, and aspirations of many Muslims, arousing admiration in some and repression on the part of others, the drama of his life and death has been considered a reference point in Islāmic history.

Al-Ḥallāj was born in the southern Iranian community of Ṭūr in the province of Fars. According to tradition, his grandfather was a Zoroastrian and a descendant of Abū Ayyūb, a companion of Muḥammad. At an early age al-Ḥallāj went to live in the city of Wāsiṭ, an important Iraqi centre for textiles, trade, and Arab culture. His father had become a Muslim and may have supported the family by carding wool.

Al-Ḥallāj was attracted to an ascetic way of life at an early age. Not satisfied with merely having learned the Qur'ān (the Islāmic scripture) by heart, he was motivated to understand its deeper and inner meanings. During his adolescence (*c.* 874–894), at a time when Islāmic mysticism was in its formative period, he began to withdraw from the world and to seek the company of individuals who were able to instruct him in the Ṣūfī way. His teachers, Sahl at-Tustarī, 'Amr ibn 'Uthmān al-Makkī, and Abū al-Qāsim al-Junayd, were highly respected among the masters of Ṣūfism. Studying first under Sahl at-Tustarī, who lived a quiet and solitary life in the city of Tustar in Khuzistan, al-Ḥallāj later became a disciple of al-Markkī of Basra. During this period he married the daughter of the Ṣūfī Abū Ya'qūb al-Aqṭa'. He concluded his instruction in the mystical way under al-Junayd of Baghdad, a brilliant intellect, under whom al-Makkī had likewise studied.

During the next period of his life (*c.* 895–910), al-Ḥallāj undertook extensive travels, preaching, teaching, and writing. He made a pilgrimage to Mecca, where he followed a strict discipline for a year. Returning to such regions as Fars, Khuzistan, and Khorāsān, he preached and wrote about the way to an intimate relationship with God. In the course of his journeys he attracted many disciples, some of whom accompanied him on a second pilgrimage to Mecca. Afterward, he returned to his family in Baghdad and then set out by sea for a mission to a territory hitherto not penetrated by Islām—India and Turkistan. Following a third pilgrimage to Mecca, he again returned to Baghdad (*c.* 908).

The milieu in which al-Ḥallāj preached and wrote was filled with social, economic, political, and religious tensions—all factors that contributed to his later arrest. His thought and activity had been provocative and had been interpreted in various ways, some of which left him highly suspect in the eyes of civil and religious authorities. The Ṣūfī movement, in general, had aroused considerable opposition, and its thought and practice had yet to be coordinated with developments in jurisprudence, theology, and philosophy.

Al-Ḥallāj's propensity for travel and his willingness to share the profundity of his mystical experiences with all who would listen were considered breaches of discipline by his Ṣūfī masters. His travel for missionary purposes was suggestive of the subversive activity of the Qarmaṭians, a 9th-century movement with Ismā'īlī affiliations that was founded by Ḥam-

dān Qarmaṭ in Iraq, whose acts of terrorism and whose missionaries were undermining the authority of the central government. Through his wife's family, he was suspected of having connections with the destructive Zanj rebellion in southern Mesopotamia that was carried out by oppressed Negro slaves inspired and led by outside dissidents. The alleged involvement of al-Ḥallāj in an attempt at political and moral reform upon his return to Baghdad was an immediate factor in his arrest, and it did nothing to improve his image in the eyes of the political leaders.

Al-Ḥallāj has been identified as an "intoxicated" Ṣūfī in contradistinction to a "sober" one. The former are those who, in the moment of ecstasy, are so overcome by the presence of the divine that awareness of personal identity is lost and who experience a merging with ultimate reality. In that exalted state, the Ṣūfī is given to using extravagant language. Not long before his arrest al-Ḥallāj is said to have uttered the statement, "Anā al-ḥaqq" ("I am the Truth"—*i.e.,* God), which provided cause for the accusation that he had claimed to be divine. Such a statement was highly inappropriate in the view of most Muslims. Furthermore, this was the kind of theosophical (divine wisdom) idea that was associated with the Qarmaṭians and the supporters of the Zanj slaves. There was no consensus about al-Ḥallāj, however. The long, drawn-out trial proceedings were marked by indecision.

After his arrest in Sūs and a lengthy period of confinement (*c.* 911–922) in Baghdad, al-Ḥallāj was eventually crucified and brutally tortured to death. A large crowd witnessed his execution. He is remembered to have endured gruesome torture calmly and courageously and to have uttered words of forgiveness for his accusers. In a sense, the Islāmic community (*ummah*) had put itself on trial, for al-Ḥallāj left behind revered writings and supporters who courageously affirmed his teachings and his experience. In subsequent Islāmic history, therefore, the life and thought of al-Ḥallāj has been a subject seldom ignored. (J.W.F.)

BIBLIOGRAPHY. Louis Massignon, *Passion d'al-Ḥallāj,* 2 vol. (1922; *The Passion of al-Ḥallāj,* 3 vol., 1974), the definitive work on al-Ḥallāj but not strictly a biography; *Encyclopaedia of Islam,* vol. 3 (1971), contains a comprehensive survey of the life, thought, and times of al-Ḥallāj.

Hallam, Arthur Henry (b. Feb. 1, 1811, London—d. Sept. 15, 1833, Vienna), English essayist and poet who died before his considerable talent developed, remembered principally as the friend of Tennyson commemorated in Tennyson's elegy *In Memoriam.*

Hallam met Tennyson at Trinity College, Cambridge (1828), where they joined other artistically and politically progressive students in the club called The Apostles. Hallam defended Tennyson's early work, *Poems, Chiefly Lyrical* (1830), in a review for the *Englishman's Magazine* and was engaged to Tennyson's sister Emily (1832). Hallam's prizewinning essays and critically acclaimed poems were collected and printed posthumously by his father, the historian Henry Hallam, in *Remains, in Verse and Prose, of Arthur Henry Hallam* (1834).

Hallam FAMILY, family of Anglo-American actors and theatrical managers associated with the beginning of professional theatre in what is now the United States.

Lewis Hallam (1714–56) was the founder of the family. With his family and a company of 10, Hallam left his native England and arrived in the British North American colonies in 1752. Their first production of Shakespeare's *Merchant of Venice,* presented September 15 in Williamsburg, Va., was the first appearance of a professional acting company in the colonies. In 1753 they built the first theatre in New York City, where they met opposition by many of the local residents who thought actors and plays were "instruments of the devil." The company later toured the colonies and also performed in Jamaica, where Hallam died.

His widow, Sarah, married David Douglass, manager of another company in the West Indies, and in 1758 that company returned to New York City with Douglass as manager. By 1763 they were known as the America Company. Under Douglass' management they opened several theatres and on April 24, 1767, in Philadelphia, presented the first professional production of an American play, *The Prince of Parthia* by Thomas Godfrey. Hallam's daughter Isabella (1746–1826), who acted under the name of Mrs. Mattocks, was a well-known actress in England. Hallam's son, Lewis Hallam the Younger (1740–1808), was the company's leading man for a number of years. After his mother died (1774) and his stepfather retired to Jamaica, the younger Hallam succeeded to management of the family company. For the next 25 years he managed and acted with various companies throughout the U.S. Though an accomplished actor, he was known as a quarrelsome and financially inept manager.

Halland, *län* (county) of southern Sweden, coextensive with the traditional *landskap* (province) of Halland. Its land area of 2,106 sq mi (5,454 sq km), extending no more than 30 mi (48 km) inland, is a low, undulating region of heaths and ridges that rise above gently sloping sandy beaches. The coastline is smooth with few anchorages. Four rivers—Viskan, Ätran, Nissan, and Lagan, famous for their salmon and long harnessed for hydroelectricity—cross the *län.* Originally part of Denmark, it was ceded to Sweden in 1645 after having been conquered by Charles X.

Rye, oats, and sugar beets are grown, and there are brick, tile, and engineering works. Halmstad (*q.v.*), the capital, and many other principal cities of the *län* are of medieval origin. Pop. (1984 est.) 236,319.

Hallandale, city, Broward County, southeastern Florida, U.S., on the Atlantic coast, just north of Miami. Settled by Scandinavian farmers in the 1890s, it was named for Luther Halland, a trading post operator. Growth of the community was crippled by hurricanes in 1906, 1910, and 1926. A construction program, begun in 1960, has resulted in a tourism-based economy. Hallandale's Gulfstream Park, with its garden of champions (displaying plaques honouring great thoroughbred horses), is the home of the annual Florida Derby (March). Inc. town, 1927; city, 1950. Pop. (1980) 36,517.

Halldór (Gudjónsson Kiljan) Laxness (Icelandic novelist): *see* Laxness, Halldór (Gudjónsson Kiljan).

Halle, until 1990 a *Bezirk* (district) of southwestern and central East Germany, created in 1952 from the southern part of the former Saxony-Anhalt state and small portions of Thuringia. Drained by the Unstrut, Saale, Mulde, and Elbe rivers, it had an area of 3,386 sq mi (8,771 sq km). Most of the *Bezirk* occupied the fertile Saxon lowland, merging west and northwest with the foreland and foothills of the Unter Harz (Lower Harz) Mountains and extending south to Sächsisches Bergland (Saxon Upland) and northeast to the Dübener and Fläming Heide (heathland). Wheat, alfalfa, and sugar beets are grown in the area, and cattle raising is extensive. Rock salt and potash deposits are mined in the west and north and lignite (brown coal) in the southeast. These raw materials helped to stimulate rapid industrial growth after the mid-19th century. The principal industries were metallurgy and the manufacture of chemicals and plastics. The chief towns after Halle (the former capital) were Dessau, Wittenberg, Merseburg, Leuna, Köthen, Zeitz, and Quedlinburg (*qq.v.*). Pop. (1989 est.) 1,777,746.

Halle, in full HALLE AN DER SAALE, city, Saxony-Anhalt *Land* (state), east-central Germany, on the right bank of the Saale River, just northwest of Leipzig. The first evidence of occupation of Halle comes from artifacts of the Upper Paleolithic period. The Neolithic is represented by painted pottery (*c.* 4000 BC). Salt deposits in a nearby valley were mined and sold at the Halle market. The salt trade of the Bronze Age is well attested. At the end of the Bronze Age (*c.* 1000 BC), *Brikettage,* clay molds used for making salt bricks, were developed, a distinctive feature of the Hallesche Kultur (Halle Culture). Around 400 BC the Halle Culture came to an end, to be succeeded by the later Jasdorf Kultur (Jasdorf Culture), which lasted until the Roman period. First mentioned in 806 as a fortress, Halle and its valuable saltworks were granted to the newly founded archbishopric of Magdeburg in 968. Halle was chartered by the Holy Roman emperor Otto II in 981. From the first there were separate jurisdictions between the *Halloren* ("saltworkers") and the German settlers in the town, leading to internecine strife throughout the Middle Ages. Both groups resisted the archbishops, and the town maintained its liberty as a member of the Hanseatic League from 1281 until 1478. In 1478 the internal feud between the democratic guilds and the patrician owners of the saltpans led a demagogue member of the town council to open the gates to the soldiers of the archbishop. The archbishop built the fortress of Moritzburg to hold the subdued townsmen in check. Despite the efforts of the archbishops, Halle accepted the Reformation in 1522. The city passed to Brandenburg in 1648. From 1945 to 1952 and again from 1990 it was the capital of Saxony-Anhalt *Land.* From 1952 to 1990 it was the capital of Halle *Bezirk* (district), East Germany.

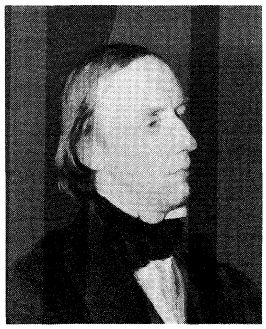
In the square is a bronze statue of George Frideric Handel, the composer, a native of Halle. The Moritzburg, destroyed by fire in 1637 and rebuilt after 1897, now houses an art gallery. The Martin Luther University of Halle-Wittenberg, founded in 1694, was closed by Napoleon in 1806 and again in 1813, but it was reestablished in 1815. It has long been recognized as one of the principal seats of Protestant learning.

An important rail junction for lines from Berlin, Breslau, Leipzig, Frankfurt am Main, the Harz country, and Hannover, Halle is, with Leipzig, a principal commercial and industrial centre of central Germany. Industries include lignite (brown coal) and potash mining, sugar refining, machine building, food processing, brewing, distilling, and the manufacture of rubber, cement, and electrical and chemical products. Pop. (1989 est.) 236,044.

Halle, Adam de la: *see* Adam de la Halle.

Hallé, Sir Charles, original name CARL HALLE (b. April 11, 1819, Hagen, Westphalia—d. Oct. 25, 1895, Manchester), German-born British pianist and conductor, founder of the famed Hallé Orchestra.

Hallé studied at Darmstadt and in Paris, where he became friendly with Chopin, Liszt, and Berlioz. He gave chamber concerts in Paris, but during the Revolution of 1848 he fled to England, settling in Manchester as a pianist and teacher. In 1850 he became conductor of the Gentlemen's Concerts there. He began to give regular concerts in 1858 with an orchestra he had formed for the Art Treasures Exhibition the previous year. This was the beginning of the Hallé Orchestra, which he conducted until his death and which maintained its excellent reputation for a century. Hallé gave frequent piano recitals in London. He



Charles Hallé, detail of an oil painting by G.F. Watts (1817–1904); in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

was the first principal of the Royal Manchester College of Music, founded in 1893 largely through his efforts. He was knighted in 1888.

Halle Neustadt, city, formerly a western district of the city of Halle an der Saale, Saxony-Anhalt *Land* (state), central Germany. The city was established in 1964 by detaching an area of about 5 square miles (13 square km) from the city of Halle as a new city, ultimately, following much new construction, to house a population of 150,000. Its population of 12,600 in 1967 had grown more than sevenfold by 1980.

Located on the northern edge of the Dölauer Heide (heath) nature reserve, the city has no industrial base, but serves as a residential and service (commercial, health, cultural, recreational, and sports) centre for workers in the chemical industries of Halle, Schkopau (the Buna works), Leuna, and other cities of the Saale River valley, with which Halle Neustadt is connected by rapid transit and highway. Pop. (1989 est.) 93,446.

Halle-Wittenberg, Martin Luther University of, German MARTIN-LUTHER-UNIVERSITÄT HALLE-WITTENBERG, state-controlled coeducational institution of higher learning at Halle, Ger. The university was formed in 1817 through the merger of the University of Wittenberg and the University of Halle.

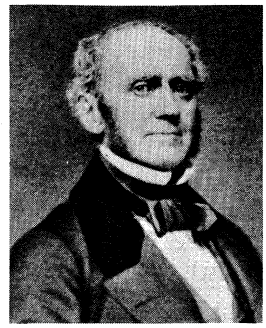
Wittenberg was founded by the elector Frederick II of Saxony in 1502 as an institute of humanistic learning. Following the arrival of religious reformer Martin Luther at Wittenberg in 1508, the university became the centre of the Protestant Reformation. Philipp Melanchthon, a leading humanist teacher and educational reformer, taught at Wittenberg during the same period.

Halle was founded in 1694 by the elector Frederick III of Brandenburg as a centre for the Lutheran party. It has been called the first modern university, largely because it soon renounced religious orthodoxy in favour of objectivity and rationalism, scientific attitudes, and free investigation. Canonical texts were replaced by systematic lectures, and disputations by seminars; German took the place of Latin as the language of instruction; an elective system replaced the traditional formalized curriculum; and professors were given almost complete control of their work. The relative liberalism of Halle was adopted by Göttingen a generation later and gradually by all German, and then most American, universities.

Following the Napoleonic occupation, Prussia was unable to support two universities, and Halle and Wittenberg were merged in 1817. When Hitler came to power in 1933, the school was renamed the Martin Luther University of Halle-Wittenberg. During the postwar period, the university was much influenced by the Soviet education system. Preference in admissions was given to students with work experience or military service, tuition was free, and most students received a stipend for living expenses. In 1968 the school was organized by subject sections.

Halleck, Fitz-Greene (b. July 8, 1790, Guilford, Conn., U.S.—d. Nov. 19, 1867, Guilford), U.S. poet, a leading member of the Knickerbocker group, known for both his satirical and romantic verse.

An employee in various New York City banks, including that of John Jacob Astor, Halleck wrote only as an avocation. In collaboration with Joseph Rodman Drake he contributed the satirical "Croaker Papers" to the New York *Evening Post* in 1819, and on the death of Drake he wrote the moving tribute beginning "Green be the turf above thee." Other popular favourites were the feudal romance "Alnwick Castle" (1822), "Burns" (written 1822, published 1827), the often recited "Marco Bozzaris" (written 1823, published 1825), "Red Jacket" (1828), and "Young America" (1865). Strongly influenced by the Scottish and English Romantic poets and Byron, he was a poet of slight but genuine gift.



Fitz-Greene Halleck

By courtesy of the Library of Congress, Washington, D.C.

Halleck, Henry W(ager) (b. Jan. 16, 1815, Westernville, N.Y., U.S.—d. Jan. 9, 1872, Louisville, Ky.), Union officer during the American Civil War who, despite his administrative skill as general in chief (1862–64), failed to achieve an overall battle strategy for Union forces.

A graduate of the U.S. Military Academy at West Point, N.Y. (1839), Halleck was commissioned in the engineers and sent in 1844 to visit the principal military establishments of Europe. After his return to the U.S., he delivered a course of lectures on the science of war, published in 1846 as *Elements of Military Art and Science,* which was widely used as a textbook by volunteer officers during the Civil War. When the Mexican War broke out (1846), he served with the U.S. expedition to the Pacific Coast and became California's secretary of state under the military government; in 1849 he helped frame the state constitution. Five years later he resigned his commission and took up the practice of law.

When war erupted between the states (1861), Halleck returned to the army as a major general and was charged with the supreme command of the Western theatre. There he was instrumental in bringing order out of chaos in the hurried formations of large volunteer armies, but the military successes of the spring of 1862 were due mainly to the military skill of such subordinate generals as Ulysses S. Grant and John Pope. In July, however, with some misgivings President Lincoln called Halleck to Washington as his military adviser and general in chief of the armies. Held responsible for subsequent reverses of Union generals in Virginia and frequently at odds with his subordinates and with the secretary of war, Edwin M. Stanton, he was replaced by Grant in March 1864. He then served as chief of staff until the end of the war.

Henry W. Halleck

By courtesy of the Library of Congress, Washington, D.C.

hälleflinta (Swedish: "rock flint"), white, gray, yellow, greenish, or pink fine-grained rock that consists of quartz intimately mixed with feldspar. It is very finely crystalline, resembling the matrix of many silica-rich (acid) igneous rocks. Many examples are banded or striated; others contain larger crystals of quartz in a fine-grained matrix. Mica, iron oxides, apatite, zircon, epidote, and hornblende may be present in small amounts.

Hälleflinta is essentially metamorphic (altered by heat and pressure) in origin and occurs with gneiss, schist, and granulite, especially in the Scandinavian Peninsula, where it is regarded as being very characteristic of certain rock layers. Of its original nature there is some doubt, but its chemical composition and the occasional presence of larger crystals indicate that it has affinities to the fine-grained, acid intrusive rocks. Rocks very similar to the typical Swedish hälleflintas occur in the Tirol, the Galicia region of Poland and the Soviet Union, and the eastern Bohemia region of Czechoslovakia.

Hallein, town, *Bundesland* (federal province) Salzburg, western Austria, on the Salzach River just south of Salzburg city. Founded in the 12th century and chartered in 1230, Hallein profited from the nearby Dürrnberg saltworks, in operation since the 13th century. Old landmarks include the Classical parish church (15th century), the town hall (1601), the pilgrimage church (1594–1612) in Dürrnberg, and parts of the medieval town wall. Hallein has a museum with Celtic and Roman antiquities and a school for wood-carvers and stonemasons. The town manufactures shoes, cosmetics, tobacco products, chemicals, cellulose, paper, and motors and is becoming increasingly known as a health and winter-sports resort. Franz Gruber, the composer of the Christmas carol "Stille Nacht, Heilige Nacht" ("Silent Night, Holy Night"), lived there. Pop. (1981) 15,404.

Hallel (Hebrew: Praise), Jewish liturgical designation for Psalms 113–118 ("Egyptian Hallel") as read in synagogues on festive occasions. In ancient times Jews recited these hymns on the three Pilgrim Festivals, when they offered their required sacrifices in the Temple of Jerusalem. The Psalms expressed faith in, and gratitude for, Divine Providence.

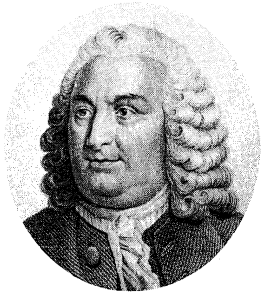
Though a benediction usually precedes and follows recitation of the Psalms, the preceding benediction is omitted on the eve of Passover (Pesaḥ). The Talmud stipulates that a reading from the Book of Esther should replace the Hallel on Purim.

In time, the term Hallel came to mean the "Great Hallel," Psalm 136, which is used in the morning service on the Sabbath, festivals, and during the Passover seder. The "half-Hallel" (parts of Psalms 115 and 116 are omitted) is used on the last six days of Passover and on the New Moon.

hallelujah, also spelled ALLELUIA, Hebrew liturgical expression meaning "praise ye Yah" ("praise the Lord"). It appears in the Hebrew Bible in several psalms, usually at the beginning or end of the psalm or in both places. In ancient Judaism it was probably chanted as an antiphon by the Levite choir. In the New Testament it appears only in Revelation 19, where it occurs four times. It was translated in the Septuagint (Jewish Greek version of the Bible made in the pre-Christian period) and became "alleluia" in the Vulgate (4th-century Christian Latin version). The early Christians adopted the expression in their worship services, and it appeared in Orthodox, Roman Catholic, Anglican, and some Protestant liturgies and in hymns.

hallenkirchen (architecture): *see* hall church.

Haller, Albrecht von (b. Oct. 16, 1708, Bern—d. Dec. 12, 1777, Bern), Swiss biologist, the father of experimental physiology, who made prolific contributions to physiology, anatomy, botany, embryology, poetry, and scientific bibliography.



Albrecht von Haller, detail of an engraving by Ambroise Tardieu after a portrait by Sigmund Freudenberger

Boyer—H. Roger-Viollet

At the University of Göttingen (1736–53), where he served as professor of medicine, anatomy, surgery, and botany, Haller undertook the exhaustive biological experimentation that was to make his encyclopaedic *Elementa Physiologiae Corporis Humani* (8 vol., 1757–66; "Physiological Elements of the Human Body") a landmark in medical history. Because of his impressive accomplishments at the newly formed university, the scientific world was shocked when he suddenly resigned his chair to return to Bern (1753–77), where he continued his research, maintained a private medical practice, and completed an enormous number of written works.

Haller was the first to recognize the mechanism of respiration and the autonomous function of the heart; he discovered that bile helps to digest fats, and he wrote original descriptions of embryonic development. He also summarized anatomical studies of the genital organs, the brain, and the cardiovascular system. Most important were his contributions to the understanding of nerve and muscle activity. On the basis of 567 experiments (190 were performed by him) Haller was able to show that irritability is a specific property of muscle—a slight stimulus applied directly to a muscle causes a sharp contraction. The experiments also showed that sensibility is a specific property of nerves—a stimulus applied to a nerve does not change the nerve perceptibly but causes the contraction of the muscle connected to it, implying that the nerves carry impulses that produce sensation. Although the English physician Francis Glisson had discussed tissue irritability a century earlier, Haller's complete scientific delineation of nerve and muscle action laid the foundations for the advent of modern neurology.

Toward the end of his life, he devoted much of his time to the cataloging of scientific literature. His *Bibliothecae Medicinae Practicae,* 4 vol. (1776–88) lists 52,000 publications on anatomy, botany, surgery, and medicine. In a study on Swiss vegetation he developed a system of botanical classification considered more logical than that of his Swedish colleague Carolus Linnaeus, known as the father of modern taxonomy. Haller was also an accomplished poet, and his glorification of the mountains ("Die Alpen"; 1732) helped bring a sense of the awareness of natural wonders to German poetry.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Haller, Bertold (b. 1492, Aldingen, near Rottweil, Switz.—d. Feb. 25, 1536, Bern), Swiss religious Reformer who was primarily responsible for bringing the Reformation to Bern.

Having arrived at Bern as a schoolmaster in 1513, Haller became canon at the cathedral in 1520. About the same time, he fell under the influence of the Protestant Reformer Huldrych Zwingli. Encouraged by Zwingli, he began openly to espouse the cause of reform. Less militant than his Zürich mentor, he conducted the reform at Bern in a more leisurely fashion. After Christmas 1525, Haller refused any longer to say mass, which action incurred his suspension by the bishop of Lausanne. The demand for his removal, however, was rejected by the city council, and he continued his reforming work. He took part in the disputations of Baden (1526) and Bern (1528), the latter marking the victory of the Reformation in that city. The official program of reorganization for the church at Bern (1532) was largely the result of Haller's efforts.

Halley, Edmond, Edmond also spelled EDMUND (b. Nov. 8, 1656, Haggerston, Shoreditch, near London—d. Jan. 14, 1742, Greenwich, near London), English astronomer and mathematician who was the first to calculate the orbit of a comet later named after him.

Halley, detail of an oil painting by R. Phillips, *c.* 1720; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

He is also noted for his role in the publication of Newton's *Philosophiae Naturalis Principia Mathematica.*

Early life. Halley began his education at St. Paul's School, London. He had the good fortune to live through a period of scientific revolution that established the basis of modern thought. He was four years old when the monarchy was restored under Charles II; two years later the new monarch granted a charter to the informal organization of natural philosophers originally called the "invisible college," which then became known officially as the Royal Society of London. Halley entered Queen's College, Oxford, in 1673 and there was introduced, by letter, to John Flamsteed, who was appointed astronomer royal in 1676. On one or two occasions Halley visited the Royal Greenwich Observatory, where Flamsteed did his work, and there was encouraged to study astronomy.

Influenced by Flamsteed's project of using the telescope to compile an accurate catalog of northern stars, Halley proposed to do the same for the Southern Hemisphere. With financial assistance from his father and, from King Charles II, an introduction to the East India Company, he sailed in November 1676 in a ship of that company (having left Oxford without his degree) for the island of St. Helena, the southernmost territory under British rule, in the South Atlantic. Bad weather frustrated his full expectations. But, when he embarked for home in January 1678, he had recorded the celestial longitudes and latitudes of 341 stars, observed a transit of Mercury across the Sun's disk, made numerous pendulum observations, and noticed that some stars apparently had become fainter since their observation in antiquity. Halley's star catalog, published late in 1678, was the first such work to be published containing telescopically determined locations of southern stars, and it established his reputation as an astronomer. In 1678 he was elected a fellow of the Royal Society and, with the intercession of the King, was granted the M.A. degree from Oxford University.

Halley and Newton. In 1684 Halley made his first visit to Sir Isaac Newton in Cambridge, an event that led to his prominent role in the development of the theory of gravitation. Halley was the youngest of a trio of Royal Society members in London that included Robert Hooke, the inventor and microscopist, and Sir Christopher Wren, the famous architect, both of whom, with Newton at Cambridge, were attempting to find a mechanical explanation for planetary motion. Their problem was to determine what forces would keep a planet in forward motion around the Sun without either flying off into space or falling into the Sun. Since these men were dependent upon their scientific stature for both livelihood and sense of achievement, each had a personal interest in being the first to find a solution. This desire for priority, a propelling motive in science, was the cause of much lively discussion and competition between them.

Although Hooke and Halley had calculated that the force keeping the planets in orbit decreased as the inverse of the square of the distances between them, they were not able to deduce from this hypothesis a theoretical orbit that would match the observed planetary motions, despite the incentive of a prize offered by Wren. Halley then visited Newton, who told him he had already solved the problem—the orbit would be an ellipse—but that he had mislaid his calculations to prove it. Encouraged by Halley, Newton then expanded his studies on celestial mechanics into one of the greatest masterpieces produced by the mind of man, the *Principia.* The Royal Society decided that "Mr. Halley undertake the business of looking after it, and printing it at his own charge," which he proceeded to do. He consulted with Newton, tactfully subdued a priority dispute between Newton and Hooke, edited the text of the *Principia,* wrote laudatory verse in Latin for the preface to honour its author, corrected the proofs, and saw it through the press in 1687.

Later works. Halley had the ability to reduce large amounts of data to a meaningful order. In 1686 his map of the world, showing the distribution of prevailing winds over the oceans, was the first meteorological chart to be published. His mortality tables for the city of Breslau, published in 1693, comprised one of the first attempts to relate mortality and

age in a population; as such, it influenced the future development of actuarial tables in life insurance. Under instructions from the Admiralty, he commanded the war sloop *Paramour Pink* in 1698–1700 on the first sea voyage undertaken for purely scientific purposes, this one to observe variations in compass readings in the South Atlantic and to determine accurate latitudes and longitudes of his ports of call. In 1701 he published the first magnetic charts of the Atlantic and Pacific areas, showing curved lines that indicated positions in the oceans having the same variation of the compass. Such charts, compiled from all available observations and augmented with many of his own made on sea voyages, were of great practical value in navigation and were used for many years after his death. Notwithstanding opposition from Flamsteed, Halley in 1704 was appointed Savilian professor of geometry at Oxford.

Continuing his pioneering work in observational astronomy, Halley published in 1705 *A Synopsis of the Astronomy of Comets,* in which he described the parabolic orbits of 24 comets that had been observed from 1337 to 1698. He showed that the three historic comets of 1531, 1607, and 1682 were so similar in characteristics that they must have been successive returns of the same visitant—now known as Halley's Comet—and accurately predicted its return in 1758.

In 1716 he devised a method for observing transits of Venus across the disk of the Sun, predicted for 1761 and 1769, in order to determine accurately, by solar parallax, the distance of the Earth from the Sun. In 1720 Halley succeeded Flamsteed as astronomer royal at Greenwich, where he made observations, such as timing the transits of the Moon across the meridian, that he hoped would eventually be useful in determining longitude at sea.

Halley's significance. Halley's concern with practical applications of science, such as problems of navigation, reflects the influence on the Royal Society of Francis Bacon, who held that science should be for the "relief of man's estate." Though wide ranging in his interests, Halley displayed a high degree of professional competence that foreshadowed scientific specialization. His wise assessment of Newton's work and his persistence in guiding it to completion earned for him an important place in the emergence of Western thought.

(O.J.E.)

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Halley's Comet, first comet whose return was predicted, demonstrating that at least some comets are members of the solar system. In 1705 Edmond Halley published a work that included his calculations showing that comets observed in 1531, 1607, and 1682 were really one comet and predicting that comet's return in 1758. The comet was sighted late in 1758, passed perihelion in March 1759, and was named in Halley's honour.

Later calculations identify it with the large, bright comet seen during the Norman Conquest of England (1066) and shown in the Bayeux Tapestry of that time, and with other comet sightings at intervals of about 76 years, from 240 BC.

During the comet's approach in 1910 the Earth probably passed (without noticeable effect) through part of its tail, which was millions of kilometres in length. As predicted, the comet, moving at a speed of more than 80,000 mph (more than 128,000 kph), again passed by the Earth and Sun in November–December 1985 and March–April 1986. The comet's passage was observed by two Soviet spacecraft (*Vega 1* and *Vega 2*) and by a European probe (*Giotto*). Data collected by these crafts indicate that the comet's oblong nucleus is black and is composed of carbon, oxygen, and various other elements. Its core dimensions appear to be about 15 km by 8 km (about 9 mi by 5 mi), and its core diameter appears to be about 6 km. Temperatures within the coma—which consists of the nucleus and its extensive envelope of electrically charged gases, dust, and larger chunks of debris—were measured at 330 K ± 20 K. The comet's nucleus also was observed to eject dust, ice, and gas in geyser-like eruptions. The Orionid and Eta Aquarid meteor showers seem to travel in its orbit.

Hallgrímsson, Jónas (b. Nov. 16, 1807, Hraun, Öxnadalur, Ice.—d. May 25, 1845, Copenhagen), one of the most popular of Iceland's Romantic poets.

Entering the University of Copenhagen in 1829, Hallgrímsson studied law, science, and literature. In 1835, with other Icelandic students in Copenhagen, he founded the periodical *Fjölnir* (1835–47), in which he published much of his poetry and later his short stories, the first in Icelandic. He returned to Iceland in 1837 and engaged in scientific research for the Danish government until 1842, when he returned to Copenhagen.

He is chiefly remembered for his lyrical poems describing Icelandic scenery. An admirer of the European Romantic poets, especially Heinrich Heine, he adapted and translated much foreign poetry into Icelandic. He was critical of the *rímur,* narrative poems in traditional, artificial form, composed in stereotyped meters and phrases, which had long been popular in Iceland, and he strove, as Wordsworth did in England, to purify the language of poetry.

Halliburton, Richard (b. Jan. 9, 1900, Brownsville, Tenn., U.S.—d. March 23/24, 1939, at sea), American travel and adventure writer who spent most of his adult life exploring the world.

Halliburton grew up in Memphis, Tenn., and went to boarding school at Lawrenceville Academy, where he demonstrated an interest in writing. He then went to Princeton University, but after his sophomore year he found his way to New Orleans, joined a crew on a freighter ship, and sailed across the Atlantic. After roaming about Europe for a year, he finished school, graduating in 1921. Immediately after graduation he and a friend joined the crew of a ship called the *Ipswich* and sailed for two more years.

Halliburton's literary career developed out of his meticulous logging of events that occurred on his own adventures. His first book, *The Royal Road to Romance* (1925), a chronicle of his adventures at sea, was a best-seller for three years and was translated into 15 languages. Many of his later journeys were patterned after those taken by famous figures of the past, both fictitious and real. He followed Ulysses' route through the Mediterranean and emulated Lord Byron by swimming the Hellespont. He swam the Panama Canal, ran from Marathon to Athens, visited the penal colony at Devil's Island, and climbed the Matterhorn, Mount Olympus, and Fuji-san. These and other experiences became the basis for his romantic narratives.

In March 1939 Halliburton left Hong Kong aboard a 75-foot (23-metre) motor-powered Chinese junk called the *Sea Dragon* en route to San Francisco. Both he and his boat disappeared after encountering a severe typhoon, some 2,400 miles (3,860 kilometres) west of Midway Island.

His works include: *The Glorious Adventure* (1927), *New Worlds to Conquer* (1929), *The Flying Carpet* (1932), *Seven League Boots* (1935), *The Book of Marvels: The Occident* (1937), and *The Second Book of Marvels: The Orient* (1938).

Halliday, M(ichael) A(lexander) K(irkwood) (b. April 13, 1925, Leeds, Yorkshire, Eng.), British linguist, teacher, and proponent of neo-Firthian theory who viewed language basically as a social phenomenon.

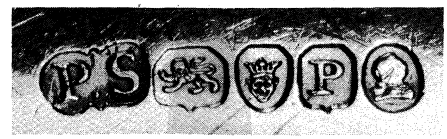
In his early work, known as "scale and category linguistics," Halliday devised four categories (unit, structure, class, and system) and three scales (rank, exponence, and delicacy) to describe language. He also did work on intonation (*Intonation and Grammar in British English,* 1967) and on discourse analysis (*Cohesion in English,* 1976). His later theory, sometimes called systemic linguistics, was that language has three functions: ideational, interpersonal, and textual.

Halliday obtained his B.A. in Chinese language and literature from London University and then did postgraduate work in linguistics, first at Peking University and later at Cambridge University, from which he obtained his Ph.D. in 1955.

halling, vigorous Norwegian folk dance for couples. The name derives from Hallingdal, a valley in southern Norway. Two or three males may dance in rivalry, performing difficult leaps, kicks, and other acrobatic stunts to demonstrate vigour and virility. The halling is one of a number of European folk dances—among them the Basque *aurresku,* the Ukrainian *hopak,* and the Alpine *Schuhplattler*—in which the male dancer shows off for his partner.

Halling danced at the Norsk Folkemuseum, Bygdøy, Nor.
Rostad Foto

hallmark, symbol or series of symbols stamped on an article of gold or silver to denote that it conforms to legal standards that define the maximum proportion of base metals that may be alloyed with pure gold or silver for hardening or other purposes; in broader terms any mark distinguishing source and quality.



London hallmark, 1810, (left to right) maker's mark of Paul Storr, lion passant, crowned leopard's head, date letter, and head of George III
By courtesy of the Worshipful Company of Goldsmiths

In Great Britain the presence of a hallmark on an article indicates that it has been sampled and tested at an authorized assay office. Most articles are required by British law to be hallmarked before sale, although there are certain exemptions (*e.g.,* gold rings other than mourning or wedding rings). Manufacturers normally send their wares to an assay office complete except for final polishing. Represen-

tative scrapings are taken from every article and accurately assayed by chemical methods. Articles that pass are stamped with the appropriate symbols of the hallmark, but any that are below the lowest standard are required by law to be broken before being returned to the manufacturer.

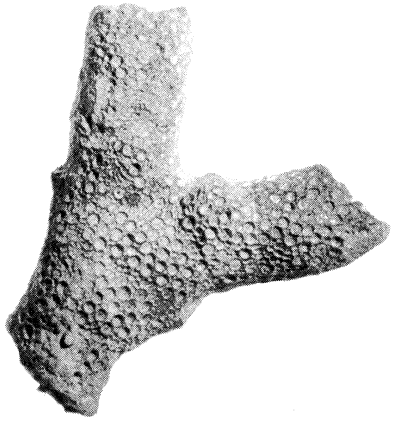
Hallmarking in Great Britain dates from Edward I. A statute of 1300 provided that no gold or silver be sold until tested by the "Gardiens of the Craft" and struck with the leopard's head first known as the king's mark. Later, a lion passant was introduced as the standard mark, and the leopard's head was retained as the London town mark. From 1478 to 1821 a crown was added. It was replaced in Edinburgh by a thistle and in Glasgow by a thistle and a lion rampant.

A maker's mark was introduced by a statute of 1363. At first a device was used—a fish, a key, or a fleur-de-lis, for example—often taken no doubt from the sign outside the goldsmith's shop. Gradually, it became the practice for the maker to use the initials of his given name and surname alone or in conjunction with a device.

Gold hallmarks differ little from those on sterling, mainly in the addition of marks reflecting the proportion of pure gold in both karats and percent. Dates are coded by letters on a shield. Other marks—*e.g.*, a figure of Britannia for higher silver content and a sovereign's head reflecting payment of duty—have been adopted from time to time. In London the London Goldsmith's Company (later the Worshipful Company of Goldsmiths) has been responsible for the assay and marking of plate, and the word hallmark means literally a mark applied at Goldsmith's Hall.

Many countries outside the United Kingdom have a system of plate marks. In the United States no hallmarks are required on silver or gold objects because there has been no guild or government regulation comparable to that of Great Britain. Local regulatory practices were established in New York, Boston, Baltimore, and elsewhere in the late 18th and early 19th centuries, but no consistent system of symbols was adopted. Maker's marks appear, usually consisting of the initials or name of the maker. Beginning in the early 19th century the words coin (900 parts fine silver to 100 parts alloy) and sterling (925 parts fine silver to 75 parts copper) were stamped on silver objects, and in 1906 the use of the words became subject to federal regulation. The purity of gold is given in karats, pure gold being 24 karats; its marking is also subject to federal regulation.

Hallopora, genus of extinct bryozoans (moss animals) found as fossils in Ordovician to Devonian marine rocks (from 345,000,000 to 395,000,000 years old). *Hallopora* is distinguished by the large size of its pores and by its internal structure. Various species of *Hallopora* are known, some of them useful for stratigraphic correlation.



Hallopora elegantula, middle Silurian in age, collected from the Rochester Shale, Lockport, N.Y.

By courtesy of the Buffalo Museum of Science, Buffalo, N.Y.

Halloween, also called ALL HALLOWS' EVE, or EVENING, a holy or hallowed evening observed on October 31, the eve of All Saints' Day. In modern times, it is the occasion for pranks and for children requesting treats or threatening tricks.

In ancient Britain and Ireland, the Celtic festival of Sambain was observed on October 31, at the end of summer. This date was also the eve of the new year in both Celtic and Anglo-Saxon times and was the occasion for one of the ancient fire festivals when huge bonfires were set on hilltops to frighten away evil spirits. The date was connected with the return of herds from pasture, and laws and land tenures were renewed. The souls of the dead were supposed to revisit their homes on this day, and the autumnal festival acquired sinister significance, with ghosts, witches, hobgoblins, black cats, fairies, and demons of all kinds said to be roaming about. It was the time to placate the supernatural powers controlling the processes of nature. In addition, Halloween was thought to be the most favourable time for divinations concerning marriage, luck, health, and death. It was the only day on which the help of the devil was invoked for such purposes.

The pagan observances influenced the Christian festival of All Hallows' Eve, celebrated on the same date. Gradually, Halloween became a secular observance, and many customs and practices developed. In Scotland young people assembled for games to ascertain which of them would marry during the year and in what order the marriages would occur. Many Halloween customs have become games played by children.

Immigrants to the U.S., particularly the Irish, introduced secular Halloween customs that became popular in the late 19th century. Mischief-making on this occasion by boys and young men included overturning sheds and outhouses and breaking windows, and damage to property was sometimes severe. In later years, the occasion has come to be observed mainly by small children, who go from house to house, often in costume, demanding "trick or treat" (the treat, often candy, is generally given and the trick rarely played). Since 1965, UNICEF, an agency of the United Nations, has attempted to incorporate into the Halloween observance the collection of money for the United Nations Children's Fund.

A common symbol of Halloween is the jack-o'-lantern (the name possibly was derived from that for a night watchman). It is a hollowed-out pumpkin carved in the appearance of a demonic face and with a lighted candle fixed inside. In Scotland a turnip was used, but the native pumpkin was substituted in the United States.

Hallowell, A(lfred) Irving (b. Dec. 28, 1892, Philadelphia—d. Oct. 10, 1974, Philadelphia), U.S. cultural anthropologist known for his work on the North American Indians, especially the Ojibwa.

Hallowell received his early training at the Wharton School of Finance and Commerce of the University of Pennsylvania and was a social worker in Philadelphia while doing graduate work in sociology and anthropology.

From his early ethnographic work, which was heavily influenced by his instructors Frank G. Speck and Franz Boas, he turned to a study of "culture and personality," the psychological dimensions of acculturation, in which he used Rorschach and other projective tests. He drew upon Freudian and Gestalt theory to show how social order is a product of the cultural environment.

Halloy, Jean-Baptiste-Julien Omalius d': *see* Omalius d'Halloy, Jean-Baptiste-Julien.

halloysite, clay mineral that occurs in two forms: one is similar in composition to kaolinite, and the other is hydrated. Both forms have a lower specific gravity than kaolinite, are fibrous rather than platy, and may exhibit a prismatic tubular shape. For detailed physical properties, *see* clay mineral (table). *See also* kaolinite.

Hallstatt, site in upper Austria where objects characteristic of the Early Iron Age (from *c.* 1100 BC) were first identified; the term Hallstatt now refers generally to Late Bronze and Early Iron Age culture in central and western Europe. During excavation between 1846 and 1899, more than 2,000 graves were found at Hallstatt. The majority fall into two groups, an earlier (*c.* 1100/1000 to *c.* 800/700 BC) and a later (*c.* 800/700 to 450 BC). Near the cemetery was a prehistoric salt mine; because of the preservative nature of the salt, implements, parts of clothing, and even the bodies of the miners themselves have been discovered.

Bronze bucket found at Early Iron Age cemetery at Hallstatt, Austria, about 6th century BC

By courtesy of the trustees of the British Museum

Hallstatt remains are generally divided into four phases (A, B, C, and D), although there is some disagreement among scholars as to how these phases should be dated. In Phase A iron was rare, but Villanovan (*q.v.*) influences are apparent. Cremation was practiced in cemeteries of flat graves (or under very low mounds). The pottery in southwest Germany was thin walled, some of it betraying strong metallic influence, while farther east the Silesian influence (Lusatian B) is noticeable.

Phase B, confined to the western regions, was marked by the reassertion of the Old Bronze Age population of southwest Germany over the comparatively new Urnfield peoples. The tumulus (barrow) again became common in burial, and cremation is predominant. The pottery (sometimes polychrome) is extremely well made.

In Phase C iron came into general use. Both cremation and inhumation (interment) were used, and the pottery was both polychrome and unpainted. Among the many metal types were: long, heavy iron and bronze swords with scrolled chapes (the metal mounting at the upper end); the winged Hallstatt axe; and long, bronze girdle mounts.

Phase D is not represented in the area around eastern Austria, but it lasted until the appearance of the La Tène (*q.v.*) period in other areas. The burial rite was mostly inhumation; the pottery, which is not common, degenerates in style and technique. Among the metal objects represented were: the dagger sword with "horseshoe" or antennae hilt; a variety of brooches and ring ornaments; and girdle mounts, sometimes in pierced work. Early archaic Greek vessels appear in the west.

Hallstatt art in general is severely geometric in style; the advances made were on technical rather than aesthetic lines. There is a

general tendency toward the extravagant and the Baroque, and the Greek Orientalizing influence is hardly felt. The typical bird motif, probably derived from Italy, may perhaps be traced back to late Helladic times in Greece. Plant patterns are very rare, although contrasts in colour and the breaking up of smooth surfaces were often used. The arrangement of figures in pairs is very characteristic; the designs, however, seem to be more concerned with a rigid symmetry, rather than treating the arrangement as an organic whole.

hallucination, experience of perceiving objects or events that are not actually present to the senses. Hallucinations are akin to illusions (*see* illusion) in that both involve false perceptions; but an illusion, unlike a hallucination, is stimulated by an actual object.

A brief treatment of hallucinations follows. For full treatment, *see* MACROPAEDIA: Perception, Human.

Interest in hallucinations has grown in recent years, due largely to research into hallucinogenic drugs. Two assumptions underlie the modern general theory of hallucination. One is that life experiences leave enduring physical changes (variously called neural traces, templates, or engrams) which function in memory, thought, and imagination. The other is that a constantly shifting balance exists between internal and external environmental forces so that both physiological and cultural experiential factors are determinants of the content and meaning of hallucinations.

It is believed by many that beneath consciousness there is a steady stream of unconscious thinking, consisting largely of memories (especially from early life) and heavily charged with emotions. At the same time, there is a steady stream of information presented to the brain by the senses. In order to function at all, the brain must select what information it will respond to; the rest is temporarily held to the side, or ignored outright. This process of selection from sensory data is performed by the mechanism of attention (*q.v.*). As long as the attention is able to cope with incoming data, so that the brain is smoothly presented with relevant information, the stream of unconscious thoughts are kept out of consciousness.

A hallucination can result if the balance described above is disturbed. Two conditions must obtain. First, the unconscious stream must be aroused, *i.e.*, must have a sufficient level of intensity. Second, the attention mechanism must fail to protect consciousness from the intrusion of unconscious thoughts. This can happen if the incoming flow of information from the senses is drastically reduced. In such cases, with the screen provided by attention removed, sufficiently intense unconscious thoughts can enter consciousness, sometimes as a hallucination. Generally, hallucinations derive their content from images stored in memory, although these can be greatly transformed.

Hallucinations are in many ways similar to dreams. As a person falls asleep, the amount of incoming sensory information, and hence the level of attention, begins to subside. Unconscious thoughts impinge upon one's consciousness. This effect of sleep can be replicated even in waking life, where the amount of mental stimulation is dramatically reduced.

Hallucinations can result when attention does not gently subside, but instead collapses from intense arousal due to extreme anxiety or extended periods of wakefulness. Hallucinations can also be induced fairly directly by various interventions into the brain. During brain surgery, for example, if cortical (of the cortex, or surface) brain cells are electrically stimulated, the patient can experience strong hallucinations based on deep-seated memories. But hallucinations are much more commonly induced by drugs which may provoke unsettling or even terrifying experiences. Some hallucinogens, such as sodium amybarbital, the "truth serum," suppress sensory input in a way that encourages the vivid recall of recent memories. Others work the opposite way: they increase sensory input to the extent that the attention is overwhelmed, and hallucinations can emerge. *See also* dream, sleep.

hallucinogen, substance that produces psychological effects that are normally associated only with dreams, schizophrenia, or religious exaltation. It produces changes in perception, thought, and feeling, ranging from distortions of what is sensed (illusions) to sensing objects where there are none to be sensed (hallucinations). Hallucinogens heighten sensory signals, but this is often accompanied by loss of control over what is experienced.

A brief treatment of hallucinogens follows. For full treatment, *see* MACROPAEDIA: Drugs and Drug Action.

The psychopharmacological drugs that have aroused widespread interest and bitter controversy are those that produce marked aberrations of behaviour. The most important of these are *d*-lysergic acid diethylamide, or LSD-25, which originally was derived from ergot (*Claviceps purpurea*), a fungus on rye and wheat; mescaline, the active principle of the peyote cactus (*Lophophora williamsii*), which grows in the southwestern United States and Mexico; and psilocybin and psilocin, which come from certain mushrooms (notably two Mexican species, *Psilocybe mexicana* and *Stropharia cubensis*). Other drugs of this group include bufotenine, originally isolated from the skin of toads; harmine, from the seed coats of a plant of the Near East and Mediterranean region; and the synthetic compounds *d*-methyltryptamine (DMT) and dimethoxyphenylethylamine. Cannabis, or marijuana, is a resin obtained from the leaves and tops of the hemp plant (*Cannabis sativa*).

Native societies of the Western Hemisphere have utilized, apparently for thousands of years, plants containing psychedelic substances. The hallucinogenic mushrooms of Mexico were considered sacred and called "god's flesh" by the Aztecs. During the 19th century the Mescalero Apaches of the southwestern U.S. practiced a peyote rite that was adopted by many of the Plains tribes. Peyotism eventually became fused with Christianity, and the Native American Church was formed in 1918 to protect peyotism as a form of worship.

Scientific interest in these substances developed slowly. Mescaline was finally isolated as the active principle of peyote in 1896. It was not until 1943, when the Swiss chemist Albert Hofmann accidentally ingested a synthetic preparation of lysergic acid diethylamide and experienced its psychedelic effects, that the search for a natural substance responsible for schizophrenia became widespread. Gordon Wasson, a New York banker and mycologist, called attention to the powers of the Mexican mushrooms in 1953, and the active principle was quickly found to be psilocybin.

Only the *d* isomer of LSD is found to be psychedelically active. It is thought that LSD, as well as psilocybin, psilocin, bufotenine, and harmine, act antagonistically towards serotonin, an important brain amine. However, evidence for this is quite contradictory. Some chemicals that block serotonin receptors in the brain have no psychedelic activity. Mescaline is structurally related to the adrenal hormones epinephrine and norepinephrine—catecholamines that are very active in the peripheral nervous system and are suspected of playing a role as neurotransmitters in the central nervous system.

During the 1950s and 1960s there was a great deal of scientific research with these hallucinogens in psychotherapy. LSD was used as an aid in the treatment of alcoholism. It was also employed to reduce the suffering of terminally ill cancer patients, and in the treatment of autistic children.

Controversy arose over social aspects of the drugs. A drug subculture sprang up surrounding these hallucinogens in the 1960s. Further research indicated that the side effects of these drugs were more serious than previous research had indicated, and that human experimentation was somewhat premature. As a result, LSD and psilocybin, as well as some other hallucinogens, were limited to scientific use, with pharmaceutical manufacture strictly regulated.

Halma (Greek: Jump), Checkers-type board game, invented about 1880, in which players attempt to move a number of pieces from one corner of a square board containing 256 squares to the opposite corner. The first to transfer all of his pieces is the winner. In the two-handed game, each player has 19 pieces; in the four-handed game, each has 13 and the players may compete as two partnerships. The game can also be played by three, but the player without an opponent in the opposite corner is at a disadvantage.

Pieces may move one square at a time in any direction onto any empty square, or they may jump over adjacent pieces, their own or an opponent's, onto an empty square beyond. Pieces are not removed from the board when they are jumped. Any number of jumps may be made in one turn of play. Players try to form ladders—strings of their own pieces spaced so that they jump several squares at a turn.

Chinese Checkers, a game for from two to six players, derived from Halma, was introduced in the United States in the 1930s. It is played in the same way as Halma, except that the pieces are usually marbles (each player has 10 or 15) and the board, in the shape of a six-pointed star, has small holes instead of squares.

Halmahera, also called DJAILOLO, or JAILOLO, largest island of the Moluccas, in Maluku Utara *kabupaten* (North Moluccas regency) of Maluku *propinsi* (province), Indonesia. The island consists of four peninsulas enclosing three great bays (*teluk*): Kau in the northeast, Buli in the east, and Weda in the southeast. Its area is 6,865 sq mi (17,780 sq km), and its name means "motherland." An isthmus connects the northern peninsula with the others and forms a bay on the western side of the island; at the mouth of this bay are the islands of Ternate, from which it is administered, and Tidore. The four peninsulas are traversed in the direction of their longitudinal axes by heavily wooded mountain chains 3,000 to 5,000 ft (900 to 1,500 m) in height, often interrupted by plains. Parts of the chain of the northern peninsula are volcanic: three volcanoes are active, one of which, Gunung Gamkonora, reaches 5,364 ft (1,635 m). There are numerous small rivers and several lakes, and near Weda is a grotto containing stalactites.

The ancient indigenous population appears to have been Papuan. The inhabitants of the interior are tall and well built, with dark-brown skin and blue-black wavy hair, worn long. They live mostly by hunting, fishing, and collecting sago starch. The coastal people include many elements from surrounding islands. They cultivate rice on temporary forest clearings and grow coconuts. Many lead a roving life of fishing, collecting forest produce, or hunting, often far beyond the home island. Headhunting once was common, particularly in the north. Islām and Christianity have made some conversions, but a kind of animism—relations with the spirits of the dead—still molds the thoughts and actions of the living. The native languages in the island's south-

ern part belong to the Austronesian (Malayo-Polynesian) group, with linguistic affinities to western New Guinea; the languages of the north, including Ternate, Tidore, and Morotai, are unrelated to any other linguistic stock. The traditional house in northern Halmahera is octagonal, and villages consist of one-family houses grouped around a square, in the middle of which is a temple. The chief towns are Gani in the south; Pantani in the southeast; Weda in the centre; and Kau, Tobelo, Galela, Laloda, Sahu, and Jailolo on the northern peninsula.

The Portuguese and Spaniards were well acquainted with Halmahera, calling it alternately Batu Tjina and Moro. The name Djailolo was that of a native state on the western coast of the island whose sultan held chief rank among the Moluccan princes before he was supplanted (1380) by the Sultan of Ternate. The Dutch obtained a footing in Halmahera with the aid of the latter, and he held claim to the northern half of the island, with the southern half under the sultan of Tidore for as long as the Dutch controlled the Indies. After World War II, Halmahera was part of the state of East Indonesia, and it was incorporated into the Republic of Indonesia after independence was granted by the Dutch in 1949. Pop. (1980) 93,895.

Halmstad, town and port, capital of the *län* (county) of Halland, southwestern Sweden, on the eastern shore of the Kattegat, at the mouth of Nissan River. The town was founded at the beginning of the 14th century and often served as the meeting place of the rulers and delegates of the three northern kingdoms. Until 1645, when the *län* was ceded to Sweden, Halmstad was part of Danish territory.

Modern public buildings, such as the town hall, complement the older structures in the town centre: wood-beamed 17th-century houses, a 14th-century Gothic church, and a 15th-century Renaissance castle. In the main town square stands Carl Milles' fountain "Europa and the Bull." There are many parks and a large preserved natural forest, Galgberget, which contains Hallandsgården, an open-air museum of old peasant cottages. Tylösand, just west, is a popular seaside resort.

The chief industries are engineering, brewing, and textile manufacturing. Smoked salmon is a specialty. Rail service connects with Göteborg, Nässjö, and Malmö, ferries with Århus, Den., and air services with Stockholm. Pop. (1984 est.) mun., 76,572.

halo, any of a wide range of atmospheric optical phenomena that result when the Sun or Moon shines through thin clouds composed of ice crystals. These phenomena may be due to the refraction of light that passes through the crystals, or the reflection of light from crystal faces, or a combination of both effects. Refraction effects give rise to colour separation because of the slightly different bending of the different colours composing the incident light as it passes through the crystals. On the other hand, reflection phenomena are whitish in colour, because the incident light is not broken up into its component colours, each wavelength being reflected at the same angle.

The most common halo is the 22° halo, a series of coloured arcs, or in some cases complete circles, of 22° angular radius with the Sun or Moon at its centre. The order of coloration is red on the inside and blue on the outside, opposite to that of the atmospheric corona.

Less frequently observed phenomena, such as parhelia, sun pillars, tangent arcs, sun crosses, and others, also are attributable to the reflection or refraction of sunlight or moonlight by ice crystals.

halo, also called NIMBUS, in art, radiant circle or disk surrounding the head of a holy person, a representation of spiritual character through the symbolism of light. In Hellenistic and Roman art the sun-god Helios and Roman emperors often appear with a crown of rays. Because of its pagan origin, the form

"The Angel with the Millstone," manuscript illumination from the Bamberg Apocalypse, c. 1007 (Bamberg, Staatsbibliothek, MS. Bibl. 140, f. 46R)
By courtesy of the Staatsbibliothek Bamberg, W.Ger.

was avoided in Early Christian art, but a simple circular nimbus was adopted by Christian emperors for their official portraits. From the middle of the 4th century, Christ was also shown with this imperial attribute, as was his symbol, the Lamb of God, from the end of the 4th century. In the 5th century it was sometimes given to angels, but it was not until the 6th century that the halo became customary for the Virgin Mary and other saints. For a period during the 5th century, living persons of eminence were depicted with a square nimbus.

The halo was used regularly in representations of Christ, the angels, and the saints throughout the Middle Ages. Often Christ's halo is quartered by the lines of a cross or inscribed with three bands, interpreted to signify his position in the Trinity. From the 15th century, however, with the growth of naturalism in Renaissance art, the nimbus created problems in representation. At first it was treated by some Florentine artists as a solid object seen in perspective, a disk fixed to the back of a saint's head. The inadequacy of this solution led to its decline in Italian art in the 16th century and to its abandonment by Michelangelo and Titian. In Flemish painting of the 15th century, it began to be represented as rays of light; under the influence of the Counter-Reformation, which sought to restore a glorious conception to religious art, this form was adopted by Italian artists of the late 16th century, notably Tintoretto, as a realistically rendered light emanating from the holy person's head. This new interpretation was the standard one in the Baroque period and in most subsequent religious works.

The halo is also found in Buddhist art of India, appearing from the late 3rd century AD. It is believed that the motif was brought to the East by Greek invaders. *See also* mandorla.

halocarbon, any chemical compound of the element carbon and one or more of the halogens (bromine, chlorine, fluorine, iodine); two important subclasses of halocarbons are the chlorocarbons, containing only carbon and chlorine, and the fluorocarbons, containing only carbon and fluorine. Examples of chlorocarbons are carbon tetrachloride and tetrachloroethylene; the best known fluorocarbon is the resin polytetrafluoroethylene, called Teflon. Several, but not all, of the Freons (*q.v.*) are halocarbons, as is the resin polychlorotrifluoroethylene (*q.v.*; Kel-F). The nonflammability, low chemical reactivity, and low toxicity of many of the halocarbons are their most valuable properties.

halocline, vertical zone in the oceanic water column in which salinity changes rapidly with depth, located below the well-mixed, uniformly saline surface water layer. Especially well developed haloclines occur in the Atlantic Ocean, in which salinities may decrease by several parts per thousand from the base of the surface layer to depths of about one kilometre (3,300 feet). In higher latitudinal areas of the North Pacific in which solar heating of the surface waters is low and rainfall is abundant, salinities increase markedly with depth through the halocline layer. Pycnoclines, or layers through which water density increases rapidly with depth, accompany such haloclines inasmuch as density varies directly with total salt content.

halogen, any of the five nonmetallic elements that comprise Group VIIa of the periodic table. The halogen elements are fluorine (F), chlorine (Cl), bromine (Br), iodine (I), and astatine (At).

A brief treatment of the halogens follows. For full treatment, *see* MACROPAEDIA: Chemical Elements. *See also* MICROPAEDIA for entries on each member of this family of elements.

Most of the halogens are found in relatively small amounts in the Earth's crust. The single exception is astatine, which does not occur naturally because it consists exclusively of short-lived radioactive isotopes. The only practical source of this element is its synthesis by nuclear reactions. The halogens, particularly fluorine, are highly reactive, so that they never occur uncombined in nature. They readily react with most metals and many nonmetals to form a variety of compounds.

The members of the halogen family closely resemble each other in general chemical behaviour and in the properties of their compounds. Characteristically, each halogen atom carries seven electrons in its outermost orbitals, which are of two different types. Potentially, the halogen atoms can hold one additional electron; in acquiring such an electron the atom acts as an oxidizing agent and in the process assumes an electrical charge and becomes an ion. Halogen elements exist in their salts as halide ions, which are very stable.

Halogeton, the generic and common name for a poisonous annual weed, belonging to the goosefoot family (Chenopodiaceae), native to southwestern Siberia and northwestern China. *Halogeton glomeratus,* introduced into Nevada about 1930, has since spread widely in the northwestern United States. It is confined to semidesert, salty lands, primarily in disturbed areas such as abandoned fields, abused ranges, and roadsides.

Halogeton, with reddish stems, varies from a few inches to 2 feet (about 60 centimetres) tall. The bluish-green leaves, sausage-shaped and bearing a hairlike spine at the tip, are very high in water content. The true flowers are inconspicuous, but the very abundant seeds bear five winglike, whitish bracts; after midsummer the plant is a mass of these showy flowerlike seeds.

The high content of oxalates (the dried plants have 5–25 percent of these) makes halogeton poisonous to sheep and cattle. Fortunately, animals do not eat the plant in quantity when other forage is available. Ranges with large amounts of halogeton ordinarily can be safely grazed if livestock are prevented from concentrating on pure stands of the plant. Elimination of the weed by spraying is feasible only in small areas.

halon, chemical compound used in fire fighting. A halon may be any of a group of halogenated aliphatic hydrocarbons, most of which are derived from methane or ethane by replacing some or all of the hydrogen atoms by atoms of the halogen series (fluorine, bromine, chlorine, or iodine). The effectiveness of halons in extinguishing fires arises from their action in interrupting chain reactions that propagate the combustion process. Halons are nonconductors of electricity and can be used in fighting fires in flammable liquids and most solid combustible materials, including those in electrical equipment; they are ineffective on fuels containing their own oxidizing agent or highly reactive metals, such as sodium or potassium. Halon 1301 (bromotrifluoromethane) is especially favoured for extinguishing fires involving electronic equipment because it leaves no residue and does not cause electrical short circuits or damaging corrosion of the equipment.

Because halon is a compound considered destructive of the Earth's ozone shield, environmentalists have urged restriction of its use.

Haloragales (plant order): *see* Hippuridales.

halothane, also called 2-BROMO-2-CHLORO-1,-1,1-TRIFLUOROETHANE, or FLUOTHANE, nonflammable, volatile, liquid drug introduced into medicine in the 1950s and used as a general anesthetic. Halothane rapidly achieved acceptance and became the most frequently used of the potent anesthetics, despite its substantially higher cost than ether and chloroform and its tendency to depress respiration and circulation. Its vapours are not nauseating or irritating to mucous membranes.

halotrichite, a sulfate mineral containing aluminum and iron $[FeAl_2(SO_4)_4 \cdot 22H_2O]$. If more than 50 percent of the iron has been replaced by magnesium, the mineral is called pickeringite. These minerals are usually weathering products of sedimentary rocks that contain aluminum and metallic sulfides, and usually occur as efflorescences. They also occur in volcanic fumarole deposits, in the gossan (weathered capping) of sulfide ore veins, and, recently deposited, in lignite and coal seams. They are sometimes grouped in older literature with other salts having a hairlike habit as *Haarsalz* ("hair salts"). For detailed physical properties, *see* sulfate mineral (table).

Ḥalq al-Wādī, also called LA GOULETTE, town, northern Tunisia, an outport for Tūnis. Located on a sandbar between Lake Tūnis and the Gulf of Tunis, it is linked to the capital by a canal 7 miles (11 km) long. The harbour complex, a base for a fishing fleet, handles a large portion of the country's imports and much of its exports (principally phosphates, iron ore, and fruits and vegetables). Ḥalq al-Wādī ("river's throat") is a popular bathing resort and residential section of Tūnis. It has several large thermal electric plants. Remains of Hispano-Turkish fortifications lie inland. Pop. (1984) 61,609.

Consult the INDEX *first*

Hals, Frans (b. 1581/85, Antwerp, Spanish Netherlands [now in Belgium]—d. Sept. 1, 1666, Haarlem, Neth.), great 17th-century portraitist of the Dutch bourgeoisie of Haarlem, where he spent practically all his life. Hals evolved a technique that was close to impressionism in its looseness, and he painted with increasing freedom as he grew older. The jovial spirit of his early work is typified by "The Merry Company" (*c.* 1616–17). In middle age his portraits grew increasingly sad, revealing sometimes a sense of foreboding (*e.g.,* "Nicolaes Hasselaer," *c.* 1630–33). The paintings of his old age show best his genius for portraying character (*e.g.,* "Man in a Slouch Hat," *c.* 1660–66).

"The Merry Toper," oil on canvas by Frans Hals, *c.* 1628–30; in the Rijksmuseum, Amsterdam

By courtesy of the Rijksmuseum, Amsterdam

Early life and works. Frans Hals left no written evidence about his life or his works, and only a brief outline of his biography is known. He was the son of a clothworker from Malines (Mechelen) and of a local girl, and the family moved from Spanish-held Flanders to Haarlem in the free Netherlands by 1591 at the latest; the local townhall records give this date for the christening of Frans's younger brother Dirck, who also became a painter. Except for a brief visit to Antwerp in 1616, Hals lived all his life in Haarlem.

What he did for the first 25 or 30 years of his life is not known. The earliest indication of his activity as an artist was that, in about 1610, he joined the Guild of St. Luke of Haarlem, a body empowered to register artists as masters. Shortly afterward he married his first wife, Annetje Harmensdochter Abeel. She bore him two children before her death in 1615. Two years later, Hals married Lysbeth Reyniers, who was to survive her husband by some nine years. In all, Hals had 10 children, and 5 of his 8 sons became painters. None, however, was of note.

Tradition has it that Frans Hals was the pupil of Carel van Mander, a minor painter and poet who helped found a successful painting academy at Haarlem. There is no evidence either to support this claim or to refute it. From the beginning, however, Hals's work conflicted with the typical mannerisms of his presumed master. His early work is actually closer in spirit to that of Jacob Jordaens, who was an outstanding Baroque painter from Antwerp and a pupil of Peter Paul Rubens and who was younger than Hals by several years. The good humour of Hals's popular scenes recalls the joyous gatherings painted by the contemporary Dutch followers of the earthy, sensuous Italian painter Caravaggio.

Frans Hals seems, from the evidence of extant works, to have begun his career with sober portraits and with group portraits of members of the local guilds and military societies. The best of these early works—which already shows complete competence in portraiture—is a monumental painting entitled "Banquet of Officers of the Civic Guard of St. George at Haarlem," painted with a loose brushstroke technique that is unlike anything else in Dutch art of the time. It already has a sense of life and of relationship between the figures that was then unknown in this type of subject matter. By about 1620, however, Hals had begun to introduce into his paintings the jovial spirit that characterized his early works and that portrays with accuracy and enthusiasm one important aspect traditionally ascribed to Dutch character. Many of his portraits are simply pictures of merrymakers. The portrait of Hans Wurst in "The Merry Company" shows the sitter in a tall, wide-brimmed hat, wearing a necklace made of pig's feet, herrings, and eggs. The portrait of Mr. Verdonck shows the subject joyfully brandishing the jawbone of a horse. Similar in spirit are the portrait of Peeckelhaering clenching his beer mug, "The Merry Toper," and two later portraits, a picture entitled "Malle Babbe," which portrays an old madwoman laughing, with an owl perched on her shoulder, and a joyful picture in the Louvre Museum of a laughing, carelessly dressed Gypsy girl. In Hals group portraits, too, the spontaneous joie de vivre that is evident in the individual portraits is felt to a degree that revolutionizes the hitherto austere genre. One such painting is his second "Banquet of Officers of the Civic Guard of St. George at Haarlem," in which the figures take up postures normally employed for the expression of mystical religious rapture to celebrate their well-nourished contentment. In this painting, Hals displays his unmistakable genius for mise-en-scène; the dramatic effects he achieves here set him apart from most other painters. His militiamen are linked in a harmonious composition that makes the viewer aware of the cohesion of their group as a whole. Each conducts a dialogue with his neighbour, and here and there one figure is made purposely to disrupt the scheme with a gesture or a glance in the viewer's direction. Nothing is happening except a meal shared by typical members of the Dutch middle class and their conversations. Yet there is a majesty to this scene that is equal to any depiction of an incident from the life of a king. This painting also hints at the sense of mysterious spirituality, which, fostered by the artist's intimate knowledge of his subjects, came with his maturity to thread its way into his absolute realism.

By the 1620s Hals had definitively evolved a technique that was close to impressionism in its looseness. Like the contemporary Spanish painter Diego Velázquez, he used colour to structure forms; and this use of colour is what sets the two artists apart from their contemporaries. Unique to Hals, however, is his use of quick, loose strokes of bright colour that suggest rather than enclose form and are highly expressive of movement and of the subjects' vitality. Most painters of the 17th century approached their paintings slowly, with preparatory drawings, a certain amount of underpainting, and an elaborate finish. Although there is no certain evidence of his method, Hals seems to have started directly on the canvas and painted quickly, leaving his first spontaneous expression, which is almost an oil sketch, as the finished work. Hals continued to use this technique, which gave a striking immediacy to his perceptive portrayals of character, all his life, painting with increasing freedom as he grew older.

It has often been suggested that Frans Hals's life resembled the lives of the bon vivants he portrayed at the beginning of his career. It is true that from 1616 he began to incur claims from creditors, and he was in financial difficulties most of his life. He belonged, however, to the Haarlem St. George militia company and was a member of the Haarlem De Wijngaertranken (Society of Rhetoricians) in 1618–19 (he was an associate of the society from 1616 to 1625); both of these facts are quite inconsistent with the romantic picture of dissipation that traditionally has been associated with the painter. Moreover, the stern preachers and theologians, the high-ranking officials, the surgeons, the admirals, the writers, and the respectable shopkeepers whose portraits Hals painted in great numbers were not likely to have posed for a dissolute person.

Later life and works. At any rate, the joviality began to disappear from the paintings of Hals's middle age. In the portraits painted after he reached the age of 40, the subjects seem to eye the world knowingly, with a shade of sadness in their faces. The earliest portrait that strongly shows this quality is "Man with Arms Crossed." Others follow that contain the same theme: "The Laughing Cavalier"; "Portrait of Isaac Abrahamszoon Massa"; "Pieter van den Broecke"; "Nicolaes Hasselaer"; "Willem van Heythuyzen"; and "Daniel van Aken Playing the Violin." These portraits seem to reveal a sense of foreboding; still, their mood ranges somewhere above the midpoint in the "human comedy." The period from 1630 to 1650 was Hals's most productive. He was very popular among the staid citizens of Haarlem's middle class, and during this time he painted more than 100 single portraits and 6 group and family portraits.

Frans Hals lived to be very old, and it is in the paintings of his old age that his genius for portraying human character is fully revealed. The last years of his life were difficult materially, and he was harassed by discouraging family problems. Although he continued to work steadily, he received markedly fewer commissions after 1650. He had, during his long career, achieved an impressive reputation; he had been honoured by many important commissions, had become in 1644 an officer of the Guild of St. Luke, and in 1649 had painted the philosopher René Descartes. Still, although some continued to value his subtle perceptions, the public had generally begun to favour a more elegant style made popular by the English portrait painter Anthony Van Dyck. What commissions he did receive were not enough to support him, and, like his two great compatriots Rembrandt and Vermeer, he saw his possessions sold at auction for debt (1654). It was not until 1662 that his right to public assistance was recognized, and he was accorded a yearly pension by the city. In spite of this adversity the portraits of Hals's last 16 years are his masterpieces. At this point, a view of the world is revealed in his painting in which the human comedy takes a tragic turn, and something breaks in the order that had kept the reasonable man and the madman separated. His portraits, no longer tempered by laughter, seem to express a realization that simply being is enough, after a certain age, for life to impress its tragic seal.

Henceforth, Hals drew gradually closer to traditional subjects and stored away his drinking glasses and his tableware. At the same time he diminished the intensity, the vividness of his themes, a greater simplicity appeared in his compositions, and he took more and more liberty with his painting. His palette lost a good deal of its lustre. But through decades of work he had evolved a remarkably broad range of blacks and whites to choose from, and these colours were sufficient for what he wanted to show.

From 1650 on, his subjects begin almost to look awestruck, and Hals ceases to bind his compositions into powerfully articulated human masses. Instead, he strings the solitude of each figure together on a flimsy thread, with the pattern broken only here and there by some ultimate spark of vitality. The light seems to act as a nervous system in his subjects that whips their drowsy flesh back to life, and the magic of the brushwork seems to startle their faces out of a swoonlike slumber. In the two celebrated portraits of the "Governors of the Old Men's Home at Haarlem," one a group of old men and the other of old women, his men seem overcome with drunkenness and his women entranced by the obsession of death. Here he presents us with the most extraordinary reunion of senile decay ever assembled in the history of the pictorial arts; he shows us the quavering flame of dying life. It is not known whether these portraits were comprehensible to his models. Apparently, none of the regents of the home objected to the paintings hanging in their Hall of Honour. Perhaps his subjects shared the old painter's humility in the face of destiny. Thus, the harmony in the colourful blare of the early works came to be succeeded by an art that seemed to give form to elusive nervous twitches, sudden motions, and to heartbeats accelerating, only to falter and start again. All his life Frans Hals had acted as a lucid observer of Haarlem. He painted it in the loud mirth of youth, and, reflecting in the image that he made of it his own life and declining health, he remained its faithful companion until his death.

Old age fostered self-denial and a strict discipline in Hals, along with a new freedom in his painting. It most certainly was a painful time for the great painter. But the years had also sharpened his vision. There is no sign of religion in the evolution of his art; and it may be assumed that to Frans Hals, painting was a secular concern. Nevertheless, the loving compassion that permeated his art becomes, in his last years, something spiritual.

Like many artists whose style is unique in their own time, he left few direct followers; the closest was Adriaen Brouwer, who used Hals's techniques well to portray tavern scenes and similar subjects. Hals was for a long time regarded as a competent but limited painter whose consistent neglect of any subjects other than portraits gave him no place in the history of significant art. It was not until the 19th century that interest in his work was revived. He influenced Édouard Manet with his free style and Vincent van Gogh with his subtle range of colours. In modern times he has been appreciated for the serious and excellent realist painter that he was. (P.De.)

MAJOR WORKS. "Banquet of Officers of the Civic Guard of St. George at Haarlem" (1616; Frans Halsmuseum, Haarlem, Neth.); "The Merry Company" (*c.* 1616–17; Metropolitan Museum of Art, New York City); "Portraits of Paulus van Beresteyn and His Wife" (1620; Louvre, Paris); "Nurse and Child" (*c.* 1620; Staatliche Museen Preussischer Kulturbesitz, Berlin); "Man with Arms Crossed" (1622; Trustees of the Chatsworth Settlement, Chatsworth, Eng.); "The Laughing Cavalier" (1624; Wallace Collection, London); "Portrait of Jacob Pietersz. Olycan" (1625; Mauritshuis, The Hague); "Portrait of Aletta Hanemans" (1625; Mauritshuis); "St. Matthew and the Angel" (*c.* 1625; State Museum, Odessa, U.S.S.R.); "Portrait of Isaac Abrahamszoon Massa" (1626; Art Gallery of Ontario, Toronto); "Young Man Holding a Skull" ("Hamlet"; *c.* 1626–28; Sir Richard Proby Collection, Peterborough, Eng.); "Banquet of Officers of the Civic Guard of St. George at Haarlem" (1627; Frans Halsmuseum); "Verdonck" (*c.* 1627; National Gallery of Scotland, Edinburgh); "Peeckelhaering" (*c.* 1628–30; Staatliche Kunstsammlungun, Kassel, Ger.); "The Merry Toper" (*c.* 1628–30; Rijksmuseum, Amsterdam); "Gypsy Girl" (*c.* 1628–30; Louvre); "Portrait of a Man" (1630; Buckingham Palace); "Malle Babbe" (*c.* 1630–33; Staatliche Museen Preussischer Kulturbesitz); "Nicolaes Hasselaer" (*c.* 1630–33; Rijksmuseum); "A Burgomaster" (*c.* 1631–33; Frick Collection, New York City); "Portrait of an Elderly Lady" (1633; National Gallery of Art, Washington, D.C.); "Portrait of a Man in His Thirties; Bust" (1633; National Gallery, London); "Pieter van den Broecke" (1633; Iveagh Bequest, Kenwood House, London); "Portrait of a Woman" (1635; Frick Collection); "The Company of Captain Reynier Reael and Lieutenant Cornelis Michielsz. Blaeuw" or "The Meagre Company" (1637; Rijksmuseum); "Willem van Heythuyzen" (*c.* 1637–39; Musée Royal des Beaux-Arts, Brussels); "The Violinist" ("Daniel van Aken Playing the Violin"; *c.* 1640; Nationalmuseum, Stockholm); "Portrait of a Young Man" (an unidentified member of the Coymans family) (*c.* 1645; National Gallery of Art, Washington, D.C.); "Portrait of Isabella Coymans, Wife of Stephanus Geraerdts" (*c.* 1650–52; private collection, Paris); "Man in a Slouch Hat" (*c.* 1660–66; Staatliche Kunstsammlungun, Kassel); "Governors of the Old Men's Home at Haarlem" (1664; Frans Halsmuseum); "Lady-governors of the Old Men's Home at Haarlem" (1664; Frans Halsmuseum).

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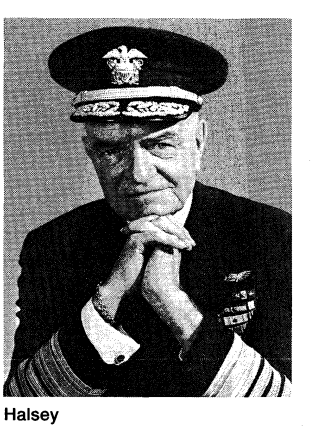
Halsey, William F(rederick), Jr., byname BULL HALSEY (b. Oct. 30, 1882, Elizabeth, N.J., U.S.—d. Aug. 16, 1959, Fishers Island, N.Y.), U.S. naval commander, who led vigorous campaigns in the Pacific area during World War II.



Halsey
By courtesy of the U.S. Navy

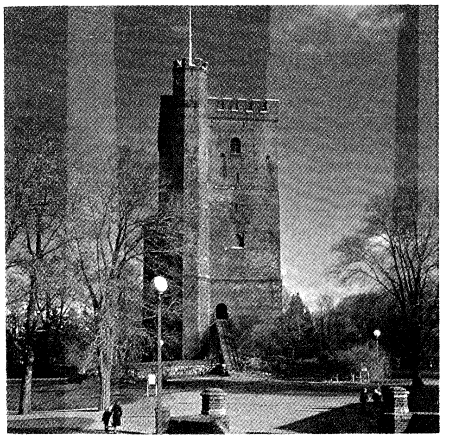
A graduate of the U.S. Naval Academy at Annapolis, Md., in 1904, Halsey served as a destroyer commander in World War I. He became a naval aviator in 1935 and reached the rank of admiral in 1942. After the Japanese attack on Pearl Harbor (December 1941), Halsey directed surprise forays on Japanese-held islands in the Marshalls and Gilberts as well as on Wake Island. In April 1942 his group manoeuvred close enough to Tokyo for planes to carry out the first bombing of the Japanese capital. Consistent successes led to his appointment (October) as commander of the Pacific force and the South Pacific area. During the next two months, he played a vital role in the Battle of Santa Cruz Islands and the naval Battle of Guadalcanal.

In June 1944 Halsey became commander of the 3rd Fleet and led his carrier task force in brilliant air strikes. He was responsible for covering and supporting U.S. land operations as well as finding and destroying the Japanese

fleet in the Battle of Leyte Gulf (October). He led U.S. forces in the final naval operations around Okinawa in the Ryukyu Islands from May 28, 1945, to September 2, when the Japanese surrendered.

Halsey was promoted to the rank of fleet admiral in December 1945, and he retired in 1947. He was president of International Telecommunications Laboratories (1951–57).

Hälsingborg, also spelled HELSINGBORG, city and seaport in Malmöhus *län* (county), southern Sweden, at the narrowest part of The Sound (Öresund), opposite the Danish town of Helsingør (Elsinore). It is the most convenient place for motor traffic to cross to and from the European continent. Because of its situation, it is known as "the Pearl of The Sound." It was first mentioned as a town in 1085. With its strong fortress, it was of great military and political importance during the European Middle Ages. It was ceded to Sweden by Denmark in 1658 but was thereafter laid waste several times by the Danes before hostilities ended in the early 18th century. The abolition in 1857 of the toll for crossing The Sound marked the beginning of the town's commercial prosperity.



The 12th-century Kärnan (the "Keep"), sole remnant of the ancient fortifications of Hälsingborg, Swed.
Picturepoint, London

Of the ancient fortifications, only Kärnan (the "Keep") has survived. Other notable buildings are the town hall (1897), in North German Gothic style; the concert hall (1931); the 13th-century Gothic-style Maria Church; and an indoor sports centre that is one of the biggest stadiums in Sweden. Museums include Vikingsberg Art Gallery and an open-air museum. Two monuments are of special interest: a Carl Milles statue to shipping and a black and gold globe of the universe in honour of the astronomer Tycho Brahe. Sofiero Castle, the royal summer residence, is nearby.

Hälsingborg is a leading shipping centre and a major manufacturing town. Shipbuilding is also important. There is ferry service to Helsingør, and railways run to Stockholm, Göteborg, and Malmö. Pop. (1989 est.) mun., 107,443.

Hälsinge Runes, greatly abbreviated runic alphabet, found mainly in inscriptions dating from the 10th to the 12th century in the Hälsingland region of Sweden. Probably developed near Lake Malar, the runes seem to be a simplification of the Swedish-Norwegian Rök runes and lack vertical strokes. *See also* Rök Stone; runic alphabet.

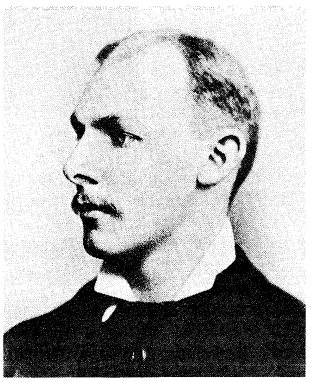
Hälsingland, *landskap* (province), east-central Sweden, in the southern part of Norrland region. It is bounded on the east by the Gulf of Bothnia, on the south by the *landskap* of Gästrikland, on the west by those of Dalarna and Härjedalen, and on the north by that of Medelpad. Its land area, 5,507 square miles (14,264 square km), is included in the administrative *län* (counties) of Gävleborg and Jämtland. Like the rest of Norrland, it is characterized by forests cut by fertile river valleys. Extensive forests have made sawmilling and the manufacture of wood pulp and cellulose the leading industries; there is some agriculture. The principal towns are Söderhamn, the southernmost; Hudiksvall, the largest and oldest (chartered 1582); and Bollnäs. Pop. (1989 est.) 142,333.

Halsted, William Stewart (b. Sept. 23, 1852, New York, N.Y., U.S.—d. Sept. 7, 1922, Baltimore, Md.), American pioneer of scientific surgery who established at Johns Hopkins University, Baltimore, the first surgical school in the United States.

After graduating in 1877 from the College of Physicians and Surgeons, New York City, Halsted studied for two years in Europe, mainly in Vienna, under the noted German surgeon Theodor Billroth. Returning to New York, Halsted quickly built a successful practice that demanded his services at six hospitals. In 1881, he discovered that blood, once aerated, could be reinfused into a patient's body.

By self-experimentation he developed (1885) conduction, or block, anesthesia (the production of insensibility of a part by interrupting the conduction of a sensory nerve leading to that region of the body), brought about by injection of cocaine into nerve trunks. He fell into a drug addiction that required two years to cure. Halsted continued his research at Johns Hopkins, where he developed original operations for hernia, breast cancer, goitre, aneurysms, and intestinal and gallbladder diseases.

An early champion of antiseptic procedures, Halsted introduced (1890) the use of thin rubber gloves that do not impede the delicate touch demanded by surgery. By ensuring completely sterile conditions in the operating room, Halsted's gloves allowed surgical access to all parts of the body. His emphasis on the maintenance of complete homeostasis, or balanced body metabolism, during surgical operations, gentleness in handling living tissue, accurate realignment of severed tissues, and his creation of hospital residencies in training surgeons did much to advance surgery in the United States.



Halsted, 1905
By courtesy of the Johns Hopkins Press

Ḥaltami (ancient country): *see* Elam.

haltia, a Balto-Finnic domestic spirit who oversees the household and protects it from harm. The word *haltia* is derived from the Germanic *haldiaz,* originally from Gothic *haldan* referring to the ruler or master of a given area.

In Finland the *haltia* was usually the spirit of the first person to lay claim to a site either by lighting a fire on it or by building a house on it or, in some cases, the first person to die there. The *haltia* was believed to resemble such a person in every way, including sex, age, dress, and mannerisms. The dominant idea was that a person, once laying claim to a piece of land, would always remain in charge of it. A *haltia* could even be brought to a new site from the previous one, either with the fire kept alive and transferred or by taking ashes from the old to the new site.

The *haltia* was the prime moral force of the household, who saw to it that norms were observed and expressed his displeasure at fighting, swearing, drinking, and other forms of socially disapproved conduct.

Other buildings on a farmstead also had their tutelary spirits. The barn spirit watched over the animals, the threshing-house spirit saw to it that the fire for drying grain was kept burning, and the mill spirit kept the miller awake to keep the mill running.

The Finnish *haltia* tradition has been influenced more recently by Swedish customs concerning the *tomte,* who appears in Finnish as *tonttu.* He is usually depicted as a bearded old man dressed in gray with a red stocking cap, with functions quite similar to those of the *haltia.* In some cases it is difficult to distinguish the household spirit from the *maahiset,* which is considered to be the aboriginal guardian of the land before human settlement.

Haltia, Mount, Finnish HALTIATUNTURI, Swedish HALDEFJÄLL, Norwegian REISDUODDARHALDDE, highest mountain in Finland, at the extreme northwestern tip of Finnish Lapland on the Norwegian border, rising to 4,357 feet (1,328 m). The peak is located in Finland's only true mountain range, the Haltia (Halddia in Norway).

Halton, district (borough), county of Cheshire, England. It has an area of 29 square miles (74 square km). The name Halton is ancient, and the barony of Halton created after the Norman Conquest (1066) included land on both sides of the River Mersey.

Runcorn, on the southern shore of the Mersey, was a small agricultural settlement dominated by a castle first built in the early 10th century on Halton Hill. The building of the Bridgewater Canal (1761), and later the Old Quarry Canal and Weaver Canal, transformed it into an industrial town with tanneries, shipyards, and soap and chemical works.

Widnes, on the northern bank of the Mersey, was merely a small scatter of houses at Woodend until 1845, when the rail-canal-dock complex was completed on what was then called Widnes Dock, now called Spike Island. Woodend was transformed into a centre of the alkali industry, established in 1847 by John Hutchinson. Soap manufacture and other chemical industries were also attracted to the growing town. Enormous quantities of toxic and evil-smelling waste from the alkali industry produced ugly refuse dumps, but the first Alkali Act of 1862 was the beginning of the slow introduction of stricter operating conditions.

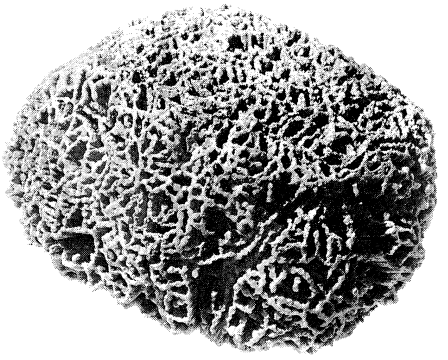
Widnes town centre developed in the second half of the 19th century around Victoria Square. The environment improved slowly in the 1920s and '30s; after World War II there was a large building program and industrial diversification, but the chemical industry is still important at Halton and Runcorn. The first bridge across the Mersey at Runcorn was completed in 1868, a high-level railway bridge; in 1905 the Transporter bridge for road traffic was opened, replaced in 1961. Pop. (1986 est.) 123,200.

halvah, also spelled HELVA, any of several confections of Balkan and eastern Mediterranean origin, made with honey, flour, butter, and sesame seeds or semolina, pressed into loaf form or cut into squares. Halvah is made with a variety of colourings and flavourings. Its texture is characteristically gritty and crisp.

In some versions, sugar and nuts, often pignolia nuts or blanched almonds, are substituted for the more traditional honey and sesame seeds. In either case, the sweet syrup is added to a sautéed mixture of butter, nuts, and farina. These are blended thoroughly, then covered and cooked until all the syrup is absorbed. The candy is often sprinkled with cinnamon or served warm or cold with whipped cream.

Halys (Turkey): *see* Kızıl River.

Halysites, extinct genus of corals found as fossils in marine rocks from the Late Ordovician Period to the end of the Silurian Period (458 to 408 million years ago). *Halysites* is also



Halysites catenularia, middle Silurian in age, collected from the Lockport Dolomite in western New York

By courtesy of the Buffalo Museum of Science, Buffalo, N.Y.

known as the chain coral from the manner of growth observed in fossilized specimens; the genus is colonial, and individual members of the colony construct an elliptical tube next to each other in the manner of chain links.

ham, the rear leg of a hog prepared as food, either fresh or preserved through a curing process that involves salting, smoking, or drying. The two hams constitute about 18–20 percent of the weight of a pork carcass. In the United States, shoulder portions of pork carcasses are frequently processed and marketed as shoulder hams, picnic hams, Callies, and Californias, but such products are inferior to true ham. Most ground ham spreads, sold under a variety of trade names, are processed from pork shoulders and ham trimmings.

A compact source of high-grade animal protein, ham compares favourably with good beef in this respect and has available energy ranging from 1,200 to 2,600 calories per pound, depending on fatness. It is an outstanding source of thiamine (vitamin B_1), iron, riboflavin, niacin, phosphorus, and calcium. Ham was one of the most ancient meats of civilized man and was common throughout Europe and Asia except where forbidden by religious edict. Introduced to the American continents by the first European settlers, it became a favoured food on the farms of North America, where home curing of hams became an elaborate tradition of the late fall and winter months. Losses through putrefaction were high, however, and product quality varied greatly.

Curing ham is essentially a process of checking the growth of spoilage bacteria by the application of curing agents; and, until such agents are sufficiently concentrated to protect the centre of the ham, the meat must be kept at a low temperature. In addition to preserving the meat, curing gives it additional flavour, depending upon the ingredients in the cure, the length of time they are applied, etc. Most hams receive a mild cure, giving a mild flavour, and require continuous refrigeration; country hams, not requiring refrigeration after processing, are produced on farms and in some plants having a specialty trade.

Salt preserves the meat but in excessive quantities impairs the flavour and makes the lean muscles undesirably hard. These disadvantages can be offset by the addition of sugar to the curing mixture, which also improves the flavour and texture of the meat; the result is called a sugar-cured ham, which most consumers prefer to the plain salt-cured product. Sodium or potassium nitrite, which inhibits the growth of the botulism-causing bacterium *Clostridium botulinum* and fixes the colour of the meat, is also used in curing; these additives became the subject of controversy in the late 20th century when studies linked them to a possible carcinogen-forming process in laboratory animals. Honey may be used to give a distinctive flavour, with sugar or replacing it, and various condiments may be added for aroma and flavour.

Basic methods of curing are dry curing, in which the cure is rubbed into the meat by hand, and brine curing, in which the meat is soaked in a mixture of water and the curing agents. Brine curing requires about four days per pound of ham; dry curing is faster (two to three days per pound). Commercial curing is accelerated by injecting the pickle (curing mixture) into the ham by means of a pump fitted with a perforated needle. Many mild-flavoured retail hams are processed rapidly by being pumped arterially to 110–118 percent of their raw weight with a pickle containing dextrose and corn syrup. In conventional curing, alkaline phosphates commonly are used to increase moisture retention. Combination cures—*e.g.,* pumping with pickle, followed by dry curing—also are used.

Heat processing is determined by the type of finished product desired. Fully cooked hams for retail sale are processed to an internal temperature of 155° F (68° C) and are therefore acceptable as food without further cooking. (A processing temperature of 137° F [58° C] is adequate to destroy trichina.)

After curing, hams may be smoked, which gives the meat a rich mahogany colour, helps in preservation, and helps develop a mellow flavour (or they may be canned and heat processed). Green hickory wood and sawdust are considered desirable fuels, but there are many variations in materials and methods of smoking. Some hams are aged after smoking.

Hams of various regions of North America and Europe are noted for their distinctive qualities resulting from unique combinations of hog-raising and meat-processing techniques. The renowned Kentucky hams of the United States, for example, are cut exclusively from Hampshire hogs that have been fattened on beans, wild acorns, and clover until the last few weeks before the slaughter, when their diet is restricted to grain. The curing process entails a month of dry-salting, a month of smoking over apple and hickory wood, and a 10- to 12-month period of maturation.

Virginia hams, prized for their sweetness, are cut from razorback hogs fed on peanuts and peaches. They are cured, then smoked over apple and hickory wood fires, and hung to age in the smokehouse. Perhaps the most widely known country hams of the United States are those of Smithfield, Va., which are processed from hogs fattened on acorns, nuts, and corn. The hams are cured in a dry mixture for 30–37 days, then spiced with black pepper, and cold smoked (at 70°–90° F [21°–27° C]) for another 10–15 days. Afterward, the ham is aged and mellowed for a minimum of one year. Queen Victoria of England was a regular and celebrated customer of a noted Smithfield concern.

In Britain, the York and Bradenham hams of Yorkshire and those of Limerick, Ireland, are especially notable. The French *jambon de Bayonne* from the Lower Pyrenees and the home-cured Estremadura and mountain-smoked *presunto* of Portugal form the basis of an extensive traditional cookery in those countries. Cured ham, often elaborately dressed, is an essential element of the Christmas smorgasbord in Scandinavia. Several European hams, notably the salt-cured *prosciutto di Parma* of Italy, the delicately smoked *Pražská šunka* and *szynka* of Czechoslovakia and Poland, respectively, and the robust Westphalian of Germany, are exported as delicacies around the world.

Ham Nghi, original name UNG LICH (b. 1870, Hue, Vietnam—d. 1947, Algeria), emperor of Annam (now Vietnam) in 1884–86 who rejected the role of a figurehead in the French colonial regime.

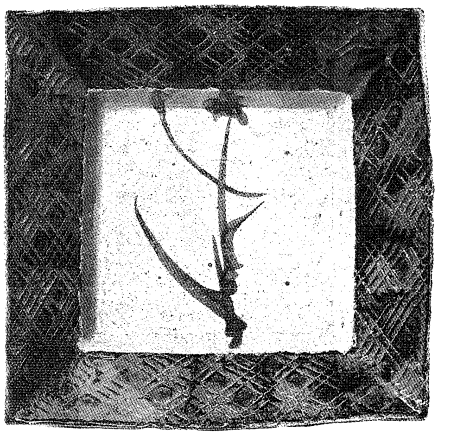
Ung Lich was a nephew of the emperor Tu Duc, whose death in 1883 led to a disputed succession. After several equally legitimate heirs had been assassinated or deposed, Ung Lich ascended the throne through the intricate intrigues of two mandarin power seekers, the regents Nguyen van Tuong and Ton That Thuyet, who sought to use the young prince to undermine French control. With the consent of France, the 14-year-old Ung Lich was crowned emperor of Annam in 1884, taking the royal name Ham Nghi.

At the instigation of the regents, the young sovereign headed an insurrection against the French at Hue on July 4, 1885. The revolt failed, and Ham Nghi fled with Ton That Thuyet to Cam Lo, a mountain refuge. The French deposed Ham Nghi and replaced him with the acquiescent Dong Khanh in 1886. Ham Nghi was captured and exiled to Algeria.

Hama (Syria): *see* Ḥamāh.

Hamad Bari: *see* Shehu Ahmadu Lobbo.

Hamada Shōji (b. Dec. 9, 1894, Kawasaki, Kanagawa *ken* [prefecture], Japan—d. Jan. 5, 1978, Mashiko), Japanese ceramist who revitalized pottery making in Mashiko, where ceramic arts had flourished in ancient times. Hamada was designated a Living National Treasure by the Japanese government in 1955.



Stoneware dish with brush-painted sugarcane pattern by Hamada Shōji, after 1930; in the Philadelphia Museum of Art

Philadelphia Museum of Art: given by Mrs. Albert M. Greenfield

Hamada studied ceramics at the Tokyo Industrial College (now the Tokyo Institute of Technology) and was also associated with the Kyōto Ceramic Testing Institute. With the British potter Bernard Leach, who also had great influence on contemporary ceramic art, he established a kiln in St. Ives, Cornwall, Eng., in the early 1920s before establishing his own in Mashiko. Leach and Hamada continued their association in the following decades.

Hamada's work is marked by a simple yet elegant economy of design that distinguished him as one of the world's great potters. His works are displayed in various museums, including Tokyo's Japan Folk Art Museum,

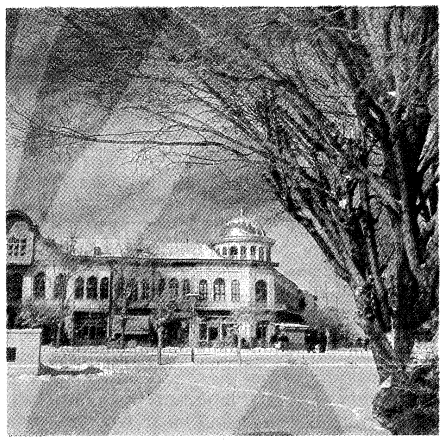
where he held the post of curator for many years.

Hamadan, also spelled HAMADĀN, ancient ECBATANA, city, west-central Iran, at the northeastern foot of Mount Alvand (11,716 feet [3,571 m]). Itself at an elevation of 6,158 feet (1,877 m), the city dominates the wide, fertile plain of the upper Qareh Sū River. There is a sizable Turkish-speaking minority.

The city, although certainly an older foundation, has records only from the 1st millennium BC. Hamadan has had many names: it was possibly the Bit Daiukki of the Assyrians, Hangmatana, or Agbatana, to the Medes, and Ecbatana to the Greeks. One of the Median capitals, under Cyrus II the Great (d. 529 BC) and later Achaemenidian rulers, it was the site of a royal summer palace. A little east of Hamadan is the Moṣṣalā, a natural mound the debris of which includes the remains of ancient Ecbatana, which has never been excavated. The modern city is built partly on its mounds. The city is mentioned in the Bible (Ezra 6:2).

The city was captured by the Arabs in 641 or 642 and for some centuries remained a provincial capital, though important only commercially. In the second half of the 12th century, the Seljuq Turkish sultans made it their capital, and so it remained for 50 years. To this period dates the building of Gonbad-e ʿAlavīyān, a mausoleum with fine stucco work.

About 1220 Hamadan was destroyed by the Mongols; in 1386 it was sacked by Timur (Tamerlane), a Turkic conqueror, and the inhabitants massacred. It was partly restored in the 17th century and subsequently changed hands often between Iranian ruling houses and the Ottomans. In modern times its strategic position has caused a revival. The city was damaged during the Iran-Iraq War of the 1980s.



Park square in Hamadan, Iran

By courtesy of the Iran National Tourist Organization

Modern development is modest. In summer the pleasant climate makes Hamadan a resort, but the winters are long and severe. The Shahnāz Dam provides water for the city. Grain and fruits are grown in abundance, and Hamadan is an important trade centre on the main Tehrān-Baghdad highway. In the Iranian rug trade it ranks second only to Kermān. Pop. (1986 prelim.) 272,449.

Hamadan rug, any of several handwoven floor coverings of considerable variety, made in the district surrounding the ancient city of Hamadan (Ecbatana) in western Iran and brought there for marketing. Several generations ago, many of these rugs were traded through Mosul and consequently were known as Mosul rugs.

The older pieces had a cotton foundation, with a single shot of weft carried across the rug after each row of Ghiordes knots. Much camel's hair in natural colours was used in the

Persian Hamadan rug, late 19th century; in a New York state private collection

New York state private collection; photograph, Otto E. Nelson—EB Inc.

pile, often forming a broad band at the edges of the rug; but wool dyed in camel colours was a frequent substitute. Repeat designs and "pole medallion" schemes (medallions connected by a "pole") were used, individual villages having their own stock patterns. A more recent production of relatively coarse and cheap rugs has been introduced, so that in late years a Hamadan has become synonymous with an inexpensive Persian.

Hamadānī, al-, in full ʿALĪ IBN SHIHĀB AD-DĪN IBN MUḤAMMAD AL-HAMADĀNĪ (b. Oct. 22, 1314, Hamadān, Iran—d. Jan. 18, 1385, near Kunar, Kashmir, India), mystic Persian theologian responsible for the propagation of the Kubrāwīyah order of Ṣūfīs (Islāmic mystics) in Kashmir.

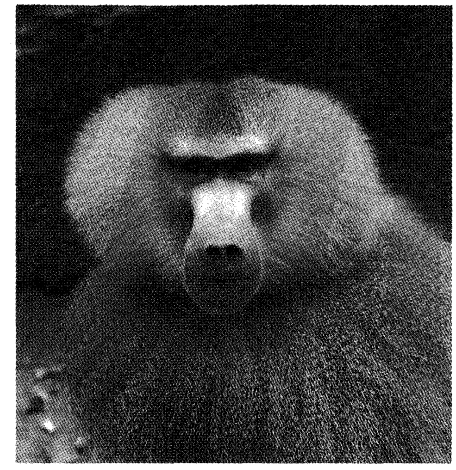
A scion of a famous Persian family of Sayyids (descendants of the Prophet Muḥammad), he became a dervish (itinerant holy man) and traveled extensively throughout the Middle East. He visited Kashmir in 1372, 1378, and 1385. Through his efforts and those of his followers, the Kubrāwīyah order of mystics became popular in Kashmir. Al-Hamadānī's best-known work is his *Dhakhīrat al-mulūk* ("Treatise on the State")—a study of political ethics. His burial place, Kulab, is still a pilgrimage site.

Hamadhānī, al-, in full BADĪʿ AZ-ZAMĀN ABŪ AL-FAḌL AḤMAD IBN AL-ḤUSAYN AL-HAMADHĀNĪ (b. 969, Hamadan, Iran—d. 1008, Herāt, Ghaznavid Afghanistan), Arabic-language author famed for the introduction of the *maqāmah* ("assembly") form in literature.

Al-Hamadhānī, often known as Badīʿ az-Zamān ("Wonder of the Age"), achieved an early success through a public debate with Abū Bakr al-Khwarizmī, a leading savant, in Nīshāpūr. He subsequently traveled throughout the area occupied today by Iran and Afghanistan before settling in Herāt and marrying. Al-Hamadhānī is credited with the composition of 400 *maqāmah*s, of which some 52 are extant (Eng. trans. by W.J. Prendergast, *The Maqámát of Badíʿ al-Zamán al-Hamadhānī*, 1915). These *maqāmah*s are written in a combination of prose, rhymed prose (*sajʿ*), and poetry and recount typically the encounters of the narrator ʿIsā ibn Hishām with Abū al-Fatḥ al-Iskandarī, a witty orator and talented poet who roams in search of fortune unencumbered by Islāmic conventions of honour.

hamadryas, also called SACRED BABOON, or ARABIAN BABOON (species *Papio hamadryas*), large, powerful monkey of the plains and open-rock areas of southern Arabia and northeast Africa. It has gray fur, and the male has a full mane over the forepart of the body. Length of the hamadryas is about 60–70 cm (24–28 inches), and weight may be up to 18 kg (40 pounds). The hamadryas is similar in habit to other baboon species but seems to live in smaller groups of a few females and a single male.

Like the ibis, the hamadryas was sacred to Thoth, ancient Egyptian god of learning.



Male hamadryas (*Papio hamadryas*)

Bruce Coleman—Bruce Coleman Ltd.

Mummified bodies of many of these baboons have been unearthed, and the hamadryas is said to have been trained by the Egyptians to perform many tasks.

Hamaguchi Osachi, also called HAMAGUCHI YUKO (b. May 1, 1870, Kōchi, Tosa province, Japan—d. Aug. 26, 1931, Tokyo), Japanese politician and prime minister (1929–30) at the outset of the Great Depression.

He was adopted into the Hamaguchi family at an early age. After his graduation from the Tokyo Imperial University in 1895, he joined the government in the Finance Ministry. Rising rapidly through the ranks, he entered politics and in 1914 was elected to the Diet (parliament). In 1924 he became finance minister in the government of Katō Takaaki and then minister of home affairs. Soon he was elected president of the liberal Minseitō (Democratic Party), and in July 1929 he was made prime minister.

Although Hamaguchi won reelection the following year in one of the cleanest contests in the history of Japanese politics, his policies were unpopular. In order to combat rising inflation, he returned Japan to the gold standard and promoted mechanization and rationalization of industry. The effects of the world depression, however, deflated the Japanese economy even further than Hamaguchi had intended, and his measures led to great social unrest. Moreover, Hamaguchi's plan to cut civil-service salaries was bitterly resisted. Finally, his attempts to force the military to yield to civilian leadership aroused right-wing disapproval. His acceptance of the terms of the 1930 London Naval Treaty limiting armaments was especially resented, and he was shot in the Tokyo Railway Station by a right-wing youth in November 1930. He died of his wounds almost a year later.

Ḥamāh, also spelled HAMA, city, central Syria, on the banks of the Orontes River. It was an important prehistoric settlement, becoming the kingdom of Hamath under the Aramaeans in the 11th century BC. It fell under Assyrian control in the 9th century BC, later passing under Persian, Macedonian, and Seleucid rule, the Seleucids renaming the city

Waterwheel, Ḥamāh, Syria
Ray Manley—Shostal/EB Inc.

Epiphaneia in the 2nd century BC. During Byzantine rule it reverted to Emath, a form of its traditional name. When the Arabs took the city in the 7th century AD, they transformed the principal Christian church into a great mosque. Ḥamāh was captured by the crusaders in 1108, retaken by the Muslims in 1115, destroyed by an earthquake in 1175, and occupied by Saladin in 1188, the Egyptian Mamlūk sultans in about 1300, and the Ottomans in the early 16th century. It passed to modern Syria after World War I.

Ḥamāh is an important agricultural market centre for cotton, cereals, fruit, and vegetables. Other economic activities include flour milling, wool and textile weaving, tanning, and cement manufacturing. Especially famous are its gardens, which flank the river and are irrigated by great wooden waterwheels (Arabic *nāʿūra*) between 33 feet (10 m) and 72 feet (22 m) in diameter. They were constructed in the 14th century to raise water to aqueducts, which supplied water for drinking and irrigation. Several of the original 32 of these waterwheels are in present-day use. The Bayt ʿAẓm palace, originally the residence of the Wali of Hama, was restored by the Syrian Department of Antiquities but was damaged in fighting in 1982. A perfectly preserved 18th-century Arab house, it is now a museum housing artifacts from the citadel of Hama, a little to the north of the city. This citadel (or tell) has produced artifacts from the 5th millennium BC down through the Syro-Hittite kingdom of Hamath in the 2nd millennium into the Byzantine period. In the early 1980s increasing political unrest culminated in a rebellion in February 1982. The uprising was suppressed with great force; about one-fourth of the old city was destroyed, and some 25,000 people were estimated to have been killed. Pop. (1987 est.) 214,000.

Hamakita, city, Shizuoka *ken* (prefecture), Honshu, Japan, on the west bank of the Tenryū River, northeast of Hamamatsu. The cotton industry began in the late 19th century, and the city now has more than 500 cotton factories. Other industrial products include automobile parts, motor bicycles, and textiles. Agriculture in the surrounding region yields *hechima* (snake gourds), ginger, and hogs. There are rail and highway connections to Hamamatsu. Pop. (1985) 77,228.

Hamamatsu, city, Shizuoka *ken* (prefecture), Honshu, Japan, on the Pacific coast, midway between Tokyo and Kyōto. A leading industrial centre with strong economic ties to Nagoya, Aichi *ken,* it is noted for pianos, motorcycles, cotton dyeing and weaving, and consumer goods. Hamamatsu is the marketing centre for western Shizuoka, serving the areas of Lake Hamana—known for its eel cultivation—and the lower Tenryū River. Long a transportation hub, it is served by the Tōkaidō Line (railway) and the Shinano and Tōkaidō highways. Pop. (1988 est.) 527,564.

Hamamelidaceae, the witch hazel family of the order Hamamelidales, comprising 23 genera of shrubs and trees native to both tropical and warm temperate regions. It includes mildly popular ornamentals such as witch hazel, winter hazel, and *Fothergilla,* which are outstanding for their early flowering and fall leaf colour; and sweet gum trees. The family is characterized by alternate, simple leaves and flowers usually having four or five often strap-shaped or small petals and four or five sepals. Sometimes either or both sepals and petals are lacking. Fruits are woody.

Autumn leaf colour, changing from golden yellow to orange and scarlet, is an outstanding trait of ironwood (*Parrotia persica*), a small tree from northern Iran. Its flowers, produced before the leaves, have drooping stamens, lack petals, and have brown, leaflike bracts. The close-grained wood is very strong, as are the twigs of the closely related *Parrotiopsis jacquemontiana,* used in its native Himalayan area for making baskets and bridges. A deciduous tree with petalless flowers, white bracts, and erect stamens, it is taller than ironwood, reaching about 6 m (20 feet). The still taller Japanese shrub *Disanthus cercidifolius* has dark purple flowers and leaves that turn crimson red in fall.

The timber of the Himalayan and tropical Asian genus *Exbucklandia* (by some authorities *Symingtonia*), which has two species, is much valued. *Altingia excelsa,* from Java, is one of the largest trees of the Asian tropics, sometimes reaching a height of 25 m and having a bole diameter of 2.5 m. There are seven species of *Altingia,* all Asian and all valued for their timber.

Hamamelidales, diverse woody order of flowering plants, belonging to the class known as dicotyledon (characterized by the presence of two seed leaves). Its three families are composed of 30 genera and 150 species, most of which are medium-sized trees or shrubs. They are distributed worldwide.

A brief treatment of Hamamelidales follows. For full treatment, *see* MACROPAEDIA: Angiosperms.

The Hamamelidaceae family (witch hazels) constitutes the bulk of the genera and species of the order bearing its name; its major distribution centres are eastern Asia and the Malaysian region, and it extends to Australia, North America, Central America, tropical and southern Africa, and Madagascar. Members of this group thrive in moist woodlands, and even on steep slopes in forested areas. Some are understory plants in forests, where they seldom form solid stands. Trunks of sweet gum (*Liquidambar styraciflua*), however, rise to heights of 36 m (120 feet). Several genera grow in the mountains of tropical and subtropical regions.

The nine species of *Platanus,* or plane trees, which comprise the Platanaceae family, are native to eastern Asia, the eastern Mediterranean region, North America, and Central America. They occupy habitats similar to those of the Hamamelidaceae. Specimens of the eastern, or American, sycamore (*P. occidentalis*) attain heights of 50 m.

Myrothamnus, with two species, represents the family bearing its name. These bushy shrubs are found only in Madagascar and the southern half of Africa. Their leaves are folded, persistent, and long-living, an adaptation to the extremely dry conditions of their habitat. None are cultivated.

The American sycamore, the plane tree, and the sweet gum furnish construction timbers and wood for furniture. They are handsome, hardy trees and are often planted extensively along streets. The crimson-tinted leaves of the sweet gum are striking in autumn; this tree also yields the resinous balsam styrax, used in perfumery and in medicine. Extracts of witch hazel (*Hamamelis*) continue to be used cosmetically and as household liniments.

Leaves of the Hamamelidales are mainly deciduous; a few species are evergreen. Plants belonging to the witch hazel and the plane tree families produce one leaf per node (joint) and consist of a leaf-stalk (petiole), accompanied by a pair of leaflike bracts (stipules) basally and by a simple, lobed blade. Sycamores and plane trees develop large stipules. Many species have hairs on the blade and petiole of the leaves.

Vegetative propagation in this group of plants appears to be limited to cuttings and layering of twigs made chiefly in commercial nurseries. Reproduction by seeds is highly successful in all three families of the Hamamelidales.

Inflorescences (flower clusters) range from a few flowers (even single ones) arising in the axil of a leaf (angle between stem and base of leaf-stalk) to pendant, spherical heads composed of many flowers. Most flowers in the witch hazel family are perfect (bisexual), but in the plane tree and the *Myrothamnus* families the stamens (male) and pistils (female) are borne in separate flowers; they even occur on separate plants in *Myrothamnus.* Except for the yellow petals of the American witch hazel, which brighten the stark autumn forests of the eastern United States (and similar petals in *Hamamelis* species flowering in early spring), and the showy red petals of the tropical *Rhodoleia,* sepals and petals of this order are lacking in *Myrothamnus* and are diminutive in the remaining genera.

When present, depending upon the genus, three to seven sepals form a short tube, and a similar number of petals remain separate. Stamens vary in number from two to eight. The witch hazel family produces a single pistil, but in the other families as many as nine pistils may be present in each flower. In the witch hazels, the perianth (sepals and petals) may be merged with the lower portion of the ovary, but in the other members, the ovary is completely superior. One or two ovules are differentiated within each ovary (many in *Myrothamnus*); they develop into seeds following pollination and fertilization. Pollination is accomplished by bees, flies, and wind; birds pollinate *Rhodoleia.* In the American witch hazel (*H. virginiana*), pollination occurs in autumn, but fertilization is completed five to seven months later; seeds and fruits mature one year after flowering. The seeds are ejected from the dry fruits with explosive force. In the witch hazel family and in *Myrothamnus,* fruits split open (capsule) to release seeds, but in plane trees the small fruits remain closed (achene).

The unifying features of the Hamamelidales include woody structure, angular vessel (conducting tube) elements of the xylem, simple leaves, stipules (with one exception), superior ovary, and few carpels in the pistil. Characteristics that distinguish the families from each other include type of inflorescence, pistil structure and form, and arrangement of leaves.

Hamann, Johann Georg (b. Aug. 27, 1730, Königsberg, Prussia [now Kaliningrad, Russian S.F.S.R.]—d. June 21, 1788, Munich, Bavaria [Germany]), German Protestant thinker, fideist, and friend of the philosopher Immanuel Kant. Hamann's distrust of reason led him to conclude that a childlike faith in God was the only solution to vexing problems of philosophy.

Largely self-educated, he made his living as a secretary-translator at Riga and Courland and as a government employee (1767–84) in the excise office and customhouse. Impatient with the Rationalistic abstractions of the Enlightenment and with the systematic Idealism of Kant (though retaining Kant's friendship), Hamann viewed truth as a necessary unity of reason, faith, and experience. His main concern was to reconcile philosophy and Christianity.

J. Nadler's edition of his writings (*Johann Georg Hamann: Werke*, 6 vol., 1949–57), coupled with the rise of Christian Existentialism, has done much to revive interest in Hamann, whose cryptic and paradoxical style long delayed appreciation of his influence on German literature, on religious thought, and on such philosophers as Schelling, Hegel, and Kierkegaard. *See also* fideism.

Hamar, town, seat of Hedmark *fylke* (county), southeastern Norway, on the eastern shore of Mjøsa (the largest lake in the country). It was founded in 1152 by Nicholas Breakspear, papal legate to Scandinavia, who later became the only English pope as Adrian IV. Ruins of the cathedral and bishop's palace remain from the destruction of the town (1567) by the Swedes. The modern town was rebuilt after 1848 and chartered in 1849. During the German invasion of Norway in World War II (April 1940), nearby Elverum was briefly the seat of the Norwegian king and Parliament, when the government fled the capital, Oslo.

Manufactures include heavy machinery, building materials, and leather goods. The surrounding agricultural areas are among the most fertile in Norway. Features include the Hedmark Museum, on the site of the old market town; the Norwegian State Archives; the Hamar cathedral (Lutheran), consecrated in 1866; and a railway museum. Pop. (1983 est.) mun., 15,837.

hamartia (from Greek *hamartanein*, "to err"), also called TRAGIC FLAW, inherent defect or shortcoming in the hero of a tragedy, who is in other respects a superior being favoured by fortune.

Aristotle introduced the term casually in the *Poetics* in describing the tragic hero as a man of noble rank and nature whose misfortune is not brought about by villainy but by some "error of judgment" (hamartia). This imperfection later came to be interpreted as a moral flaw, such as Othello's jealousy or Hamlet's irresolution, although most great tragedies defy such a simple interpretation. The hero's suffering and its far-reaching reverberations are far out of proportion to his flaw. An element of cosmic collusion among the hero's flaw, chance, necessity, and other external forces is essential to bring about the tragic catastrophe.

In Greek tragedy the nature of the hero's flaw is even more elusive. Often the tragic deeds are committed unwittingly, as when Oedipus unknowingly kills his father and marries his own mother, or, if committed knowingly, they are not committed by choice. Orestes is under obligation to Apollo to avenge his father's murder by killing his mother. Also, an apparent weakness is often only an excess of virtue, such as an extreme probity or zeal for perfection. It has been suggested in such cases, since the tragic hero is never passive but struggles to resolve his tragic difficulty with an obsessive dedication, that he is guilty of hubris—*i.e.*, presumption of being godlike and attempting to overstep his human limitations.

Hamartolos, George: *see* George the Monk.

hamartoma, benign tumourlike growth made up of normal mature cells in abnormal number or distribution. While malignant tumours contain poorly differentiated cells, hamartomas consist of distinct cell types retaining normal functions. Because their growth is limited, hamartomas are not true tumours and some, such as hemangiomas that occur as birthmarks, may disappear with time. Bony tumours such as osteoid osteoma, an overgrowth of bone and immature bone tissue (osteoid), may cause pain and resorption of bone during growth. Hemangiomas, hamartomas composed of vascular tissue, may appear quite large at birth but are usually left untreated unless they threaten facial structures; attempts at surgical removal frequently leave a poorer appearance than the natural regression of the hamartoma.

Ḥamāsah, an Arabic anthology compiled by the poet Abū Tammām in the 9th century; it is so called from the title of its first book, which contains poems descriptive of fortitude in battle, patient endurance of calamity, steadfastness in seeking vengeance, and constancy under reproach and in temptation—in a word, the attribute of *ḥamāsah*.

The anthology consists of 10 books, containing, in all, 884 poems, mostly fragments selected from longer poems: (1) *al-Ḥamāsah;* (2) *al-Marāthī,* "Dirges"; (3) *al-Adab,* "Manners"; (4) *an-Nasīb,* "Amatory Verses"; (5) *al-Hijāʾ,* "Satires"; (6) *al-Adyāf was al-madīḥ,* "Hospitality and Panegyric"; (7) *aṣ-Ṣifāt,* "Miscellaneous Descriptions"; (8) *as-Sayr wa an-Nuʿas,* "Journeying and Drowsiness"; (9) *al-Mulah,* "Pleasantries"; and (10) *Madhammāt an-nisāʾ,* "Dispraise of Women."

The poems, taken from the works of Arab poets of all periods, from the pre-Islāmic to about 832, are extemporaneous or occasional utterances, as distinguished from *qaṣīdah*s, or elaborately finished odes. They are short, direct, and generally free of metaphor; only the fourth book, *an-Nasīb,* a standard opening of the *qaṣīdah* (ode), is an exception. The *Ḥamāsah* was compiled *c.* 835 while Abū Tammām was staying at Hamadan (Iran). The excellence of its selection caused it to be said that Abū Tammām displayed higher qualities in his choice of extracts than in his own poetry. It is a storehouse of ancient material, and it became a fundamental work for poets seeking to acquire polish. It inspired many commentaries, enumerated by Ḥajjī Khalīfa, the 17th-century historian and bibliographer.

Al-Buḥturī, a protégé of Abū Tammām, produced another *ḥamāsah,* much more elaborate and less appreciated; other anthologists followed him. A number of such works have survived; others are known only by title.

Hambleton, district, county of North Yorkshire, England. With an area of 506 sq mi (1,312 sq km), it includes part of the Cleveland Hills, continuous with the Hambleton Hills, from which the district takes its name. They form the west-facing escarpment of the North York Moors, rising to more than 1,000 ft (305 m) and flanking the fertile lowland corridor (10 to 15 mi [16 to 24 km] wide) of the Vales of Mowbray and York. This sheltered lowland of clay soils is rich agricultural land, with numerous villages and small market towns. Northallerton, the largest, is the administrative centre.

After the partial colonization of the clay country by Anglian and Danish farmers, much was periodically laid waste in succeeding centuries by the Normans and later by the Scots. With agricultural improvements in the 18th century, Northallerton, Thirsk, Bedale, and Easingwold all became prosperous market towns, but they failed to grow much in the 19th century.

The eastern hills, now part of the North York Moors National Park, have villages settled in Anglian times that now attract tourists. Stokesley, the only old Cleveland market town in Hambleton district, is, nevertheless, a dormitory of Teesside district. Increasing mechanization of agriculture has displaced many farmworkers, and alternative employment in light industry is provided mainly at Northallerton and Thirsk, both situated near the improved road link with Teesside and the north. Pop. (1982 est.) 75,100.

Hambletonian, in full HAMBLETONIAN 10, also called RYSDYK'S HAMBLETONIAN (foaled 1849), U.S. harness racehorse (Standardbred), ancestor of most present-day harness racers. Thrice inbred great-grandson of Messenger (foundation sire of the breed of Standardbreds), he was the son of Abdallah out of a crippled mare. His original owner sold him with his dam for $125 to a hired man, William Rysdyk, who eventually became wealthy from Hambletonian's stud fees.

Although fast by the standard of his time, the horse raced very little, being placed in stud in 1851. Through 1875 he sired more than 1,000 foals (the total is variously given as 1,187 and 1,331). After several years his offspring became noted for their trotting ability, and gradually his descendants came to dominate the breed.

Hambletonian Stake, annual U.S. race for three-year-old trotters, one of harness racing's most widely known events. The Hambletonian was first held in 1926 at Syracuse, N.Y. It was later moved to Goshen, N.Y., in 1957 to Du Quoin, Ill., and in 1981 to Meadowlands (N.J.) Racetrack. To win the Hambletonian a horse must win two 1-mile heats. The race was named after Hambletonian (Rysdyk's Hambletonian), the foundation sire of most modern trotting horses in the United States.

Hamburg, port city and *Land* (state), northern Germany. The *Land,* third smallest of the 16 German *Länder* (after Bremen and Berlin), is coextensive with the metropolitan area of Hamburg. The city is the country's largest port and commercial centre and one of the largest and busiest ports in Europe.

The following article treats briefly the modern city of Hamburg. Fuller treatment is provided in the following MACROPAEDIA articles. For history and contemporary life, *see* Hamburg; for additional perspective on the city in its national and regional context, *see* Germany.

Hamburg stands at the northern extremity of the lower Elbe River Valley, 68 miles (109 km) upstream from the Elbe's North Sea outlet. The Elbe divides into north and south branches southeast of the old city and reunites as the Unterelbe to the southwest. Hamburg's metropolitan area borders the *Länder* of Schleswig-Holstein to the north and Lower Saxony to the south. The city has mild winters and summers, with high humidity and frequent fog; its mean winter and summer temperatures are 34.2° F (1.2° C) and 62.4° F (16.9° C), respectively.

Hamburg is the economic centre of Germany and the nation's major industrial city, producing copper, vegetable and mineral oils, machinery, electrotechnical goods, and cigarettes. The city, a focus of intercontinental as well as of western European and Scandinavian trade, is the centre of Germany's shipping concerns. Its harbour handles more than one-half of the country's imports (foodstuffs, tea, coffee, and petroleum) and exports (machinery, processed petroleum, copper, and pharmaceuticals).

Hamburg city lies on both sides of the Alster River, which is dammed a short distance from its mouth to form a lake. The old town, just south of the Alster, is crossed by a number of narrow canals (*Fleete*); the new town lies to its west. During World War II, Allied air raids demolished more than half of Hamburg's residential area and harbour installations, necessitating long-range reconstruction efforts. The five principal churches within the ancient city walls conserve traces of the past, while most of the existing buildings are of more recent construction; an example is the Rathaus, built

in Neo-Renaissance style, which is the seat of the city and *Land* governments.

Hamburg University (founded in 1919) emphasizes study in foreign languages, economics, geography, ethnology, and international law; a research laboratory in particle physics, the German Electronic Synchrotron, is connected with the university. The city has state schools for music, art, and sculpture, as well as several excellent art and special museums, including the Hamburger Kunsthalle (founded in 1850). The birthplace of Felix Mendelssohn and Johannes Brahms, Hamburg has a sustained tradition of musical activity that is nurtured by orchestras and by groups specializing in chamber music, choral performances, and church music. The Hamburg State Opera (founded in 1678) has won international fame.

Hamburg's port, with about 40 miles (65 km) of docks and extensive warehousing facilities, handles freight for more than 1,000 destinations. Rail lines link the waterfront to the German railway network, and vast numbers of trucks enter the harbour zone each day. A 10,500-foot (3,200-metre) tunnel under the Elbe River has been completed as part of the Stockholm–Lisbon highway, relieving the city centre of long-distance traffic. Hamburg's international airport is located 8 miles (13 km) to the north in Fuhlsbüttel. Area city and *Land,* 292 square miles (755 square km). Pop. (1989 est.) city and *Land,* 1,603,070.

Hamburg Art Gallery, German HAMBURGER KUNSTHALLE, art gallery in Hamburg, founded in 1850, with paintings and sculptures of all periods, drawings (notably by German Romantics), prints, coins, and medals. The collection of paintings is strongest in works of the later 19th and the 20th centuries. The building that originally housed the gallery dates from 1869. A new building opened in 1919.

hamburger, also called BURGER, ground beef. The term is applied variously to (1) a patty of ground beef, sometimes called hamburg steak, Salisbury steak, or Vienna steak, (2) a sandwich consisting of a patty of beef served within a split bread roll, with various garnishes, or (3) the ground beef itself, used as a base in many sauces, casseroles, terrines, and the like. The origin of hamburger is unknown, but the hamburger patty and sandwich were probably brought by 19th-century German immigrants to the United States, where in a matter of decades it came to be considered an archetypal American food. The importance of the hamburger in 20th-century American popular culture is indicated by its virtual ubiquity at backyard barbecues and on fast-food restaurant menus and by the proliferation of so-called hamburger stands and restaurants. Some chains, such as McDonald's, Burger King, and Wendy's, have proliferated worldwide.

Hamburgers are customarily eaten as a sandwich, between two halves of a round bun. Mustard, mayonnaise, catsup, and other condiments, along with garnishes of lettuce, onion, tomato, and pickle, constitute the customary dressing. In the variation known as the cheeseburger, a slice of cheese is melted over the patty. The patty itself is often seasoned or augmented with chopped onions, spices, or bread crumbs before cooking.

According to United States Department of Agriculture (USDA) standards, hamburger meat may be designated either "hamburger," "chopped beef," or "ground beef." It must be ground from fresh beef with no by-products or nonmeat extenders, but the USDA does permit the inclusion of loose beef fat and seasonings in meat labeled "hamburger." Also, by law, hamburger and chopped or ground beef sold commercially may contain no more than 30 percent fat. Fifteen percent fat is regarded as the ideal proportion in terms of juiciness and flavour of the cooked product.

Hamdānī, al-, in full ABŪ MUḤAMMAD AL-ḤASAN IBN AḤMAD AL-HAMDĀNĪ (b. 893?, Ṣan'ā', Yemen—d. *c.* 945?), Arab geographer, poet, grammarian, historian, and astronomer who represented some of the best aspects of Islāmic culture during the last effective years of the 'Abbāsid caliphate. From his literary production al-Hamdānī was known as the "tongue of South Arabia."

Most of al-Hamdānī's life was spent in Arabia itself. He was widely educated, and he traveled extensively, acquiring a broad knowledge of his country. He became involved in a number of political controversies. When he was imprisoned for one of them, his influence was sufficient to invoke a tribal rebellion in his behalf to secure his release.

His encyclopaedia *al-Iklīl* ("The Crown"; Eng. trans. of vol. 8 by N.A. Faris as *The Antiquities of South Arabia*) and his other writings are a major source of information on Arabia, providing a valuable anthology of South Arabian poetry and much genealogical, topographical, and historical information. It has been said that he died in prison in Ṣan'ā' in 945, but this is now in question.

Ḥamdānid DYNASTY, Muslim Arab dynasty of northern Iraq (al-Jazīrah) and Syria (905–1004) whose members were renowned as brilliant warriors and as great patrons of Arabic poets and scholars.

Ḥamdān ibn Ḥamdūn brought the family, already well established in al-Jazīrah, to political prominence by taking part in uprisings against the 'Abbāsid caliph late in the 9th century. His sons, however, became 'Abbāsid officials, al-Ḥusayn serving as a military commander and Abū al-Hayjā' 'Abd Allāh initiating the Ḥamdānid dynasty by assuming the post of governor of Mosul (905–929). The dynasty struck an independent course under 'Abd Allāh's son Nāṣir ad-Dawlah al-Ḥasan (reigned 929–969) and expanded westward into Syria. In 979 the Ḥamdānids were driven out of Mosul by the Būyid 'Aḍud ad-Dawlah, who was then annexing Iraq to his domains, and Abū Taghlib (reigned 969–979) was forced to seek refuge and help from the Fāṭimids of Egypt, though without success. 'Aḍud ad-Dawlah later maintained two Ḥamdānids, Ibrāhīm and al-Ḥusayn, as joint rulers of Mosul (981–991), but the dynasty's power had already shifted to Syria.

Aleppo and Homs had been won about 945 by Abū Taghlib's uncle, Sayf ad-Dawlah, who spent most of his reign (*c.* 943–967) defending his frontiers (from northern Syria to Armenia) against the Byzantine Greeks. It was in Sayf ad-Dawlah's honour that the poet al-Mutanabbī (d. 965), during his stay at the Ḥamdānid court (948–957), wrote his famed panegyrics. Trouble with the Byzantine Empire increased during Sa'd ad-Dawlah's tenure (967–971). The kingdom was invaded on several occasions, and even Aleppo and Homs were temporarily lost, while the Fāṭimids also began to infringe on the southern end of Syria. The Fāṭimids and the Ḥamdānids struggled for possession of Aleppo throughout Sa'īd ad-Dawlah's reign (991–1002), even drawing the Byzantine emperor Basil II into the conflict. In 1002 control of Aleppo passed into the hands of the slave general Lu'lu', who ruled as regent (1002–04) for the last two Ḥamdānids, 'Alī II and Sharīf II, and then as a Fāṭimid vassal.

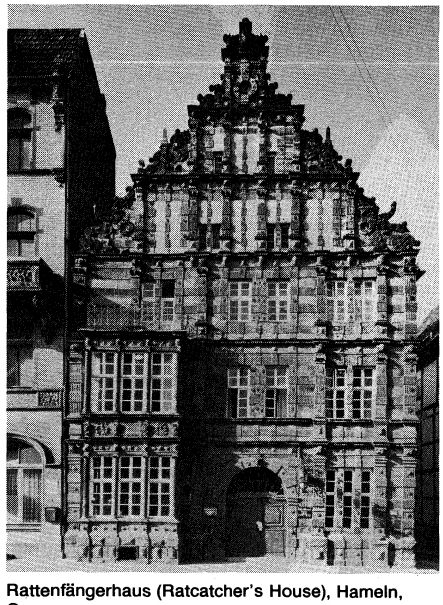
Hamden, urban town (township), New Haven county, southwestern Connecticut, U.S., immediately north of the city of New Haven. The area, first settled in 1664, was named for John Hampden (1594–1643), English parliamentarian. It was separated from New Haven and incorporated as a town in 1786. Eli Whitney, inventor of the cotton gin, began manufacturing muskets there in 1798; a tablet near Lake Whitney Dam marks the site of his armoury. Hamden has many old mill sites, and its economic growth was stimulated in the early 1800s by the completion of the Farmington Canal and the railroad. There has since been diversified industrial development. Within the town are the Sleeping Giant State Park and the villages of Whitneyville and Mount Carmel. Quinnipiac College (established 1929 in New Haven) merged with Larson College and moved to Hamden in 1952. Pop. (1988 est.) 52,710.

Häme, in full HÄMEEN LÄÄNI, Swedish TAVASTEHUS LÄN, *lääni* (province), southwestern Finland, north of Helsinki, including part of Lake Päijänne, which serves as its eastern boundary. The province, which has a land area of 6,568 square miles (17,010 square km), produces lumber, rye, oats, barley, and potatoes; livestock and dairy cows are also important. It is the home of the Tavastians, or Tavastlanders (Hämäläiset), one of the original groups of Finnish people, and derives its name from the medieval castle of Häme, near the administrative capital, Hämeenlinna. Tampere, in west-central Häme, developed as the province's major industrial centre during the early 19th century, a position that it has retained. Lahti, in extreme southeastern Häme, is a winter-sports centre. Pop. (1989 est.) 683,728.

Hämeenlinna, Swedish TAVASTEHUS, city, capital of Häme *lääni* (province), southwestern Finland, on the shore of Vanaja Lake, northwest of Helsinki. The city's name is derived from the castle of Häme, parts of which date from about 1250. The town, originally chartered in 1639, was located north of the castle but moved to its present site, a little to the south, in 1779. In 1862 it became the northern terminus of Finland's first railroad.

Notable landmarks in Hämeenlinna include the castle (reopened in 1979 after reconstruction), the church (1798), the Renaissance-style town hall, and the birthplace of composer Jean Sibelius. Hämeenlinna has an art gallery, science institute, municipal museum, and teachers' training college. Aulanko Park, a tourist centre, is located nearby. Local industry includes textile factories, tanneries, and rubber works. Pop. (1988 est.) mun., 42,760.

Hameln, English HAMELIN, city, Lower Saxony *Land* (state), located in north-central



Rattenfängerhaus (Ratcatcher's House), Hameln, Ger.

Archiv fur Kunst und Geschichte, Berlin

Germany, on the Weser River, southwest of Hannover. Originating around the Abbey of St. Boniface, founded by monks from Fulda in the 8th century, it was a market centre dependent on the Abbey of Fulda until 1259. Chartered *c.* 1200, it passed to the dukes of Brunswick and later became a member of the Hanseatic League.

The well-known legend of the ratcatcher, the Pied Piper of Hamelin, became associated in the 16th century with the alleged departure and fate of the children of Hameln in 1284. One hypothesis links the story with an exodus of the young men in connection with the German colonization of the east. The Pied Piper has also been likened to Nicholas of Cologne, who in 1212 led thousands of German children on the ill-fated Children's Crusade. There is a ratcatcher collection in the local history museum, and there are ratcatcher inscriptions on two of the town's many notable half-timbered Renaissance houses, the Rattenfängerhaus (Ratcatcher's House) and the Hochzeitshaus (Wedding House).

Hameln is the central city of the Weserbergland (Weser Highland) scenic region and nature park. It is a commercial centre with a rail junction and river port; industries include the manufacture of carpets, chemicals, machinery, and food products. Pop. (1989 est.) 57,642.

hamerkop (bird): *see* hammerhead.

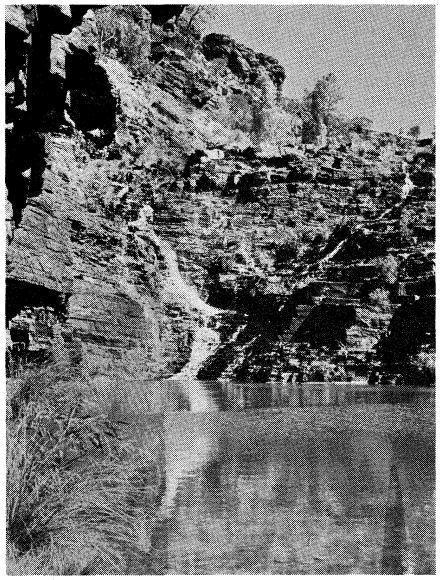
Hamerling, Robert, original name RUPERT JOHANN HAMMERLING (b. March 24, 1830, Kirchberg am Walde, Austria—d. July 13, 1889, Graz), Austrian poet remembered chiefly for his epics.

After studying in Vienna he became a teacher in Trieste (1855–66). He wrote several popular collections of lyrics, including *Ein Schwanenlied der Romantik* (1862), which have some attractive rhythms but not much originality. His most important works are his epics: *Ahasver in Rom* (1866; "Ahasuerus in Rome"), a grandiosely romantic retelling of the myth of the wandering Jew, which, in spite of its brilliant descriptions, suffers from theatricality; and *Der König von Sion* (1869; "The King of Zion"), a narrative of the Anabaptist movement of 1534. Other works include dramas, a novel, and autobiographical writings such as *Stationen meiner Lebenspilgerschaft* (1889). His collected works (4 vol., 1900) were edited by M. Rabenlechner.

Articles are alphabetized word by word, not letter by letter

Hamersley Range, mountains in the Pilbara region, northwestern Western Australia, extending east-southeast for 160 mi (260 km) south of the Fortescue River. Part of an ancient tableland broken by faults and gorges, the range terminates in rocky headlands and coral islets at the Indian Ocean. It includes the highest peak in Western Australia, Mt. Meharry (4,098 ft [1,249 m]), southeast of Wittenoom Gorge. The climate is hot and dry.

The range is important for its minerals, particularly iron ore. After 1960 large iron mines were developed at Mt. Tom Price, Mt. Newman, Paraburdoo, Pannawonica, and other sites; by 1980 the range accounted for 90 percent of Australia's iron ore production. Railroads carry the ore of Dampier and Port Hedland on the coast, where it is processed and shipped abroad, principally to Japan. Blue asbestos, discovered at Wittenoom in 1917, was mined intermittently during the 1930s and methodically after 1943; a plant for the extraction of the mineral fibre was built there in 1950, but asbestos mining was discontinued in 1966 because of high production costs. Gold is found in small quantities. Much of the area, other than the mining sites, forms Hamersley Range National Park, where the wildlife includes red kangaroos, wallaroos, and dingoes. The range was discovered in 1861 by Francis T. Gregory, an explorer and mineral surveyor, and was named for Edward Hamersley, one of the backers of his expedition.



Dales Gorge in the Hamersley Range, Western Australia

John Brownlie—Bruce Coleman Inc.

Hamgyŏng Mountains, Korean HAMGYŎNG-SANMAEK, mountain range, northeastern North Korea, forming a watershed that divides Hamgyŏng-pukto (North Hamgyŏng Province) into two areas: the northwestern frontier area and the eastern Sea of Japan (East Sea) area. On the northeastern edge of the Kaema Highlands, the range stretches southwest to Mt. Yudu, the connecting point with the Bujŏnryong Mountains of Hamgyŏng-namdo (South Hamgyŏng Province), and northeast to Mt. Unmu, near the southern side of the Tumen River. Called the Korean Alps, they constitute the highest range of Korea, with 72 peaks rising higher than 6,600 ft (2,000 m). The highest is Mt. Kwanmo (8,337 ft), the highest peak of peninsular Korea, though Paektu-san (9,003 ft), on the border with China, is higher. There is an abundance of virgin forests. The mountains' eastern side forms a steep incline along the coast, and the rivers originating in the mountains and entering the Sea of Japan are short and swift.

Hamgyŏng-namdo, English SOUTH HAMGYŎNG PROVINCE, province, eastern North Korea, facing the Tongjosŏn-man (Gulf of East Korea), on the Sea of Japan (East Sea). Until 1896 it was the southwestern half of Hamgyŏng Province. After the nation's independence in 1945, the area of the province was reduced by about one-half by the reorganization of North Korean administrative districts. In 1949 the Wŏnsan area and two southern counties were attached to Kangwŏn Province, and a small northwestern part was made a part of the new province of Chagang. In 1954 three northeastern counties went to the new province of Yanggang; and in 1960 Hamhŭng, Hŭngnam, and one county were separated and amalgamated as the autonomous special city of Hamhŭng-si. Hamgyŏng-namdo, nevertheless, remained the largest province of North Korea, with an area of 7,350 sq mi (19,000 sq km). Most of its area is in the southern edge of the Kaema Highlands (*q.v.*), but the Hamhŭng plain is one of the country's largest rice-producing plains. Its main agricultural products are rice and corn (maize). Apples and peaches from Pukchŏng, Tŏksŏng, and Sinch'ang are especially well known. Hemp, flax, and tobacco are also cultivated. The fishing industry is active, as the neighbouring waters of the Tongjosŏn-man offer good fishing grounds for pollack, herring, mackerel, and sardine. Marine products of the province account for about one-half of North Korea's total. Mining industries include sulfur, iron, lead, zinc, asbestos, magnesite, and tungsten. The abundant hydroelectric power resources of the Changjin, Pujŏn, and Hŏch'ŏn rivers support major manufacturing enterprises, including the large nitrogenous fertilizer plant in the Hamhŭng-si industrial district. The province is one of North Korea's principal suppliers of consumer goods. The provincial capital is Hamhŭng. Pop. (1972 est.) 1,897,000.

Hamgyŏng-pukto, English NORTH HAMGYŎNG PROVINCE, province, extreme northeastern North Korea, facing the Sea of Japan (East Sea) to the east, and bounded on the north and west by the U.S.S.R. and China. Until 1896 it was the northeastern half of Hamgyŏng Province, but in 1954 the northwestern part was separated to become the new province of Yanggang. The capital, Ch'ŏngjin, was elevated to the status of an autonomous special city, Ch'ŏngjin-si. Most of the province's 6,050-sq-mi (15,700-sq-km) area is in the northeastern edge of the Kaema Highlands (*q.v.*), with the Hamgyŏng Mountains (*q.v.*), including Mt. Kwanmo (8,337 ft [2,541 m]), the highest peak, stretching to the west. The plains area is limited to a narrow northeastern frontier area along the Tumen River, an international frontier and the eastern sea. Agricultural products are few, the main crops being corn (maize), beans, and millet; flax and hops are also cultivated. Some sheep pastures are found in the mountainous and hilly districts. There is an abundant reserve of forest resources, and forestry is well developed. The main industry of the province, however, is mining: there are large reserves of iron near Musan, and the brown coal mined in the lower Tumen River district accounts for four-fifths of North Korea's total. Metal manufacturing and chemical and machine industries flourish in the larger cities, Aoji, Kimch'aek, Najin, and Unggi, and in the Ch'ŏngjin-si industrial zone. The provincial capital is Ch'ŏngjin. Pop. (1972 est.) 1,524,000.

Hamhŭng, city and provincial capital, Hamgyŏng-namdo (South Hamgyŏng Province), east central North Korea. It was the commercial and local administrative centre of northeastern Korea during the Yi dynasty (1392–1910). It began to develop rapidly as a modern industrial city with the construction in 1928 of a large nitrogenous fertilizer plant at its seaport, Hŭngnam, 7½ mi (12 km) southeast, and of hydroelectric power plants on the nearby Pujŏn and Changjin rivers. During the Korean War (1950–53), most industrial plants in the area were destroyed by U.S. bombing raids, but they have been rebuilt, and a large new synthetic textile plant has been constructed. Chemical, metal, and machinery industries, oil refining, and food processing are also carried on. Hamhŭng became an autonomous special city, Hamhung-si, with the reorganization of administrative districts in 1960, when its seaport, Hŭngnam, became a part of the city. The Hamhŭng branch of the Academy of Science, the Chemical Industry College, a medical college, the Chemistry Research Institute, and the Hamhŭng State Historical Museum are located there. Its scenic beaches are popular for bathing. Pop. (1980 UN est.) 775,000.

Hamid DYNASTY, Turkmen dynasty (*c.* 1300–1423) that ruled in southwestern Anatolia. It was founded by Felekuddin Dündar, whose father, Ilyas, was a frontier ruler under the Seljuqs and who named it after his grand-

father; Dündar governed the Hamid principality jointly with his brother Yunus, with two capitals, one at Eğridir and one at Antalya (Attalia). Dündar was defeated and killed (1324) by Demirtaş, the Il-Khanid governor of Anatolia. Eğridir was restored by Dündar's sons in 1374 as a dependency of the Ottoman Turks.

The Antalya branch was occupied by a Christian force from Cyprus (1361–73). Annexed by the Ottoman sultan Bayezid I in 1392, the principality was restored by Timur (Tamerlane) after his victory over the Ottomans at the Battle of Ankara (1402). In 1423 Osman, the last Hamid ruler, was defeated, and the principality was reincorporated into the Ottoman Empire.

Situated on the north–south route from the Mediterranean port of Antalya to the Mongol empire, Hamid was a strategically and commercially important territory.

Hamid-Abad (Turkey): *see* Isparta.

Hamilcar Barca, Barca also spelled BARCAS (d. winter 229/228 BC), general who assumed command of the Carthaginian forces in Sicily during the last years of the First Punic War with Rome (264–241). He was the father of Hannibal.

By 247, when Hamilcar took charge in Sicily, Carthage had lost to Rome all its Sicilian possessions except Lilybaeum (now Marsala) and Drepanum (now Trapani). While harassing Roman troops with guerrilla tactics in western Sicily, Hamilcar staged a landing on the north coast, capturing Mount Ercte (probably Pellegrino near Palermo), which he held in the face of determined Roman attempts to dislodge him (247–244). From this area he mounted naval expeditions against the shores of Sicily and southern Italy. Suddenly he left Ercte for Mount Eryx (modern Erice near Trapani), which he held until 241.

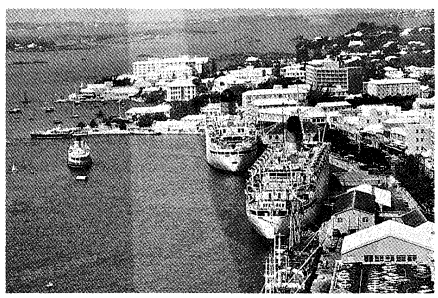
After the defeat of the Carthaginian fleet in that year by Gaius Lutatius Catulus, Hamilcar made a treaty with the Romans ending the war. He then returned to Africa, where his mercenary troops revolted. Until 238 Hamilcar was engaged in recapturing his northern African provinces from the rebels. His success resulted in a growth in his strength as leader of Carthage's popular party and led him, probably with his government's sanction, to occupy Spain as a compensation for the loss to Rome of Sicily and Sardinia. In Spain he founded the city of Acra Leuce (perhaps modern Alicante) and made extensive conquests (237–229/228) before his death in battle.

Hamill, Dorothy Stuart (b. July 26, 1956, Chicago, Ill., U.S.), American figure skater who won the gold medal for women's figure skating at the Winter Olympic Games in 1976.

Hamill got her first ice skates at the age of eight, and when she was 14 she dropped out of school to pursue her skating career while being privately tutored. From the 1960s she lived and trained at Denver, Colo. She won her first championship, the U.S. Ladies Novice, at the age of 12. The freestyle was her strong point in figure skating, and she won the freestyle world championship in 1975. After her Olympic victory, she turned professional and from 1977 skated with the Ice Capades. She is coauthor of *Dorothy Hamill on and off the Ice* (1983).

Hamilton, city in the fertile western region of Victoria, Australia, on the Grange Burn River. The original village (founded in 1850) grew around an inn on the north bank of the river and was called The Grange. It became an important way station for coach traffic in the 1850s between Portland and the goldfields. Renamed Hamilton, it became a municipality in 1859, a town in 1928, and a city in 1949. Situated on the Henty and Glenelg highways, Hamilton is linked to Melbourne, 165 miles (266 km) to the east, by rail. Its industries include knitting mills and sawmills, dairy plants, and wallboard manufacturing. Pop. (1986) 9,969.

Hamilton, capital of the British colony of Bermuda, on Great Bermuda island in the western Atlantic, along the northern shore of a deepwater harbour. The name also applies to one of the nine parishes on the island. Founded in 1790 and incorporated in 1793, Hamilton succeeded historic St. George as capital in 1815 and in 1897 was raised to city status. To encourage business and employment, it was made a free port in 1956. Tourism is the economic mainstay; visitors arrive by oceangoing vessels, which dock alongside the main street, and by air at the terminal 8 miles (13 km)



Hamilton harbour, Bermuda
By courtesy of the Bermuda News Bureau

northeast. Buildings in the city are commonly painted in pastel shades and have white roofs formed of the native coral. The imposing neo-Gothic cathedral is on Church Street. Nearby are the Sessions House (accommodating the House of Assembly, the Supreme Court, and the judicial offices) and other government buildings. The Bermuda Library and the Historical Society Museum stand in the Par-la-Ville Gardens, and there is an art gallery in the city hall. Pop. (1985 est.) 1,676.

Hamilton, city, seat (1853) of the regional municipality of Hamilton-Wentworth, southeastern Ontario, Canada, at the extreme western end of Lake Ontario, on the southern shore of landlocked Hamilton Harbour (Burlington Bay). The site was visited by the great French explorer René-Robert Cavelier, sieur de La Salle, in 1669. Settlement began with the arrival of United Empire Loyalists from the rebellious 13 American colonies in 1778. The city was named for George Hamilton, who laid out the original town in 1813 on a sloping plain between the waterfront (north) and the Niagara Escarpment (south), which there rises abruptly to a point (250 feet [75

City Hall, Hamilton, Ont.
By courtesy of the Canadian Government Travel Bureau, Ottawa; photograph, C.F. Ruggles

m]), locally known as "the Mountain." During its early growth, Hamilton was overshadowed by nearby Dundas, but the opening of the Burlington Canal (1830), linking Hamilton Harbour to Lake Ontario, led to its rapid development as an important port and rail centre.

Hamilton is now one of Canada's leading industrial centres. Its iron and steel industry, which began in 1893, has grown to become Canada's largest, accounting for a major part of the national steel output. Other industries include the manufacture of automobiles, tires, railroad equipment, electrical apparatus, clothing, cotton duck, chemicals, and farm implements. The city is also a financial hub and the centre of an extensive fruit-growing district; it is the site of one of Canada's largest open-air markets.

Hamilton is well served with rail and freeway connections to Toronto (35 miles [55 km] northeast) and Buffalo, N.Y. (55 miles [88 km] southeast). Its excellent harbour, 10 square miles (25 square km) in area, is protected from Lake Ontario by a sand bar 4 miles (6 km) long. McMaster University (founded in Toronto in 1887 and moved to Hamilton in 1930), noted for nuclear research, is on the western edge of the city. Hamilton Place (1973) is an impressive performing arts centre. The Canadian Football Hall of Fame is in City Hall Plaza. Also in the vicinity are Dundurn Castle (1832; site of a summer light and sound spectacle), the Royal Botanical Gardens (1941), and Stoney Creek Historic Monument, the site of a decisive battle of the War of 1812. Inc. village, 1816; town, 1833; city, 1846. Pop. (1986) city, 306,728; metropolitan area, 423,398.

Hamilton, city, north-central North Island, New Zealand, 80 miles (130 km) above the mouth of the Waikato River. Hamilton originated as a military settlement on the site of a deserted Maori village. Declared a borough in 1877 and a city in 1945, Hamilton was named after Captain John Hamilton, a Royal Navy officer killed fighting Maoris. The city, the most important inland centre of New Zealand, is linked to Auckland (70 miles [113 km] northwest) and Wellington (343 miles [552 km] south) by rail and road. It serves as a pastoral and lumbering area; industries include dairy and meat processing, brewing, brickmaking, sawmilling, engineering, and the production of stock food, farm machinery, clothing, cardboard cartons, plastics, prefabricated buildings, and coal gas. Hamilton lies on the natural-gas pipelines from the Kapuni and Maui fields. Prominent institutions are the University of Waikato (1964), a teachers' training college, an Anglican cathedral, and the Hamilton Art Gallery. Pop. (1988 est.) city, 96,200; urban area, 103,500.

To make the best use of the Britannica, consult the INDEX *first*

Hamilton, district, Strathclyde region, southwestern Scotland. It was created by the reorganization of 1975 from part of the northwestern area of the former county of Lanark. It covers an area of 51 square miles (132 square km) contiguous with the city of Glasgow on the northwest. It is centred on the burgh of Hamilton (*q.v.*). During the 19th century Hamilton developed as an industrial town based initially on lace and textiles, and later coal mining and engineering, but it now functions primarily as a commercial and administrative centre, the seat of the district authority. The River Clyde valley, forming the northeastern margin of the district, and the higher land to the south are mainly farmland with the emphasis on dairy farming and the intensive production of tomatoes and soft fruit for the jam-making industry of the nearby town of Carluke in Clydesdale district. Pop. (1987 est.) 107,018.

Hamilton, large burgh and administrative centre for Hamilton district, in Strathclyde region, Scotland, situated near the junction of Avon Water with the River Clyde, just southeast of the metropolitan complex of Glasgow. The area has been settled since prehistoric

times, and Cadzow Castle (2 mi [3 km] southeast) was a royal residence from the 10th century. The town took its name in 1445 from the Hamilton family, to whom it was given by Robert I the Bruce after the Battle of Bannockburn in 1314. It became a royal burgh in 1548 but surrendered its title in 1670. The discovery of coal caused great expansion of the town in the 19th century, and later iron foundries and engineering works were established. By 1947, however, all the pits had stopped production. Hamilton is now mainly a commercial, residential, and administrative centre with some light engineering, textile, and food-processing plants. It is the centre for a considerable area of orchards, market gardens, and dairy farms. Pop. (1981) 51,719.

Hamilton, city, seat (1803) of Butler County, southwestern Ohio, U.S., on the Great Miami River, 25 mi (40 km) north of Cincinnati. With nearby Middletown it forms a standard metropolitan statistical area. In 1794 a town called Fairfield was laid out adjoining Ft. Hamilton, which was used in 1791–96 by Gen. Arthur St. Clair and Gen. "Mad" Anthony Wayne against the Indians. Fairfield was later renamed for Alexander Hamilton, the U.S. statesman. Rossville, across the river, merged with Hamilton in 1854, by which time the Miami and Erie Canal, with connections to Dayton and Cincinnati, had been built. This and the construction of a hydraulic power plant assured the city's industrial future. It is now an agricultural trading centre with diversified manufactures, including safes, auto parts, paper, textiles, and mechanical and hydraulic presses. The Soldiers, Sailors, and Pioneers Monument and the Butler County Historical Society display local relics. A campus (1968) of Miami University is in the city. Inc. village, 1810; city, 1857. Pop. (1980) 63,189.

Hamilton, MARQUESSES AND DUKES OF, titled Scottish nobility, of several creations, in the families Hamilton and Douglas, grouped below chronologically and indicated by the symbol •.

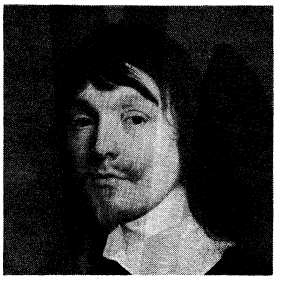
• Hamilton, John Hamilton, 1st marquess of, EARL OF ARRAN, LORD AVEN (b. 1532/35—d. April 12, 1604), Scottish nobleman active in Scottish and English politics and in the unsuccessful negotiations for the release of Mary Stuart, Queen of Scots.

The third son of James Hamilton, 2nd earl of Arran, he was given the abbey of Arbroath in 1551. In politics he was largely under the influence of his unscrupulous younger brother Claud Hamilton, afterward (1587) Baron Paisley (b. September 1543?–d. 1621/22). At first hostile to Mary Stuart, they later became her devoted partisans. Claud met Mary on her escape from Lochleven and escorted her to Hamilton Palace. With others of the Queen's party they were forfeited by the Parliament and sought their revenge on the regent Moray. Although the Hamiltons disavowed all connection with Moray's murderer, James Hamilton of Bothwellhaugh, he had been provided with horse and weapons by the abbot of Arbroath, and it was at Hamilton that he sought refuge after the deed. Their uncle, Archbishop John Hamilton, was hanged at Stirling in 1571 for alleged complicity in the murder of Mary's husband, Lord Darnley, and is said to have admitted that he was a party to the murder of Moray.

At the pacification of Perth in 1573 the Hamiltons abandoned Mary's cause. On the uncertain evidence extracted from the assassin by torture, the Hamiltons had been credited with a share in the murder of the regent Lennox in 1571. In 1579 proceedings against them for these two crimes were resumed, and when they escaped to England their lands and titles were seized by their enemies. John Hamilton soon dissociated himself from the policy of his brother Claud, who continued to plot for Spanish intervention on behalf of Mary until her death. (He later, in 1590, went mad and was mad at his death.) With other Scottish exiles, John crossed the border in 1585 and marched on Stirling; he was admitted on November 4 and formally reconciled with James VI, with whom he was thenceforward on the friendliest terms. He was created marquess of Hamilton, earl of Arran, and Lord Aven in 1599.

• Hamilton, James Hamilton, 3rd marquess and 1st duke of, EARL OF CAMBRIDGE (b. June 19, 1606—d. March 9, 1649, Preston, Lancashire, Eng.), Scottish Royalist whose vacillating, ineffectual leadership did great damage to King Charles I's cause during the English Civil War between the Royalists and the Parliamentarians.

Educated at Oxford University, he succeeded to his father's title of marquess of Hamilton



1st Duke of Hamilton, detail of a portrait after Sir Anthony Van Dyck; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

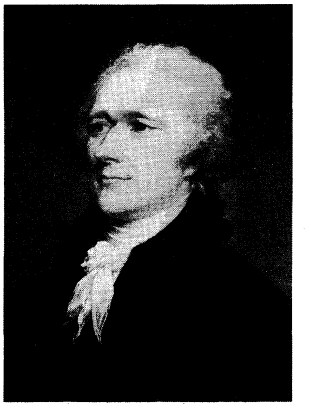
in 1625 and became a favourite of Charles I. From 1631 to 1633, during the Thirty Years' War on the European continent, Hamilton displayed incompetence as a commander of a force sent to aid the Swedish troops fighting in Germany. In 1638 Charles made Hamilton a commissioner to deal with the Scots, who had drawn up the National Covenant, pledging to maintain their Presbyterian form of worship in opposition to the English liturgy that Charles was trying to introduce. Hamilton resigned his commissionership in 1639, after failing to disband the Scottish Assembly of Covenanters. When he returned to Scotland from England in 1641, Hamilton attempted to come to terms with the more extreme Covenanters under the Earl of Argyll, thereby earning the enmity of the staunch Royalist James Graham, earl of Montrose. Shortly before the outbreak of the Civil War in August 1642, the alliance between Hamilton and Argyll collapsed. Nevertheless, Hamilton tried to keep Scotland neutral in the conflict. He was made duke of Hamilton in April 1643 and seven months later was forced by the Covenanters to flee to England. But Charles, who had decided to give Montrose a free hand in crushing the Covenanters, no longer trusted Hamilton, and in January 1644 he had the Duke imprisoned. Although freed by Parliamentary troops in April 1646, Hamilton still remained loyal to the King. The 24,000-man army he led against the English Parliamentarians in July 1648 was defeated by some 9,000 troops under Oliver Cromwell in an eight-day battle around Preston (August 17–25). Taken prisoner by Cromwell, Hamilton, after a futile attempt to escape, was executed in March 1649.

• Hamilton, William Hamilton, 2nd duke of, EARL OF CAMBRIDGE, also called (1639–49) EARL OF LANARK (b. Dec. 14, 1616—d. Sept. 12, 1651, Worcester, Worcestershire, Eng.), Scottish Royalist during the English Civil Wars, who succeeded to the dukedom on the execution of his brother, the 1st duke, in 1649.

He was a loyal follower of his brother and was created earl of Lanark in 1639; in the next year he became secretary of state for Scotland. Sent by the Scottish committee of estates to treat with Charles I at Newcastle upon Tyne in 1646, he sought in vain to persuade the King to consent to the establishment of Presbyterianism in England. In December 1647 he was one of the Scots who signed the treaty with Charles known as the "Engagement" and thereafter he helped to organize the second phase of the Civil War. He fled abroad in 1649, returning to Scotland with the future Charles II in 1650, and the next year he joined in the Scottish invasion of England. He died from wounds received at the Battle of Worcester. He left no male heirs and the title devolved on the 1st Duke's elder surviving daughter Anne (*c.* 1631–1716), duchess of Hamilton in her own right.

Hamilton, Alexander (b. Jan. 11, 1755/57, Nevis, British West Indies—d. July 12, 1804, New York City), New York delegate to the Constitutional Convention (1787), major author of the *Federalist* papers, and first secretary of the Treasury of the United States (1789–95), who was the foremost champion of a strong central government for the new United States. He was killed in a duel with Aaron Burr.

Early life. Hamilton's father was James Hamilton, a drifting trader and son of Alexander Hamilton, the laird of Cambuskeith, Ayrshire, Scot.; his mother was Rachel Fawcett Lavine, the daughter of a French Huguenot physician and the wife of John Michael Lavine, a German or Danish merchant who



Alexander Hamilton, detail of an oil painting by John Trumbull; in the National Gallery of Art, Washington, D.C.

By courtesy of the National Gallery of Art, Washington, D.C., Andrew Mellon Collection

had settled on the island of St. Croix in the Danish West Indies. Rachel probably began living with James Hamilton in 1752, but Lavine did not divorce her until 1758.

In 1765 James Hamilton abandoned his family. Destitute, Rachel set up a small shop, and at the age of 11 Alexander went to work, becoming a clerk in the countinghouse of two New York merchants who had recently established themselves at St. Croix. When Rachel died in 1768, Alexander became a ward of his mother's relatives, and in 1772 his ability, industry, and engaging manners won him advancement from bookkeeper to manager. Later, friends sent him to a preparatory school in Elizabethtown, N.J., and in the autumn of 1773 he entered King's College (later Columbia) in New York. Intensely ambitious, he became a serious and successful student, but his studies were interrupted by the brewing revolt against Great Britain. He publicly defended the Boston Tea Party, in which Boston colonists destroyed several tea cargoes

in defiance of the tea tax. In 1774–75 he wrote three influential pamphlets, which upheld the agreements of the Continental Congress on the nonimportation, nonconsumption, and nonexportation of British products and attacked British policy in Quebec. Those anonymous publications—one of them attributed to John Jay and John Adams, two of the ablest of American propagandists—gave the first solid evidence of Hamilton's precocity.

Revolutionary War service. In March 1776, through the influence of friends in the New York legislature, Hamilton was commissioned a captain in the provincial artillery. He organized his own company and at the Battle of Trenton, when he and his men prevented the British under Lord Cornwallis from crossing the Raritan River and attacking George Washington's main army, showed conspicuous bravery. In February 1777 Washington invited him to become an aide-de-camp with the rank of lieutenant colonel. In his four years on Washington's staff he grew close to the General and was entrusted with his correspondence. He was sent on important military missions and, thanks to his fluent command of French, became liaison officer between Washington and the French generals and admirals.

Eager to connect himself with wealth and influence, Hamilton married Elizabeth, the daughter of Gen. Philip Schuyler, the head of one of New York's most distinguished families. Meantime, having tired of the routine duties at headquarters and yearning for glory, he pressed Washington for an active command in the field. Washington refused, and in early 1781 Hamilton seized upon a trivial quarrel to break with the General and leave his staff. Fortunately, he had not forfeited the General's friendship, for in July Washington gave him command of a battalion. At the siege of Cornwallis' army at Yorktown in October, Hamilton led an assault on a British stronghold.

Early political activities. In letters to a member of Congress and to Robert Morris, the superintendent of finance, Hamilton analyzed the financial and political weaknesses of the government. In November 1781, with the war virtually over, he moved to Albany, where he studied law and was admitted to practice in July 1782. That same month he became receiver of continental taxes for the state of New York, a post he gave up a few months later, after the New York legislature elected him to the Continental Congress. Between July 1781 and July 1782 he wrote six essays for the *New York Packet* under the pen name of The Continentalist, in which he argued for a strong central government. In Congress from November 1782 to July 1783 he worked for the same end, being convinced that the Articles of Confederation were the source of the country's weakness and disunion.

In 1783 Hamilton began to practice law in New York City. He defended unpopular Loyalists who had remained faithful to the British during the Revolution in suits brought against them under a state law called the Trespass Act. Using the pseudonym Phocion, he published two pamphlets in 1784 pleading for moderation and justice in the treatment of Loyalists, and in 1786, partly as a result of his efforts, state acts disbarring Loyalist lawyers and disfranchising Loyalist voters were repealed. In that year he also won election to the lower house of the New York legislature, taking his seat in January 1787. Meanwhile, the legislature had appointed him a delegate to the convention in Annapolis, Md., that met in September 1786 to consider the commercial plight of the Union. Hamilton suggested that the convention exceed its delegated powers and call for another meeting of representatives from all the states to discuss various problems confronting the nation. He drew up the draft of the address to the states from which emerged the Constitutional Convention that met in Philadelphia in May 1787. After persuading New York to send a delegation, Hamilton obtained a place for himself on the delegation.

Hamilton went to Philadelphia as an uncompromising nationalist who wished to replace the Articles of Confederation with a strong centralized government, but he did not take much part in the debates. He served on two important committees, one on rules in the beginning of the convention and the other on style at the end of the convention. In a long speech on June 18, he presented his own idea of what the national government should be. His model was the England of George III: a government of three departments—legislative, executive, and judicial. The legislature would consist of an assembly, or lower house, elected for three years by free male citizens and of a senate chosen indirectly by electors for life. The president, who also would hold office for life and was to be selected by a double set of electors, would have an absolute veto over the legislature. The central government would appoint the state governors, who would have an absolute veto over state legislation. The judiciary would consist of a supreme court whose justices would have life tenure. Although the states were to be preserved, they would have virtually no power. Under this essentially monarchical plan, the national government would have unlimited sovereignty. Hamilton's plan had little impact on the convention; the delegates went ahead to frame a constitution that, while it gave strong power to a federal government, stood some chance of being accepted by the people. Since the other two delegates from New York, who were strong opponents of a Federalist constitution, had withdrawn from the convention, New York was not officially represented, and Hamilton had no power to sign for his state. Nonetheless, even though he knew that his state wished to go no further than a revision of the Articles of Confederation, he signed the new constitution as an individual.

Opponents in New York quickly attacked the Constitution, and Hamilton answered them in the newspapers under the signature Caesar. Since the Caesar letters seemed not influential, Hamilton turned to another classical pseudonym, Publius, and to two collaborators, James Madison, the delegate from Virginia, and John Jay, the secretary of foreign affairs, to write *The Federalist,* a series of 85 essays in defense of the Constitution and republican government that appeared in newspapers between October 1787 and May 1788. Hamilton wrote at least two-thirds of the essays. *The Federalist* was widely read, had a great influence on contemporaries, became one of the classics of political literature, and helped shape American political institutions. In 1788 Hamilton was reappointed a delegate to the Continental Congress from New York. At the ratifying convention in June, he became the chief champion of the Constitution and, against strong opposition, won approval for it.

Hamilton's financial program. When President Washington in 1789 appointed Hamilton the first secretary of the Treasury, Congress asked him to draw up a plan for the "adequate support of the public credit." Envisaging himself as something of a prime minister in Washington's official family, Hamilton developed a bold and masterly program designed to build a strong union, one that would weave his political philosophy into the government. His immediate objectives were to establish credit at home and abroad and to strengthen the national government at the expense of the states. He outlined his program in four notable reports to Congress (1790–91).

A result of the struggle over Hamilton's program and over issues of foreign policy was the emergence of national political parties. Like Washington, Hamilton had deplored parties, equating them with disorder and instability. He had hoped to establish a government of superior persons who would be above party. Yet he became the leader of the Federalist Party, a political organization in large part dedicated to the support of his policies. Hamilton placed himself at the head of that party because he needed organized political support and strong leadership in the executive branch to get his program through Congress. The political organization that challenged the Hamiltonians was the Republican Party created by James Madison, a member of the House of Representatives, and Secretary of State Thomas Jefferson. In foreign affairs the Federalists favoured close ties with England, whereas the Republicans preferred to strengthen the old attachment to France. In attempting to carry out his program, Hamilton interfered in Jefferson's domain of foreign affairs. Detesting the French Revolution and the egalitarian doctrines it spawned, he tried to thwart Jefferson's policies that might aid France or injure England and to induce Washington to follow his own ideas in foreign policy. Hamilton went so far as to warn British officials of Jefferson's attachment to France and to suggest that they bypass the Secretary of State and instead work through himself and the President in matters of foreign policy. This and other parts of Hamilton's program led to a feud with Jefferson in which the two men attempted to drive each other from the Cabinet.

When war broke out between France and England in February 1793, Hamilton wished to use the war as an excuse for jettisoning the French alliance of 1778 and steering the United States closer to England, whereas Jefferson insisted that the alliance was still binding. Washington essentially accepted Hamilton's advice and in April issued a proclamation of neutrality that Republicans said favoured England. In that month an emissary from republican France, Edmond-Charles Genet, in trying to advance the cause of his own country, violated American neutrality by arming privateers in U.S. ports. Hamilton in June began a series of articles under the name "Pacificus" in defense of the neutrality proclamation and in August another series under the name "No Jacobin" that condemned Genet's activities and eventually led to Genet's recall in 1794.

At the same time, British seizure of U.S. ships trading with the French West Indies and other grievances led to popular demands for war against Great Britain, which Hamilton opposed. He believed that such a war would be national suicide, for his program was anchored on trade with Britain and on the import duties that supported his funding system. Hamilton persuaded the President to send John Jay to London to negotiate grievances. Hamilton wrote Jay's instructions, manipulated the negotiations, and defended the unpopular treaty Jay brought back in 1795, notably in a series of newspaper essays he wrote under the signature Camillus; the treaty kept the peace and saved his system.

Out of the Cabinet. Lashed by criticism, tired and anxious to repair his private fortune, Hamilton left the Cabinet on Jan. 31, 1795. His influence, as an unofficial adviser, however, continued as strong as ever. Washington and his Cabinet consulted him on almost all matters of policy. When Washington decided to retire, he turned to Hamilton, asking his opinion as to the best time to publish his farewell. With his eye on the coming presidential election, Hamilton advised withholding the announcement until a few months before the meeting of the presidential electors. Following that advice, Washington gave his *Farewell Address* in September 1796. Hamilton drafted most of the address, and some of his ideas were prominent in it. In the

election, Federalist leaders passed over Hamilton's claims and nominated John Adams for the presidency and Thomas Pinckney for the vice presidency. Because Adams did not appear devoted to Hamiltonian principles, Hamilton tried to manipulate the electoral college so as to make Pinckney president. Adams won the election, and Hamilton's intrigue succeeded only in sowing distrust within his own party. Hamilton's influence in the government continued, however, for Adams retained Washington's Cabinet, and its members consulted Hamilton on all matters of policy, gave him confidential information, and in effect urged his policies on the president.

Early in 1797 James T. Callender, a Republican hack, published a *History of the United States for the Year 1796,* in which he accused Hamilton of corruption in connection with an affair that Hamilton had had six years earlier with Maria Reynolds. Hamilton met the attack by writing a pamphlet in which he confessed the "irregular and indelicate amour" and printed the blackmailing letters that the woman's husband, a confidence man, had sent to him but denied any corrupt dealings with him. Although Hamilton successfully defended his integrity as a public man, he subjected his private life to a bitter humiliation.

When France broke relations with the United States, Hamilton stood for firmness but agreed with the president's policy of trying to reestablish friendly relations. After the failure of a peace mission that President Adams had sent to Paris in 1798, followed by the publication of dispatches insulting to U.S. sovereignty, Hamilton wanted to place the country under arms. He even believed that the French, who had embarked on an undeclared naval war, might attempt to invade the country. Hamilton sought command of the new army, though Washington would be its titular head. Adams resisted Hamilton's desires, but in September 1798 Washington forced him to make Hamilton second in command of the army, the inspector general, with the rank of major general. Adams never forgave Hamilton for this humiliation. Hamilton wanted to lead his army into Spain's Louisiana and the Floridas and other points south but never did. Through independent diplomacy, Adams kept the quarrel from spreading and at the order of Congress disbanded the provisional army. Hamilton resigned his commission in June 1800. Meantime Adams had purged his Cabinet of those he regarded as "Hamilton's spies."

In retaliation, Hamilton tried to prevent Adams' reelection. In October 1800 he privately circulated a personal attack on Adams, *The Public Conduct and Character of John Adams, Esq., President of the United States.* Aaron Burr of New York, the Republican candidate for vice president and Hamilton's political enemy, obtained a copy and had it published. Hamilton was then compelled to acknowledge his authorship and to bring his quarrel with Adams into the open, a feud that revealed an irreparable schism in the Federalist Party. Thomas Jefferson and Aaron Burr won the election, but, because both had received the same number of electoral votes, the choice between them for president was cast into the House of Representatives. Hating Jefferson, the Federalists wanted to throw the election to Burr. Hamilton helped to persuade them to select Jefferson instead. By supporting his old Republican enemy, who won the presidency, Hamilton lost prestige within his own party and virtually ended his public career.

The Burr quarrel. In 1801 Hamilton built a country house called the Grange on Manhattan island and helped found a Federalist newspaper, the *New York Evening Post,* the policies of which reflected his ideas. Through the *Post* he hailed the purchase of Louisiana in 1803, even though New England Federalists had opposed it. Some of them talked of secession and in 1804 began to negotiate with Burr for his support. Almost all the Federalists but Hamilton favoured Burr's candidacy for the governorship of New York state. Hamilton urged the election of Burr's Republican opponent, who won by a close margin, but it is doubtful that Hamilton's influence decided the outcome. In any event, Hamilton and Burr had long been enemies, and Hamilton had several times thwarted Burr's ambitions. In June 1804, after the election, Burr demanded satisfaction for remarks Hamilton had allegedly made at a dinner party in April in which he said he held a "despicable opinion" of Burr. Hamilton held an aversion to dueling, but as a man of honour he felt compelled to accept Burr's challenge. The two antagonists met early in the morning of July 11 on the heights of Weehawken, N.J., where Hamilton's eldest son, Philip, had died in a duel three years before. Burr's bullet found its mark, and Hamilton fell. Hamilton left his wife and seven children heavily in debt, which friends helped to pay off. (A.De C./Ed.)

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Hamilton, Alice (b. Feb. 27, 1869, New York, N.Y., U.S.—d. Sept. 22, 1970, Hadlyme, Conn.), American pathologist, known for her research on industrial diseases. By actively publicizing the danger to workers' health of industrial toxic substances, she contributed to the passage of workmen's compensation laws and to the development of safer working conditions.

Hamilton received her medical degree from the University of Michigan (1893) and continued her studies at Johns Hopkins University and in Germany. She taught at the Harvard Medical School (1919–35) and did studies for the state of Illinois, the federal government, and the League of Nations. Her writings include *Exploring the Dangerous Trades* (1943).

Hamilton, Andrew (b. *c.* 1676, Scotland—d. Aug. 4, 1741, Philadelphia, Pa. [U.S.]), British American colonial lawyer, judge, and public official who defended John Peter Zenger in a case important as the first victory for freedom of the press in the American colonies (1735).

Hamilton is known to have migrated to Virginia as an indentured servant shortly before 1700. In Virginia, Hamilton taught school, was admitted to practice law in the colony in 1703, married there in 1706, and two years later purchased a large landholding in Maryland. Hamilton practiced law in Kent county and served in the Maryland Assembly.

After pursuing further legal studies at Gray's Inn, London, he returned to the American colonies and settled permanently in Philadelphia. He soon became a prominent attorney. He was appointed city recorder in 1727, and he later donated the building ground for and helped to plan the city's Province House (Independence Hall). He served the province as attorney general of Pennsylvania (1714), provincial agent of the colony (1724–26), and representative to the colonial assembly and speaker of the house (1727–39). He also was made a judge of the vice-admiralty court in 1737.

When John Peter Zenger (*q.v.*), a New York printer, was tried in 1735 for seditious libel against the colony's royal governor, William Cosby, Hamilton was retained as defense attorney by Cosby's political opponents. Hamilton argued that controversial articles printed in Zenger's *New-York Weekly Journal* were true and therefore could not be considered libelous. He also argued that, despite existing judicial procedures, the jury, not the judges, should determine the truth of the articles. Although the judges ruled Hamilton's arguments out of order, the jurors found Zenger not guilty.

Hamilton, Emma, Lady, original name AMY LYON (b. *c.* 1761, Great Neston, Cheshire, Eng.—d. Jan. 15, 1815, Calais, Fr.), mistress of the British naval hero Admiral Horatio (afterward Viscount) Nelson.

The daughter of a blacksmith, she was calling herself Emily Hart when, in 1781, she began to live with Charles Francis Greville, nephew of her future husband, Sir William Hamilton, British envoy to the Kingdom of Naples. In 1786 Greville sent her to Naples to be his uncle's mistress in return for Hamilton's payment of Greville's debts. On Sept. 6, 1791, she and Hamilton were married. A beautiful woman whose portrait was often painted by George Romney, she was already a great favourite in Neapolitan society and the diplomatic intermediary between Hamilton and her close friend Queen Maria Carolina of Naples. It was said that Lady Hamilton facilitated Nelson's victory over the French in the Battle of the Nile (Aug. 1, 1798) by securing Neapolitan permission for his fleet to obtain stores and water in Sicily.

Lady Hamilton and Nelson, who had met in 1793, became lovers after his Nile triumph. In 1800, when the British government recalled Hamilton, Nelson returned with him and his wife to England, where she flaunted her control over the admiral. They had two daughters, one of whom survived infancy. After her husband's death (April 6, 1803) she lived with Nelson at Merton, Surrey. Although she inherited money from both men (Nelson was killed at the Battle of Trafalgar, Oct. 21, 1805), she squandered most of it, was imprisoned for debt (1813–14), and died in impecunious exile.

BIBLIOGRAPHY. Colin Simpson, *Emma* (1983); and Flora Fraser, *Beloved Emma* (1986; also published as *Emma, Lady Hamilton*), are sympathetic treatments.

Hamilton, Gavin (b. 1723, Bertram Shotts, Lanarkshire, Scot.—d. Jan. 4, 1798, Rome, Italy), Scottish-born painter of scenes from history, portraitist, archaeologist, and art dealer who was one of the pioneers of Neoclassicism.

From 1742 until his death he lived in Rome, except for a period from about 1752 to 1754 when he was in London, primarily painting portraits of the British aristocracy. He was part of Rome's inner circle of antiquarians and Neoclassical artists. Perhaps his best-known works were his paintings of scenes from Homer's *Iliad,* executed in the 1760s in a severely classical style. Hamilton also conducted important excavations of ancient archaeological sites near Rome and sold many of the discovered artifacts and art objects to British collectors.

Hamilton, Sir Ian (Standish Monteith) (b. Jan. 16, 1853, Corfu, Ionian Islands [Greece]—d. Oct. 12, 1947, London, Eng.), British general, commander in chief of the Mediterranean Expeditionary Force in the unsuccessful campaign against Turkey in the Gallipoli Peninsula during World War I.

Hamilton served in various campaigns in India and Africa, beginning in the 1870s, and was Lord Kitchener's chief of staff during the South African War (1899–1902). He was knighted in 1902. In 1910 he became British commander in chief in the Mediterranean.

On March 12, 1915, Hamilton was placed in charge of the expeditionary force intended to

seize control of the Dardanelles Strait and to capture Constantinople. During the next six months, he conducted operations against the Turks at Gallipoli but suffered heavy casualties and made little headway. He remained unrealistically optimistic, and, when the British Cabinet had begun to favour the evacuation

Sir Ian Hamilton, oil painting by John Singer Sargent; in the Scottish National Portrait Gallery, Edinburgh

By courtesy of the Scottish National Portrait Gallery, Edinburgh

of his force, he inopportunely reiterated his belief in the ultimate success of the campaign. He was recalled on Oct. 16, 1915, and was given no further command. He wrote *Gallipoli Diary*, 2 vol. (1920).

Hamilton, (Anthony Walter) Patrick (b. March 17, 1904, Hassocks, Sussex, Eng.—d. Sept. 23, 1962, Sheringham, Norfolk), English playwright and novelist, notable for his capture of atmosphere and the Cockney dialect spoken in the East End of London.

Hamilton began acting in 1921 and then, fascinated by theatrical melodrama, took to writing. He became known with the novel *Craven House* (1926). Three very successful motion pictures were based on works by Hamilton. His play *Rope* (first performed 1929; U.S. title *Rope's End*) was made into a film by Alfred Hitchcock under the title *Rope* (1948). The play *Gaslight* (1938; also called *Angel Street*) was phenomenally successful not only on the stage but also as a motion picture (1944), under the title *Gaslight*, starring Ingrid Bergman and Charles Boyer; a British-made film titled *Angel Street*, from the same play, was released in 1952. From his novel *Hangover Square* (1941) was made the motion picture of the same title (1945). Hamilton also wrote novels portraying the unpleasantness of the modern city: *The Midnight Bell* (1929) and *The Plains of Cement* (1934), both included in the volume *Twenty Thousand Streets Under the Sky* (1935).

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Hamilton, Sir William (b. Dec. 13, 1730, Scotland—d. April 6, 1803, London), British diplomat and archaeologist, the husband of Emma, Lady Hamilton, mistress of Adm. Horatio Nelson.

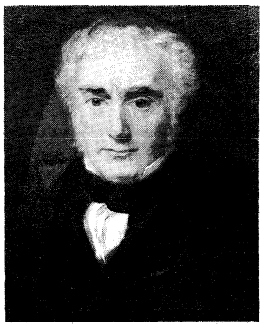
Hamilton was the son of Lord Archibald Hamilton, governor of Greenwich Hospital and of Jamaica. He served in the army (1747–58) but left it after his marriage to a Welsh heiress, whose estate in Swansea he inherited on her death in 1782. From 1764 until his recall in 1800, Hamilton served as British envoy to the court of Naples. He was knighted in 1772.

Hamilton made or caused to be made, at Vesuvius and Etna, a series of observations on the action of volcanoes and published several treatises on earthquakes and volcanoes between 1772 and 1783. He was a notable collector, and many of his treasures went to enrich the British Museum. He married Emma in 1791. *See also* Hamilton, Emma, Lady.

Hamilton, Sir William, 9TH BARONET (b. March 8, 1788, Glasgow—d. May 6, 1856, Edinburgh), metaphysical philosopher and influential educator, also remembered for his contributions in the field of logic.

Hamilton became a member of the Scottish bar in 1813, inherited the baronetcy in 1816 (after a court suit), and in 1821 was appointed professor of civil history at Edinburgh University, where he was elected to the chair of logic and metaphysics in 1836. A versatile teacher, he was also knowledgeable in anatomy, physiology, literature, and theology and was a frequent contributor to journals. His long friendship with the French philosopher Victor Cousin originated with his essay in the *Edinburgh Review* on "The Philosophy of the Unconditioned" (1829), a critique of Cousin's *Cours de philosophie.*

Hamilton's own reputation as a philosopher rested on his articles on German philosophers. He was thus not recognized as an original thinker, and critics dismissed his effort to combine the Scottish "philosophy of common sense" with views held by Immanuel Kant, but he successfully stimulated an interest in metaphysics and introduced Kant to the



Sir William Hamilton, detail of an oil painting by J. Ballantyne; in the Scottish National Portrait Gallery, Edinburgh

By courtesy of the Scottish National Portrait Gallery, Edinburgh

British public. His place in the history of logic rests on his doctrine of the "quantification of the predicate," which refers to the traditional proposition of logic, "All *A* is *B*." By modifying quantitatively the predicate to produce two forms, "All *A* is all *B*" and "All *A* is some *B*," he extended the range of classification of propositions.

In the field of education Hamilton helped bring about the royal commission of 1850, and its subsequent reforms, by his articles in the *Edinburgh Review.*

Hamilton, Sir William Rowan (b. Aug. 3/4, 1805, Dublin—d. Sept. 2, 1865, Dublin), Irish mathematician and astronomer who developed the theory of quaternions, a landmark in the development of algebra, and discovered the phenomenon of conical refraction. His unification of dynamics and optics, moreover, has had a lasting influence on mathematical physics, even though the full significance of his work was not fully appreciated until after the rise of quantum mechanics.

Life. Like his English contemporaries Thomas Babington Macaulay and John Stuart Mill, Hamilton showed unusual intellect as a child. Before the age of three his parents sent him to live with his father's brother, James, a learned clergyman and schoolmaster at a Church of England school at Trim, a small town near Dublin, where he remained until 1823, when he entered Trinity College, Dublin. Within a few months of his arrival at his uncle's he could read English easily and was advanced in arithmetic; at five he could translate Latin, Greek, and Hebrew and recite Homer, Milton, and Dryden. Before his 12th birthday he had compiled a grammar of Syriac, and by the age of 14 he had sufficient mastery of the Persian language to compose a welcome to the Persian ambassador on his visit to Dublin.

Hamilton became interested in mathematics after a meeting in 1820 with Zerah Colburn, an American who could calculate mentally with astonishing speed. Having read the *Eléments d'algèbre* of Alexis-Claude Clairaut and Isaac Newton's *Principia,* Hamilton had immersed himself in the five volumes of Pierre-Simon Laplace's *Traité de mécanique céleste* (1798–1827; Eng. trans., *Celestial Mechanics*) by the time he was 16. His detection of a flaw in Laplace's reasoning brought him to the attention of John Brinkley, professor of astronomy at Trinity College. When Hamilton was 17, he sent Brinkley, then president of the Royal Irish Academy, an original memoir about geometrical optics. Brinkley, in forwarding the memoir to the Academy, is said to have remarked: "This young man, I do not say *will be,* but *is,* the first mathematician of his age."

In 1823 Hamilton entered Trinity College, from which he obtained the highest honours in both classics and mathematics. Meanwhile, he continued his research in optics and in April 1827 submitted his "Theory of Systems of Rays" to the Academy. The paper transformed geometrical optics into a new mathematical science by establishing one uniform method for the solution of all problems in that field. Hamilton started from the principle, originated by the 17th-century French mathematician Pierre de Fermat, that light takes the shortest possible time in going from one point to another, whether the path is straight or is bent by refraction. Hamilton's key idea was to consider the time (or a related quantity called the "action") as a function of the end points between which the light passes and to show that this quantity varied when the coordinates of the end points varied, according to a law that he called the law of varying action. He showed that the entire theory of systems of rays is reducible to the study of this characteristic function.

Shortly after Hamilton submitted his paper and while still an undergraduate, Trinity College elected him to the post of Andrews Professor of Astronomy and Royal Astronomer of Ireland, to succeed Brinkley, who had been made a bishop. Thus an undergraduate (not quite 22 years old) became ex officio an examiner of graduates who were candidates for the Bishop Law Prize in mathematics. The electors' object was to provide Hamilton with a research post free from heavy teaching duties. Accordingly, in October 1827 Hamilton took up residence next to Dunsink Observatory, five miles (eight kilometres) from Dublin, where he lived for the rest of his life. He proved to be an unsuccessful observer, but large audiences were attracted by the distinctly literary flavour of his lectures on astronomy. Throughout his life Hamilton was attracted to literature and considered the poet Wordsworth among his friends, although Wordsworth advised him to write mathematics rather than poetry.

Six years after his move to Dunsink, Hamilton married Maria Bayley, daughter of a former rector in County Tipperary, who bore him two sons and a daughter. But his wife was less successful at running the household; as a result, Hamilton never had regular meals and came to rely excessively on alcohol. He would usually work all day in the dining room, and the cook would bring him a mutton chop from time to time. After his death scores of bones were found on plates sandwiched among his papers.

In 1835 Hamilton was the chief local organizer of the British Association for the Advancement of Science meeting in Dublin and at the closing dinner was knighted by the Lord Lieutenant. Two years later he became president of the Royal Irish Academy. In 1843 he was awarded a Civic List life pension of £200 a year by the British government.

During Hamilton's last illness, an attack of gout, he received with great satisfaction the news that his name had been placed at the head of the first list of Foreign Associates elected by the newly formed National Academy of the United States.

Works. In 1832 a supplement to Hamilton's theory of rays was published. In it he predicted that, as a result of the theory, a wholly unexpected phenomenon would be found in connection with the refraction of light in biaxial crystals, which produce interference figures consisting of two sets of concentric rings when light passes through them. It had been known for some time that certain crystals of this kind, such as topaz, give rise to two refracted rays for each incident ray. The theory of this double refraction had been worked out a few years earlier by Augustin Fresnel. Hamilton found by his general method that under certain conditions a single ray of incident light could actually produce an infinite number of refracted rays in a biaxial crystal and that they would form a cone. Hamilton's prediction of conical refraction, regarded in his lifetime as his most brilliant achievement in optics, was confirmed experimentally within two months by a colleague, Humphrey Lloyd.

Today his unification of optics and dynamics is regarded as far more important than his work on conical refraction. In 1835 his memoir, "On a General Method in Dynamics," was published. In it he applied his idea of the characteristic function to the motion of systems of bodies and expressed the equations of motion in a form that revealed the duality between the components of momentum of a dynamical system and the coordinates determining its position. Although Hamilton's canonical equations expressing this duality and his principle that reduces the whole of dynamics to a problem in the calculus of variations have long been familiar to students of dynamics, the deep significance of the duality he discovered was not appreciated for nearly 100 years, until the rise of quantum mechanics.

In the same year Hamilton made his famous discovery of quaternions; these ordered sets of four ordinary numbers, satisfying special laws of equality, addition, and multiplication, are useful for studying quantities having magnitude and direction in three-dimensional space. This discovery was a landmark, since it freed algebra from the commutative postulate of multiplication—that the order or sequence of factors does not determine the result. His investigations in algebra had begun 10 years before with a pioneer paper on algebraic couples of numbers in which the basic entity was not a single number but ordered pairs of numbers. Hamilton used this idea to develop a rigorous theory of complex numbers, involving the square root of -1. This paper was remarkable as a pioneer attempt to put algebra on an axiomatic basis like geometry. The geometry of complex numbers (*i.e.,* numbers of the form $a + bi$, in which i is the square root of -1) is that of the two-dimensional vectors in a plane. In attempting to develop analogous technique for three-dimensional space, Hamilton was delayed for many years by a fundamental difficulty that could not be resolved so long as he restricted his attention to "triplets." Suddenly, on Oct. 16, 1843, the solution flashed into his mind as he was walking to Dublin along the Royal Canal: geometrical operations in three-dimensional space require not triplets but "quadruplets." The reason is that, whereas the algebraic couple suffices in the plane because it is equivalent to a multiplier and an angle, in three dimensions the orientation of the plane itself is variable, and this gives rise to two more numbers. Hamilton was so excited by his discovery that as he passed Brougham Bridge he cut the fundamental formulas of quaternions on the stonework: $i^2 = j^2 = k^2 = ijk = -1$.

Hamilton's discovery was a break with tradition, because it involved the surrender of the commutative law of multiplication—that b times a is the same as a times b. The remaining 22 years of his life were devoted to developing the algebra of quaternions and its applications. This work was published posthumously in 1866 as *The Elements of Quaternions.* Unfortunately, Hamilton believed that quaternions were ideally suited for the solution of problems in applied mathematics, but it was the simplified version of J. Willard Gibbs, known as vector analysis, that was eventually adopted by mathematical physicists. The value of Hamilton's discovery lay rather in pure mathematics, through its effect on the development of modern abstract algebra.

(G.J.W.)

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Hamilton, William Thomas, byname WILDCAT BILL (b. Dec. 6, 1822, England—d. May 24, 1908, Montana, U.S.), mountain man, trapper, and scout of the American West.

Brought to America at age two, Hamilton grew up in St. Louis, Mo., and began trapping at an early age on the North Platte and Green rivers (in present-day Nebraska and Wyoming). He became an Indian fighter in the 1850s in California, the Northwest, and the Plains. In 1858 he set up a trading post in what became Missoula, Mont., and, while trading, held various jobs as county sheriff, Indian agent, and army scout. His memoirs, *My Sixty Years on the Plains,* appeared in 1905.

Hamilton-Gordon, George: *see* Aberdeen, George Hamilton-Gordon, 4th Earl of.

Hamilton River (Labrador, Canada): *see* Churchill River.

Hamilton-Temple-Blackwood, Frederick Temple: *see* Dufferin and Ava, Frederick Temple Hamilton-Temple-Blackwood, 1st Marquess of.

Hamiltonian function, also called HAMILTONIAN, mathematical definition introduced in 1835 by Sir William Rowan Hamilton to express the rate of change in time of the condition of a dynamic physical system—one regarded as a set of moving particles. The Hamiltonian of a system specifies its total energy—*i.e.,* the sum of its kinetic energy (that of motion) and its potential energy (that of position)—in terms of the Lagrangian function derived in earlier studies of dynamics and of the position and momentum of each of the particles.

The Hamiltonian function originated as a generalized statement of the tendency of physical systems to undergo changes only by those processes that either minimize or maximize the abstract quantity called action. This principle is traceable to Euclid and the Aristotelian philosophers.

When, early in the 20th century, perplexing discoveries about atoms and subatomic particles forced physicists to search anew for the fundamental laws of nature, most of the old formulas became obsolete. The Hamiltonian function, although it had been derived from the obsolete formulas, nevertheless proved to be a more correct description of physical reality. With modifications, it survives to make the connection between energy and rates of change one of the centres of the new science.

Hamīrpur, city, west-central Himāchal Pradesh state, northeastern India. It is situated about 40 miles (65 km) northeast of Bhakra Dam in the Himalayan-Sutlej Basin and lies on the road from Mandi to Nādaun. The nearest railway station is Jwalamukhi Road.

The region around Hamīrpur is mountainous and hilly. Agriculture is the principal means of livelihood; wheat, corn (maize), paddy rice, potatoes, vegetables, ginger, plums, peaches, and apricots are grown. Industries in the region include soapmaking, wood carving, leather working, silk weaving, cane making and basketmaking, fruit packing, and spinning. Pop. (1981) 8,797.

Hamīrpur, town, southwestern Uttar Pradesh state, northern India, on the Yamuna River, south of Kānpur. Located at a road junction and near a major rail line, it is an agricultural trade centre. The town contains ruins dating from the 11th century. The region around Hamīrpur is mostly level except for hills in the south. Crops include wheat, rice, millet, barley, and cotton. Mahoba, the largest town, is noted for betel nuts. Pop. (1981) 21,376.

Hamito-Semitic languages, also called SEMITO-HAMITIC, ERYTHRAEAN, AFRO-ASIATIC, or AFRASIAN LANGUAGES, a family of genetically related languages, developed from a common parent language that presumably existed about the 6th–8th millennium BC and was perhaps located in the present-day Sahara. It is the main language family of northern Africa and southwestern Asia and includes such languages as Arabic, Hebrew, Amharic, and Hausa.

A brief treatment of the Hamito-Semitic languages follows. For full treatment, *see* MACROPAEDIA: Languages of the World.

The languages belonging to the Hamito-Semitic family are commonly subdivided into five branches—Semitic, Egyptian, Berber, Cushitic, and Chadic—which represent what were dialects of the original parent language. Despite the work of several scholars, only an approximate, provisional reconstruction of the parent-language forms of Hamito-Semitic has been made. More has been done in comparing the language typologies.

Numerous typological features, both phonological and morphological, seem to have been common to all Hamito-Semitic languages at an early stage of their development. Languages retaining all or most of these features belong to the Ancient Stage; those that retain no less than two-thirds of the ancient consonantal system and about one-half to two-thirds of the other features belong to the Middle Stage; those that have lost more than half of these characteristics belong to the New Stage. All modern Hamito-Semitic languages except Literary Arabic and Hebrew belong to the New Stage.

The Semitic branch can be subdivided into four groups. The Northern Peripheral group, from the Ancient to Middle Stage, includes Akkadian with its dialects, Babylonian and Assyrian, spoken from about 3200 BC to the beginning of the Christian era. The Northern Central group includes the Canaanite, Ugaritic, and Amorite languages of the Ancient Stage, spoken from the 3rd to the 2nd millennium BC. To the Middle Stage belongs Phoenician-Punic, spoken from the 2nd millennium BC to the 1st millennium AD. Also to the Middle Stage belong Hebrew, Moabite, Ya'udi, and Old Aramaic. Hebrew, originally spoken in Palestine from the 13th century BC to the 2nd century AD, became in 1948 one of the official languages of the new state of Israel.

The South Central group includes Classical, or Literary, Arabic belonging to the Ancient and Middle Stages. Originally spoken in Arabia, it is now found from the Indian to the Atlantic Ocean and has been attested from the 5th century BC to the present. From the New Stage came the modern Arabic dialects, some of them mutually unintelligible. They have about 100,000,000 speakers. To the Southern Peripheral group of the Ancient to Middle Stage belong the South Arabic dialects, spoken from the 1st millennium BC to the 1st millennium AD. The Middle Stage is represented by Ge'ez, or Ethiopic, found in northern Ethiopia in the 1st millennium AD; and the New Stage is represented by the South Arabic group and the tripartite Ethiopic group.

The Egyptian branch of the Hamito-Semitic family includes only one language (with local dialects)—namely, Egyptian. Beginning sometime before 3000 BC, it can be differentiated into five stages, each of which lasted at least 500 years. The most recent developmental stage of the Egyptian language, Coptic, began in about the 2nd century AD and lasted to the 17th century and possibly, in some villages, until the 19th century. Coptic is still in ecclesiastical use (along with Arabic) among the Arabic-speaking Monophysite Christians of Egypt.

The Berber (Berbero-Libyan) branch is represented by a multitude of New Stage Berber dialects distributed all over North Africa, from the Siwa Oasis in Egypt to Senegal. There is little or no intelligibility between the dialects, except for historically neighbouring ones. Arabic borrowings are evident; there are also a number of borrowings from Punic, Latin, and the languages south of the Sahara.

The Cushitic branch goes back to a reconstructed Common Cushitic parent language. The Cushitic languages are all from the New Stage and can be subdivided into five groups: the Northern group, spoken mainly in The Sudan and also in Eritrea; the Eastern group, spoken east of Addis Ababa; the Central, or Agau, group, dispersed over Ethiopia; the Southern group, located in Tanzania, south of the Equator; and the Western group (Omotic), spoken along the western border of Ethiopia and in northern Kenya.

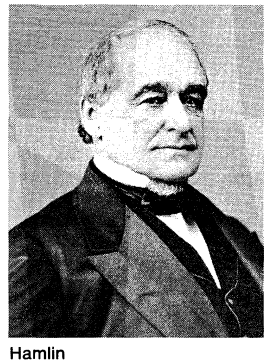
Of the Chadic (Chado-Hamitic) branch the most important language by far is Hausa. Its speakers live in northern Nigeria and in Niger, as well as in parts of Ghana, Cameroon, Togo, Dahomey, Chad, and the Central African Republic. Hausa is also spoken as a second language by many speakers of other African languages. All the other languages of the Chadic branch, some 150, are spoken by smaller ethnic groups. No Chadic language except Hausa has been reduced to writing.

Hamlet, legendary prince of Denmark and central character in Shakespeare's play of the same name, whose problematic character has lent itself to innumerable interpretations by actors and critics. Hamlet corresponds to the figure of Amleth (Amlódi), whose story is narrated in books 3 and 4 of Saxo Grammaticus' history of Denmark, written in the late 12th century. It is possible that Saxo drew on a (lost) Icelandic saga of Amlódi, mentioned by a 10th-century Icelandic poet, for his information. It has been argued that Saxo's Amleth was originally a product of Geatish tradition as it developed in Jutland. One scholar, however, has suggested that the Hamlet story has its origins in the East, being similar to a tale in the 10th-century *Shāh-nāmeh* ("Book of Kings") by the Persian poet Ferdowsī. Others have posited a Celtic origin, pointing to the warrior Amhlaide, who is named as the slayer of King Niall Glúndub in the Irish Annals under the year 917.

The Hamlet story was told in volume 5 (1570) of François de Belleforest's *Histoires tragiques.* Shakespeare's play, which was first performed in 1600 or 1601, was evidently preceded by another play of Hamlet, now lost and usually referred to as the *Ur-Hamlet,* of which Thomas Kyd is a conjectured author. *The Hystorie of Hamblet,* an English version of Belleforest's work, was published in London in 1608. None of these sources provides a clue to Hamlet's famous hesitation (his reluctance or unreadiness to avenge his father's murder), which is central and peculiar to Shakespeare's conception of Hamlet. This hesitation has fascinated critics, but none of the explanations offered, such as unconscious Oedipal guilt (suggested by the Freudians) or the inability of an over-refined, over-reflective nature to translate complex feeling into simple action, has found complete acceptance.

Hamlin, Hannibal (b. Aug. 27, 1809, Paris Hill, Maine, U.S.—d. July 4, 1891, Bangor, Maine), U.S. vice president (1861–65) under Pres. Abraham Lincoln.

After practicing law for a time Hamlin entered politics as an antislavery Jacksonian Democrat and served in the Maine state legislature (1836–40). He was elected to Congress in 1842 and again in 1844. In his first term as a U.S. senator (1848–56), he took an antislavery position on sectional issues and left the Democratic Party in 1856 because of its endorsement of the Kansas–Nebraska Act. In the same year he was elected Maine's first Republican governor but resigned in February 1857 to return to the U.S. Senate. As vice president he favoured radical emancipation measures and arming of Negroes. After failing



Hamlin

By courtesy of the Library of Congress, Washington, D.C.

to secure renomination in 1864, he became collector of the port of Boston but resigned in 1866 when he found himself out of sympathy with Pres. Andrew Johnson's policies. Elected to the Senate again (1869–81), he upheld radical reconstruction and served as chairman of the Foreign Relations Committee. Hamlin served for one year as U.S. minister to Spain (1881–82).

Hamlyn's monkey: *see* owl-faced monkey.

Hamm, city, North Rhine-Westphalia *Land* (state), northwestern Germany, situated on the Lippe and Ahse rivers and the Lippe-Seitenkanal, at the eastern edge of the Ruhr industrial region. Founded in 1226 as the capital of the county of Mark, it was a prosperous member of the Hanseatic League until the wars of the 17th and 18th centuries led to its decline. Hamm was revitalized by the Industrial Revolution in the 19th century. It was heavily bombed in World War II, and more than half of its buildings were destroyed. Rebuilt, the new city is dominated by a skyscraper (1959) housing the *Land* Supreme Court. The medieval St. Paul's church and parts of the 16th-century St. Agnes' church survived. There are a museum, a music school, a large wooded park, and thermal (saline) springs.

An important railway junction, Hamm's chief industry is the manufacture of wire and cables. There are other heavy industries in the city and coal mines in the vicinity. Pop. (1989 est.) 173,611.

Ḥammād ar-Rāwiyah (Arabic: Ḥammād the Transmitter or Reciter) (b. *c.* 694, al-Kūfah, Iraq—d. *c.* 772, al-Kūfah), anthologist of Arab antiquities credited with collecting the seven early odes known as *al-Muʿallaqāt* (*The Seven Odes*).

Ḥammād's father was not an Arab but was brought to Iraq from the Daylam region of Iran. Ḥammād's circle of friends in al-Kūfah enjoyed wine and poetry, and Ḥammād became one of the most learned men of his time in Arabic poetry. He committed vast numbers of poems to memory and studied the associated lore of battles, genealogies, and folk stories. This knowledge won him the favour of al-Walīd II and perhaps others of the Umayyad caliphs of Damascus. After the Umayyad dynasty fell to the 'Abbāsids, Ḥammād retired to al-Kūfah. He was criticized by some Arab scholars because his interest was in poetry rather than philology and grammatical scholarship; and he was suspected by them, moreover, of creating some of the early Arabic poems he collected.

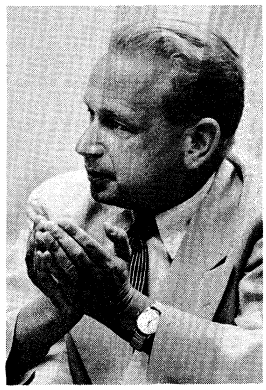
Hammāmāt, al-, also spelled HAMMAMMET, fishing port and beach resort, situated in Nābul *wilāyah* (governorate), northeastern Tunisia, on the Khalīj (gulf) al-Hammāmāt. Al-Hammāmāt (Arabic: "bathing places") is located on the southeast coast of Cape Bon Peninsula, on the border of the Sāḥil region, and between the Roman sites of Siagum and Pupput, approximately 30 mi (50 km) from Tūnis. It is referred to as the Tunisian Riviera, because of its sandy beaches, mild winters, and pleasant summers.

The fortress is believed to have been built in the 13th century AD. The *Medīna* (old town) was founded probably in the 15th century and was extended during the Spanish occupation of Tūnis (1535–69) by Emperor Charles V. During World War II the German general Erwin Rommel used al-Hammāmāt as his headquarters. A major local attraction is the international cultural centre built in the form of an ancient theatre. Pop. (1984) 30,441.

Ḥammār, Hawr al-, English LAKE ḤAMMĀR, large swampy lake in southeastern Iraq, south of the junction of the Tigris and Euphrates rivers. Fed by distributaries of the Euphrates, the lake (70 mi [110 km] long; 750 sq mi [1,950 sq km] in area) drains via a short channel into the Shatt al-Arab near Basra. It was once only a reed-filled marshland but is now being utilized as a natural irrigation reservoir for the fertile soils of the delta region, where dates, rice, and cotton are the principal crops. The lake and surrounding marshlands are inhabited by the Maʿdan, a tribe of semi-nomadic marsh dwellers. Their distinctive culture is based on the herding of water buffalo, the hunting of wildfowl and pigs from reed canoes, and the building of elaborate houses of woven reeds (Arabic *mudhīf*). The structures have Gothic-appearing arches made of bundles of reeds fastened together at the top; the walls are woven in intricate patterns of reeds. A 4th-millennium-BC plaque from the Sumerian city of Uruk on the western edge of the marshes depicts such a structure, showing the longevity of the style.

Hammarskjöld, Dag (Hjalmar Agne Carl) (b. July 29, 1905, Jönköping, Swed.—d. Sept. 18, 1961, near Ndola, Northern Rhodesia), Swedish economist and statesman, second secretary general of the United Nations (1953–61), whose leadership enhanced the prestige and effectiveness of the UN. He was posthumously awarded the Nobel Prize for Peace for 1961.

The son of Hjalmar Hammarskjöld, prime



Dag Hammarskjöld, 1954
United Nations Photograph

minister of Sweden (1914–17) and chairman of the Nobel Prize Foundation (1929–47), Dag Hammarskjöld studied law and economics at the universities of Uppsala and Stockholm and taught political economy at Stockholm (1933–36). He then joined the Swedish civil service as permanent under secretary in the Ministry of Finance and subsequently became president of the board of the Bank of Sweden. From 1947 he served in the Ministry of Foreign Affairs. In 1951 Hammarskjöld was chosen vice chairman of Sweden's delegation to the UN General Assembly, of which he became chairman in 1952. On April 10, 1953, five months after the resignation of Trygve Lie of Norway as secretary general, Hammarskjöld was elected to the office for a term of five years. In September 1957 he was reelected to another five-year term.

For several years he was most concerned with fighting and threats of fighting in the Middle East between Israel and the Arab states; he and the Canadian statesman Lester Pearson (Nobel Peace Prize winner for 1957) participated in the resolution of the Suez Canal crisis that arose in 1956. Hammarskjöld also played a prominent role in the 1958 crisis in Lebanon and Jordan.

The Belgian Congo became the independent Republic of the Congo on June 30, 1960, and Hammarskjöld sent a UN force to suppress the civil strife that began there soon afterward. In September 1960 his action was denounced by the Soviet Union, which demanded that he resign and that the office of secretary general be replaced by a three-man board (*troika*) comprising representatives of the Western, Communist, and neutral nations. Soon after, while on a peace mission to Pres. Moise Tshombe of the Congolese province of Katanga, Hammarskjöld was killed in an airplane crash.

As secretary general, Hammarskjöld is generally thought to have combined great moral force with subtlety in meeting international challenges. He insisted on the freedom of the secretary general to take emergency action without prior approval by the Security Council or the General Assembly, and he preserved this freedom partly by the careful ambiguity of his public utterances. He allayed widespread fears that the UN would be completely dominated by its chief source of military and financial sustenance, the United States. The absence of a major international crisis during the first three years of his secretaryship enabled him to concentrate on quietly building public confidence in himself and his office.

Hammarskjöld, (Knut) Hjalmar (Leonard) (b. Feb. 4, 1862, Tuna, Swed.—d. Oct. 12, 1953, Stockholm), statesman who, as prime minister of Sweden, maintained his country's neutrality during World War I.

After teaching civil law at Uppsala University (1891–95), Hammarskjöld worked in the Ministry of Justice and acted as head of that ministry in 1901–02. He was appointed president of the Göta Supreme Court in 1902 and became a member of the Permanent Court of Arbitration at The Hague in 1904, where he served until 1946. In 1905 he acted as minister of education and as a delegate to the negotiations in Karlstad over the dissolution of the union of Sweden and Norway. After acting as Swedish minister in Copenhagen (1905–07), he became governor of Uppsala province, a position he held until 1930.

Hammarskjöld attained prominence in international diplomacy in the years before World War I, serving as Sweden's chief delegate to the Hague Peace Conference (1907) and presiding over the Franco-Italian arbitration court (1913) dealing with seizure of vessels during the Italo-Turkish War (1911–12). He became prime minister in 1914 after the Liberal ministry had resigned in protest over the proposed comprehensive national defense plan that Hammarskjöld soon implemented. He

Hjalmar Hammarskjöld, bronze relief portrait by J.E. Lindberg, 1930; in Gripsholm Castle, Sweden
By courtesy of the Svenska Portrattarkivet, Nationalmuseum, Stockholm

kept Sweden out of World War I, but protests over food shortages forced him to resign in 1917. He subsequently served as curator of the Académie de Droit International (Academy of International Law) at The Hague, president of the Institut de Droit International (1924–38), and chairman of the Nobel Prize foundation (1929–47).

hammer, tool designed for pounding or delivering repeated blows. Varied uses require a multiplicity of designs and weights. Hand hammers consist of a handle and striking head, with the head often made of metal with a hole in the centre to receive a wooden handle. Sometimes the entire hammer is forged or cast in one piece of metal. Surfaces of hammerheads vary in size, in angle of orientation to the handle (parallel or inclined), and in type of face (flat or convex). Carpenters' hammers often have a claw on the head for extracting nails. Weights range from a few ounces or grams up to 15 pounds (7 kilograms) for hammers used in breaking stones.

Heavier hammers are power tools, among the largest being the pile driver. Trip-hammers depend on gravity for their impulse, but steam hammers often employ, in addition to gravity, a downward thrust from a steam-activated piston. Pneumatic hammers driven by air include the hammer drill, used on rock and concrete, in which the hammerhead is a drill head, and the riveting hammer, used principally in construction operations involving steel girders and plate.

Hammer, Armand (b. May 21, 1898, New York City), American petroleum executive, entrepreneur, and patron of the arts.

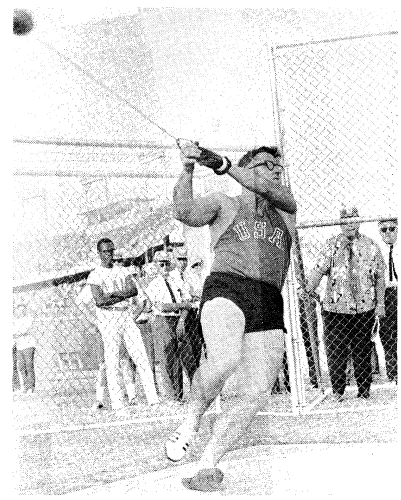
The son of a doctor, Hammer had made his first $1,000,000 through his enterprising ventures in his father's pharmaceutical company before receiving a medical degree from Columbia University in 1921. Journeying to Soviet Russia in 1921 to give medical aid to that country's famine victims, he was personally persuaded by Lenin to turn his business talents to account there instead. In 1925 Hammer obtained a concession from the Bolsheviks to manufacture pencils for the Soviet Union, and his firm soon became the largest supplier of cheap, reliable pencils in the country. His business ventures were bought out by the Soviets in the late 1920s, and Hammer returned to the United States in 1930 laden with innumerable paintings, jewelry pieces, and other art objects formerly owned by the Romanov imperial family and sold to him by the cash-hungry Soviets. In the 1930s he sold most of these valuables and embarked on such profitable post-Prohibition business ventures as whiskey making and the manufacture of whiskey barrels, as well as cattle raising.

Tiring of his hectic business lifestyle, Hammer retired in 1956 but was approached that year by a friend who suggested that he finance two wildcat oil wells being drilled in Bakersfield, Calif., by the near-bankrupt Occidental Petroleum Corporation. Hammer financed the wells, which unexpectedly struck oil, and he quickly increased his holdings in Occidental, becoming the firm's chief executive officer and chairman of the board in 1957. By the mid-1960s, under Hammer's management, Occidental's gross annual income was more than $650,000,000, and profitable oil ventures in Libya (which were later nationalized) and diversifications into chemical manufacturing had boosted Occidental's gross income to more than $2,000,000,000 by 1970. Because of his longtime trade and personal contacts with the Soviets, Hammer and his firm were among the principal participants in the broadening of U.S.–Soviet trade ties that accompanied the era of detente in the 1970s. Hammer also became a prominent art collector, dealer, and patron, holding exhibitions and making donations from his hoard of Old Master paintings and drawings to various American museums.

hammer throw, track-and-field sport in which a hammer is hurled for distance, using two hands within a throwing circle.

The sport developed centuries ago in the British Isles. Legends trace it to the Tailteann Games held in Ireland about 2000 BC, when the Celtic hero Cú Chulainn gripped a chariot wheel by its axle, whirled it around his head, and threw it farther than did any other individual. Wheel hurling was later replaced by throwing a boulder attached to the end of a wooden handle. Forms of hammer throwing were practiced among the ancient Teutonic tribes at religious festivals honouring the god Thor.

Since 1866 the hammer throw has been a regular part of track-and-field competitions in



Hammer throw
Don Chadez

Ireland, Scotland, and England. The English standardized the event in 1875 by establishing the weight of the hammer at 7.26 kg (16 pounds) and its length at 106.75 cm (later changed to a maximum 121.3 cm, or 3 feet 11.75 inches) and by requiring that it be thrown from a circle 2.135 m in diameter.

The event has been included in the Olympic Games since 1900; it is for male competition only. Early hammers had forged-iron heads and wooden handles, but the International Amateur Athletic Federation now requires use of a wire-handled spherical weight. The ball is of solid iron or other metal not softer than brass or is a shell of such metal filled with lead or other material. The handle is spring steel wire, with one end attached to the ball by a plain or ball-bearing swivel and the other to a rigid, two-hand grip by a loop. The throwing circle is protected by a C-shaped cage for the safety of officials and onlookers.

In the modern hammer throw technique, a thrower makes three, full, quick turns of the body before flinging the weight. Strength, balance, and proper timing are essential. The throw is a failure if the athlete steps on or outside the circle, or if the hammer lands outside a 40° sector marked on the field from the centre of the circle. For world records, *see* Sporting Record: *Athletics*. *See also* Olympic Games.

Hammer v. Dagenhart (1918), legal case in which the Supreme Court of the United States struck down the Keating-Owen Act, which had regulated child labour. The act, passed in 1916, had prohibited the interstate shipment of goods produced in factories or mines in which children under age 14 were employed or adolescents between ages 14 and 16 worked more than an eight-hour day.

Hammer v. *Dagenhart* was a test case in 1918 brought by employers outraged at this regulation of their employment practices. Dagenhart was the father of two boys who would have lost jobs at a Charlotte, N.C., mill if Keating-Owen were upheld; Hammer was the U.S. attorney in Charlotte.

In a 5 to 4 decision, the Court ruled that the Keating-Owen Act exceeded federal authority and represented an unwarranted encroachment on state powers to determine local labour conditions. In a notable dissent, Justice Oliver Wendell Holmes pointed to the evils of excessive child labour, to the inability of states to regulate child labour, and to the unqualified right of Congress to regulate interstate commerce—including the right to prohibit.

Hammer v. *Dagenhart* was overturned when the Court upheld the constitutionality of the Fair Labor Standards Act in *U.S.* v. *Darby Lumber Company* (1941).

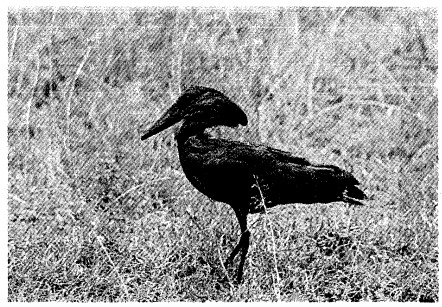
Hammerfest, town, Finnmark *fylke* (county), on the barren island of Kvaløya in Sørøysundet (Sørøy Sound) off the northwestern coast of Norway. Chartered in 1789, it was bombarded and destroyed by two English brigs in 1809. Between 1816 and 1852 Norway, Sweden, and Russia conducted surveys in the area to establish a meridian arc between Hammerfest and the Danube River at the Black Sea. A meridian stone column at Fuglenes in the town commemorates the completion of this work. In 1891 most of Hammerfest was destroyed by fire; Norway's first municipal hydroelectric generating station was included in its reconstruction. From 1940 to 1944 the town was occupied by the Germans, who, upon their withdrawal, blew up the installations and forcibly evacuated the population. Hammerfest has since been rebuilt and is now the commercial centre of western Finnmark. It is the northernmost town in Europe.

In summer the town has a road connection with the National Highway and with Finland

The port of Hammerfest on Sørøysundet (Sørøy Sound), Norway
Wolfgang Meier—Bavaria-Verlag

and air services to other parts of Norway. Tourism, fish-oil processing, and livestock raising are the town's economic mainstays. Despite its northerly latitude, the harbour in Hammerfest is ice-free the year round because of the warming effect of the North Atlantic Current (terminal section of the Gulf Stream), which also causes midwinter temperatures to remain only slightly below freezing. Because the town is so far north, the sun shines continuously from May 17 to July 29, but there is no sunlight from November 21 to January 21. Pop. (1986 est.) mun., 7,089.

hammerhead, also called HAMERKOP, or HAMMER-HEADED STORK (*Scopus umbretta*), African wading bird, the sole species of the family Scopidae, within the order Ciconiiformes, which also includes herons, flamingos, and storks. The hammerhead ranges over Africa south of the Sahara and occurs on Madagascar and in southwestern Arabia. It



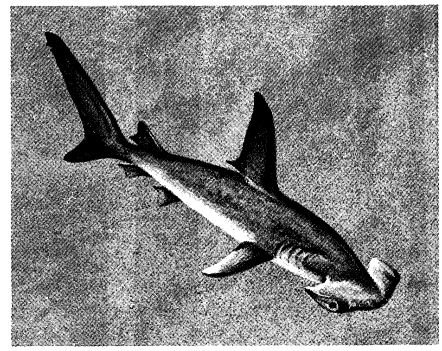
Hammerhead (*Scopus umbretta*)
Christina Loke—Photo Researchers

is about 60 cm (2 feet) long, nearly uniform umber or earthy brown in colour, and bears a conspicuous horizontal crest on the back of its large head. The heavy, compressed, hook-tipped bill is black, like the shortish legs. Active especially at twilight, the bird sits beside a stream with its head down or wades slowly, stirring the mud with one foot and then the other, feeding on mollusks, frogs, small fishes, and aquatic insects. It builds an enormous nest of sticks, sometimes 1.8 m (6 feet) across and 1.2 m (4 feet) high, on a rocky ledge or in a tree. The nest is dome shaped with an entrance on the side and a narrow tunnel leading to a central chamber lined with mud. The bird lays three to six chalky-white eggs.

hammerhead shark, any shark of the family Sphyrnidae (class Selachii). Hammerheads are widely distributed in all oceans, in warm and temperate waters. These sharks are named for the unusual shape of their heads, which are broad, flattened, and hammer- or spade-shaped, with the eyes and nostrils at the ends of the sidewise projections. It is thought that the peculiarly shaped head may serve as a rudder, aiding maneuverability, and that the nostrils, being widely spaced, enable better tracking of scents.

Hammerheads are swift, powerful sharks that may be found at sea, close to shore, or in brackish water. They feed on fish, stingrays, skates, and other sharks. Some species are fished for leather and oil.

Hammerheads have long been feared as potential man-eaters. Three species seem to be particularly dangerous: the great hammerhead (*Sphyrna mokarran*), growing to a maximum length of 4.5 m (15 feet) or more; the scalloped hammerhead (*S. lewini*), growing to about 3 m; and the smooth hammerhead (*S. zygaena*), growing to about 4.25 m. All three are grayish and are found throughout the tropics; the smooth hammerhead, which is valued as a sport fish, also ranges into cooler waters. These three species are individually distinguished by the shape of the front edge of the head: straight, with a central notch in the great hammerhead; curved outward with



Smooth hammerhead (*Sphyrna zygaena*)
Painting by Richard Ellis

a central notch in the scalloped hammerhead; and curved outward but unnotched in the smooth hammerhead.

Hammerling, Rupert Johann: *see* Hamerling, Robert.

Hammerschmidt, Andreas (b. 1611/12, Brüx, Bohemia—d. November 8, 1675), Austro-Bohemian composer from whose work were taken most of the chorale tunes used in the Lutheran service of worship.

Nothing is known of his early life, but in 1633 he was in the service of Graf (Count) Rudolf von Bünau. In 1633 Hammerschmidt was organist at the Peterskirche in Freiberg, and four years later he moved to Zittau, becoming organist at the Johanneskirche, where he stayed for the remaining 40 years of his life. As a composer, he left a large output that is important in the history of Lutheran music. In form, his cantatas foreshadow those of the 18th century, although they show little variety in mood or treatment. His sources are mainly the chorales and the German Bible. His works include 17 Lutheran masses (consisting only of the Kyrie and Gloria); a collection of madrigals for unaccompanied singers, *Geistliche Madrigalien* ("Sacred Madrigals"); a set of sacred symphonies for one or two voices with strings and continuo; and a book of secular songs, *Weltliche Oden* ("Worldly Odes").

Hammersmith and Fulham, formerly HAMMERSMITH, inner borough of Greater London, with an area of 6 square miles (16 square km). Main westward routes out of London pass through the northern part of the borough, with the heaviest traffic on the Great West Road served by the Hammersmith overpass.

In Hammersmith are the White City Stadium; Olympia (exhibition centre); Hurlingham Park; and the grounds of Chelsea, Fulham, and Queen's Park Rangers football (soccer) clubs. The British Broadcasting Corporation's main television centre is in Wood Lane with other BBC studios in Shepherd's

Bush and on the riverside near Hammersmith's suspension bridge. The annual Oxford and Cambridge (universities) Boat Race starts from near Putney Bridge. The southern part of the borough contains Fulham Palace, seat of the bishops of London. Until 1834, Hammersmith formed part of Fulham parish.

St. Paul's School, founded in 1509 by John Colet (dean of St. Paul's) and originally situated in the cathedral's churchyard, moved to Hammersmith in 1884. John Dwight set up his kilns by the river in the early 1670s, and there are many wharves along the waterfront. Coal gas was produced in Fulham as early as 1829. The prison close by, Wormwood Scrubs, was built by convicts in 1874. Pop. (1982 est.) 149,400.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Hammerstein, Oscar, II (b. July 12, 1895, New York City—d. Aug. 23, 1960, Doylestown, Pa., U.S.), U.S. lyricist, musical comedy author, and theatrical producer influential in the development of musical comedy and known especially for his immensely successful collaboration with the composer Richard Rodgers.

The grandson of the opera impresario Oscar Hammerstein, he studied law at Columbia University before beginning his career in the theatre. Between 1920 and 1959 he wrote all or part of about 45 musical dramas for stage, film, or television. Until he became exclusively Rodgers' librettist in 1943 Hammerstein wrote lyrics for several other composers, among them Vincent Youmans, Rudolf Friml, Sigmund Romberg ("Lover Come Back to Me"; "Softly, As in a Morning Sunrise"), and Jerome Kern ("All the Things You Are"; "The Last Time I Saw Paris"). Among Hammerstein's best known early works are *Rose Marie* (1924; music by Friml); *The Desert Song* (1925; music by Romberg); and the Jerome Kern musicals *Sunny* (1925) and *Show Boat* (1927), which includes the perennial favourites, "Ol' Man River" and "Only Make Believe."

After a period of less successful writing for films he teamed with Richard Rodgers in creating *Oklahoma!* (1943; winner of the Pulitzer Prize, 1944), *Carousel* (1945), and *South Pacific* (1949; Pulitzer Prize in 1950), combining bright tunes with relatively sophisticated stories—a blend then unfamiliar to the stage but later widely adopted. Hammerstein's lyrics are often marked by a simplicity and sensitivity perhaps best exemplified by "If I Loved You" (from *Carousel*).

Rodgers and Hammerstein formed a music publishing firm, Williamson Music, Inc., and from 1949 were theatrical producers for their own works as well as for those of many others. Other musical comedies with Rodgers include *The King and I* (1951), *The Sound of Music* (1959), *Flower Drum Song* (1958), and the film *State Fair* (1945).

Hammett, (Samuel) Dashiell (b. May 27, 1894, St. Mary's County, Md., U.S.—d. Jan. 10, 1961, New York City), U.S. writer who created the hard-boiled school of detective fiction. (*See* detective story; hard-boiled fiction).

Hammett left school at 13 and worked at a variety of low-paying jobs before working eight years as a detective for the Pinkerton agency. He served in World War I, contracted tuberculosis, and spent the immediate postwar years in army hospitals. He began to publish short stories and novelettes in pulp magazines and wrote two novels—*Red Harvest* and *The Dain Curse* (both published in 1929)—before writing *The Maltese Falcon* (1930), generally considered his finest work. It introduced Sam

Hammett
Culver Pictures, Inc.

Spade, Hammett's fictional detective creation, played by Humphrey Bogart in the film version directed by John Huston (1941), which became a classic of its genre. He also wrote *The Glass Key* (1931) and *The Thin Man* (1932), which initiated a motion picture and later a television series built around his detecting couple, Nick and Nora Charles. Nora was based on the playwright Lillian Hellman, with whom he formed a romantic alliance in 1930 that lasted until his death. Her *Pentimento* (1973) has an account of their life together.

After 1934 Hammett devoted his time to left-wing political activities and to the defense of civil liberties. He served in World War II as an enlisted man. In 1951 he went to jail for six months because he refused to reveal the names of the contributors to the bail bond fund of the Civil Rights Congress, of which he was a trustee.

Hammond, city, Lake County, northwestern Indiana, U.S., in the Calumet industrial complex between Chicago and Gary, on the Grand Calumet River, near Lake Michigan. It was founded in 1869 when George Hammond, a pioneer in shipping refrigerated beef, established with Marcus Towle the State Line Slaughterhouse. Ice from the river and inland lakes was used for packing the meat. Until destroyed by fire in 1901, the packinghouse was the city's largest industry. The city, originally called Hohman, and then State Line because it is on the Illinois–Indiana boundary, was renamed in 1873 to honour the meat-packer. Handicapped by the lack of a harbour, it failed to attract the heavy industry found in neighbouring cities but did develop diversified light manufacturing. The Purdue University–Calumet Campus is there. Inc. 1883. Pop. (1980) city, 93,714; Gary–Hammond–East Chicago metropolitan area (SMSA), 642,781.

Hammond, John Hays (b. March 31, 1855, San Francisco—d. June 8, 1936, Gloucester, Mass., U.S.), U.S. mining engineer who helped develop gold mining in South Africa and California.

In 1880 he was engaged by the U.S. Geological Survey for a study of the California goldfields; afterward, as a consulting engineer, he visited most of the countries of North and South America. Acting as a consulting engineer for British gold interests from 1893, he became a leader of the mining faction whose protests against government policies led to the Jameson Raid (January 1896), an abortive attempt to overthrow the Transvaal government and set up a South African federation under the British flag. Hammond was arrested and condemned to death but was later released. He organized and was chairman from 1914 to 1915 of the World Court League, an organization that carried on an intensive campaign for an international court, and was chairman of the U.S. Coal Commission in 1922.

Hammond, John Hays, Jr. (b. April 13, 1888, San Francisco—d. Feb. 12, 1965, New York City), U.S. inventor whose development of radio remote control served as the basis for modern missile guidance systems.

Son of the noted U.S. mining engineer John Hays Hammond, he established the Hammond Radio Research Laboratory in 1911. By the beginning of World War I, he had not only developed radio remote control but also incorporated it with a gyroscope to send an experimental yacht on a 120-mile (190-kilometre) round trip between Gloucester, Mass., and Boston. Hammond then developed techniques for preventing enemy jamming of remote control and invented a radio-controlled torpedo for coastal defense.

Hammond conducted some of the earliest experiments in frequency modulation (FM) broadcasting and invented single-dial radio tuning. In addition he devised an amplifier that was used on long-distance telephone lines.

During World War II he developed a variable-pitch ship propeller that increased engine efficiency. His later developments include a method of intelligence transmission called "Telespot." He was president of the Hammond Research Corporation, a consulting firm, and often served as research consultant to large corporations.

Hammond, Laurens (b. Jan. 11, 1895, Evanston, Ill., U.S.—d. July 1, 1973, Cornwall, Conn.), American businessman and inventor of the electronic keyboard instrument known as the Hammond organ.

Hammond's early education took place in Europe, where the family had moved in 1898. Returning to the United States, Hammond attended Cornell University where he received a degree (1916) in mechanical engineering. In 1920, while employed as an engineer for a Detroit automobile concern, he worked privately on a variety of original devices, eventually inventing a soundless clock by enclosing the spring motor in a soundproof box. Selling the marketing rights for his clock, Hammond quit his job and devoted all his efforts to experimentation. He soon developed a synchronous motor that revolved in phase with the 60-cycle electric alternating current then becoming standard. It became the heart of both the Hammond clock and the Hammond organ.

In 1928 he perfected his electric clock and founded the Hammond Clock Company; the company name was changed to the Hammond Instrument Company in 1937, later (1953) becoming the Hammond Organ Company. Although he was not a musician, Hammond became fascinated early in 1933 with the sounds emanating from the phonograph turntables in his laboratory. He and his engineers began to explore the possibilities of producing conventional musical tones by electric synthesis. By the end of 1934 he had designed and built an instrument with 91 small tonewheel generators (rotated by means of his synchronous motor), with harmonic drawbars placed above the keyboard to permit the mixture of millions of different tones. The advertised claims for the Hammond organ were disputed by the manufacturers of traditional pipe organs, and a complaint was made to the Federal Trade Commission in 1937; the commission decided in Hammond's favour. His later inventions included the Solovox (1940), an attachment to the piano keyboard designed to enable the amateur player to augment the melody with organ-like or orchestral sounds, and the chord organ (1950), on which chords are produced simply by touching a panel button.

Hammond, Walter Reginald (b. June 19, 1903, Dover, Kent, Eng.—d. July 1, 1965, Durban, South Africa), English cricketer and former team captain (1939–46) who broke many records during his career as one of the country's finest batsmen.

He made his first appearance for Gloucestershire in 1920 and joined the English national team three years later. He scored 7,249 runs

and took 101 catches in Test (international) competition, which were records at the time. His 10 catches in a game in 1928 and his 78 catches for that season are world records. After his retirement in 1947, Hammond moved to South Africa.

Hammond Innes, Ralph, pseudonym RALPH HAMMOND (b. July 15, 1913, Horsham, Sussex, Eng.), English novelist known for adventure stories in which suspense and the forces of nature are strong features.

Hammond Innes began his career in teaching and publishing. He worked on the staff of the *Financial News* newspaper during 1934–40 and was in the British Royal Artillery during 1940–46. He travelled widely, and in 1978 he was made a Commander of the British Empire.

Hammond Innes' best known books are *The White South* (1949); *Campbell's Kingdom* (1952); *The Mary Deare* (1956); *The Doomed Oasis* (1960); *Atlantic Fury* (1962); *The Conquistadors* (1969); *The Last Voyage: Captain Cook's Lost Diary* (1979); and *The Black Tide* (1982). He also wrote television and motion-picture scripts.

Hammondsport, village, Urbana Town (township), Steuben County, southern New York, U.S., at the south end of Keuka Lake (one of the Finger Lakes), 20 mi (32 km) north-northwest of Corning. In 1829 William Bostwick planted the first grapevine in the area, which was settled by French winegrowers in the 1860s. Incorporated in 1871, it is now the centre of the New York state wine, especially champagne, industry. The Greyton H. Taylor Wine Museum exhibits early phases of wine production, including barrel making. Potato growing and tourism are additional local economic factors.

Glen Hammond Curtiss (1878–1930), the pioneer aviator and inventor, was born in Hammondsport, where in 1902 he established a motorcycle factory. At nearby Stony Brook Farm, with the help of Alexander Graham Bell and others, he conducted his early experiments in flying, including the flight of the "June Bug" on July 4, 1908, to win the *Scientific American* silver trophy for the first U.S. powered flight of 3/5 mi (1 km). The Glen H. Curtiss Museum contains his memorabilia with displays on the history of aviation. Pop. (1980) 1,065.

Ḥammūdid DYNASTY, in Spain, Muslim Berber dynasty, one of the party kingdoms (*ṭā'ifahs*) that emerged during the decline of the Umayyad caliphate of Córdoba early in the 11th century; they ruled Málaga (1022–57) and Algeciras (1039–58).

In 1013 the Umayyad caliph Sulaymān al-Musta'īn awarded Sabtah to 'Alī ibn Ḥammūd and Algeciras, Tangier, and Asilah to 'Alī's brother al-Qāsim in payment for their help in returning him to the throne. 'Alī, however, claiming to be the rightful heir to Hishām II, al-Musta'īn's predecessor, marched into Córdoba in July 1016 and deposed al-Musta'īn. Al-Musta'īn was then declared al-Hishām's murderer and executed, while 'Alī had himself proclaimed caliph and assumed the title an-Nāṣir. The first non-Umayyad to occupy the Spanish caliphate, 'Alī was murdered by his palace slaves after a brief reign (1016–18). Al-Qāsim, meanwhile, had been governing Seville and, after the murder of the Umayyad al-Murtaḍā (reigned 1018), established himself in Córdoba (1018–21). The resident Berbers, however, induced 'Alī's son Yaḥyā al-Mu'talī to take Córdoba and proclaimed him caliph in 1021, only to drive him out in 1022. Al-Qāsim returned that year, but he too was forced out in 1023. Yaḥyā, now ruler of Málaga, was invited back to Córdoba in 1025, but by this time the caliphate was a meaningless institution, so, entrusting it to his lieutenants, he returned to Málaga, where his successors ruled until 1057, when the city was seized by the Zīrids. The Ḥammūdid line, through al-Qāsim's heirs, held Algeciras until 1058.

Hammurabi, also spelled HAMMURAPI (b. Babylon—d. 1750 BC), sixth and best known ruler of the 1st (Amorite) dynasty of Babylon (reigning 1792–50 BC), noted for his surviving set of laws once considered the oldest promulgation of laws in human history. *See* Hammurabi, Code of.

Like all the kings of his dynasty except his father and grandfather, Hammurabi bore a tribal Amorite name belonging to the Amnanum. Only scanty information exists about his immediate family: his father, Sin-muballit; his sister, Iltani; and his firstborn son and successor, Samsuiluna, are known by name.

Hammurabi, limestone relief; in the British Museum

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

When Hammurabi succeeded Sin-muballit in 1792 BC he was still young, but as was customary in Mesopotamian royal courts of the time he had probably already been entrusted with some official duties in the administration of the realm. In that same year Rim-Sin of Larsa, who ruled over the entire south of Babylonia, conquered Isin, which served as a buffer between Babylon and Larsa. Rim-Sin later became Hammurabi's chief rival.

The reconstruction of Hammurabi's rule is based mainly on his date formulas (years were named for a significant act the king had performed in the previous year or at the beginning of the year thus named). These show him engaged in the traditional activities of an ancient Mesopotamian king: building and restoring temples, city walls, and public buildings, digging canals, dedicating cult objects to the deities in the cities and towns of his realm, and fighting wars. His official inscriptions commemorating his building activities corroborate this but add no significant historical information.

The size, location, and military strength of the realm left to Hammurabi made it one of the major powers in Babylonia. That Hammurabi was not strong enough to change the balance of power by his own will is well expressed in a diplomatic report: "There is no king who is powerful for himself: with Hammurabi, 'the man of Babylon,' go ten or 15 kings, so with Rim-Sin, 'the man of Larsa'; with Ibalpiel, 'the man of Eshunna,' . . . go 20 kings."

Hammurabi inherited one major direction for his political activity: to succeed in controlling the Euphrates waters—important in an area that depended exclusively on irrigation agriculture. Such a policy naturally led to conflicts with the kingdom of Larsa, situated in a disadvantageous downstream position. This policy, begun by Hammurabi's great-grandfather but most forcefully and partially successfully pursued by his father, Hammurabi himself took up in 1787 BC, near the beginning of his reign, when he conquered the cities Uruk (Erech) and Isin, held by Rim-Sin, and clashed again with Rim-Sin the year after. But, according to Hammurabi's date formulas and contemporary diplomatic correspondence, these operations led no further because Hammurabi shifted the direction of his military operations in 1784 toward the northwest and the east. For almost 20 years thereafter no significant warlike activity is reported. These years were characterized by changing coalitions among the main kingdoms—Mari, Ashur, Eshnunna, Babylon, and Larsa. Hammurabi used this time of uneasy stalemate to fortify several cities on his northern borders (1776–1768 BC).

The last 14 years of Hammurabi's reign were overshadowed by continuous warfare. In 1764 Hammurabi dealt with a coalition of Ashur, Eshnunna, and Elam—the main powers east of the Tigris—whose position threatened to block his access to the metal-producing areas of Iran. It can be assumed, however, that Hammurabi took the initiative in moving against Rim-Sin of Larsa in 1763 BC. Few particulars are reported about this latter war, but it seems that Hammurabi successfully employed a stratagem that apparently had been used before by Sin-muballit against Rim-Sin: damming up the water of a main watercourse and then either releasing it suddenly to create a devastating flood or simply withholding it—the main resource of life—from the enemy's people (that Hammurabi used this device to bring about Rim-Sin's defeat can be assumed from the fact that in 1760 he rebuilt a canal—the western branch of the Euphrates—to facilitate the resettlement of the uprooted population that lived along its course before this war). The final siege of Larsa, Rim-Sin's last stronghold, lasted for several months. It was the last step to Hammurabi's victory.

In 1762 BC Hammurabi again engaged in hostilities with the eastern powers. It is unknown whether this was a protective move on his part or a reaction on theirs to the change in the balance of power. The motives that led Hammurabi in 1761 BC against his longtime ally, Zimrilim, king of Mari, 250 miles upstream from Babylon on the Euphrates, remain enigmatic. Two explanations are likely: it was either again a fight over water rights or an attempt by Hammurabi to gain control over Mari's excellent location at the crossroads of the ancient Near East's overland trade.

Two years later Hammurabi had to direct his armies eastward for a third time (1757–55 BC). The final destruction of Eshnunna during this campaign—again achieved by damming up the waters—most likely proved to be a pyrrhic victory, because it removed a buffer zone between Babylonia proper and the peoples of the east (among them probably the Kassites, who were to take over in Babylonia 160 years hence). During his last two years, Hammurabi thus had to concentrate on the construction of defense fortifications. By this time he was a sick man, and he died in 1750 BC, with the burden of government already being carried by his son, Samsuiluna.

Changes affecting nearly all spheres of life took place during Hammurabi's reign. They were aimed at the consolidation of conditions resulting from the transformation of a small city-state into a large territorial state. His letters show that he personally engaged in the details of implementing these changes and in the daily routine of the administration of his realm. This personal style is characteristic for Hammurabi and also for other contemporary rulers. Hammurabi's laws—not a law code in the modern sense—must also be considered as an expression of his concern to be a just ruler—an ideal pursued by Mesopotamian kings at all times.

That Hammurabi failed to set up an effective

bureaucratic system may be attributed to his personal style in the governance of his realm and the fact that he was fully engaged in wars during the last part of his reign. The lack of effective administration might have been one reason for the fast deterioration after his death of what he had achieved in military terms.

When Hammurabi conquered southern Babylonia he did not follow the century-old tradition of having himself deified during his lifetime. There is reason to believe that this was his personal decision, probably based on a different view of the nature of kingship, setting a precedent for the concept of kingship until Hellenistic times.

Hammurabi's eminence in Mesopotamian history has long been exaggerated. It was first based on the discovery of his laws but subsequent discoveries of older, though less voluminous, collections of laws have led to a less enthusiastic view. Moreover, the frequently noted resemblance between Hammurabi's laws and the Mosaic laws is now seen in terms of common heritage rather than as proof for direct dependency.

Hammurabi is also credited with bringing Mesopotamia again under a single rule. Although there existed certain trends toward such unification—particularly expressed in the themes depicted on contemporary seals and in the apodoses of omens evoking a past when such kings as Sargon of Akkad and Shulgi ruled Mesopotamia from the Persian Gulf to the Mediterranean Sea—it is doubtful that unification was the only motive for Hammurabi's conquests. The lasting achievement of Hammurabi's rule was that the theatre of Mesopotamian history, which had been in the south from the beginning of the 3rd millennium BC, was shifted to the north, where it remained for more than 1,000 years.

(J.M.R.)

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Hammurabi, Code of, the most complete and perfect extant collection of Babylonian laws, developed during the reign of Hammurabi (1792–1750 BC) of the 1st dynasty of Babylon. It consists of his legal decisions that were collected toward the end of his reign and inscribed on a diorite stela set up in Babylon's temple of Marduk, the national god of Babylonia. These 282 case laws include economic provisions (prices, tariffs, trade, and commerce), family law (marriage and divorce), as well as criminal law (assault, theft) and civil law (slavery, debt). Penalties varied according to the status of the offenders and the circumstances of the offenses.

The background of the code is a body of Sumerian law under which civilized communities had lived for many centuries. The existing text is in the Akkadian (Semitic) language; but, even though no Sumerian version is known to survive, the code was meant to be applied to a wider realm than any single country and to integrate Semitic and Sumerian traditions and peoples. Moreover, despite a few primitive survivals relating to family solidarity, district responsibility, trial by ordeal, and the lex talionis (*i.e.,* an eye for an eye, a tooth for a tooth), the code was advanced far beyond tribal custom and recognized no blood feud, private retribution, or marriage by capture.

The principal (and only considerable) source of the Code of Hammurabi is the stela discovered at Susa in 1901 by the French Orientalist Jean-Vincent Scheil and now preserved in the Louvre.

Hampden, John (b. 1594, London—d. June 24, 1643, Thame, Oxfordshire, Eng.), English Parliamentary leader famous for his opposition to King Charles I over ship money, an episode in the controversies that ultimately led to the English Civil Wars.

John Hampden, engraving by Michael van der Gucht in E. Ward's *History of the Grand Rebellion,* printed in 1713

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

A first cousin of Oliver Cromwell, Hampden was educated at the University of Oxford and the Inner Temple, London, and entered the House of Commons in 1621. There he quickly became a specialist in matters of taxation and a close friend of Sir John Eliot, a leading Puritan critic of the crown. In 1627 Hampden was imprisoned for nearly a year for refusing to contribute a forced loan demanded by the King. When Eliot died in 1632, after three years in prison, Hampden's ill will for Charles was firmly established.

Hampden resisted on principle the payment of ship money, a levy collected by the King for outfitting his navy. Only Parliament was empowered to levy taxes, however, and Hampden reasoned that, as Parliament could meet only when summoned by the king, Charles was, in effect, eliminating the need to call Parliament if he could impose taxes himself. The King contended, however, that ship money was a type of tax that by custom did not need the approval of Parliament. In 1635 Hampden refused to pay 20 shillings in ship money, and the case went before the 12 judges of the Court of the Exchequer. Although seven of the judges upheld Charles and five sided with Hampden (1638), the narrow majority received by the King may have been a factor that encouraged widespread resistance to the tax.

During the Long Parliament, which convened in November 1640, Hampden became the principal lieutenant of Parliamentary leader John Pym in a vigorous attack on royal policies, and he was one of the five members who successfully evaded arrest by the King in January 1642. After the outbreak of the Civil War between the Parliamentarians and the Royalists in August 1642, Hampden served as a colonel in the Battle of Edgehill, Warwickshire (October), but on June 18, 1643, he was mortally wounded in a skirmish with Royalists at Chalgrove Field near Thame. *A Life of John Hampden* by John Adair was published in 1976.

Hampden, Walter, original name WALTER HAMPDEN DOUGHERTY (b. June 30, 1879, Brooklyn, N.Y., U.S.—d. June 11, 1955, Los Angeles), U.S. actor, theatre manager, and repertory producer.

Hampden attended Harvard briefly but graduated from Brooklyn Polytechnic Institute. After a year's study of singing, dancing, speech, and playing the cello in France, Hampden joined Sir Frank Benson's company in England, where he played more than 70 classical roles in three years. In 1905 he married Mabel Moore, an actress in the troupe, and in 1906 he played Hamlet in London to great applause. After his return to the U.S. in 1907, he appeared in several modern dramas with Nazimova, but his *Hamlet* was so successful that when he formed his own repertory company that play became its foundation. In 1923 Hampden revived Edmond Rostand's *Cyrano de Bergerac,* a play still associated with his name. He opened his own theatre (1925) with Ethel Barrymore as his leading lady, and in the ensuing years he gave outstanding performances in *Hamlet, The Merchant of Venice* (1925–26), and *An Enemy of the People* (1927–28). Hampden appeared in his first motion picture, *The Hunchback of Notre Dame* (1929), and later played the part of an aging actor in *All About Eve* (1950). He made his television debut as Macbeth in 1949. Hampden was the fourth president of the Players' club.

Hampshire, county of south central England, bounded west by Dorset and Wiltshire, north by Berkshire, east by Surrey and West Sussex, and south by the English Channel. Its 13 districts, covering an area of 1,458 sq mi (3,777 sq km), are East Hampshire, Hart, New Forest, Rushmoor, Test Valley, the boroughs of Basingstoke and Deane, Eastleigh, Fareham, Gosport, and Havant, and the cities of Portsmouth, Southampton, and Winchester.

The county falls into four physical areas. A broad belt of rolling chalk downland, at times more than 800 ft (240 m) high, runs across the middle from east to west. Tertiary clays, sands, and gravels, often covered by heath and woodland, lie to the north and south. In the east The Weald, with its typical scarps and vales, crosses the county border. The oldest rocks occur in this Wealden area—Lower and Upper Greensands and Gault clays. The Solent, a narrow strait dividing the Isle of Wight from the mainland, marks the lower course of the ancient Frome or River Solent. Submergence along the coast resulted in former tributaries becoming the independent streams, which now drain most of the chalk and southern Tertiary areas.

There is considerable evidence of prehistoric settlement of most ages in Hampshire. Remains of small Bronze Age farmsteads exist at Quarley, and most notable among Iron Age remains are hill forts such as those at Danebury and Hengistbury Head. During the Roman occupation, urban settlements developed at Silchester (Calleva Atrebatum) and Winchester (Venta Belgarum), the focal points of the Roman road system in the area. There was a smaller settlement at Southampton (Clausentum). Villa sites are numerous in the northwest. There were potteries in the New Forest and an imperial weaving works at Winchester, but the most substantial remains are in the town walls of Silchester and the outer wall at Portchester Castle. The museum at Reading, in Berkshire, houses artifacts from Silchester.

The county is first mentioned in the Anglo-Saxon Chronicle in AD 755, when Winchester was an important town. Though it had suffered severely from attacks of Norsemen, during the Middle Ages the county enjoyed a comparatively peaceful existence. The few castles that were built include those at Odiham, Portchester, and Winchester. Medieval industries commonly included the manufacture of woollens, and Southampton was important for the export and import of wool and wine. The whole of the county remained in the episcopal see of Winchester from 676 until 1927, when the sees of Guildford and Portsmouth were created. Monastic remains are found at Beaulieu and Netley, in the great church of Romsey, and in Winchester cathedral.

The county has always been agricultural, its main concerns now being dairying and the production of corn (maize). Market garden-

ing is locally important, particularly between Southampton and Portsmouth. There is still a large acreage of woodland—for instance, in the New Forest, a former royal hunting ground. Portsmouth and Gosport form one of Britain's principal naval centres, while Southampton is a major passenger port. Petroleum is refined at Fawley. The tourist industry provides much employment, and resorts include Southsea and Hayling Island. Most market towns have light industries such as engineering and brewing. Pop. (1982 est.) 1,486,300.

Hampshire, breed of pig developed in the United States from the Wessex Saddleback and other varieties first imported from England around 1825; in the late 20th century it was one of the predominant breeds in the U.S. The trim, fine-coated Hampshire is black with a white saddle, which includes the forelegs. Recent selection has improved the breed's growing ability, and its carcass is among the highest in quality and quantity of meat.

Hampshire, breed of medium-wool, dark-faced, hornless sheep originating in Hampshire, England. It is large and blocky and, as a superior mutton breed, is noted for its early maturity. It is one of the most popular meat breeds in the United States, where it is raised extensively for market-lamb production in farming regions and for crossing with white-faced range ewes in the western range regions for the production of market lambs. The wool of Hampshire fleeces is strong, of medium fineness and length, and desirable for manufacturing purposes except for the occurrence of black fibres in a small percentage of fleeces.

The Oxford, a breed popular in England and in the Great Lakes region of the U.S., was produced in the mid-19th century in Oxfordshire, England, by crossing Hampshires and Cotswolds.

Hampshire Avon (river, England): *see* Avon, East.

Hampton, independent city, southeastern Virginia, U.S., on Chesapeake Bay and the north shore of Hampton Roads (harbour), opposite Norfolk, to which it is linked by the Hampton Roads Bridge–Tunnel. It forms part of a metropolitan complex, including Newport News, Norfolk, Virginia Beach, Chesapeake, and Portsmouth. It originated around Ft. Algernourne (now Ft. Monroe), built in 1609 on the site of the Indian village of Kecoughtan to protect the James River to Jamestown. Permanent settlement dates from 1610–11, which makes it the nation's oldest continuously settled community of English origin. It became part of Elizabeth City County in 1620. St. John's Church was established in 1610; the present structure dating from 1728 has been restored. Organized as a town in 1705, Hampton was named for the 3rd earl of Southhampton and grew as a seaport, being later surpassed by Norfolk. Attacked during the American Revolution and again in the War of 1812, it was burned by Confederates in 1861 to prevent its capture by Federal forces occupying Old Point Comfort (*q.v.*) and Ft. Monroe. Rebuilt after the Civil War, it incorporated as a town in 1887 and developed fishing and seafood processing industries.

Military installations and tourism are important to the economy. Ft. Monroe (headquarters for the U.S. Continental Army Command), Langley Air Force Base, and the Langley Research Center for the National Aeronautics and Space Administration are in the city. The Syms-Eaton Museum commemorates Benjamin Syms and Thomas Eaton, who founded the first free schools (1634, 1659) in America; the two schools merged in 1805 as Hampton Academy, which was later absorbed into the public school system. Hampton Institute (1868) was established by Gen. Samuel C. Armstrong, chief of the Freedmen's Bureau, to educate former slaves. Thomas Nelson Community College opened there in 1967. Incorporated a city in 1908, Hampton merged with Elizabeth City County and the town of Phoebus in 1952. Pop. (1980) city, 122,617; metropolitan area (SMSA), 364,449.

Hampton, Lionel (Leo), byname HAMP (b. April 12, 1913, Louisville, Ky., U.S.), U.S. swing musician, the first to use the vibraphone (vibraharp, or vibes) in jazz. He is particularly known for the rhythmic vitality of his playing and for his showmanship as a performer.

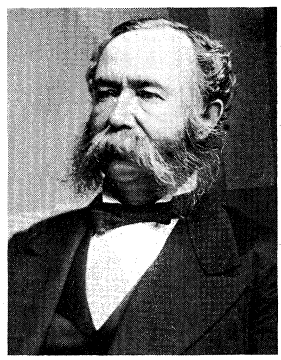
Hampton studied drums as a child and as a teenager went to California, where he played drums in a band formed with his friend Les Hite, the saxophonist. When the band recorded "Memories of You" with Louis Armstrong in 1930, Hampton became the first musician to record on the vibraphone. During the 1930s he formed the first of his own groups, and in 1936 he joined the Benny Goodman Quartet. Beginning in the 1930s, Hampton made a series of recordings with musicians drawn from the greatest of the swing bands. From the 1940s through the mid-1960s, he led and recorded with his own big band, and he later continued to perform and record as a guest artist, primarily at jazz festivals.

Hampton, Wade (b. March 28, 1818, Charleston, S.C., U.S.—d. April 11, 1902, Columbia, S.C.), Confederate war hero during the American Civil War who restored Southern white rule to South Carolina following Radical Reconstruction.

Born into an aristocratic plantation family, Hampton graduated from South Carolina College in 1836 and studied law. He never practiced, however, instead devoting himself to the management of his family's landholdings in Mississippi and South Carolina.

From 1852 to 1861 Hampton served in the South Carolina legislature. He consistently upheld a conservative position on slavery and secession. When the South seceded, Hampton gave unstintingly of himself and his fortune to the Confederacy. Though lacking military experience, he organized and commanded "Hampton's Legion" of South Carolina troops. He rose from colonel to lieutenant general and saw combat in many key battles. He served as second in command to General J.E.B. Stuart and, after Stuart's death, led the cavalry corps. Wounded three times, he survived to become a military hero to the defeated South and a symbol of the nobility and gallantry of the "Lost Cause."

Hampton backed Pres. Andrew Johnson's plans for Reconstruction and sought reconciliation between North and South. But with the imposition of Radical policies, Hampton took the lead in South Carolina in the fight to restore white supremacy. With the Republicans firmly in control from 1868 to 1876, however, he devoted himself primarily to restoring his greatly depleted fortune. In 1876 he campaigned vigorously as the Democratic candidate for governor. His triumph was largely attributable to systematic efforts by his backers to prevent blacks from voting.



Wade Hampton

By courtesy of the Library of Congress, Washington, D.C.

Reelected in 1878, Hampton resigned the following year when elected to the U.S. Senate. He served until 1891, defeated for reelection the previous year by "Pitchfork Ben" Tillman. The transition from Hampton to Tillman represented the end of rule by genteel antebellum aristocrats in the South. Hampton served as a commissioner of Pacific Railways from 1893 to 1897 before retiring to Columbia.

Hampton Court, Tudor palace on the north bank of the River Thames in the London borough of Richmond upon Thames. It was built by Cardinal Wolsey and given by him to Henry VIII (reigned 1509–47), who enlarged it as his favourite residence. George II (ruled 1727–60) was the last reigning monarch to occupy it. The gardens were laid out in Dutch style for William III (reigned 1689–1702). The staterooms are open to the public, and the palace and its gardens, with Bushy Park adjoining, are one of London's major tourist attractions.

Clock Court, Hampton Court

Norman Tomalin—Bruce Coleman Inc.

Hampton Court Conference, meeting held at Hampton Court Palace, near London, in January 1604, in response to the Millenary Petition (*q.v.*), in which the Puritans set forth their demands for reform of the Church of England. The conference was presided over by King James I and attended by the bishops and the Puritan leaders. Among the reforms discussed were changes in church government, changes in *The Book of Common Prayer,* and a new translation of the Bible.

James rejected most of the Puritans' demands and was firm in his rejection of any change in the episcopal form of church government. When confronted with the issue, he said that he had learned in Scotland "No bishop, no king." He accepted the Puritans' request for a new translation of the Bible, which led to the one important result of the conference, the preparation of the Authorized (King James) Version of the Bible (1611).

Hampton Roads, great natural roadstead, southeastern Virginia, U.S., formed by the deepwater estuary of the James River, protected by the Virginia Peninsula. The Nansemond and Elizabeth rivers also enter the roadstead, which is connected to Chesapeake Bay by the Thimble Shoal Channel (1,000 ft [305 m] wide, 45 ft deep, and 11 mi [18 km] long). Two deepwater channels branch out from the harbour, the southern of which is linked with the coastal inlets of North Carolina through the Atlantic Intracoastal Waterway. Port cities facing the roads include Norfolk and Portsmouth on the south and Newport

News and Hampton on the north. Norfolk is joined to Hampton by a 5-mi bridge–tunnel and to the eastern shore of Virginia by the Chesapeake Bay Bridge–Tunnel complex (18 mi) spanning Chesapeake Bay.

Hampton Roads, an important military base since colonial days, is the headquarters of the 5th Naval District, the Atlantic Fleet (Norfolk), the Tactical Air Command (Langley Air Force Base), the Continental Army Command (Ft. Monroe), and the Army Transportation Center (Ft. Eustis). Portsmouth has an important naval shipyard, officially called the Norfolk Naval Shipyard.

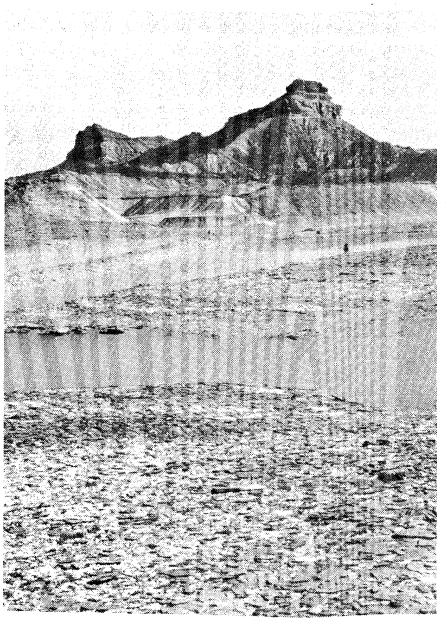
On March 9, 1862, during the Civil War, Hampton Roads was the scene of the battle between the ironclads "Monitor" and "Virginia" ("Merrimack"). The Hampton Roads Conference, unsuccessful negotiations for ending the war, between Pres. Abraham Lincoln and Confederate representatives, was held in the roads aboard the Federal transport "River Queen" on Feb. 3, 1865.

The port cities comprise the Port of Hampton Roads, under the State of Virginia Port Authority, one of the busiest U.S. seaports. Exports include coal, tobacco, and fertilizers; imports include petroleum products and ores. Shipbuilding, food products, lumber, and chemicals are important local industries.

Hampton Roads, Battle of (March 9, 1862): *see* Monitor and Merrimack, Battle of.

Hampton Roads Conference (Feb. 3, 1865), informal, unsuccessful peace talks at Hampton Roads, Va., U.S., between the Union and the Confederacy during the U.S. Civil War. At the urging of his wartime adviser, Francis P. Blair, Sr., Pres. Abraham Lincoln had agreed for the first time since the start of the war to meet with representatives of the South. The President and Secretary of State William H. Seward met on the boat "River Queen" with three spokesmen for the Confederacy, Vice Pres. Alexander H. Stephens, Sen. R.M.T. Hunter of Virginia, and Assistant Secretary of War J.A. Campbell. Lincoln offered a peace settlement that called for a reunion of the nation, emancipation of the slaves, and disbanding of Confederate troops. Since the Southern representatives were authorized to accept independence only, no settlement was possible.

Ḥamrā', al-Ḥammādah al-, also spelled HAMADET EL-HAMRA, desolate rocky plateau



Part of al-Ḥammādah al-Ḥamrā' (Red Stony Plateau), of the Libyan Sahara, Libya
Freddy Tondeur—Atlas Photo

of the Sahara, northwestern Libya. Located mostly in Tripolitania, it occupies an area measuring about 275 mi (440 km) by 190 mi. Its bare rock outcrops reach a height of about 2,700 ft (825 m). Wells are drilled for petroleum, which was discovered in the region in 1976. Some phosphates have also been discovered. The region's name is Arabic for "red stony plateau."

hamster, any of a number of stout, Old World rodents belonging to the family Cricetidae (order Rodentia). They are typically short-tailed,

Golden hamster (*Mesocricetus auratus*)
John Markham

soft-furred animals with large cheek pouches for carrying food. In most cases, hamsters generally live in burrows, are nocturnal, and feed on fruits, grain, and vegetables; but some species also eat insects and other small animals. There are six genera, among them *Cricetus,* including only the common, or black-bellied, hamster (*C. cricetus*), and *Mesocricetus,* including only the golden, or Syrian, hamster (*M. auratus*).

The common hamster inhabits the steppes and cultivated lands of Europe, ranging into western Asia. A fairly large rodent, it is 20 to 30 centimetres (8 to 12 inches) long without the 3- to 6-cm tail. Its coat is brown above and black below and has several white patches along each side. A solitary animal, the common hamster digs an elaborate burrow system with separate chambers for nesting and for storing the food that it gathers in great quantities. It sometimes damages crops and may thus become a pest. It has been used in laboratory research but is not so well suited to captivity as the golden hamster.

The golden hamster is a popular pet as well as laboratory animal. A native of the steppe country of Asia Minor and the Balkans, it is reddish brown with white underparts and is 15 to 20 cm long, including the very short tail. It feeds on both plant and animal material and is essentially solitary. In captivity it is clean, easily cared for, and readily tamed. Like the common hamster, it is prolific; it produces as many as 18 young a year, in several litters. The gestation period is about two and a half weeks. All golden hamsters in captivity are apparently derived from a single litter captured in Syria in 1930.

Hamsun, Knut, pseudonym of KNUT PEDERSON (b. Aug. 4, 1859, Lom, Nor.—d. Feb. 19, 1952, near Grimstad), Norwegian novelist, dramatist, poet, and winner of the Nobel Prize (1920). A leader of the Neo-Romantic revolt at the turn of the century, he rescued the novel from a tendency toward excessive naturalism.

Of peasant origin, Hamsun spent most of his childhood in the remote Lofoten Islands and had almost no formal education. He started to write at the age of 19, when he was a shoemaker's apprentice in Bodø, in northern Norway. During the next 10 years, he worked as a casual labourer. Twice he visited the United States, where he worked as a streetcar conductor in Chicago and a farmhand in North Dakota.

His first publication was the novel *Sult* (1890; *Hunger,* 1899), the story of a starving young writer in Norway. *Sult* marked a clear departure from the social realism of the typical Norwegian novel of the period. Its refreshing viewpoint and impulsive, lyrical style had an electrifying effect on European writers. Hamsun followed his first success with a series of lectures attacking such idols as Ibsen and Tolstoy, and he produced a flow of works that continued until his death.

Like the asocial heroes of his early works—*e.g., Mysterier* (1892; *Mysteries,* 1927), *Pan* (1894), and *Victoria* (1898)—Hamsun either was indifferent to or took an irreverent view of progress. In a work of his mature style, *Markens grøde* (1917; *Growth of the Soil,* 1920), he expresses a back-to-nature philosophy. But his message of fierce individualism, influenced by Nietzsche and Strindberg, remains constant. Consistent to the end in his antipathy to modern Western culture, Hamsun supported the Germans during their occupation of Norway in World War II. After the war he was imprisoned as a traitor, but charges against him were dropped in view of his age.

Hamsun's collaboration with the Nazis seriously damaged his reputation, but after his death critical interest in his works was renewed and new translations made them again accessible to an international readership. His deliberate irrationalism and his wayward, spontaneous, impressionistic style had wide influence throughout Europe, and such writers as Maksim Gorky, Thomas Mann, and Isaac Bashevis Singer acknowledged him as a master.

Hamsun, oil painting by an unknown artist, 1919
By courtesy of the Nobel Foundation, Stockholm

Ḥamzah ibn ʿAlī, in full ḤAMZAH IBN ʿALĪ IBN AḤMAD, also called AZ-ZŪZANĪ (b. 985—d. after 1021), one of the founders of the Druze religion. Almost nothing is known of his life before he entered Egypt in 1017. He became a spokesman for the religious convictions of the Fāṭimid caliph al-Ḥākim (the Fāṭimids were the ruling dynasty in Egypt), who was already accorded the position of *imām,* a divinely appointed and authoritative spokesman for Islām. Al-Ḥākim then claimed to be the embodiment of the Godhead—a state beyond name and beyond good and evil. Ḥamzah in turn assumed the position of *imām.*

Considerable resistance to these doctrines appeared when they were first preached in 1017, and Ḥamzah went into hiding until 1019, when al-Ḥākim was able to move vigor-

ously to support the new religious movement. Near Cairo, Ḥamzah began to build a strong missionary organization. Cosmic ranks were given to members of its hierarchy, and a class of missionaries was organized to spread the teachings. Ḥamzah claimed to be representing not just another sect but rather an independent religion, one that superseded traditional Islām. Al-Ḥākim disappeared in mysterious circumstances in 1021, and, much persecuted, the Druze cult all but ceased to exist in Egypt. Ḥamzah from hiding claimed that al-Ḥākim had only withdrawn to test the faith of his followers. Ḥamzah's teachings later provided the ideological foundation for many peasant revolts in Syria, which is the stronghold of the Druzes.

Han ———: for rulers of the Han dynasty, *see under* individual names.

han, in Japanese history, fief controlled by a daimyo, or territorial lord, during the Tokugawa period (1603–1868).

The *han* evolved during the 15th century when local daimyo gradually came into military and civil control of their own domains. In the warfare that took place among them at the end of the century, the size of the *han* gradually increased; many assumed the boundaries of one or more of the old Imperial provinces. Eventually, the Tokugawa family managed to ally the majority of the *han* on its side, establishing the Tokugawa shogunate in 1603. The Tokugawa *han* thus came to occupy about one-quarter of Japan, but the remaining three-quarters of the country continued to be divided into 295 other *han;* by the end of the period, there were still 265. The Tokugawa system of government was called *bakuhan,* a combination of *bakufu,* denoting the central government, or shogunate, and *han.*

Subject to the nominal authority of the central government, the *han* operated autonomously, even providing their own military forces. Each *han* was economically self-sufficient and had its own system of transit duties and highway barriers. It was an alliance of *han* hostile to the Tokugawa that finally overthrew the shogunate and established a new central government under the emperor in 1868.

On March 5, 1869, the restored Imperial government requested the daimyo to surrender their domains to the emperor; the final abolition of the *han* was proclaimed on Aug. 29, 1871.

Consult the INDEX *first*

Han DYNASTY, Pinyin HAN (206 BC–AD 220), the second great Chinese Imperial dynasty, considered the prototype for all later Chinese dynasties. So thoroughly did the Han dynasty establish what was thereafter considered Chinese culture that the Chinese word denoting someone who is Chinese means "a man of Han."

The dynasty was founded by Liu Pang, later Kao Tsu (256–195 BC), a man of humble birth who led the revolt against the repressive policies of the preceding short-lived Ch'in dynasty (221–206 BC). The Han copied the highly centralized Ch'in administrative structure, dividing the country into a series of administrative areas ruled by centrally appointed officials and developing a salaried bureaucracy in which promotion was based primarily on merit. Unlike the Ch'in, however, the Han adopted a Confucian ideology that emphasized moderation and virtue and thereby masked the authoritarian policies of the regime. So successful was this policy that the Han lasted longer than any other Chinese empire, reigning—with a short interruption when Wang Mang temporarily usurped the throne and established the Hsin dynasty (AD 9–25)—for more than 400 years. Some scholars divide the Han into two sections, calling the period before Wang Mang's usurpation, when the capital was in the western Chinese city of Ch'ang-an, the Former, or Western, Han (206 BC–AD 25) and the period after Wang Mang, when the capital was moved eastward to Lo-yang, the Later, or Eastern, Han (AD 25–220).

The book burning and repression of the Ch'in dynasty were designed to stamp out all forms of cultural expression except a writing system for keeping records; the brutish Ch'in reign, however, was too brief to accomplish thoroughly such a broad goal, and the vestiges of culture were revived by the successor Han.

The latter was not only a literate society but one of compulsive record keepers. Thus, the cultural milieu of the Han was well documented. The Yüeh-fu, or Music Bureau, for example, compiled detailed descriptions of the music of the day and its instruments, techniques, and songs. In the court and the Confucian temples, music fell into two categories: music to accompany banquets and ritual music. In temple rituals, dance was often an important element, and something resembling a system of dance notation recorded the movements of large bands of musicians and companies of dancers in their performances. There also were highly informal dances with much body movement but little footwork that were part of private entertainment. Several forms of plucked string instruments were in use during the Han. Buddhism came to China from India during the dynasty, and with it came richly sonorous bronze bells. A form of drama appeared in which performers acted out the heroic deeds of celebrated warriors.

Although little except walls and tombs remains of Han architecture, much has been learned about the style from *ming ch'i* house models and paintings on tomb tiles. Imperial records describe the main palace of the Eastern Han at Lo-yang as being immensely proportioned, surrounded by tall towers variously of timber, stone, and brick. The tombs had vaulted roofs and were enclosed in huge earthen mounds that still stand centuries after their contents were looted. Interior walls of important buildings were plastered and painted—so the ubiquitous records relate—with figures, portraits, and scenes from history. Although the names of the artists did not survive, the highest-ranking of them—the *tai-chao,* or painters-in-attendance—were close associates of the emperor, a tradition carried on in ensuing dynasties down to modern times. In addition to wall paintings, paintings on standing room-divider screens and on rolls or scrolls of silk appeared in the Han.

The first major stone tomb sculpture in China was created in the Han period, and lifelike clay figurines of people and animals also appeared. In the Former Han, bronzework continued the style of the late Chou dynasty and often was inlaid with silver and gold. Bronze vessels were made both for sacrificial rituals and for household use, the latter including lamps, mirrors, and garment hooks fashioned in the form of humans, animals, and mythical beasts. The weaving of silk in rich colours and patterns of geometric designs or cloud and mountain themes became a major industry and source of export trade. Han potters included house models and human figures among their funerary wares, and two types of glazed ware were used domestically, often closely imitating the shape and design of bronze vessels.

The Shang dynasty discovered lacquer, but it was the Han that brought its lacquerwork to such perfection that some of its lacquered wine cups in perfect condition have been excavated from water-sodden graves in North China. Many exquisite examples of Han lacquerware survive.

Poetry was nurtured by the Han dynasty, and a new genre, *fu,* a combination of rhyme and prose, began to flourish. *Fu* were long, descriptive compositions meant to entertain, and they became the norm of creative writing. About 1,000 examples survive. The prose literature of the era included works of history, philosophy, and politics. One of the greatest of early histories comes from this period in the *Shih-chi* of Ssu-ma Ch'ien. In sharp distinction from the Ch'in, who tried to suppress culture, the Han came to require cultural accomplishment from their public servants, making mastery of classical texts a condition of employment. The title list of the enormous imperial library is China's first bibliography. Its text included works on practical matters such as mathematics and medicine, as well as treatises on philosophy and religion and the arts. Advancement in science and technology was also sought by the rulers, and the Han invented paper, used water clocks and sundials, and developed a seismograph. Calendars were published frequently during the period. The governmental, cultural, and technological achievements of the Han were such that every ensuing dynasty sought to emulate them.

Han Chiang (China): *see* Han River.

Han-Ch'ing (Chinese mathematician): *see* Chu Shih-chieh.

Han-chung, Pinyin HANZHONG, city in southern Shensi Province (*sheng*), China. It is a county-level municipality (*shih*) and the administrative centre of Han-chung Prefecture (*ti-ch'ü*). Han-chung is situated in a long, narrow, and fertile basin along the Han Shui (river), between the Tsinling Shan (mountains) and Mi-ts'ang Shan. To the north one of the few routes across the Tsinling Shan joins it to Pao-chi in Shensi, while southwestward a route leads into Szechwan Province.

The route into Szechwan was traditionally an important one, linking the Wei Ho (river) Valley, seat of successive dynastic capitals, with the rich Szechwan Basin. The route was first constructed to take carriage traffic under the Ch'in in the 3rd century BC. In early historical times the area had belonged to the Ch'u state, based on the Middle Yangtze River region. It was annexed in 325 BC by the Ch'in and established as Han-chung Commandery (*chün*). On the collapse of the Ch'in in 206 BC, the future founder of the Han was installed as prince of Han-chung; the Han dynasty takes its name from that of the Prince's fief.

Throughout the ages Han-chung has remained the administrative centre of the mountainous frontier district between Szechwan, Kansu, and Shensi provinces and was a place of major strategic importance, constituting the key to control of Szechwan. During the Three Kingdoms period (AD 220–264) it was a battleground between the northern state of Wei and the Szechwanese kingdom of Shu. At this time it was given the name of Liang-chou, which it held intermittently until the 10th century. In 782 it was given the name of Hsing-yüan to commemorate the fact that the T'ang emperor Te II Tsung (reigned 780–805) took refuge there during the rebellions of 781–785 and used the city as a base for his recapture of the capital. Under the Sung dynasty (960–1279) it was the capital of Li-chou Province. Incorporated in the northern empire of Chin after 1127, it was the site of crucial battles in the 13th century with the Mongols, who inflicted crushing defeats on the Chin forces in this area. Under the Mongol (Yüan) dynasty (1279–1368) it again took the provincial name Hsing-yüan, but in 1368 the Ming dynasty (1368–1644) renamed it Han-chung, which it has been ever since. It remained a superior

prefecture (*fu*) until 1912, when it became a county (*hsien*) seat.

The surrounding area was originally wild virgin forest, and it was very sparsely populated until the 17th century, when the use of new crops—corn (maize) and sweet potatoes in particular—made the cultivation of the hill slopes possible. A wave of immigration from Szechwan and the Middle Yangtze region, as well as from other areas, followed, and its population grew rapidly until the 19th century.

Han-chung's traditional role as a transportation centre was somewhat lessened by the construction in the early 1950s of a rail link from Pao-chi to Ch'eng-tu (Szechwan), which by-passed the city about 70 mi (110 km) to the west. Han-chung remains the principal agricultural market and collecting centre for southern Shensi. The area produces timber and forest products as well as rice, corn, tea, and a wide range of fruits. It has minor light industries, among which the cotton textile industry is the most important. Pop. (1982) 374,270.

Han-fei-tzu, Pinyin HANFEIZI (d. 233 BC, China), the greatest of China's Legalist philosophers. His essays on autocratic government so impressed King Cheng of Ch'in that the future emperor adopted their principles after seizing power in 221 BC. The book that goes by Han-fei's name comprises a synthesis of legal theories up to his time.

Life. Little is known of Han-fei's life. A member of the ruling family of Han, one of the weaker Warring States that were in conflict during the 5th–3rd centuries BC, he studied under the Confucian philosopher Hsüntzu but deserted him to follow another school of thought more germane to the conditions accompanying the collapse of the feudal system in his time. Finding that his advice to the ruler of his native state went unheeded, he put his ideas into writing. A speech defect is also reputed to have induced his recourse to writing. King Cheng of Ch'in (a western state), who became Shih Huang-ti, the first emperor of the Ch'in dynasty in 221 BC, read and admired some of his essays. When in 234 BC Cheng launched an attack on Han, the ruler of Han dispatched Han-fei to negotiate with Ch'in. Cheng was delighted to receive Han-fei and probably planned to offer him a high government post. Li Ssu, the chief minister of Ch'in and a former schoolmate of Han-fei's, presumably afraid that he might gain the King's favour by virtue of superior erudition, had Han-fei imprisoned on a charge of duplicity. Complying with Li Ssu's order to commit suicide, he drank the poison Li Ssu sent him, ending his life.

Political thought. To Han-fei it was axiomatic that political institutions must change with changing historical circumstances. It is folly, he said, to cling to outmoded ways of the past, as the Confucians did. It was also axiomatic that political institutions must be adapted to the prevailing pattern of human behaviour, which is determined not by moral sentiments but by economic conditions. In a year of famine people do not feed their own kin, while in a year of plenty they feast casual visitors—not because they are alternately heartless and generous but "because of the difference in the amount of food to be had." In ancient times, when goods were abundant, men made light of them, but increased population pressure on resources brought economic scarcity; consequently, "men of today quarrel and snatch." The ruler, therefore, should not try to make men good but only to restrain them from doing evil. Nor should he try "to win the hearts of the people" because, selfish as men are, they do not know their own true interests. The people's mind is as undependable as an infant's.

According to the Confucians, as virtue confers on a king the right to rule, misrule voids that right. Han-fei thought differently. Whatever the ruler's moral qualities and however he rules, possession of authority (*shih*) carries the inalienable right to exact obedience. "Subject serving ruler, son serving father, and wife serving husband" together constitute "an immutable principle of the world." Even if a lord of men is unworthy, no subject would dare to infringe his prerogative. Moreover, political duty takes precedence over other duties. A soldier, it was said, ran from battle because he thought that, if he was killed, he could no longer serve his father. Han-fei commented: "A filial son to his father can be a traitorous subject to his ruler."

Authority should be wielded not whimsically but through laws (*fa*) that the ruler promulgates and that all must obey. "The intelligent ruler makes the law select men and makes no arbitrary appointment himself; he makes the law measure merits and makes no arbitrary judgment himself." He can abrogate a law, but, so long as he allows it to stand, he should observe it.

To ensure an effective bureaucracy and to protect his authority from encroachment or usurpation, the ruler must make use of *shu* ("administrative techniques" or "statecraft"). Rulers of the Warring States found it advantageous to employ men skilled in government, diplomacy, and war. But how to separate solid talent from idle chatter became a serious problem. *Shu* was Han-fei's answer to the problem. After assigning posts according to individual capacities, the ruler should demand satisfactory performance of the responsibilities devolving on their posts and punish anyone who is derelict of duty or oversteps his power. The ruler may authorize an official to carry out a proposal he has submitted. He should punish him not only when the results fall short of the stated goal but also when they exceed it.

Shu is also Han-fei's answer to the problem of usurpation, through which more than one ruler had lost his throne. The interest of the ruler and ruled are incompatible: "Superior and inferior wage one hundred battles a day." Therefore, it behooves the ruler to trust no one; to be suspicious of sycophants; to permit no one to gain undue power or influence; and, above all, to use wile to unearth plots against the throne.

With supreme authority secure and good order prevailing, the ruler proceeds to aggrandize his realm by means of military power. Might is the decisive factor in interstate relations. Military power is inseparable from economic strength. Farming being the only productive occupation, all other callings, especially that of the scholar, should be discouraged. Giving relief to the destitute is both unwise and unfair. To collect taxes from the rich in order to help the poor "is robbing the diligent and frugal and indulging the extravagant and lazy."

(K.-c.H.)

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Han Gan: *see* Han Kan.

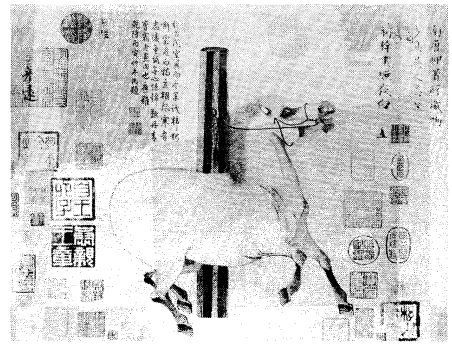
Han-gang (South Korea): *see* Han River.

Han Hsiang, Pinyin HAN XIANG, in Chinese mythology, one of the Pa Hsien, the Eight Immortals of Taoism. He desired to make flowers bloom in an instant and to produce fine-tasting wine without using grain. When his uncle scoffed at the idea, Han Hsiang performed the impossible before his uncle's eyes: flowers suddenly appeared in bloom from a clod of earth. In addition, a mysterious poem of 14 golden characters was seen on the leaves—a prophecy that was only later understood when the uncle was driven into exile.

Han Hsiang usually is depicted holding a bouquet or basket of flowers, a hoe, and a mushroom of immortality. He is said to have been converted to Taoism (*c.* 9th century AD) by Lü Tung-pin, another Immortal, but all attempts to convert his wife ended in failure.

Han Jiang (river, southern China): *see* Han River.

Han Kan, Pinyin HAN GAN (fl. mid-8th century), Chinese painter of the T'ang dynasty, who, though recorded as having done wall paintings on Buddhist and Taoist themes, is



"The Night Shining White Steed," ink on paper by Han Kan, *c.* 750; in the Mrs. John D. Riddell Collection

By courtesy of Mrs. John D. Riddell, London

best remembered for his paintings of horses. Han Kan emphasized the strength and nobility of the horses of the T'ang empire with a tautly controlled line and compositions of great clarity. The horse as a subject of painting was continued by Li Kung-lin in the Sung dynasty (960–1279) and by Chao Meng-fu in the Yüan dynasty (1206–1368), among others.

Han-k'ou, Pinyin HANKOU, conventional HANKOW, large urban area and river port in Wu-han Municipality (*shih*), Hupeh Province (*sheng*), central China. Located on the left bank of the Han Shui (river) at its confluence with the Yangtze, it is the largest of the three Wu-han (*q.v.*) cities (Han-k'ou, Han-yang, and Wu-ch'ang). It was founded as Hsia-k'ou under the Sung dynasty (960–1279). Han-k'ou was one of the first Chinese cities opened to foreign trade (1861), came under Nationalist Chinese administration in 1928, was occupied by the Japanese in 1938, and passed to Communist rule in 1949. It is now part of the great Wu-han urban complex.

Han-lin Yüan (Chinese institution): *see* Han-lin Academy.

Han River, Wade–Giles romanization HAN SHUI, Pinyin HAN SHUI, one of the most important tributaries of the Yangtze River of China. It has a total length of about 952 mi (1,532 km). The Han Shui rises in the Shen-ch'iung Shan (mountains), part of the Mi-t'sang Shan in the north of Ning-ch'iang County in the extreme southwest of Shensi Province. Its upper stream is known successively as the Yü-tai Ho, the Yang Shui, and, below Mien-hsien, the Mien Shui. At

Han-chung it becomes the Han Shui. It flows eastward at the foot of the Tsinling Shan, receiving from the north various tributaries (of which the Hsun Ho is the largest) and a large number of north-flowing tributaries arising in the Ta-pa Mountains to the south. This upper valley of the Han Shui is mostly rugged and mountainous, but around Han-chung is a fertile alluvial basin some 60 mi (100 km) long and 12 mi (19 km) wide. Below An-k'ang the river cuts through a series of deep gorges and emerges eventually into the central Yangtze Basin at Kuang-hua (Lao-ho-k'ou) above Yün-hsien in Hupeh Province.

The lower course of the Han Shui flows through a rich lowland. The course changes frequently, and the area is so flat that a small change in the level of the river may inundate a considerable area, and extensive dikes are required. Above Hsiang-fan at Chün Hsien, where the Han Shui receives the Tan Chiang (river), a dam completed in 1970 stabilizes the water flow, prevents flooding, extends the range of navigation, and permits irrigation. Six hydroelectric generators began operation on the site between 1968 and 1973. Further downstream at Hsiang-fan the river receives its largest tributary, the Pai-shui Chiang. In the 1950s, in order to prevent flooding, a large retention basin was built at the confluence of the Pai-shui Chiang to accumulate floodwaters and to regulate the flow of the Han Shui itself; four extensive irrigation projects were also built in the area.

Below Hsiang-fan the Han Shui meanders south and then turns eastward to join the Yangtze at Wu-han. In this lower course much of the river's water is dispersed into the innumerable creeks and lakes of the southern section of the North China Plain. Toward its junction with the Yangtze, the river narrows sharply. This area, too, has been prone to frequent and disastrous flooding, and, to prevent this, in 1954 a second retention basin was built south of the junction with the Yangtze.

The Han Shui is an important waterway. The lower course of the river, with its innumerable small waterways and canals, forms the spine of a dense network of water transport covering the whole southern part of the North China Plain; junks can travel from Shashih to Wu-han by these waterways—a much shorter distance than along the main stream of the Yangtze.

Han River, Wade–Giles romanization HAN CHIANG, Pinyin HAN JIANG, river in eastern Kwangtung Province (*sheng*), China. The Han River rises in the Wu-i Shan (mountains) in southwest Fukien Province to the north of Ch'ang-t'ing. Its upper course is known as the T'ing Chiang, and it flows south to Feng-shih, below which it is joined by the Yung-ting Chi (river). Flowing south over the border into Kwangtung Province, it is joined at San-ho-pa by its principal tributary, the Mei Chiang, which drains an extensive area in northeastern Kwangtung between the Ta-wan Shan and Lien-hua Shan ranges, and another eastern tributary, the Ta-ch'ing Chiang, which drains a small basin to southern Fukien on the west of the Po-p'ing range. The Han River then flows south to discharge into the sea through an extensive delta plain below Ch'ao-an, with Swatow at its southwestern corner.

The Han Chiang forms an important local waterway. While the outlet channels in the delta are very shallow and blocked by sandbanks and mud flats, above Ch'ao-an small steamboats and junks can reach San-ho-pa and, on the Mei Chiang, can sail as far as Mei-hsien. The upper course can be used by small craft as far as Ch'ang-t'ing.

Han River, Korean HAN-GANG, river, northern South Korea, rising in the western slopes of the T'aebaek-sanmaek (mountains) and flowing generally westward across the peninsula through the provinces of Kangwŏn, Kyŏnggi, and North Ch'ungch'ŏng and through the city of Seoul to the Yellow Sea. Of its 319-mile (514-kilometre) length, 200 miles (320 km) are navigable, and it has been a valuable river transportation route since ancient times, particularly during the Yi dynasty (1392–1910). Various agricultural products are grown in its 10,000-square-mile (26,000-square-kilometre) drainage basin. There are several islands in the lower course of the river, such as Yŏi-do, located within the city limits of Seoul. The Han supplies the cities along its course with water for industrial and general use. The river's upper course, in the mountains, is used to generate hydroelectric power. In the 1970s three additional multipurpose dams were built at Yŏngwŏl, Tanyang, and Yŏju.

Han-tan, Pinyin HANDAN, city in southern Hopeh Province (*sheng*), China. Han-tan is situated on the higher ground on the west of the North China Plain, on the great north–south route from Peking to Cheng-chou and Lo-yang (both in Honan Province), where it is crossed by a long-established route from Chinan (Tsinan) in Shantung Province into the mountains of Shansi Province.

The area was already settled in Shang times (*c.* 1766–1122 BC). Han-tan is first mentioned in about 500 BC, but it achieved its greatest fame when, from 386 to 228 BC, it was the capital of the state of Chao. It was a centre of trade and was famed for luxury and elegance. In 228 it was attacked and taken by the armies of the Ch'in dynasty (221–206 BC) and became a commandery (district ruled by a commander). Reduced to ruins in the civil wars accompanying the fall of the Ch'in, under the Han (206 BC–AD 220) it became the seat of an important feudal kingdom, Chao-kuo, the city being rebuilt on a site slightly to the north. The remains of the walls and foundations of buildings of both the Chao capital and the Han city still remain to the southwest of the modern city; the walls are almost 4 miles (6.5 km) in circumference. After the Han period its importance declined somewhat. From T'ang times (618–907) it became a county town subordinate to Tz'u-chou, while in Ming (1368–1644) and Ch'ing (1644–1911) times it was subordinate to Kuang-p'ing Prefecture (*fu*) in the former province of Chihli. After 1949 it developed into an important industrial centre.

Recent growth has depended partly on its importance as a communication centre. It is on the main railway from Peking to Chengchou and Wu-han (Hupeh), with branch lines running to the nearby iron- and coal-producing areas of Wu-an a few miles to the west and Feng-feng to the southwest. It is also the centre of a network of major roads. Industrial development has taken place in the cotton industry, based on the long-established cotton cultivation of the area, but the city has also developed into a centre for iron and steel and other heavy industries. The area has produced iron from an early date. Modern development, however, has been based on the newly exploited field of coking coal at Fengfeng, which is also used in a major power-generating plant. Pop. (1985 est.) city centre, 727,500; city, 954,300; city and administratively attached counties, 1,248,600.

Han-t'eng-ko-li Peak, Pinyin HANTENGRI FENG, also called KHAN-TENGRI, peak in the Tien Shan (mountains) of Central Asia, on the boundary between the Kazakh Soviet Socialist Republic and the Uighur Autonomous Region of Sinkiang, China. Situated in a heavily glaciated mountain knot, the mountain rises to 22,949 feet (6,995 m). Until Soviet explorers found that nearby Pik Pobeda (Victory Peak; 24,406 feet [7,439 m]) was higher, Han-t'eng-ko-li was thought to be the highest elevation of the Tien Shan. The Kalagyuri Glacier (58 miles [36 km] long) below and east of the peak is the largest known glacier in China.

Han T'o-chou, Pinyin HAN TUOZHOU (d. 1207, Hangchow, now in Chekiang Province, China), minister to the Chinese emperor Ning Tsung (reigned 1194–1224) of the Sung dynasty (960–1279). Han tried to recover territory in northern China that had been taken from the Sung several generations earlier by the Juchen tribes of Inner Asia. The ensuing war proved disastrous. More Sung territory was lost and a large indemnity was demanded by the Juchen. When Han attempted to halt negotiations and resume the war, he was executed by his own people and his head offered to the Juchen as a means of conciliation.

Han Wen-kung (Chinese author): *see* Han Yü.

Han Xiang (Chinese mythological figure): *see* Han Hsiang.

Han-yang, also called TS'AI-TIEN, Pinyin HANYANG, or CAIDIAN, urban area and industrial city in Hupeh Province (*sheng*), central China. Located on the right bank of the Han Shui (river) at its confluence with the Yangtze, opposite Han-k'ou, it is the westernmost of the three cities of the Wu-han (*q.v.*) conurbation (Han-k'ou, Han-yang, Wu-ch'ang). Han-yang was founded under the Sui dynasty (AD 581–618) but was of little importance until modern times. In the early 1900s it became the site of China's first modern iron- and steelworks and was, in addition, a key arsenal city. Han-yang was occupied by the Japanese in 1938–45 and passed to Communist control in 1949.

Han Yongun, also called MANHAE (b. 1879, Korea—d. 1944, Korea), Korean Buddhist poet and religious and political leader.

Han early developed a deep concern for his country and people and participated in the famous Tonghak Revolt of 1894, a social reform movement directed by leaders of the apocalyptic Tonghak sect. With the failure of the movement, Han escaped to Mt. Solok, where he began to study Buddhism, entering the priesthood in 1905. He immediately became a leader of the struggle to renovate and nationalize Korean Buddhism; in 1909 he published the influential *Pulgyo-yusin-ron.* In 1910, when Korea fell under Japanese rule, he joined the independence movement, convening a nationwide meeting of Buddhists to call for Korea's independence and the independence of Korean Buddhism from the Japanese. He took part in the drafting and signing of a Korean Declaration of Independence in 1919, and he was arrested and imprisoned for three years.

In 1927 he led in the establishment of the Singanhoe society, a united national independence front. He also continued to work toward the modernization and popularization of Buddhism. Han published poems, many inspired by the Gandhian civil-disobedience movement, a collection of which, *Nim ŭi ch'immuk* ("The Silence of the Lover"), is regarded as a classic of modern Korean literature. The "Lover" in the title and throughout the work is at once the Buddha and his fatherland.

Han Yü, Pinyin HAN YU, also called HAN WEN-KUNG (b. 768, Teng-chou, Honan Province, China—d. 824, Ch'ang-an), master of Chinese prose, outstanding poet, and the first proponent of what later came to be known as Neo-Confucianism, which had wide influence in China and Japan.

An orphan, Han initially failed his civil service exams because the examiners refused to accept his unconventional prose style, but he eventually entered the bureaucracy and served in several high government posts. At his death the title of president of the ministry of rites was conferred upon him, as well as the epithet "Prince of Letters," both great honours.

Han Yü, portrait by an unknown artist; in the National Palace Museum, Taipei

By courtesy of the Collection of the National Palace Museum, Taipei, Taiwan, Republic of China

At a time when its popularity had greatly declined, Han began a defense of the Confucian doctrine. He attacked Taoism and Buddhism, then at the height of their influence. So outspoken was he that he castigated the Emperor for paying respect to the supposed finger bone of the Buddha, an act that almost cost Han Yü his life and because of which he was banished to South China for a year. In defending Confucianism, Han quoted extensively from the *Mencius*, the *Ta hsüeh* ("Great Learning"), the "Doctrine of the Mean," and the "Classic of Changes," works that hitherto had been somewhat neglected by Confucians. In so doing, he laid the foundations for later Neo-Confucianists who took their basic ideas from these books.

Han advocated the adoption of the free, simple prose of these early philosophers, a style unencumbered by the mannerisms and elaborate verselike regularity of the parallel prose that was prevalent in Han's time. His own essays (*e.g.*, "On the Way," "On Man," "On Spirits") are among the most beautiful ever written in Chinese, and they became the most famous models of the prose style he espoused. In his poetry also, Han tried to break out of the existing literary forms, but many of his efforts at literary reform failed.

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Hana, village and valley, Maui County, on the east central coast of Maui Island, Hawaii, U.S. The village, on the shore of Hana Bay, was for many years an isolated enclave of ancient Hawaiian culture. Capt. James Cook, the English explorer-navigator, anchored in the bay in 1778, and missionaries arrived about 40 years later. Modern resort facilities have been developed near the adjacent Kauiki Head cinder cone. Most residents are employed at a resort hotel or on a large cattle ranch. Hana has facilities for the offlanding of fuel and an airport to the north. Wananalua Church, organized in 1837, is constructed of lava rock.

The valley, historically a battleground in the power struggles between Hawaiian chiefs and Maui warriors, encompasses the eastern flanks of the Haleakala Volcano, a heavily dissected verdant terrain with deep gorges caused by wind and water erosion. Its northeastern coastline is bordered by sheer cliffs ranging up to 500 ft (150 m) in height. The district is rimmed by protected beaches, coastal villages, and fishing settlements. The construction headquarters for Maui Ditch, a system of irrigation tunnels that channel the waters of Haleakala to the sugarcane fields, was at Nahiku, 10 mi (16 km) northwest of Hana village. Except for the anchorage at Hana Bay, the area was isolated until a coastal road was completed in 1927. Wailua Falls (south) drop hundreds of feet into a kukui (candlenut) grove in Wailua Gulch; farther south the Kipahulu Valley, with its Seven Sacred Pools, is a conservation area. Pop. (1980) 643.

Haná Valley, agricultural region of southern Severomoravský *kraj* (region) and northeastern Jihomoravský *kraj*, eastern Czech Socialist Republic, central Czechoslovakia. A plain formed by the confluence of the Blata, Romže, Bečva, Moštěnka, Valová, and Haná rivers and the Morava, its very fertile soils support wheat, barley, corn (maize), and sugar beet cultivation and poultry and pig rearing. The people, called Hanáki, speak a dialect of Czech (Moravian) and wear distinctive, richly embroidered costumes. The region's centre is Olomouc (*q.v.*), a former royal city and capital of Moravia until 1642. Other towns include Prostějov, an industrial centre manufacturing iron and steel, agricultural machinery, clothing, food and dairy products, and Hanáchká Režná (a regional liquor resembling Bourbon whiskey); Náměšť na Hané, where the annual Hanácké Dožínky (Haná Harvest Festival) is held; and Litovel, with a municipal museum containing Haná costumes and embroidery. Tourism is important for the region's economy. The reservoir behind the Plumlov Dam, west of Prostějov, provides swimming and water sports facilities. Javoříčko caverns west of Litovel, discovered in 1938, yielded artifacts of prehistoric humans and are attractions for visitors.

Ḥanābilah, also called MADHHAB ḤANBAL, English HANBALITES, in Islām, the most fundamentalist of the four Sunnī schools of religious law. Based on the teachings of Aḥmad ibn Ḥanbal (780–855), the Ḥanbalī legal school (*madhhab*) emphasized virtually complete dependence on the divine in the establishment of legal theory and rejected personal opinion (*ra'y*), analogy (*qiyās*), and the Hellenistic dogma of the Mu'tazilah school of theology, on the grounds that human speculation is likely to introduce sinful innovations (*bid'ah*). The school thus relied solely on a literal reading of the Qur'ān and Ḥadīth (narratives relating to the Prophet's life and sayings) in formulating legal decisions. Popular in Iraq and Syria until the 14th century, the traditionalist Ḥanbalī legal approach was revived in the 18th century through the teachings of Ibn Taymīyah (1263–1328) in the Wahhābīyah movement of central Arabia. This *madhhab* has since become the official legal school of 20th-century Saudi Arabia.

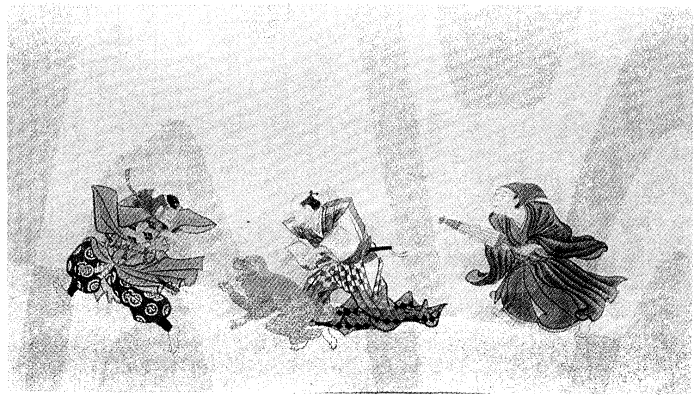
Hanabusa Itchō, also called ITCHŌ, original name TAGA SHINKŌ (b. 1652, Ōsaka—d. Feb. 7, 1724, Edo, Japan), Japanese painter who broke away from the orthodox style of the Kanō school to experiment with humorous subjects from everyday life. Because of his subject matter his work is sometimes classified with the Ukiyo-e school of paintings and prints, and, indeed, some of his designs were used by later Ukiyo-e wood-block printers. Unlike most of the Ukiyo-e artists, however, he did not limit his subjects to actors and courtesans but depicted the Edo (now Tokyo) townsmen as well. Many of his paintings (*e.g.*, such ink landscapes as "Mount Fuji"; Tokyo National Museum) are notable for their poetic expression, and others for their satirical overtones.

In 1698 he was exiled to a distant island for caricaturing the shogun (military ruler). Pardoned 11 years later, he returned to Edo, changed his name to Hanabusa Itchō, and became famous as a painter. He opened a painting school and was active in the artistic circles of the day; his friends included the poets Matsuo Bashō and Enomoto Kikaku.

Ḥanafīyah, also called MADHHAB ḤANĪFAH, English HANAFITES, in Islām, one of the four Sunnī schools of religious law, incorporating the legal opinions of the ancient Iraqi schools of al-Kūfah and Basra. Ḥanafī legal thought (*madhhab*) developed from the teachings of the theologian Imām Abū Ḥanīfah (*c.* 700–767) by such disciples as Abū Yūsuf (d. 798) and Muḥammad ash-Shaybānī (749/750–805) and became the official system of Islāmic legal interpretation of the 'Abbāsids, Seljuqs, and Ottomans. Although the Ḥanafis acknowledge the Qur'ān and Ḥadīth (narratives concerning the Prophet's life and sayings) as primary sources of law, they are noted for the acceptance of personal opinion (*ra'y*) in the absence of precedent. The school currently predominates in Central Asia, India, Pakistan, Turkey, and the countries of the former Ottoman Empire.

Hanafuda (Japanese: Flower Cards), deck of 48 cards divided into 12 suits of four cards. Each suit is named for a month of the year and pictures a flower identified with that month. The cards are tiny, only 2⅛ by 1¼ inches, but about three times thicker than Western cards.

Hanafuda evolved after the Portuguese had brought Western cards to Japan in the 17th century. Hanafuda bear no numbers or symbols, except for the flower pictures, to signify suit and rank. In most suits, the first two cards show only a plain representation of the identifying flower and are worth 1 point. The suit's third ranking card adds a *tanzaku,* a picture of a sheet of paper for poetry writing, and is worth 5 points. The top card in each suit



Scene from *Kyogen* (Comic Plays), detail of a handscroll by Hanabusa Itchō; in the Richard P. Gale collection, Mound, Minn.

By courtesy of Richard P. Gale; photograph, the Minneapolis Institute of Arts, Minnesota

shows the flower to which is added a picture of some animal, bird, evidence of man, or the moon. These high cards are worth either 10 or 20 points.

Most Hanafuda games involve three players, who are dealt seven cards in each hand, the remaining cards constituting the stock. A complete game consists of 12 hands, or months. The simplest game is Matching Flowers, in which a player takes tricks by matching a card in his hand with any of the same suit in the discard. When each month is tallied, bonus points are given for varying combinations of *tanzaku* and high-point cards. In the more complicated and widely played game Eighty-Eight, players try for more than 40 bonus combinations, many of them scored at the hand's outset if they happen to be dealt to a player intact. Other Hanafuda games include Koi Koi and Kabu.

Hanalei, village, Kauai County, on the north central coast of Kauai Island, Hawaii, U.S. Near the head of Hanalei ("crescent") Bay, the village is in the scenic and fertile Hanalei or Hanohano ("majestic") Valley (3,439 ft [1,048 m] deep), one of the state's few rice-producing regions. While some cattle are raised, the villagers are primarily paddy, taro, and vegetable farmers. Missionaries arrived at the site in 1834, and Mission Home was built and furnished with materials brought around Cape Horn. The Waioli Mission (1841), now used as a community centre, combines the starkness of a New England clapboard house with Hawaiian details such as lanais (porches), wide eaves, and long, sloping roof lines. This synthesis exerted a strong influence on subsequent Hawaiian architecture. The Wainiha Power Plant, 4 mi (6 km) northwest, is serviced by waterfalls, fed by Alakai Swamp, that pour over the nearby Wainiha *pali*s (cliffs). The locality around Princeville (east) has been developed into a resort complex, and Lumahai Beach (west) is a noted beauty spot. Pop. (1980) 483.

hanamichi (Japanese: "flower passage"), in Kabuki theatre, runway that passes from the rear of the theatre to stage right at the level of the spectators' heads. Some plays also make use of a second, narrower *hanamichi* constructed on the opposite side of the theatre. The name *hanamichi* suggests that it was once used to present flowers and gifts to the actors.

An integral part of the Kabuki drama since the 18th century, it is used for climactic scenes—spectacular entries, exits, processions, and battles—and for scenes when intimacy and emotional rapport with the audience are desired. Geographically, it may represent a forest, a mountainous road, an inlet of water, or a street or ceremonial path to the inner courtyards of palaces. Like the main stage, it is often equipped with a trapdoor permitting the sudden appearance of ghosts or supernatural beings from below. The door is called *suppon* (Japanese: "snapping turtle") because the actor's head emerges like that of a turtle from its shell.

Hanau, in full HANAU AM MAIN, city, Hesse *Land* (state), central Germany, a port on the right bank of the canalized Main at the mouth of the Kinzig, east of Frankfurt am Main. The old town grew up around the castle of the lords of Hanau (counts from 1429) and was chartered in 1303; the new town was founded in 1597 for Protestant Dutch and Walloon refugees. Hanau passed to Hesse-Kassel in 1736. In 1813 it was the scene of a battle between Napoleon's troops and Austrians and Bavarians. Much of the town was rebuilt after being virtually demolished in World War II, and the new buildings were erected to conform to the historic pattern. Notable landmarks include the 14th-century St. Mary's Church, the Dutch-Walloon church of St. John (1658), the two town halls, and the monument to the Brothers Grimm, born in Hanau. Philippsruhe castle (1701–15) and the electoral residence (1776–84) at Wilhelmsbad (spa) are nearby.

A centre of the jewel trade, which dates from the 16th century, Hanau's principal industries are gem cutting and polishing, the smelting and working of precious metals, and the manufacture of rubber goods. Pop. (1989 est.) 84,300.

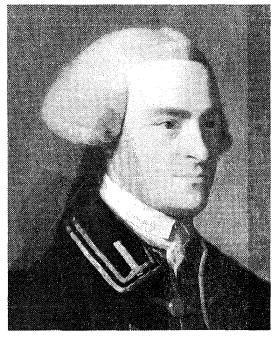
Ḥanbalī school (Islamic law): *see* Ḥanabilah.

Hanbury Brown, Robert: *see* Brown, Robert Hanbury.

Hancock, city, Houghton County, northwestern Upper Peninsula of Michigan, U.S., across Portage Lake from Houghton. Laid out in 1859, it was named for John Hancock, the American Revolutionary War leader. With the discovery of nearby copper mines in the mid-19th century, Hancock became a busy shipping point. In addition to mining, local industries include the manufacture of foundry products and machinery, lumber milling, and commercial fishing. Hancock is the seat of Suomi College (1896). The Arcadian Copper Mine and the Quincy Mine Steam Hoist have guided tours during the summer. The Portage Lake Ship Canal connects Portage Lake with Lake Superior. Nearby is the Frederick J. McLain State Park. Inc. village, 1875; city, 1903. Pop. (1980) 5,122.

Hancock, John (b. Jan. 12, 1737, Braintree, Mass.—d. Oct. 8, 1793, Quincy, Mass., U.S.), American Revolutionary leader and first signer of the U.S. Declaration of Independence.

After graduating from Harvard (1754), Hancock entered a mercantile house in Boston owned by his uncle Thomas Hancock, who later left him a large fortune. In 1765 he became a selectman of Boston and from 1769 to 1774 was a member of the Massachusetts General Court. He was chairman of the Boston town committee formed immediately after the "Boston Massacre" in 1770 to demand the removal of British troops from the city.



John Hancock, detail of a portrait by John Singleton Copley; in the Museum of Fine Arts, Boston

By courtesy of the City of Boston, on deposit at the Museum of Fine Arts

In 1774 and 1775 he was president of the first and second provincial congresses, and he shared with Samuel Adams the leadership of the Massachusetts Patriots. With Adams he was forced to flee Lexington for Philadelphia when warned in April 1775 that he was being sought by Gen. Thomas Gage's troops, approaching from Boston. Hancock was a member of the Continental Congress from 1775 to 1780; he served as its president from May 1775 to October 1777. He hoped to become commander in chief of the Continental Army, but George Washington was selected instead.

Hancock was a member of the Massachusetts Constitutional Convention of 1780 and in the same year was elected governor of the state. He served in the Congress under the Articles of Confederation in 1785–86 and then returned to the governorship. He presided over the Massachusetts Convention of 1788 that ratified the Federal Constitution, although he had been unfriendly at first toward the document. Hancock died while serving his ninth term as governor.

Hancock, Thomas (b. May 8, 1786, Marlborough, Wiltshire, Eng.—d. March 26, 1865, London), English inventor and manufacturer who founded the British rubber industry. His chief invention, the "masticator," worked rubber scraps into a shredded mass of rubber that could be formed into blocks or rolled into sheets. This process, perfected in 1821, led to a partnership with the Scottish chemist and inventor of waterproof fabrics, Charles Macintosh. The best known of the waterproofed articles they produced were macintosh coats, popularly known as mackintoshes.

Hancock, Winfield Scott (b. Feb. 14, 1824, Montgomery County, Pa., U.S.—d. Feb. 9, 1886, Governor's Island, N.Y.), Union general during the American Civil War (1861–65), whose policies during Reconstruction military service in Louisiana and Texas so endeared him to the Democratic Party that he became the party's presidential candidate in 1880.

Winfield Scott Hancock

By courtesy of the National Archives, Washington, D.C.

A West Point graduate (1844), he served with distinction in the Mexican War (1846–48). Hancock was appointed a brigadier general of volunteers on the outbreak of the Civil War and served in the Peninsular campaign of 1862. In May 1863 he was made head of the II Corps, Army of the Potomac, which he led for most of the remaining two years of the war. He served with distinction at the Battle of Gettysburg (July 1863) and participated in the drive on Richmond, Va., the following spring. As a major general after the war, he commanded (1866–68) various army departments, including the military division composed of Louisiana and Texas. Although great discretionary power had been conferred upon him, Hancock insisted on the maintenance of the civil authorities in their "natural and rightful dominion." This stand enraged some Republicans, who were counting on military power to protect black and white Republicans in the South, but his policy won him the support of the Democrats, who nominated him for the presidency in 1880. After narrowly losing the election to the Republican candidate, James A. Garfield, he returned to military life.

hand, grasping organ at the end of the forelimb of certain vertebrates, exhibiting great mobility and flexibility in the digits and in the whole organ. It is made up of the wrist joint, the carpal bones, metacarpal bones, and phalanges. The digits include a medial thumb (when viewed with the palm down), containing two phalanges, and four fingers, each containing three phalanges.

The major function of the hand in all vertebrates except man is locomotion; bipedal locomotion in man frees the hands for a

largely manipulative function. In primates the tips of the fingers are covered by fingernails—a specialization that improves manipulation. The palms and undersides of the fingers are marked by creases and covered by ridges called fingerprints or palm prints, which function to improve tactile sensitivity and grip. The friction ridges are arranged in general patterns that are peculiar to each species but that differ in detail. No two individuals are alike, and in man the patterns are used for identification. The thumb is usually set at an angle distinct from the other digits; in man and the great apes it rotates at the carpometacarpal joint, and it is therefore opposable to the other fingers and may be used in combination with them to pick up small objects.

Among the apes and some New World monkeys the hand is specialized for brachiation—hand-over-hand swinging through the trees. Digits two to five are elongated and used in clasping tree limbs; the thumb is reduced and little used in swinging. Terrestrial monkeys, such as the baboon, do not have reduced thumbs and can carry out precise movements with fingers and opposing thumb.

The development of dexterity in the hands and increase in brain size are believed to be dependent processes in the evolution of man. X-ray records of ossification patterns in the hands are today used to chart growth rate and growth normality in children.

hand, ancient unit of length, now standardized at 4 inches (10.16 centimetres) and used today primarily for measuring the height of horses from the ground to the withers. The unit was originally defined as the width of a man's hand from the little finger to the thumb. A statute of Henry VIII of England established the hand at four inches. Units of various lengths, known as hand, or palm, were used by ancient Egyptians, Hebrews, Greeks, Romans, and others.

Hand, (Billings) Learned (b. Jan. 27, 1872, Albany, N.Y., U.S.—d. Aug. 18, 1961, New York City), U.S. jurist whose tough and sometimes profound mind, philosophical skepticism, and faith in the United States were employed throughout a record tenure as a federal judge (52 years, from April 10, 1909, until his death). Although he was never a justice of the Supreme Court, he is generally considered to have been a greater judge than all but a few of those who have sat on the highest U.S. court.

Hand
Alfred Eisenstaedt, *Life* Magazine © Time Inc.

At Harvard, Hand studied philosophy (under William James, Josiah Royce, and George Santayana) and law, and thereafter he practiced law in Albany and New York City. In 1909 he was appointed a federal district judge in New York, and in 1924 he was elevated to the United States Court of Appeals for the second circuit (New York, Connecticut, and Vermont), one of his colleagues being his cousin Augustus Noble Hand. From 1939 he served as chief judge. He sat in many cases after his official retirement in 1951.

Because several Supreme Court justices disqualified themselves, Hand's court rendered the final decision (1945) in a major antitrust suit against the Aluminum Company of America (usually called the Alcoa case). After a trial lasting four years, Hand wrote for the court an opinion rejecting the "rule of reason" that the Supreme Court had applied in antitrust cases since 1911. He ruled that evidence of greed or lust for power was inessential; monopoly itself was unlawful, even though it might result from otherwise unobjectionable business practices. In his view, "Congress did not condone 'good trusts' and condemn 'bad ones'; it forbade all."

In 1950 Hand sustained the conviction of 11 American Communist Party leaders on Smith Act charges of conspiracy to teach and advocate the overthrow of the government. His reasoning was adopted by Chief Justice Fred M. Vinson when the Supreme Court also upheld the convictions (*Dennis* v. *United States,* 1951). In a later case (*Yates* v. *United States,* 1957), the Supreme Court under Chief Justice Earl Warren considerably restricted the applicability of the Smith Act.

A collection of Hand's papers and speeches was edited as *The Spirit of Liberty* (1952; 3rd ed., 1960) by Irving Dilliard. Hershel Shanks selected and annotated 43 opinions by Hand for *The Art and Craft of Judging* (1968).

Handa, city, Aichi Prefecture (*ken*), Honshu, Japan, on the Chita-hantō (Chita Peninsula), facing Chita-wan (Chita Bay) of the Pacific Ocean. It served as an important commercial port during the Tokugawa era (1603–1867), when the production of processed foods and cotton began. An irrigation system in the hills behind the city was opened in 1962. Vegetables, fruit, and flowers are raised in the vicinity for the market in Nagoya, to which Handa is connected by two rail lines. Industries include brewing, food processing, and the manufacture of cotton goods using cotton cultivated in the hinterland. Pop. (1980) 89,328.

Handan (China): *see* Han-tan.

handball, any of a family of games played in walled courts or against a single wall, with a small rubber ball that is struck with hand or fist against the wall. The object is to cause the ball to rebound with variations of power or speed and at such an angle that the opposition cannot return it. There are three versions of handball: four-wall, three-wall, and one-wall. Each may be played by two (singles) or four (doubles).

History. One of the oldest of ball games, handball has been traced back to the baths of Rome. Played later as a bare-handed game called *pelota* in Spain and France, it was the forerunner of modern jai alai (*q.v.*). Handball was adapted in the British Isles during the 16th century and called fives (*q.v.*).

The immediate forerunner of the modern game was developed in Ireland, where handball was played about 1,000 years ago. In the 1850s, Irish town and county championships were regularly played, using a hard leather-covered ball on courts that were about 80 ft (24 m) long and 40 ft wide. Irish emigrants took the game to the United States in the 1880s, and Phil Casey built the first U.S. walled court in Brooklyn in 1886. Kicking was permitted, and some players developed unusual skill in returning low balls with their feet.

The first international match was played in 1887 between the Irish champion, John Lawlor, and the U.S. champion, Casey. Begun in Ireland on August 4, the match ended on Casey's U.S. court on November 29. Casey won, 11 games to 6, and then retained his title against all challengers until his retirement in 1900.

During the 1890s in the U.S., play began with a soft ball—usually a tennis ball with the outer covering removed. This ball was used in smaller four-wall courts in the New York City area. Then young players began using this larger ball outdoors against the solid wall of a building. The use of the soft ball spread to other cities, mostly for four-wall play. Dissatisfaction with the large, slow ball led to development of a smaller gas-filled ball that proved to be more acceptable to players and stimulated new interest in the game.

The four-wall soft-ball game was taken up avidly in such midwestern U.S. cities as Detroit, Cleveland, Milwaukee, and Chicago. When the Milwaukee fire department converted from horse-drawn to motorized equipment, its stables were converted into handball courts. The sport helped keep fire fighters fit, and a number of the firemen developed into ranking competitive players.

About the same time, the game underwent changes and courts were reduced in size. A one-wall game was developed in New York City about 1913 and played on the beaches against bathhouses and bulkheads, with the hard sand forming the floor of the court. Within a few years, the one-wall game was played by both men and women throughout the eastern United States. It was taken indoors by the Young Men's Christian Association (YMCA) and clubs and, where space in large cities was at a premium, was even installed on roofs. As a forerunner of the three-wall game, some one-wall courts were equipped on each side of the front wall with a hinged triangular wing, which swung out and locked into position along the two side lines, forming a partial three-wall court and making difficult shots into the front corner possible.

The Irish game of handball was originally played on a hard clay floor, with one wall of stone at the front of the court, against which the ball was struck. The ball, the four-wall court, and the system of scoring were developed during the 18th century, when the game was a popular pastime in many parts of Ireland. The Irish ball has a cork or wood centre covered by woollen thread and thin pieces of cork or rubber. The outer cover is of thin sheepskin. This ball is called an alley cracker or hard ball. Some tournaments or championships are played with a soft, rubber ball, but the Irish ball is the recognized championship medium. The standard ball is $1\frac{7}{8}$ in. (4.7 cm) in diameter and weighs $1\frac{1}{2}$–$1\frac{3}{4}$ oz (43–50 g).

Rules have changed little since the 1880s, when the first Irish championships were played. For many years challenge and championship games for stakes as high as £1,000 were not uncommon. Then the Gaelic Athletic Association took over supervision of the game, betting was abolished in 1924, and Irish handball became an amateur game. Regular county, provincial, and all-Ireland championships were established. There are many courts throughout Ireland and at most schools and colleges, although a soft, rubber ball is now generally used in schools.

Handball is played today mainly in the United States, Canada, and Ireland and to some extent in Mexico, Argentina, Australia, New Zealand, and France. International competition has been stimulated in recent years through invitational events conducted by Canada and the United States.

The court. Standard four-wall courts are 40 ft long, 20 ft wide, and 20 ft high, with a back wall 12 ft high. A short line, parallel to the front wall, divides the court in half; the service line is parallel to and 5 ft in front of the short line. Between these two lines on each side of the court is a service box, formed by a line parallel to and 18 in. from each sidewall. The serving zone is the space between the outer edges of the short and service lines. A vertical line marked on each sidewall, 5 ft behind the short line, indicates the front edge of the back court receiving zone.

In one-wall handball the wall (front) is 20 ft wide and 16 ft high, with a playing zone 34 ft long (the back edge is the long line) by 20 ft wide. The sidelines extend 3 ft farther from the wall than the long line. The short line runs parallel to and 16 ft from the wall. Service markers (lines) 6 in. long, parallel to and midway between the long and short lines, extend inward from the sidelines. The imaginary joining of these markers forms the service line. The service area, 20 ft by 9 ft, includes the long and sidelines. One-wall courts are popular because they permit more spectators to watch games and are less expensive to build. Three-wall courts also permit more spectators to view matches but are less common and are not standardized. They may have a front and two sidewalls, the back being open, or a front wall, back wall, and one sidewall as in a jai alai court. Court dimensions and markings are similar to four-wall courts, with a back court (long) boundary line or a sideline added for the jai alai type court. Development of courts with one or more glass walls allowed more spectators to watch four-wall matches and enjoy skillful play off the back wall.

Principles of play. The ball is made of black rubber; it is 1⅞ in. in diameter and 2.3 oz in weight. Only one hand may be used in striking the ball; no other part of the body may be used. When attempting to return the ball, the player cannot strike it more than once. Gloves made of soft material or leather must be worn to prevent moisture from affecting the ball.

To start the game a server stands anywhere within the serving zone, drops the ball to the floor, and strikes it on the first bounce with one hand, causing it to hit the front wall on the fly. In the four-wall game, the rebounding ball must land on the floor back of the short line, either before or after striking one of the sidewalls. If it does not cross this line, it is a short ball, which is a fault. Two successive faults retire the side. In the one-wall game, if the ball lands beyond the long line, it is a long ball, also a fault; if it goes outside the sidelines, it is a handout—that is, the side (hand) serving loses service but the score remains the same. A fault is called if, while serving, the server steps beyond the serving zone or leaves the zone before the rebound passes the short line. In four-wall doubles, the server's partner must remain within the service box until the rebound passes the short line; in one-wall doubles, he must be outside the sidelines straddling the service line. Breaches of these regulations are faults. If a server's partner enters the playing zone before the served ball passes him, it is a fault.

The receiving side may return the serve (rebound) either on the volley (fly) or on the first bounce; the return may hit the sidewalls and must hit the front wall. In four-wall handball the receiver or receivers must be at least five feet back of the short line until the server strikes the ball; in the one-wall game the receiver must remain back of the service line until the rebound passes the short line. The rally continues, sides alternating in hitting the ball until one side misses. If a receiver misses, the server scores a point; if the serving side misses, the receiving side wins only the right to serve. The server continues to serve as long as he scores. Game is 21 points.

In doubles, one player on the starting side serves. If he faults twice, service passes to the other team. Thereafter, both players on each team must serve before the serve goes to the opposition.

Players cannot block each other from playing the ball. If they do, or if the ball hits an opponent before hitting the front wall, the ball is dead and must be served again.

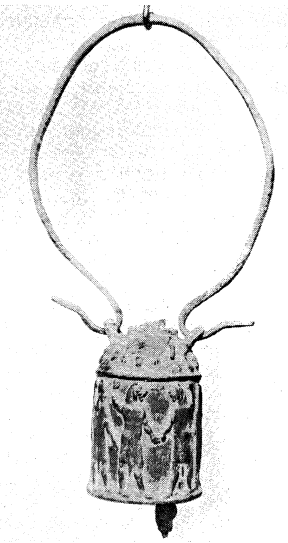
Three-wall regulations are the same as those for four-wall, except that a ball in play striking outside the long line (a long ball) is a point if struck last by the receiver or handout if struck last by the server.

Any shot beyond an opponent's reach is called a placement. The most effective placement is a kill, in which the ball rebounds at a height so low that it is impossible to return it. An ace is a legal serve that eludes the receiver. The greater variety of angle shots—for example, side-wall to front wall, ceiling to front, side to back—makes the four-wall game the most demanding form of handball. All versions require good physical condition, speed, control, and stamina, and many athletes play handball to condition themselves for other sports.

The three strokes used in handball are the underhand, the basic service stroke; the overhand, for high bounding balls or fly balls; and the sidearm, the best stroke for the kill shot. It is important to move into position in the court to be ready to make the return stroke. A player who can strike the ball with either hand can save energy and be a double threat to his opponent. *See also* team handball.

(H.T.F.)

handbell, small bell—usually of brass or bronze but sometimes of copper, clay, porcelain, glass, or other hard material—with an attached stem, loop, or leather strap for a handle. The earliest handbells were probably of



Ancient handbell found near Babylon, *c.* 1000 BC
Ernest Morris

beaten copper, but since the Bronze Age most metal bells have been cast.

Throughout ancient Asia, Egypt, Greece, and Rome, handbells played an important role in religious rituals; their ringing called to prayer and was thought to exorcise demons and heal the sick. They have also had extensive liturgical and utilitarian functions in the monasteries of Asia and Europe.

To signal and to attract attention, handbells have served street vendors, town criers, and night watchmen in the West. In ancient Greece they announced the opening of the fish market, and in Rome, that of the public baths. The common practice of ringing handbells during funeral processions (often to ward off demons) has been recorded on the 11th-century Bayeux Tapestry. Medieval European peasants rang handbells in the fields as fertility charms.

Secular and religious handbells in the East and West have often been works of art, made of precious metals, with elaborate ornamentation in relief. Among the earliest handbells extant (from *c.* 655 BC) are 80 of cast bronze from Nineveh (in modern Iraq). About 40 old Irish bells, made of iron plates, hammered square and riveted, are preserved, the most famous being the Clog-an-Eadhacta Phatraic (Bell of St. Patrick's Will) of *c.* 552 AD.

Sets of handbells tuned diatonically (*i.e.,* to a seven-note scale) first appeared in England in the 17th century for practicing the mathematical permutations of change ringing. By the 18th century, groups of ringers had branched out into tune playing, with the bells' range expanded to several chromatic (12-note) octaves.

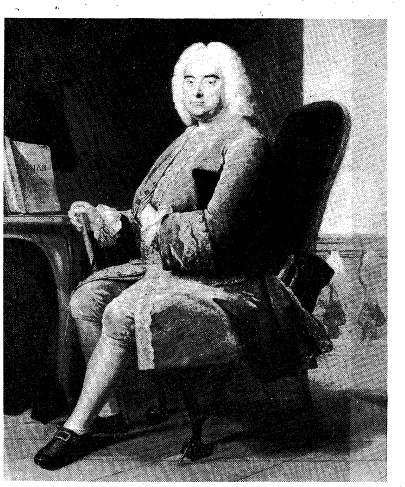
In 1847 the U.S. showman P.T. Barnum brought to the U.S. the Lancashire Bell Ringers under the pseudonym Swiss Bell Ringers, a label retained by all subsequent professional handbell groups. Most bands in the U.S. consist of 8 to 12 players, each of whom may control from 2 to 12 bells spread out on a table. The 20th-century handbell-ringing movement was furthered in vaudeville and later by non-professional ringers in New England.

handcuffs, device for shackling the hands, used by police on prisoners under arrest. Until modern times handcuffs were of two kinds: (1) the figure 8, which confined the hands close together either in front of or behind the body; and (2) rings that fitted around the wrists and were connected by a short chain, these being somewhat like those used by modern police forces. The old names were manacles, shackbolts or shackles, gyves, and swivels. Most modern handcuffs are made of steel, adjustable to the wrist size, and equipped with an automatic locking device. Disposable handcuffs of nylon are now available; their advantage is that a policeman can easily carry several pairs, for example, at the scene of a riot.

handedness, a tendency to use one hand rather than the other to perform most activities; it is the usual practice to classify persons as right-handed, left-handed, or ambidextrous. *See* laterality.

Handel, George Frideric, German (until 1715) GEORG FRIEDRICH HÄNDEL, or HAENDEL (b. Feb. 23, 1685, Halle, Saxony—d. April 20, 1759, London), German-born English composer of the late Baroque era, noted particularly for his operas, oratorios, and instrumental compositions, including the most famous of all oratorios, the *Messiah* (1741), and the occasional pieces *Water Music* (1717) and *Music for the Royal Fireworks* (1749).

Early life. Handel's father, Georg Händel, was a successful surgeon; his mother was the daughter of a Lutheran clergyman. Handel showed a marked gift for music, and his talent was encouraged by his family. He had the opportunity to hear excellent church and civic music in Halle; also at nearby Weissenfels, where his father was court surgeon to the



Handel, detail of an oil painting after Thomas Hudson, 1756; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

duke of Saxe-Weissenfels, he heard the music played at court. He became a pupil in Halle of the composer F.W. Zachow, organist of the Liebfrauenkirche and director of the town choir, and from him he learned the principles of keyboard performance and of composition; others instructed him in oboe and violin. Oboe sonatas composed by him at that time still survive. In 1696 he was taken to Berlin, where his talents were noticed by the elector Frederick III (later King Frederick I of Prussia) and the electress Sophia Charlotte.

His father died when Handel was 11, but his education had been provided for, and in 1702 he enrolled as a law student at Halle University. To enlarge his musical experience and to guarantee some part of his living expenses, Handel became organist of the Reformed (Calvinist) Cathedral in Halle when he entered the university and served for one year, until he went north to Hamburg, where greater opportunities awaited him.

In Hamburg and Italy. In Hamburg, Handel joined the violin section of the opera orchestra. Encouraged by the director of the Hamburg opera, Handel also took over some of the duties of harpsichordist, and early in 1705 he presided over the premiere of his first opera, *Almira.* This was sufficiently successful for him to be invited to contribute further works to the repertoire. The music for these works—*Nero* (1705) and *Florindo* and *Daphne* (1706)—is, however, lost.

At this time Italy was considered the musical centre of Europe, and ambitious musicians who could raise the necessary money went there to study. Handel's grand tour of Italy was a great success, indicating command of both musical expression and social graces. He resided for periods of varying length in Florence, Rome, Naples, and Venice. In Florence he met the composer Alessandro Scarlatti, and there in 1707 his first Italian opera, *Rodrigo,* was written. The production of *Rodrigo* drew great acclaim for Handel from the principal patrons of art in Rome. In response Handel moved to Rome, where he composed prolifically. His works included many Italian solo cantatas (vocal compositions) and duets, the extended cantata *Il trionfo del tempo e del disinganno* (1708), Latin church music, and the oratorio *La Resurrezione.*

From Rome, Handel moved on to Naples. There he composed the serenata—a dramatic cantata—*Aci, Galatea e Polifemo* in June 1708, an interesting set of French songs, and a *Cantata Spagnuola* (*No se enmenderá jamás*) that apparently stemmed from a flirtation with a Donna Laura from Spain or Portugal, and he began to compose the opera *Agrippina.* First performed in Venice on Dec. 26, 1709, *Agrippina* enjoyed sensational success.

Before his arrival in Italy Handel enjoyed a national reputation; his mastery of the Italian opera style made him an international figure. Through his friend Agostino Steffani—a papal ambassador-at-large and, until lately, musical director in Hanover—he met Prince Ernest Augustus of Hanover, who offered him Steffani's place at court. Handel accepted and remained director of music at Hanover officially until 1716, but mostly he held the post in absentia. He arrived in Hanover at the beginning of 1710 and left in the autumn for London.

Career in England. Early in 1711 his opera *Rinaldo* was performed in London and was greeted so enthusiastically that Handel sensed the possibility of continuing popularity and prosperity in England. A year later, with electoral permission for a limited stay, he was back in London for the production of *Il pastor fido* and *Teseo.* In 1713 he won his way into royal favour by his *Ode for the Queen's Birthday* and the *Utrecht Te Deum* and *Jubilate* in celebration of the Peace of Utrecht, and he was granted an annual allowance of £200 by Queen Anne.

Recognized and respected as man and musician by prominent members of both the English aristocracy and the intelligentsia, Handel was in no hurry to return to Hanover. Since, on the death of the queen in 1714, the elector George Louis became King George I of England, Handel had no need to do so. On October 26 the king and his family heard music by Handel in the Chapel Royal. By that time Handel had again visited Hanover in the retinue of the king-elector. While in Germany he also went to Hamburg, where *Rinaldo* had been performed in 1715 and where his setting of Barthold Heinrich Brockes' *Passion* (*c.* 1716) was sung several times from 1717 on; and he stayed in other German cities.

In 1718 Handel became director of music to the Duke of Chandos, whose palace at Cannons lay a little north of London. There Handel composed 12 *Chandos Anthems,* a setting of the poet John Gay's *Acis and Galatea* (a different work from *Aci, Galatea, e Polifemo*), and *Haman and Mordecai.* This last—the text by several hands (probably including Alexander Pope, the English satirical poet) and after the French playwright Jean Racine's *Esther*—was to be the effective starting point for English oratorio—a large musical composition for solo voices, chorus, and orchestra, without acting or scenery, usually dramatizing a story from the Bible.

Secure in his profession, Handel now bought the house in Brook Street that was to be his home for the rest of his life. In 1726 he became a British subject, which enabled him to be appointed a composer of the Chapel Royal. In this capacity he wrote much music, including the *Coronation Anthems for George II* in 1727 and the *Funeral Anthem for Queen Caroline* 10 years later.

From 1720 until 1728 the operas at the King's Theatre were staged by the Royal Academy of Music, and Handel, as a director of the academy, was responsible for composing the music of most of them. Although the songs from them were very popular, the operas themselves enjoyed varying degrees of success. From 1728, after the sensation caused by John Gay's satirical *Beggar's Opera,* the future of opera—which meant opera in the Italian style—appeared increasingly uncertain. Handel, however, was loath to relinquish interest in what he took to be not only the highest form of composition but also the most lucrative. In 1729 he once more visited the European continent.

In spite of the vagaries of some of his Italian star singers and the uncertainties of public taste, Handel went on composing operas until 1741, by which time he had written about 40 such works. Opera went into decline in London for a variety of reasons, one of them being the impatience of the English with a form of entertainment in an unintelligible language sung by artists of whose morals they disapproved, and, as opera declined, oratorio became increasingly popular.

As musical director, impresario, composer, virtuoso performer on harpsichord and organ, and fashionable teacher, Handel expended his energy recklessly and in 1737, having suffered what appears to have been a mild stroke, was very ill. After recuperating at Aix-la-Chapelle, he was saddened by the death of the queen. The sombre anthem, incorporating a German chorale melody, that he composed for her funeral was publicly performed on December 17 and privately for the royal family in the Chapel Royal a week later. Soon Handel was as active as ever. He produced one of his most charming and humorous operas, *Serse,* published the Opus 4 organ concerti, composed *Saul* and *Israel in Egypt* as well as shorter works, and helped establish the Fund for the Support of Decayed Musicians (now the Royal Society of Musicians).

The extent to which Handel had steered away from Italian opera is indicated by his use of English texts in 1739 and 1740. These were the English poet John Dryden's "Ode for St. Cecilia's Day" and John Milton's "L'Allegro" and "Il Penseroso." In 1740 Handel published the concerti grossi of Opus 6 and a second set of organ concerti. During that year, in response to the decline of opera, Handel may seriously have considered a change of course but appears to have been discouraged.

At this juncture an invitation from the Duke of Devonshire, the lord lieutenant of Ireland, to furnish a work for Dublin charities pulled Handel out of his state of dejection. Characteristically, he now moved to the opposite extreme and worked so intensively that his promised oratorio, *Messiah,* was written in its first form between August 22 and September 14. A month later its scarcely less inspired successor, *Samson,* was also ready for the copyists. In November, accompanied by some of his performers, Handel traveled to Dublin by way of Chester, where, with the aid of the cathedral musicians, he tried out *Messiah* in private. On December 23 he began a series of subscription concerts in Dublin, and on April 13, 1742, *Messiah* was given its first performance. It created a deep impression and was repeated on June 3. Handel remained in Ireland through the summer, during which time he rearranged the suite of pieces constituting *Forest Music.*

The works of the next three years included the oratorios *Joseph and His Brethren* (first performed in 1744) and *Belshazzar* (1745), the secular oratorios *Semele* (1743) and *Hercules* (1745), and the *Dettingen Te Deum* (1743), celebrating the English victory over the French at the Battle of Dettingen during the War of the Austrian Succession. In 1745, however, there was further concern about Handel's health, and a contemporary wrote that he appeared "dejected, wan, and dark [as he sat by] not playing the harpsichord" at a performance of *Alexander's Feast.* Yet the decade that followed *Messiah* was one of great significance in Handel's career. During this time he made oratorio and large-scale choral works the most-popular musical form in England, a fact of some social importance. In the mid-1740s many voices were being raised against "permissiveness," and the feeling that the great oratorios were some sort of bulwark against moral laxity grew stronger. This feeling of righteousness grew when, after 1749, *Messiah* became especially associated with the Foundling Hospital. A general benefactor of the hospital and a governor from 1750, Handel superintended *Messiah* performances in its chapel until 1754.

Handel's last years. Handel's sense of charity and his general concern for other people raised him to a high place in the affections of the British. His music was even then recognized as a reflection of the national personality, and his capacity for realizing the common mood was nowhere better shown than in the *Music for the Royal Fireworks,* with which he symbolized the end of the Silesian Wars, in 1749. Twelve thousand people are said to have attended a rehearsal of this music in Vauxhall Gardens.

In the summer of 1750 Handel, having visited Germany for the last time, was seriously injured in a coach accident in Holland. Recovered from the mishap, he returned home to compose *Jephtha,* the last of his oratorios. While working on this—as he noted on the manuscript on Feb. 13, 1751—his eyes began to trouble him, and he underwent eye surgery. Although he never became completely blind, there is no doubt that he was gravely handicapped in his work in his final years.

Jephtha was performed at Covent Garden Theatre (where the oratorios were usually performed), London, on Feb. 26, 1752. From

then on, the Lenten oratorio seasons were eagerly anticipated. Handel attended the performances, and he sometimes played concerti on the organ. He had indeed become an institution to the English people.

Handel kept his interests in musical activities alive until the end. After his death on April 20, 1759, he was buried in Poets' Corner in Westminster Abbey in the presence of 3,000 people who had come to mourn the passing not only of a great composer but of one held in universal esteem as a man.

Growth of Handel's reputation. Handel, accorded the status of a classic in England during his own lifetime, is unique among musicians in never having suffered diminution of reputation as either man or artist. As a young man he was aware of, and to some extent supplied, the demands of aristocratic patronage. In England, however, by adapting himself to a different climate of opinion and taste, he came to serve and indeed to express the needs of a wider public. More than anyone else he democratized music, and in this respect his popular oratorios, his songs, and his best-loved instrumental works have a significance transcending their purely musical importance. Handel's music became an indispensable part of England's national culture.

In Germany interest in Handel grew apace. Through performances of his works and the critical attention paid to Handel, he became reestablished in Germany as a national composer. (P.M.Y./Ed.)

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handgun, any firearm small enough to be held in one hand when fired. It usually fires a single projectile or bullet, and additional ammunition may be available in a revolving mechanism or magazine. Handguns may be used for target shooting, hunting small game, or personal self-defense. Automatic handguns are illegal in many countries, and private ownership of any handgun is restricted in most of the world. *See also* automatic pistol; pistol; revolver.

handicap, in sports and games, method of offsetting the varying abilities or characteristics of competitors in order to equalize their chances of winning. Handicapping takes many, often complicated, forms. In horse racing, a track official known as the handicapper may assign weights to horses according to their speed in previous performances; the presumed fastest horse must carry the most weight. In trotting, horses sometimes start at different points; the horse thought to be the best in the race has to run farther than any other. In golf, two unequal players may have a close match by allowing the poorer player a handicap, a certain number of uncounted strokes based on earlier performances. The same is true in 10-pin bowling. In sailboat racing, dissimilar boats compete under various handicapping formulas that add time to the faster boats' actual elapsed time for a race; thus, the winner of a race may be not the first to finish but rather the boat that performs best in relation to its design.

Handke, Peter (b. Dec. 6, 1942, Griffen, Austria), avant-garde Austrian playwright, novelist, poet, and essayist, one of the most original German-language writers in the second half of the 20th century.

The son of a bank clerk, Handke studied law at the University of Graz from 1961 to 1965 and contributed pieces to the avant-garde literary magazine *manuskripte.* He came to public notice as an anticonventional playwright with his first important drama, *Publikumsbeschimpfung* (1966; *Offending the Audience*), in which four actors analyze the nature of theatre for an hour and then alternately insult the audience and praise its "performance," a strategy that arouses varied reactions from the crowd. Several more plays lacking conventional plot, dialogue, and characters followed, but Handke's other most significant dramatic piece was his first full-length play, *Kaspar* (1968), which depicts the foundling Kaspar Hauser as a near-speechless innocent destroyed by society's attempts to impose on him its language and its own rational values. Handke's other plays include *Das Mündel will Vormund sein* (1969; "The Ward Wants to Be Guardian," Eng. trans. *My Foot My Tutor*) and *Der Ritt über den Bodensee* (1971; *The Ride across Lake Constance*).

Handke's novels are for the most part ultra-objective, deadpan accounts of characters who are in extreme states of mind. His best-known novel, *Die Angst des Tormanns beim Elfmeter* (1970; *The Goalie's Anxiety at the Penalty Kick*), is an imaginative thriller about a former soccer player who commits a pointless murder and then waits for the police to take him into custody. *Die linkshändige Frau* (1976; *The Left-Handed Woman*) is a dispassionate description of a young mother coping with the disorientation she feels after she has separated from her husband. Handke's memoir about his deceased mother, *Wunschloses Unglück* (1972; "Wishless Un-luck," Eng. trans. *A Sorrow Beyond Dreams*), was another of his most effective works.

Handke also wrote short stories, essays, radio dramas, and autobiographical works. The dominant theme of his writings is that ordinary language, everyday reality, and their accompanying rational order have a constraining and deadening effect on human beings and are underlain by irrationality, confusion, and even madness.

handkerchief tree: *see* dove tree.

Handl, Jacob, also called JACOBUS GALLUS (b. 1550, Reifnitz, Carniola [now Ribnica, Yugos.]—d. July 18, 1591, Prague), German-Austrian composer known for his sacred music.

A Cistercian monk, Handl traveled in Bohemia, Moravia, and Silesia; was a member of the Viennese court chapel in 1574; and was choirmaster to the bishop of Olmütz (modern Olomouc, Czech.) in 1579–85. His most notable work is the *Opus musicum* (1590), a collection of motets for the entire year. His wide-ranging, eclectic style blends archaism and modernity. He rarely used cantus firmus, preferring the then-new Venetian polychoral manner, yet he was equally conversant with earlier imitative techniques. Some of his chromatic transitions foreshadowed the breakup of modality; his five-voice motet *Mirabile mysterium* contains chromaticism worthy of Don Carlo Gesualdo. He enjoyed word painting in the style of the madrigal, yet he could write the simple *Ecce quomodo moritur justus* later used by G.F. Handel in his funeral anthem, *The Ways of Zion Do Mourn.*

Handlin, Oscar (b. Sept. 29, 1915, Brooklyn, N.Y.), American historian and educator noted for his examinations of immigration and other social topics in American history.

The son of Jewish immigrant parents, Handlin graduated from Brooklyn College in 1934 and earned his M.A. degree from Harvard University in 1935. He then taught history at Brooklyn College (1936–38) and joined the history faculty at Harvard in 1939. He received his doctorate from Harvard in 1940. After holding several prestigious professorships, he became director of the Harvard University Library in 1979.

Handlin's doctoral thesis, published in modified form as *Boston's Immigrants, 1790–1865* (1941) was a study of the acculturation of Irish immigrants to that city. His next major work, *Commonwealth* (1947), examined governmental influence on the economy of the early United States, particularly in Massachusetts. His most important historical study, *The Uprooted* (1951), told the story of the great waves of immigration that formed the American people, and it examined the psychological and cultural adjustments that people had to make after settling in the United States. The book's combination of literary style, acute scholarship, and humane reportage typified Handlin's approach to the writing of social history. *The Uprooted* won a Pulitzer Prize.

Handlin went on to write about many other aspects of American history. Among his subsequent works are *The American People in the Twentieth Century* (1954), *Race and Nationality in American Life* (1956), *Al Smith and His America* (1958), *The Americans* (1963), *Fire-Bell in the Night* (1964), and *Children of the Uprooted* (1966).

handling, materials: *see* materials handling.

hands, imposition of, also called LAYING ON OF HANDS, ritual act in which a priest or other religious functionary places one or both hands palms down on the top of another person's head, usually while saying a prayer or blessing. The imposition of hands was first practiced in Judaism and was adopted by Christianity. In the Hebrew Bible it is associated with three interrelated ideas: consecration (*i.e.,* setting apart for the service of God), transmission of a divine gift, and identification (the means whereby an offerer was linked with his sacrifice).

In the New Testament the same ideas are present; all of these ideas are connected with ordination and baptism, in both of which the imposition of hands is a standard part of the ritual. Ordination involves both setting apart and the conveyance of a gift, and the theme of identification is implicit in that the one ordained shares in the authority and is the representative of the ordainer. The imposition of hands connected with baptism is a means whereby the convert is identified and so brought into the community; it is further a setting apart for the service of God and is, on occasion, connected with the gift of the Holy Spirit. The New Testament further indicates that the imposition of hands conveyed a blessing and was a means of healing.

The early church continued these uses and added two more: the imposition of hands for the blessing of catechumens (*i.e.,* those preparing for baptism) and for the reconciliation of penitents and heretics. The church has preserved the use of this ritual act, primarily in the rites of ordination and confirmation.

Handsome Lake (Seneca Indian chief): *see* Ganioda'yo.

Handsome Lake cult, also called LONGHOUSE RELIGION, or GAI'WIIO (Seneca: "Good Message"), longest-established prophet movement in North America. Its founder was Ganioda'yo (*q.v.*), a Seneca chief whose name meant "Handsome Lake"; his heavenly revelations received in trance in 1799 rapidly transformed both himself and the demoralized Seneca. Their Christian beliefs, which came primarily from Quaker contacts, included a personal creator-ruler, a devil, heaven, hell, and judgment; Jesus was identified with a local mythological figure. Seneca divinities were retained as ruling angels, rituals were reduced to four transformed dance feasts, and the longhouse was modified into a "church." A puritan and modernizing ethic attacked alcohol and witchcraft, banned further land sales, encouraged the men to practice plow agriculture and

animal husbandry, and stressed stability of the nuclear family.

Ganioda'yo's teaching spread among the Iroquois and later became embodied in fixed forms as the "Code of Handsome Lake," which is still recited once in two years in the 20th century by authorized "preachers" in some 10 longhouses providing for about 5,000 adherents on Iroquois reservations in New York state in the United States and in Ontario and Quebec in Canada. Though not anti-white, the religion serves to maintain Indian identity and has shown some growth in the 20th century.

Handy, W(illiam) C(hristopher) (b. Nov. 16, 1873, Florence, Ala., U.S.—d. March 28, 1958, New York City), U.S. black composer who changed the course of popular music by integrating the blues idiom into the then fashionable ragtime. Among his best known works is the classic "St. Louis Blues."

A son and grandson of ministers, Handy was educated at Teachers Agricultural and Mechanical College, Huntsville, Ala., and worked as a schoolteacher and bandmaster. Though he became blind at the age of 30, he conducted his own orchestra from 1903 to 1921.

Handy worked during the period of transition from ragtime to jazz. Drawing on the vocal blues melodies of Negro folklore, he added harmonizations in his orchestral arrangements. His work helped develop the conception of the blues as a harmonic framework within which to improvise. With his "Memphis Blues" (1911), an election campaign song for the mayor Edward H. "Boss" Crump of Memphis, Tenn., and especially his "St. Louis Blues" (1914), he introduced a nostalgic element peculiar to the music of Southern blacks. This was achieved chiefly by use of the "blue" or slightly flattened seventh tone of the scale, which was characteristic of black folk music. Later he wrote other blues pieces ("Beale Street Blues," "Careless Love") and several marches and symphonic compositions. Forced to publish "St. Louis Blues" himself, he organized a publishing firm, which he directed until late in his life. He issued anthologies of Negro spirituals and blues and studies of U.S. black musicians. His autobiography, *Father of the Blues,* was published in 1941.

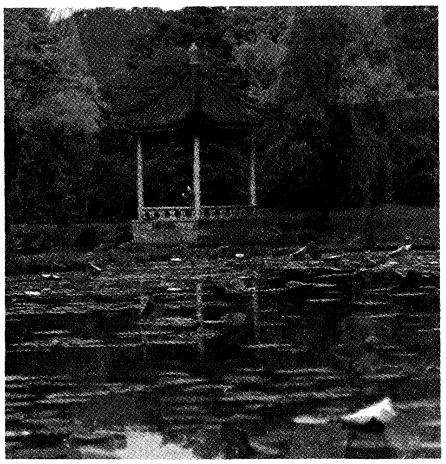
Han'en (Buddhist reformer): *see* Shinran.

Hanfeizi (Chinese philosopher): *see* Han-fei-tzu.

Hanford, city, seat (1893) of Kings County, central California, U.S., in the San Joaquin Valley, 33 mi (53 km) south of Fresno. Settled in 1871, it was named for James M. Hanford, a Southern Pacific Railroad official. The Mussel Slough feud between ranchers and the railroad reached its bloody climax there in 1880 and provided the plot for Frank Norris' novel *The Octopus* (1901). The economy remains basically agricultural (cotton, dairy produce, feed grains, fruit), although the manufacture of tires and petroleum products and the proximity of Lemoore Naval Air Station (1961) are significant. Inc. 1891. Pop. (1980) 20,958.

Hang-chou, Pinyin HANGZHOU, conventional HANGCHOW, city in northern Chekiang Province (*sheng*), China. It is the provincial capital and forms a prefecture-level municipality (*shih*) controlling a large area, including the lower valley of the Fu-ch'un Chiang (river) and the valley of the Hsin-an Chiang, site of a hydroelectric installation some 75 mi (120 km) southwest of Hang-chou.

The city stands on the north bank of the Ch'ien-t'ang Chiang estuary at the head of Hang-chou Wan (bay). It has water communications with the interior of Chekiang to the south, is the southern terminus of the Grand Canal, and is linked to the network of canals and waterways that cover the Yangtze River Delta area to the north. From Hsiao-shan on



Garden in Hang-chou, Chekiang Province, China
A. Topping—Rapho/Photo Researchers

the opposite side of the estuary an ancient canal also connects it with Shao-hsing and Ning-po to the southeast. The city stands at the foot of a scenic range of hills, the Hsi-t'ien-mu Shan (Eye of Heaven Mountains), and on the shore of the Hsi Hu (also called West Lake). Its buildings and gardens are also renowned, and it is situated among hills and valleys in which some of the most famous monasteries in China are located.

The county (*hsien*) of Ch'ien-t'ang was first established at this site under the Ch'in dynasty (221–206 BC) but did not begin to develop until the 4th and 5th centuries AD when the Yangtze River Delta area began to be settled. It became a major local centre with the completion of the Chiang-nan Canal (then the southern section of the Grand Canal) in 609. During the Five Dynasties (907–960), Hang-chou was the capital of the state of Wu-yüeh. In the later Sung period, northern China fell to the Juchen (Chin) dynasty, and the Sung, then confined to southern China, made Hang-chou (then known as Lin-an) their capital. A centre of commerce, it was visited in the late 13th century by the Venetian traveller Marco Polo, who called it Kinsai, or Quinsay (a corruption of the Chinese Ching-shih, meaning "temporary capital"); it then had an estimated population of 1,000,000–1,500,000.

Although it never again reached the peak of importance that it had achieved as capital of the Southern Sung dynasty (1126–1279), Hang-chou remained of importance. Under the Ming (1368–1644) and Ch'ing (1644–1911) dynasties it was a superior prefecture (*fu*), as well as the provincial capital of Chekiang. It became immensely wealthy, being at the centre of a fertile rice-growing area as well as the site of the most important silk industries in China. It also became famous as a centre of culture, producing numerous writers, painters, and poets. Its importance as a port dwindled, however, as Hang-chou Wan gradually silted up and as its outport, Kan-p'u, became useless. From the 14th century onward its trade gradually shifted to Ning-po and, in the 19th century, to the new city of Shanghai. During the Taiping Rebellion the city fell to the rebels in 1861 and suffered severe damage.

Subsequently, although no longer a major port, it remained a commercial centre for domestic trade and was opened to foreign trade in 1896. Its commercial role was later augmented by the construction of a railway to Shanghai (1909), of another to Ning-po (1937), and of a main line to Kiangsi and Hunan provinces in 1936–38. Since the construction of railways in Fukien Province in the 1950s, Hang-chou has become the focus of rail traffic from the south and southeastern provinces to Shanghai. It was also the focus of the earliest network of modern motor roads, constructed in the 1930s. Hang-chou was held by the Japanese from 1937 to 1945.

Since 1949 Hang-chou, though it has been carefully preserved as a scenic district and tourist attraction, has also developed into an industrial centre. The silk industry has been modernized and now produces both silk and cottons. There is an electric generating plant connected by a power grid with the large Hsin-an Chiang hydroelectric project to the southwest and to Shanghai and Nan-ching (Nanking). A chemical industry has also been established. In the late 1950s a major tractor plant was built there, and a machine-tool industry subsequently developed. Hang-chou is also a centre for an industrial area engaged in grain milling, tea processing, and the production of hemp, silk, and cotton.

Hang-chou is a cultural centre, and Hang-chou University, Chekiang University, Chekiang Agricultural University, and a number of other seats of higher education have been established there. Pop. (1983 est.) 1,800,000.

hang gliding, unpowered human flight using a kitelike apparatus with a frame, usually of aluminum, and a sail, usually of Terylene. Takeoff is achieved from a hilltop, cliff top, or mountaintop or from a motorboat tow.

Deriving from the sailplane, or glider, the hang glider was developed in the 1960s from the design of Francis Rogallo of the U.S. National Aeronautics and Space Administration for a flexible-wing parachute projected for use in steering space vehicles in reentry. Many variations of his original design followed, both by Rogallo and others.

The hang glider was first used for recreation and stunt flying. The activity subsequently developed into an organized sport, including duration-of-flight, distance, and altitude-gain competitions. A European championship was held in 1974 and a world championship in 1975 and thereafter. From 1976 world championships were held and records kept under the control of the Fédération Aéronautique Internationale (FAI; International Aeronautical Federation). By 1979 there were motorized hang gliders. Such factors as limited manoeuverability, susceptibility to wind changes, and lack of body protection of the operator combine to make the sport a relatively dangerous one.

Hangayn Mountains, Mongolian HANGAYN NURUU, also called CHANGAI, or KHANGAI, MOUNTAINS, range in the central Mongolian People's Republic. It extends northwest–southeast for about 500 mi (805 km), parallels the Mongolian Altai Mountains (south), and rises to a height of 13,225 ft (4,031 m) in Otgon Tenger. Most of its northern drainage flows into the Selenge Mörön (river), which, with its chief tributary, the Orhon Gol, drains into Lake Baikal in Siberia. The rivers of the steeper southern slopes end in salt lakes or disappear in the Gobi (desert).

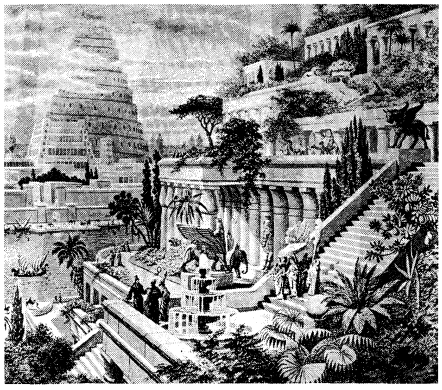
hanging, execution by strangling or breaking the neck by a suspended noose. The traditional method, still in use on the continent of Europe, involves suspending the victim from a gallows or crossbeam until he has died of asphyxiation.

Elsewhere, the condemned person stands on a trapdoor, and when the trap is released he falls several feet until stopped by the rope. The jerk breaks the cervical vertebrae and is thought to cause immediate loss of consciousness.

hanging (word game): *see* hangman.

Hanging Gardens of Babylon, one of the Seven Wonders of the World. The gardens, built within the walls of the royal palace

at Babylon, the capital of Babylonia (now in southern Iraq), did not actually "hang" but were instead "up in the air"—that is, they were roof gardens laid out on a series of ziggurat terraces that were irrigated by pumps from the Euphrates River. Traditionally, they were



Reconstruction drawing of the Hanging Gardens of Babylon, constructed *c.* 8th–6th century BC
Brown Brothers

the work either of the semilegendary Queen Sammu-ramat (Greek Semiramis, mother of the Assyrian king Adad-nirari III, who reigned from 810 to 783 BC) or of King Nebuchadrezzar II (reigned 604–562 BC), who built them to console his Median wife Amytis because she missed the mountains and greenery of her homeland.

The Hanging Gardens were described in detail by classical authors, who related that the terraces were roofed with stone balconies on which were layered various materials, such as reeds, bitumen, and lead, so that the irrigation water would not seep through the terraces. Although no certain traces of the Hanging Gardens have been found, a German archaeologist, Robert Koldewey, did uncover a peculiar series of foundation chambers and vaults in the northeastern corner of the palace at Babylon. An unusual well in one of the vaults suggests it may have been used in conjunction with a chain pump and thus was perhaps part of the substructure of the once towering Hanging Gardens.

Hangul, Korean HAN'GŬL (Korean alphabet): *see* Hankul.

Hangzhou (China): *see* Hang-chou.

Hani, also called WONI, or HOUNI, non-Chinese people living on the high southwestern plateau of Yunnan *sheng* (province), China, specifically concentrated in the southwestern corner. The Hani are Tibeto-Burmese with strong Austro-Asiatic elements. Classified as tribes of the larger Yi (Wu-man) ethnic group, the Hani were the first of the Yi to migrate from Tibet, appearing in China in Han times. They were infiltrated slightly by the Thai who were fleeing the Mongols. Numbering about 1,112,000 in the late 20th century, they speak a dialect belonging to the Tibeto-Burmese language group.

Yunnan province contains culturally different Hani branches. The most southern have been influenced by the Thai, but the northern Hani are similar to Tibetans.

hanif, in the Qur'ān, the sacred scripture of Islām, an Arabic designation for true monotheists (especially Abraham) who were not Jews, Christians, or worshipers of idols. The word appears to have been borrowed from a Syriac word meaning heathen and, by extension, designating a Hellenized person of culture. There is no evidence that a true hanif cult existed in pre-Islāmic Arabia, but there were certain individuals who, having repudiated the old gods, prepared the way for Islām but embraced neither Judaism nor Christianity. In this sense, some of Muḥammad's relatives, contemporaries, and early supporters were called hanifs—*e.g.,* Waraqah ibn Nawfal, a cousin of the Prophet's first wife, Khadījah, and Umayyah ibn Abī aṣ-Ṣalt, an early 7th-century Arab poet.

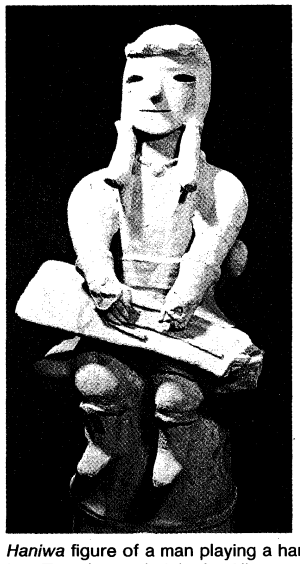
Hanish Islands, Arabic JAZĀ'IR ḤANĪSH, archipelago, southern Red Sea, belonging to Yemen (Ṣanʿā'). Long under Ottoman sovereignty, the island group's political status was purposely left indeterminate by the Treaty of Lausanne (1923), under which Turkey surrendered all its Asiatic territories outside Anatolia. Between 1923 and World War II, Italy exercised loose control over the fishermen frequenting the islands; the islands passed definitively to Yemen (Ṣanʿā') after the war.

The four main islands of the Hanish group extend north–south in a chain about 40 miles (65 km) long and lie 19–45 miles (31–72 km) off the Yemeni coast. From the north they are the islands of: az-Zuqar, the largest, which is irregularly shaped and about 10 miles (16 km) north–south and 8 miles (13 km) east–west at its widest point; al-Ḥanīsh aṣ-Ṣaghīr (Little Hanish); al-Ḥanīsh al-Ḳabīr (Great Hanish) 10 miles northeast–southwest, maximum width 3 miles); and Suyūl Ḥanīsh. Interspersed among these islands, and also extending southwest to the coast of Ethiopia in Africa, are many small islets and rocks; the group is a major navigational hazard of the southern Red Sea.

Volcanic in origin, the group has rugged topography throughout. The island of az-Zuqar rises to 2,047 feet (624 m) above sea level; this is the highest elevation on any of the Red Sea's many islands. Although barren and inhospitable to settlement, the islands have rich fishing grounds and are visited by fishermen from Yemeni coastal ports.

haniwa, terra-cotta sculpture arranged on and around Japanese tombs dating from the Tumulus, or Kofun, period (*c.* AD 250–*c.* 500). The first *haniwa* were barrel-shaped cylinders (*haniwa* means "circle of clay") used to mark the borders of a burial ground. Later, in the early 4th century, the cylinders were surmounted by sculptural forms such as figures of warriors, female attendants, dancers, birds, animals, boats, and even houses. It is believed that the figures symbolized continued service to the deceased in the other world.

Haniwa vary from 1 to 5 feet (30 to 150 cm) in height, the average being about 3 feet (90 cm). Since the figures are hollow, the eyes, noses, and mouths are indicated by perforation, lending the objects a mysterious charm. *Haniwa* were mass-produced during the 6th century, but thereafter the introduction of Buddhism and the practice of cremation caused a decline in the building of tumuli and, thus, in the production of *haniwa.*



Haniwa figure of a man playing a harp, late Tumulus period; in the Aikawa Collection
By courtesy of the Aikawa Collection

hank, in textile manufacture, unit of measure applied to a length of yarn or to a loose assemblage of fibres forming a single strand, and varying according to the fibre origin. A hank of cotton or of the spun silk that is made from short lengths of waste silk is 840 yards (760 m) in length. A hank of linen is 300 yards (270 m). In worsted yarn, made from combed fibre, there are 560 yards (510 m) to a hank.

hankow: *see* Han-k'ou.

Hankul, also spelled HANGUL, also called ONMUN, Korean HAN'GŬL ("Great Script"), or ŎNMUN ("Vernacular Script"), alphabetic system used for writing the Korean language. The system, known as Chosŏn Muntcha in North Korea, consists of 24 letters, including 14 consonant and 10 vowel symbols. The consonant symbols are formed with curved or angled lines; vowel symbols are composed of vertical or horizontal straight lines together with short lines on either side of the main line.

The development of the Hankul alphabet is traditionally ascribed to Sejong, fourth king of the Yi dynasty; the system was made the official writing system for the Korean language in the mid-1440s by one of Sejong's decrees. Because of the influence of Confucianism and of Chinese culture, however, Hankul was not used by scholars or Koreans of the upper classes until after 1945, when Korea ceased to be under Japanese rule.

Hanlin Academy, Chinese (Wade–Giles romanization) HAN-LIN YÜAN, Pinyin HANLIN YUAN, elite scholarly institution founded in the 8th century AD in China to perform literary tasks for the court and to establish the official interpretation of the Confucian Classics, which were the basis of the civil-service examinations necessary for entrance into the upper levels of the official bureaucracy. The academy lasted until 1911.

The academy was created by Emperor Hsüan Tsung (reigned AD 712–756) of the T'ang dynasty. Although at first membership in the academy was not confined to scholars and included court favourites, jugglers, and musicians, by the time of the Ming dynasty (1368–1644) admittance to the body had become an honour bestowing great prestige and was granted only to the outstanding recipients of the *chin-shih* degree, the highest level of the examination system. Under the subsequent Ch'ing dynasty (1644–1911/12), the Hanlin Academy, as the highest academic institution in China, was often referred to by westerners as the National, or Imperial, Academy or the Board of Academicians.

For the most part, Hanlin scholars drafted and compiled the Imperial edicts, tutored members of the Imperial family and the palace eunuchs, worked on new interpretations of the Confucian Classics, and prepared encyclopaedias of world knowledge. But the orientation of the academy was so traditional that in the Imperial encyclopaedia of 1747 the Hanlin scholars were able to call the description of the five continents by the Jesuit missionary Matteo Ricci a "wild fabulous story" that was obviously not in accord with China's position as the centre of the world. The academy ended when the Ch'ing dynasty was overthrown.

Hanna, Mark, byname of MARCUS ALONZO HANNA (b. Sept. 24, 1837, New Lisbon, Ohio, U.S.—d. Feb. 15, 1904, Washington, D.C.), prominent industrialist and prototype of the U.S. political kingmaker; he successfully pro-

Mark Hanna, 1900

By courtesy of the Library of Congress, Washington, D.C.

moted the presidential candidacy of William McKinley in the election of 1896 and personified the growing influence of big business in American politics.

The prosperous owner of a Cleveland coal and iron enterprise, Hanna soon expanded his interests to include banking, transportation, and publishing. Convinced that the welfare of business (and consequently the prosperity of the nation) was dependent upon the success of the Republican Party, he began as early as 1880 to work among industrialists to ensure the financial support of likely candidates for office. He was especially impressed by Ohio congressman William McKinley's successful sponsorship in 1890 of a high protective tariff, and thenceforth he devoted all his energies to McKinley's political advancement, first as governor (1892–96) and then as president (1897–1901). In preparation for the 1896 contest with the Democrat–Populist candidate, William Jennings Bryan, Hanna was reputed to have poured more than $100,000 of his own money into preconvention expenses alone. Raising an unprecedented fund from wealthy individuals and corporations, the dynamic Hanna skillfully directed the $3,500,000 campaign—the costliest and best organized the nation had ever witnessed. At a rate of spending exceeding his opponents by 20 to 1, his 1,400 paid workers inundated the country with millions of pamphlets promising continuing prosperity with McKinley. Hanna succeeded in stunting Bryan's grass-roots appeal with a continual barrage of posters and propaganda that preceded and followed Bryan at every whistle-stop of his campaign train.

Once in office, McKinley helped to fulfill Hanna's lifelong ambition by appointing Sen. John Sherman secretary of state, thus creating a vacancy in the U.S. Senate. Hanna was elected to fill the vacancy (March 1897) and remained in the Senate until his death. A standard biography is Herbert Croly, *Marcus Alonzo Hanna: His Life and Work* (1912).

Hanna, William (Denby); and Barbera, Joseph (Roland) (respectively b. July 14, 1910, Melrose, N.M., U.S.; b. 1911, New York City), U.S. motion-picture animators and partners in Hanna-Barbera Productions, founded in 1957. The two collaborated for nearly a half century.

William Hanna joined a California engineering firm after studying engineering and journalism. He switched careers to cartooning in 1930 and in 1937 joined Metro-Goldwyn-Mayer (MGM) as a director and story man in the animation department.

Joseph Barbera was working as a bank accountant with the Irving Trust Company in New York City when he started submitting cartoons to magazines: he sold his first one to *Collier's* magazine and decided to forsake banking for cartooning. He joined MGM as a sketch artist in the same year as Hanna.

At MGM Hanna and Barbera created the *Tom and Jerry* characters and produced more than 200 films in the series between 1940 and 1957. They won seven Oscars from the Academy of Motion Picture Arts and Sciences for their cartoons between 1943 and 1952. After 1957, when they formed their own company, they made a prodigious number of cartoon series for television using a computerized catalogue of character movements. *The Flintstones, Yogi Bear,* and *Huckleberry Hound* were among the most popular Hanna-Barbera productions.

Hanna-Barbera Marineland: *see* Marineland of the Pacific.

Hannah, also spelled ANNA (11th century BC), mother of Samuel, the Jewish judge. Childless as one of the two wives of Elkanah, she prayed for a son, promising to dedicate him to God. Her prayers were answered, and she brought the child Samuel to Shiloh for religious training. In the Talmud she is named as one of seven prophetesses, and her prayer is in the Rosh Hashana (Jewish New Year) first-day service, exemplifying successful petitions to God.

Hannes Hafstein (Icelandic statesman and poet): *see* Hafstein, Hannes.

Hannibal (b. 247 BC, North Africa—d. *c.* 183–181, Libyssa, Bithynia), Carthaginian general, one of the great military leaders of antiquity, who commanded the Carthaginian forces against Rome in the Second Punic War (218–201 BC).

Early life. Hannibal was the son of the great Carthaginian general Hamilcar Barca. According to Polybius and Livy, the main Latin sources for his life, Hannibal was taken to Spain by his father and at an early age was made to swear eternal hostility to Rome. From the death of his father in 229/228 until his own death *c.* 183, Hannibal's life was one of constant struggle against the Roman republic.

His earliest commands were given to him in the Carthaginian province of Spain by Hasdrubal, son-in-law and successor of Hamilcar; and it is clear that he emerged as a successful officer, for, on the assassination of Hasdrubal in 221 BC, the army proclaimed him, at the age of 26, its commander in chief, and the Carthaginian government quickly ratified his field appointment.

Hannibal immediately turned himself to the consolidation of the Punic hold on Spain. He married a Spanish princess, Imilce, then began to conquer various Spanish tribes. He fought against the Olcades and captured their capital, Althaea; quelled the Vaccaei in the northwest; and in 221, making the seaport Cartagena (Carthage Nova, the capital of Carthaginian Spain) his base, won a resounding victory over the Carpetani in the region of the Tagus River.

In 219 BC Hannibal made an attack on Saguntum, an independent Iberian city south of the Ebro River. In the treaty between Rome and Carthage subsequent to the First Punic War (264–241), the Ebro had been set as the northern limit of Carthaginian influence in the Iberian Peninsula. Saguntum was indeed south of the Ebro, but the Romans had "friendship" (though perhaps not an actual treaty) with the city and regarded the Carthaginian attack on it as an act of war. The siege of Saguntum lasted eight months, and in it Hannibal was severely wounded. The Romans, who had sent envoys to Carthage in protest (though they did not send an army to help Saguntum), after its fall demanded the surrender of Hannibal. Thus began the Second Punic War, declared by Rome and conducted, on the Carthaginian side, almost entirely by Hannibal.

The march into Gaul. Hannibal spent the winter of 219–218 at Cartagena in active preparations for carrying the war into Italy. Leaving his brother Hasdrubal in command of a considerable army for the defense of Spain and North Africa, he crossed the Ebro in April or May of 218 and marched into the Pyrenees (the Romans, shortly before they heard of this, decided on war). There his army—which consisted, according to Polybius, of 90,000 infantry, 12,000 cavalry (Polybius' figures are probably exaggerated; a total force of about 40,000 is more likely) and a number of elephants—met with stiff resistance from the Pyrenean tribes. This opposition and the desertion of some of his Spanish troops greatly diminished his numbers, but he reached the Rhône River with but little resistance from the tribes of southern Gaul. Meanwhile, the Roman general Publius Cornelius Scipio transported his army, which had been detained in northern Italy by a rebellion, by sea to Massilia (Marseille). As Scipio moved northward along the right bank of the Rhône, he learned that Hannibal had already crossed the river and was marching northward on the left bank. Realizing that Hannibal probably planned to cross the Alps, Scipio returned to northern Italy to await him.

Controversy has surrounded the details of Hannibal's movements after the crossing of the Rhône. Polybius states that he crossed it while the river was still in one stream at a distance of four days' march from the sea. Fourques, opposite Arles, is thought to be a likely place, but he may have made a crossing north of the confluence of the Isère and the Rhône. Hannibal used coracles and boats locally commandeered; for the elephants he made jetties out into the river and floated the elephants from these on earth-covered rafts. Horses were embarked on large boats or made to swim. During this operation hostile Gauls appeared on the opposite bank, and Hannibal dispatched a force under Hanno to cross farther upstream and attack them in the rear.

After crossing and receiving friendly Gallic leaders headed by the northern Italian Boii, whose superior knowledge of the Alpine passes must have been of the greatest value to Hannibal's plans, the Carthaginians crossed the Durance River (or more probably an ancient branch of it that flowed into the Rhône near Avignon) and passed into an area called "the island," the identification of which is the key to Hannibal's subsequent movements on land. According to Polybius, it was a fertile, densely populated triangle bounded by hills, by the Rhône, and by a river that is probably either the Aygues or the Isère. On the "island" a civil war was being fought between two brothers (of what tribe it is not clear). Brancus, the elder, in return for Hannibal's help, provided supplies for the Carthaginian army, which, after marching about 750 miles in four months from Cartagena, was in sore need of them.

The Alpine crossing. Hannibal's army approached the Alps either by the Col de Grimone or the Col de Cabre, then through the basin of the Durance, or else by the Genèvre or Mont Cenis passes into the upper Po Valley, descending into the territory of the hostile Taurini, where Hannibal stormed their chief town (modern Turin).

Some details of Hannibal's crossing of the Alps have been preserved. At first danger came from the Allobroges, who attacked the rear of Hannibal's column. (Along the middle stages of the route, other Celtic groups attacked the baggage animals and rolled heavy stones down from the heights on the enfilade below, thus causing both men and animals to panic and lose their footings on the precipitous paths. Hannibal took countermeasures, but these involved him in heavy losses in men.) On the third day he captured a Gallic town and provided the army from its stores with rations for two or three days. Harassed by the daytime attentions of the Gauls from the heights and mistrusting the loyalty of his Gallic guides, Hannibal bivouacked on a large bare rock to cover the passage by night of his horses and pack animals in the gorge be-

low. Snow was falling on the summit of the pass, making the descent even more treacherous. Upon the hardened ice of the previous year's fall, the soldiers and animals alike slid and foundered in the fresh snow. A landslide blocked the narrow track, and the army was held up for one day while it was cleared. Finally on the 15th day, after a journey of five months from Cartagena, with 20,000 infantry, 6,000 cavalry, and only a few of the original 38 elephants, Hannibal descended into Italy, having surmounted the difficulties of climate and terrain, the guerrilla tactics of inaccessible tribes, and the major difficulty of commanding a body of men diverse in race and language under conditions to which they were ill fitted.

The war in Italy. Hannibal's forces were now totally inadequate to match the army of Scipio, who had rushed to the Po River to protect the recently founded Roman colonies of Placentia (modern Piacenza) and Cremona. The first action between the two armies took place on the plains west of the Ticino River, and Hannibal's Numidian cavalry prevailed. Scipio was severely wounded, and the Romans withdrew to Placentia. After manoeuvres failed to lead to a second engagement, the combined armies of Sempronius Longus and Scipio met Hannibal on the left bank of the Trebia River south of Placentia and were soundly defeated (December 218). This victory brought both Gauls and Ligurians to Hannibal's side, and his army was considerably augmented by Celtic recruits. After a severe winter (in which he contracted an eye infection), he was able to advance in the spring of 217 as far as the Arno River. Although two Roman armies were now in the field against him, he was able to outmanoeuvre that of Gaius Flaminius at Arretium and reached Faesulae (modern Fiesole) and Perugia. By design, this move forced Flaminius' army into open combat, and, as it passed between the northern shore of Lake Trasimene and the opposite hills, Hannibal's troops from their prepared positions all but annihilated it, killing thousands and driving others to drown in the lake. Reinforcements of about 4,000 cavalry under Gaius Centenius were intercepted before they arrived and were also destroyed. The Carthaginian troops were too worn to clinch their victories and march on Rome. Hannibal, furthermore, nurtured the vain hope that the Italian allies of Rome would defect and cause civil war.

Hannibal spent the summer of 217 resting at Picenum, but later he ravaged Apulia and Campania; meanwhile the delaying tactics of Quintus Fabius Maximus Cunctator's army allowed only skirmishes between the two armies. Suddenly in early summer of 216 Hannibal moved southward and seized the large army supply depot at Cannae on the Aufidus River. There early in August the Battle of Cannae (modern Monte di Canne) was fought. While the Gauls and Iberian infantry of Hannibal's centre line yielded (without breaking) before the drive of the numerically superior Roman infantry, the Libyan infantry and cavalry of Hannibal's flanks stood fast, overlapped the Roman line, and in a rear encircling movement turned to pursue the victorious legionaries.

This great land victory brought the desired effect: many regions began to defect from the Italic confederacy. But Hannibal did not march on Rome but spent the winter of 216–215 in Capua. Gradually the Carthaginian fighting strength weakened. The strategy suggested by Fabius was put into operation: to defend the cities loyal to Rome; to try to recover, where opportunity offered, those cities that had fallen to Hannibal; never to enter battle when the enemy offered it but rather to keep the Carthaginians alert in every theatre of war. Thus Hannibal, unable because of inferior numbers to spread his forces to match the Romans and unable to employ this concentrated strength in a decisive battle, passed from the offensive to a cautious and not always successful defensive in Italy, inadequately supported by the home government at Carthage and, because of the Roman command of the sea, forced to obtain local provisions for protracted and ineffectual operations.

Hannibal, except for the capture of Tarentum (modern Taranto), gained only minor victories (215–213). Reinforcements from Carthage were few. In 213 Casilinum and Arpi (captured by Hannibal in winter 216–215) were recovered by the Romans, and in 211 Hannibal was obliged to march to relieve the Roman siege of Capua. Despite Hannibal's quick march to within three miles of the strongly fortified walls of Rome, Capua fell. In the same year, in Sicily, Syracuse fell, and by 209 Tarentum, in south Italy, had also been recaptured by the Romans.

The wars in Spain and Africa. Meanwhile Roman successes in Spain dealt severe blows to Carthaginian power there. In 208 Hasdrubal, detaching a force from the main Carthaginian army, crossed the Alps (probably by his brother's route) to go to Hannibal's aid. Hasdrubal's army was defeated, however, at Metaurus in northern Italy (207) before the Carthaginian armies could effect a junction. His last hope of making a recovery in central Italy thus dashed, Hannibal concentrated his forces in Bruttium, where with the help of his remaining allies he was able to resist Roman pressure for four more years.

Scipio, however, struck at North Africa, breaking Carthage's principal ally, the Massaesylian Numidians, and endangering Carthage. In order to go to the help of his country, Hannibal abandoned Italy in 203. Although a preliminary armistice had already been declared and the Carthaginian armies had accepted Scipio's severe terms (winter 204–203), Hannibal concentrated the remnants of the Carthaginian forces at Hadrumetum (modern Sousse, Tunisia). Almost at the very moment when the ambassadors were returning from Rome with the preliminary peace proposals, the Carthaginians violated the armistice.

Accounts of the campaigns that followed differ greatly. Both Hannibal and Scipio, in order to link up with their respective Numidian allies, moved up the Bagradas River to the region of Zama Regia. Hannibal was now deficient in cavalry; the mercenary troops of his front line and the African infantry of his second line together were routed, and Scipio, seeing that Hannibal's third line, the veteran soldiers, was still intact, reformed his front and brought up the Numidian cavalry of Masinissa, his Numidian ally, in the Carthaginian rear. Hannibal lost 20,000 men in defeat, but he himself escaped Masinissa's pursuit.

Exile and death. The treaty between Rome and Carthage that was concluded a year after the Battle of Zama frustrated the entire object of Hannibal's life, but his hopes of taking arms once more against Rome lived on. Although accused of having misconducted the war, he was made a suffete (a civil magistrate) in addition to retaining his military command, and as suffete he was able to overthrow the power of the oligarchic governing faction at Carthage and bring about certain administrative and constitutional changes. He thus became unpopular with a certain faction of the Carthaginian nobility, and according to Livy he was denounced to the Romans as inciting Antiochus III of Syria to take up arms against the Romans. Hannibal fled to the court of Antiochus at Ephesus (195), where he was welcome at first, since Antiochus was preparing war with Rome. Soon, however, the presence of Hannibal and the sound advice he gave concerning the conduct of the war became a source of embarrassment, and he was sent to raise and command a fleet for Antiochus in the Phoenician cities. Inexperienced as he was in naval matters, he was defeated by the Roman fleet off Side, in Pamphylia. Antiochus was defeated on land at Magnesia in 190, and one of the terms demanded of him by the Romans was that Hannibal should be surrendered. Again accounts of Hannibal's subsequent actions vary; either he fled via Crete to the court of King Prusias of Bithynia, or he joined the rebel forces in Armenia. Eventually he took refuge with Prusias, who at this time was engaged in warfare with Rome's ally, King Eumenes II of Pergamum. He served Prusias in this war, and, in one of the victories he gained over Eumenes at sea, it is said that he threw cauldrons of snakes into the enemy vessels.

Finally the Romans by unknown means put themselves in a position to demand the surrender of Hannibal. Unable this time to escape, Hannibal poisoned himself in the Bithynian village of Libyssa. The year is uncertain but was probably 183.

Personality. It is not to be expected that his Roman biographers would treat Hannibal impartially, but Polybius and Dio Cassius give the least biassed accounts. In spite of the charges of Hannibal's cruelty put forth by the Roman authors, he did enter into agreement with Fabius for the return of prisoners and treated with respect the bodies of Tiberius Sempronius Gracchus (consul 215) and Lucius Aemilius Paulus (216), the fallen enemy generals. Of avarice, the other charge commonly laid against him, no direct evidence is found other than the practices necessary for a general to finance a war: indeed, he spared Fabius' farm.

Much that was said against him (*e.g.,* cannibalism by Polybius) might be ascribed to individual activities of his generals, but even this is uncertain. His physical bravery is well attested, and his temperance and continence were praised. His power of leadership is implied in the lack of rioting and disharmony in that mixed body of men he commanded for so long, while the care he took for his elephants and horses as well as his men gives proof of a humane disposition. His treachery, that *punica fides* that the Romans detested, could from another point of view pass for resourcefulness in war and boldness in strategem. Of his wit and subtlety of speech many anecdotes remain. He spoke Greek and Latin fluently, but more personal information is absent from his biographies. He is shown in the only surviving portraits, the silver coins of Cartagena struck in 221, the year of his election as general, with a youthful, beardless, and pleasant face. (W.Cu./Ed.)

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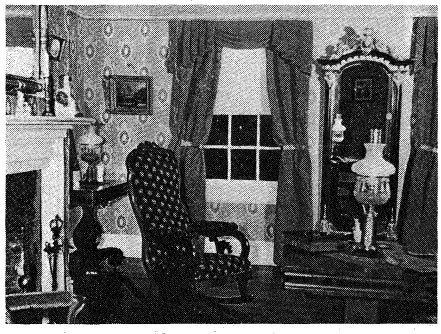
De Beer's *Hannibal* (1969) collects photographs of topography, together with cultural material on Rome and Carthage in Hannibal's time.

Hannibal, city, Ralls and Marion counties, northeastern Missouri, U.S., on the Mississippi River, there spanned to Hull, Ill., by the Mark Twain Memorial Bridge (1935). Noted as the boyhood home of Samuel Clemens (Mark Twain), it was the setting for some of



The parlour, "Becky Thatcher" House, Hannibal, Mo.
By courtesy of the Becky Thatcher Book Shop, Hannibal, Mo.

his books, including his classics about Tom Sawyer and Huck Finn. Settled (1819) by Moses Bates on land given (1818) to Abraham Bird as compensation for property damaged in the New Madrid earthquake (1811), the town received its Carthaginian name from Hannibal Creek (later Bear Creek).

A trading centre for grain and dairy products, it has light manufacturing (electrical appliances, cement, and fabricated steel buildings). Memorials to Mark Twain include his boyhood home and museum (1937), Judge Clemens' Law Office, "Becky Thatcher" House, and the Pilaster House. Mark Twain Cave, also a reputed hideout for the outlaw Jesse James and a station on the Underground Railroad for runaway slaves, is 2 mi (3 km) south. Jackson's Island, adventure territory for Tom and Huck, is near the Illinois shore of the Mississippi. Twain's two-room cabin birthplace at Florida in Monroe County is preserved in the Mark Twain State Park, 25 mi southwest. Tom Sawyer Days, a national fence-painting contest, is held in July.

Molly Brown, heroine of the "Titanic" sinking and the subject of the musical *The Unsinkable Molly Brown,* was born in Hannibal, and her birthplace is preserved. Portraitist Carroll Beckwith was also a native of the city. Hannibal–La Grange College was founded in 1929. Inc. town, 1839; city, 1845. Pop. (1980) 18,811.

Hannington, James (b. Sept. 3, 1847, Hurstpierpoint, Sussex, Eng.—d. Oct. 29, 1885, Equatorial Africa), English Anglican missionary and first bishop of Eastern Equatorial Africa.

Educated at St. Mary Hall, Oxford, and ordained in 1874, Hannington became curate at Hurstpierpoint in 1875. In 1878 his thoughts were turned to mission work by the murder of two missionaries on the shores of Lake Victoria. He sailed in 1882, at the head of a party of six, for Zanzibar, and thence set out for Uganda, but was forced by illness to return to England in 1883. On his recovery he was consecrated bishop of Eastern Equatorial Africa (June 1884) and in 1885 reached Lake Victoria, only to be killed with his men within a few days by order of the King of Uganda. The story of this journey is given in his own *Last Journals,* which were published in 1888.

Hanno (fl. 5th century BC), Carthaginian who conducted a voyage of exploration and colonization to the west coast of Africa sometime during the 5th century. Setting sail with 60 vessels holding 30,000 men and women, Hanno founded Thymiaterion (now Kenitra, Mor.) and built a temple at Soloeis (Cape Cantin, now Cape Meddouza). He then founded five additional cities in and around present Morocco, including Carian Fortress (Greek: Karikon Teichos) and Acra (Agadir). The Carian Fortress is perhaps to be identified with Essaouira on the Moroccan coast, where archaeological remains of Punic settlers have been found. Farther south he founded Cerne, possibly on the Río de Oro, as a trading post. He evidently reached the coast of present Gambia or of Sierra Leone and may have ventured as far as Cameroon. An account of his voyage was written in the temple of Baal at Carthage and survives in a 10th-century-AD Greek manuscript known as *Periplus of Hannon,* probably an ancient Greek translation from the Punic.

Hanno, also called HANNO THE GREAT (fl. 2nd half of the 3rd century BC), leader of the aristocratic pro-Roman faction at Carthage during the Second Punic War (218–201) between Rome and Carthage. In 241 Hanno was given command against the Carthaginian mercenaries who had raised a rebellion among the native North African peoples subject to Carthage. Nevertheless, his incompetence as a general soon forced him to share the command with Hamilcar Barca, and together they crushed the uprising (238). Hanno's political popularity at Carthage rested on his domination of the North African tribesmen, from whom he exacted high taxes. As spokesman for the landed nobility, he opposed the policy of foreign conquest pursued by Hamilcar Barca and his son Hannibal in the interests of the commercial classes. Hence, during the Second Punic War, Hanno undermined support in Carthage for Hannibal's military efforts in Spain and Italy. After Hannibal's defeat, Hanno helped negotiate a peace with the Romans.

Hanno, SAINT: *see* Anno, Saint.

Hannover (former state, Germany): *see* Hanover.

Hannover, English HANOVER, *Regierungsbezirk* (administrative district), south central Lower Saxony *Land* (state), northwestern Germany. Hannover is bordered by the *Länder* of North Rhine-Westphalia to the southwest and Bremen to the northwest and by the *Regierungsbezirke* of Lüneburg to the north, Braunschweig to the southeast, and Weser-Ems to the west. The district occupies an area of 3,491 sq mi (9,041 sq km) and is coextensive with portions of the former German state of Hanover and the larger historic region of Saxony. Its contemporary boundaries were created by an administrative reorganization in 1977 in which the northwestern half of the former *Regierungsbezirk* of Hildesheim was merged with a smaller Hannover district. Hannover *Regierungsbezirk* takes its name from that of the largest city and capital of the *Land,* which serves also as administrative seat of the district.

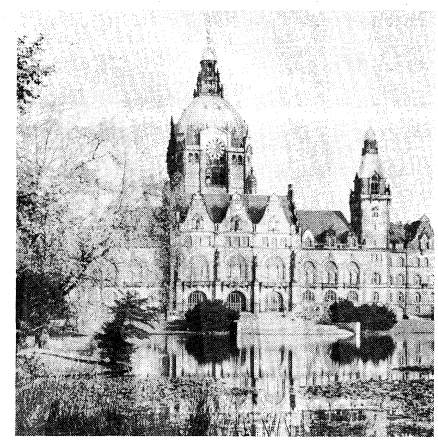
Central Hannover is crossed from west to east by the Börde, a zone of open arable land lying on the northern border of the Central German Uplands. From its narrow west end at the foot of the Wiehengebirge (Wiehen Mountains), the Börde broadens eastward to form a wide plain that eventually merges into the North Harz Foreland. The fertile loess-loam soils are well drained and support high yields of wheat, sugar beets, and vegetables. Throughout history the Börde terrain has been used as a great highway between eastern and western Europe. Today the route is followed by a dense network of roads, railways, and inland waterways. Hannover, an important traffic and communications centre, is situated on the Mittelland Canal where the Leine valley routeway emerges from the southern hills to intersect the Börde. It is the leading industrial city in Lower Saxony, specializing in food processing, electrical engineering, and rubber processing. Hildesheim, with its electrical and clothing industries, lies in the fertile Innerste valley on the western edge of the North Harz Foreland.

South of Hannover the arable land of the Börde penetrates between the forest-covered ridges of the Weserbergland (Weser Hills) and Leinebergland (Leine Hills). Many small towns engage in lumber, paper, or furniture industries. Hameln, the famed town of the "Pied Piper" and a textile- and carpet-manufacturing centre, sits in the broad fertile valley of the Weser River near the North Rhine-Westphalia border. North of Hannover the glaciated lands of the North German Plain begin. The fertile loess regions change to level *Geest,* raised sandy blocks of heath and wooded land interspersed with low-lying peat bogs; rye is grown rather than wheat. Some of the peat bogs have been drained to create productive cattle pasture. The largest lake of Lower Saxony, the Steinhuder Meer, is situated on the southern edge of the plain, providing a recreation site for Hannover's large urban population. Oil and natural gas fields are exploited west of the Weser River.

Population densities in the district range from fewer than 50 persons per sq mi (20 per sq km) on portions of the North German Plain to densities exceeding 1,300 persons per sq mi (500 per sq km) in much of the Börde zone. The majority of the population are descendants of the western Saxons and speak a Low German dialect. Approximately 80 percent of the people are Protestants. The predominant form of rural settlement is one of irregular, compact villages. Higher education in the district is centred in Hannover and includes a university, medical school, veterinary college, and academy for music and drama. Pop. (1989 est.) 2,006,360.

Hannover, English HANOVER, city, capital (1946) of Lower Saxony *Land* (state), northwestern Germany, on the Leine River and the Mittelland (Midland) Canal, where the spurs of the Harz Mountains meet the wide North German Plain.

First mentioned in documents in 1100, it was chartered in 1241 and joined the Hanseatic League in 1386. From 1495 it belonged to the Calenberg-Celle line of the House of Welf, whose seat it was from 1636. In 1714 George Louis of that house became George I of Great



New town hall (begun 1900), Hannover, Ger.
Toni Schneiders—Bruce Coleman

Britain. From 1815 to 1866 the city was capital of the kingdom of Hanover, but in the latter year it was annexed by Prussia; it later became the capital of Hanover province and, in 1946, of Lower Saxony.

During World War II about 60 percent of Hannover was destroyed, but on the ruins has arisen a replanned, modern city, highly indus-

trialized but still preserving the parks, public gardens, and woods that earned for it the title of "the garden city." Notable among these are the Great Garden (laid out in the 17th century in geometric fashion), the great Hannover woods (Eilenriede), the Maschsee (an artificial lake), the Hermann-Löns Park, the Stadtpark, and the zoological gardens. Most of the city's historic buildings were destroyed or severely damaged in World War II; those that could not be rebuilt include the Leibniz House (1652), where the philosopher G.W. Leibniz lived from 1676 until his death in 1716; the old palace (1752); and the old chancellery (1550). Reconstructed buildings include the old town hall (1435–80), the opera (1842–52), the Market Church (1349–59), the Neustädter Church (which contains the tomb of Leibniz), and the Church of the Cross (1333). The ruined St. Giles' (or St. Aegidius') Church (1347) remains as a memorial to war victims. New government offices have been built around the old Leine Palace (1636–40, rebuilt 1817–42), the former residence of the Hanoverian court, which was restored and is now the home of the Diet (Legislature) of Lower Saxony. Rebuilt museums include the Lower Saxony State Museum, with natural-history, prehistory, and ethnology departments and extensive picture gallery; and the Kestner-Museum, with Egyptian, Greek, Roman, Cypriot, and Etruscan antiquities and medieval ecclesiastical art. The Wilhelm Busch Museum specializes in caricatures. The city has a university (established in 1831), a school of veterinary medicine, and other colleges.

Hannover is one of the most important traffic junctions in northern Germany and is linked to Berlin by rail, expressway, and air. It is a financial and commercial centre with highly diversified industries, especially manufacture of motor vehicles and machinery. The German Industries Fair (first held in Hannover in 1947), now called Hannover Fair, has had great influence on the city's postwar development. Pop. (1989 est.) 498,495.

Hanoi, capital, from 1976, of Vietnam; capital, 1954–76, of North Vietnam; and former capital of French Indochina. The city is situated in northern Vietnam on the western bank of the Red River, about 85 miles (140 km) inland from the South China Sea.

The region around modern Hanoi was settled in prehistoric times, and the location was often chosen as a political centre by Chinese conquerors. In 1010 Ly Thai To, the first ruler of the Ly dynasty (1009–1225) of Vietnam, chose the site of Hanoi for his capital. It remained the main capital of Vietnam until 1802, when the last Vietnamese dynasty, the Nguyen, transferred the capital south to Hue. The name Dong Kinh, given to the city during the Later Le dynasty (1428–1787), became corrupted by Europeans to Tonquin; during the French-colonial period (1883–1945) the name Tonkin was used to refer to the entire region. In 1831 the city of Dong Kinh was renamed Ha Noi ("City Between Two Rivers") by the Nguyen dynasty.

Under French rule, Hanoi again became an important administrative centre. In 1902 it was made the capital of French Indochina. This was due in large part to Tonkin's proximity to southern China, where the French sought to expand their influence, and also to Tonkin's mineral resources. Hanoi remained the administrative centre during the Japanese occupation (1940–45) of the territory.

In August 1945, following the Japanese surrender, the Viet Minh under the leadership of Ho Chi Minh seized power in Hanoi, and the city was established as the capital of the Democratic Republic of Vietnam. The French, however, reasserted their control over Hanoi from 1946 until their defeat at Dien Bien Phu on May 7, 1954. Shortly thereafter Hanoi became the capital of the Democratic Republic of Vietnam (North Vietnam).

During the Vietnam War, the bombing of Hanoi by the United States in 1965, 1968, and 1972 caused massive damage. Following the collapse of South Vietnam on April 30, 1975, North Vietnam extended its control over all of Vietnam. On July 2, 1976, the Socialist Republic of Vietnam was proclaimed, and Hanoi was established as its capital.

Many of Hanoi's centuries-old monuments and palaces have been destroyed by foreign aggression and civil war, but there remain several historical and scenic points. Among the latter is Lake Hoan Kiem ("Lake of the Restored Sword"). Historical sites include the Co Loa citadel, dating from the 3rd century BC; the Temple of Literature (1070), dedicated to Confucius; the Mot Cot ("One-Pillar") Pagoda (1049); and the Temple of the Trung Sisters (1142). The University of Hanoi, the Revolutionary Museum, the Army Museum, and the National Museum are important cultural institutions.

Since 1954 Hanoi has been transformed from a primarily commercial city into an industrial and agricultural centre. Manufactures include machine tools, electric generators and motors, plywood, textiles, chemicals, and matches. Rice, vegetables, cereals, and industrial crops are grown in the surrounding area.

Hanoi is also a communications centre. Roads link Hanoi with other major Vietnamese cities, and railway lines provide access to its port of Haiphong; to K'un-ming in Yunnan province, China; and to Ho Chi Minh City (Saigon). Small ocean-going vessels can sail to Hanoi on the Red River, and many small rivers are navigable from the capital to most parts of northern Vietnam. Hanoi has two airports. Pop. (1985 est.) 2,961,000.

Hanotaux, (Albert-Auguste-) Gabriel (b. Nov. 19, 1853, Beaurevoir, Fr.—d. April 11, 1944, Paris), statesman, diplomat, and historian who directed a major French colonial expansion in Africa and who championed a Franco-Russian alliance that proved important in the events leading to World War I.

Trained as an archivist-historian, Hanotaux joined the faculty of the École des Hautes

Hanotaux, detail of an engraving by Dujardin after a portrait by Benjamin Constant

By courtesy of the Bibliotheque Nationale, Paris

Études in Paris in 1880. The same year, he entered the Foreign Ministry as an archivist and rapidly earned a series of advancements. A member of the Chamber of Deputies (1886–89), he was appointed foreign minister in May 1894, a post he held continually for the next four years.

Hanotaux was a French nationalist committed to policies of colonial expansion. During his ministry, French domination was established in French West Africa, Madagascar, and Tunisia; inroads were made in Algeria; and French resistance to the British in the Sudan was promoted. In 1898 he was the prime advocate of a strong stand at Fashoda (modern Kodok), where French and English forces confronted each other.

Accused of being an Anglophobe, Hanotaux apparently saw England as an obstacle to France's security against Germany. He sought rapprochement with Russia as an expression of that concern. After he left office in 1898 he continued to serve his country on special diplomatic missions and, in 1920–23, as a delegate to the League of Nations.

Hanotaux's historical interests centred upon early modern institutional history and contemporary diplomatic affairs. Among his most noteworthy works are *Origines de l'institution des intendants des provinces* . . . (1884; "Origins of the Establishment of the Provincial Intendants"); *Études historiques sur le XVI^e^ et XVII^e^ siècle en France* (1886; "Historical Studies on the 16th and 17th Century in France"); *Histoire du cardinal de Richelieu,* 6 vol. (1893–1947; "History of Cardinal Richelieu," the last three volumes in collaboration with the Duke de La Force); *Histoire illustrée de La guerre de 1914,* 7 vol. (1915–26; "Illustrated History of the War of 1914"); and *Histoire de la France contemporaine, 1871–1900,* 4 vol. (1903–08; *Contemporary France*).

Hanover, German HANNOVER, former state of northwestern Germany, first an electorate (1692–1806) of the Holy Roman Empire, then a kingdom (1814–66), and finally a Prussian province (1866–1945). After World War II the state was administratively abolished; its former territory formed about 80 percent of the *Land* (state) of Lower Saxony.

Hanover grew out of the early 17th-century division of territories of the Welf house of Brunswick-Lüneburg. Created in 1638 as the principality of Brunswick-Calenberg-Göttingen, it came to be named after its principal town, Hanover. Ernest Augustus I (1630–98), duke from 1680, united the principality with that of Lüneburg, marrying his son George Louis to Sophia Dorothea of Celle, only daughter of George William, duke of Brunswick-Lüneburg; upon the latter's death in 1705 the two states were formally joined. Ernest Augustus in 1692 had obtained from the Holy Roman emperor Leopold I the designation of his principality as the ninth electorate of the empire, called officially Brunswick-Lüneburg but commonly Hanover.

Ernest Augustus had married Sophia of the Palatinate, granddaughter of James I of Great Britain. The British Act of Settlement (1701) designated her heiress of the British crown after Queen Anne, but, because Sophia died shortly before Anne in 1714, her son George Louis succeeded as George I, the first of five monarchs of the house of Hanover to rule both Hanover and Great Britain. The court of the electress Sophia had been a cultural centre, embellished especially by George Frideric Handel and G.W. Leibniz. George I (d. 1727) and George II (d. 1760) frequently visited their homeland; but George III (d. 1820) never did so, and George IV (d. 1830) and William IV (d. 1837) did so only once each. The electorate was ruled well in their absence by a ministry in Hanover, associated with the German chancellery in London.

Hanover was expanded to the North Sea by the addition of Bremen and Verden in 1715 and the bishopric of Osnabrück in 1803. Called Britain's "Achilles' heel" in continental Europe, Hanover suffered invasions during Britain's wars, especially during the Seven Years' War (1756–63) and the French Revolutionary and Napoleonic Wars from 1793. The Prussians seized it in 1801 and 1805 and the French in 1803 and 1806, after which part of it was incorporated into the French empire and the rest into the Kingdom of Westphalia, created by Napoleon I for his brother Jérôme Bonaparte. After the fall of Napoleon in 1814, Hanover was reconstituted as a kingdom largely because of British in-

fluence and acquired Hildesheim, Eichsfeld, East Frisia, Bentheim, Lingen, and Emsland. It was the fourth largest German state after Austria, Prussia, and Bavaria. The constitution imposed on Hanover by George IV in 1819 did little to alter the nobles' domination of the state, and only after a rising in 1830 did William IV (in 1833) grant a new charter extending political power to the middle class and (to a minor extent) to the peasantry and submitting state finances and royal revenues to parliamentary control.

The death of William IV on June 20, 1837, terminated the personal union between Great Britain and Hanover. Because of the Hanoverian law prohibiting female succession if there was a male heir, Ernest Augustus, duke of Cumberland (1771–1851) and brother of William IV, became king of Hanover upon William's death, while William's niece Victoria succeeded to the British throne. A reactionary, Ernest Augustus overthrew the Hanoverian constitution, but the revolution of 1848–49 forced him to grant a new one. In 1851 Hanover joined the German Customs Union (Zollverein).

George V (1819–78), blind from the age of 14, became king on his father's death in 1851. The rise of Prussia undid his kingdom: he tried to remain neutral in the Seven Weeks' War in 1866 between Austria and Prussia but was driven from Hanover. The kingdom was then annexed by Prussia (Sept. 20, 1866) and accorded limited self-government. The German Hanoverian party continued to demand a separate status for Hanover in the Reichstag throughout the period of the German empire (1871–1918), but Hanover remained part of Prussia until 1945.

Hanover was briefly reestablished as a state in August 1946, but on November 1 of that year it was united with Oldenburg, Brunswick, and Schaumburg-Lippe to form the *Land* of Niedersachsen (Lower Saxony).

Hanover (city, Germany): *see* Hannover.

Hanover, town, Grafton county, western New Hampshire, U.S. It lies along the Connecticut River. It was settled in 1765 and named for Hanover, Conn., the home of many of its early settlers. Hanover is the seat of Dartmouth College (1769) and the Mary Hitchcock Memorial

Baker Memorial Library, Dartmouth College, Hanover, N.H.
By courtesy of Dartmouth College

Hospital. The Baker Memorial Library (Dartmouth) has frescoes by the Mexican artist José Clemente Orozco. Annual collegiate events include the Dartmouth Winter Carnival and the Congregation of the Arts. Nearby are the home of the sculptor Augustus Saint-Gaudens (national historic site; 1964), Wilder Dam and Lake, and the Dartmouth Skiway. Pop. (1986 est.) 9,520.

Hanover, borough, York county, southern Pennsylvania, U.S. It lies in the Conewago Valley, 20 miles (32 km) southwest of York. Laid out in 1763 by Colonel Richard McAllister, it was incorporated as a borough in 1815 and named for Hanover, Ger. Earlier it had been known as "McAllister's Folly." Later it was called "Rogue's Rest," and "Rogue's Harbour," because of its lack of law enforcement over boundary disputes between Pennsylvania and Maryland. The first American Civil War battle north of the Mason–Dixon Line was fought there on June 30, 1863, when General J.E.B. Stuart's Confederate cavalry clashed with Union forces under General Hugh J. Kilpatrick and General George Custer. A trading point for rich farmlands, the borough also has light manufactures (shoes, books, textiles, and furniture). Nearby Hanover Shoe Farms breeds Standardbred horses. The nearby Conewago Chapel, established (1787) as a Jesuit mission, was designated a Sacred Heart Basilica in 1962. Pop. (1987 est.) 15,461.

Hanover, village, seat of Hanover county, east-central Virginia, U.S. It lies immediately east of Ashland, near the Pamunkey River, 15 miles (24 km) north of Richmond. Founded in 1720 and named for the elector of Hanover (afterward George I of England), it is known for its association with Patrick Henry, orator of the American Revolution, who was largely responsible for the passage of the Bill of Rights. Henry was born (May 29, 1736) at Studley, 1.5 miles (2.4 km) south, and in the Hanover Courthouse he gained fame as an orator by effectively pleading (Dec. 1, 1763) the colony's case against the Parsons' Cause. In 1774 he organized Virginia's first military company, the Hanover County Volunteers, in the village. The Hanover Tavern (*c.* 1723), operated by John Shelton, Henry's father-in-law, has been restored and is now the home of the Barksdale Theatre. Scotchtown, to the northwest, was Henry's home (1771–77) and also the girlhood home of Dolley Madison (*née* Payne), wife of President James Madison. Henry Clay, the statesman and orator, was born (1777) at Clay Spring, 4.5 miles (7 km) south. A few miles north of Hanover is the Lion Country Safari-Kings Dominion, an 800-acre (324-hectare) amusement complex with a monorail and tropical-wildlife preserve. Pop. (1970) 300.

Hanover, HOUSE OF, British royal house of German origin, descended from George Louis, elector of Hanover, who succeeded to the British crown, as George I, in 1714. The dynasty provided six monarchs: George I (reigned 1714–27), George II (reigned 1727–60), George III (reigned 1760–1820), George IV (reigned 1820–30), William IV (reigned 1830–37), and Victoria (reigned 1837–1901). It was succeeded by the house of Saxe-Coburg-Gotha, renamed in 1917 the house of Windsor. *See* the genealogical table on page 688.

After the English Revolution of 1688–89, the Act of Settlement of 1701 secured the crown to Protestants. It made Anne (of the house of Stuart) the heir presumptive; and, if she lacked issue, the crown was to go to Sophia, electress of Hanover (granddaughter of James I), and her descendants, passing over many Roman Catholics in the normal line of succession. The electress predeceased Anne by two months, and the crown went to Sophia's son, George I. The first two Georges were considered foreigners, especially by many Scots, and in 1715 and 1745 the Stuart claimants—James Edward, the Old Pretender, and Charles Edward, the Young Pretender—vainly attempted to regain the throne. George III, born in England, achieved wider British recognition.

Hanover (an electorate, which became a kingdom in 1814) was joined to the British crown until 1837. In that year Victoria inherited the British crown but, by continental Salic Law, was barred as a woman from succession to Hanover, which went to William IV's brother, Ernest Augustus, duke of Cumberland.

Hanriot, François (b. Dec. 3, 1759, Nanterre, near Paris—d. July 28, 1794, Paris), commander in chief of the Paris national guard during the supremacy of the Jacobin Club extremists, led by Robespierre, in the French Revolution.

A partisan of the Revolution from the start, Hanriot showed great courage in the rising of Aug. 10, 1792, after which he was elected commandant of the sansculotte section of the Paris national guard. His coolness and military ability were decisive in the overthrow of

Hanriot, engraving by F. Bonneville, 18th century
By courtesy of the Bibliotheque Nationale, Paris

the moderate revolutionary group called the Girondins. On May 31, 1793, the Paris Commune appointed him commander in chief of the Paris national guard, and on June 2 his force of 80,000 insurgents surrounded the Convention (national assembly) and compelled it to decree the arrest of 29 Girondin deputies. Although most of the intended victims escaped arrest, they no longer sat in the Convention; for his part in their expulsion, Hanriot was elected permanent commander in chief. A loyal supporter of Robespierre in his persecution of opponents (the Terror, 1793–94), Hanriot fell from power with his chief in July 1794 (the "Thermidorian reaction"), and they were guillotined together.

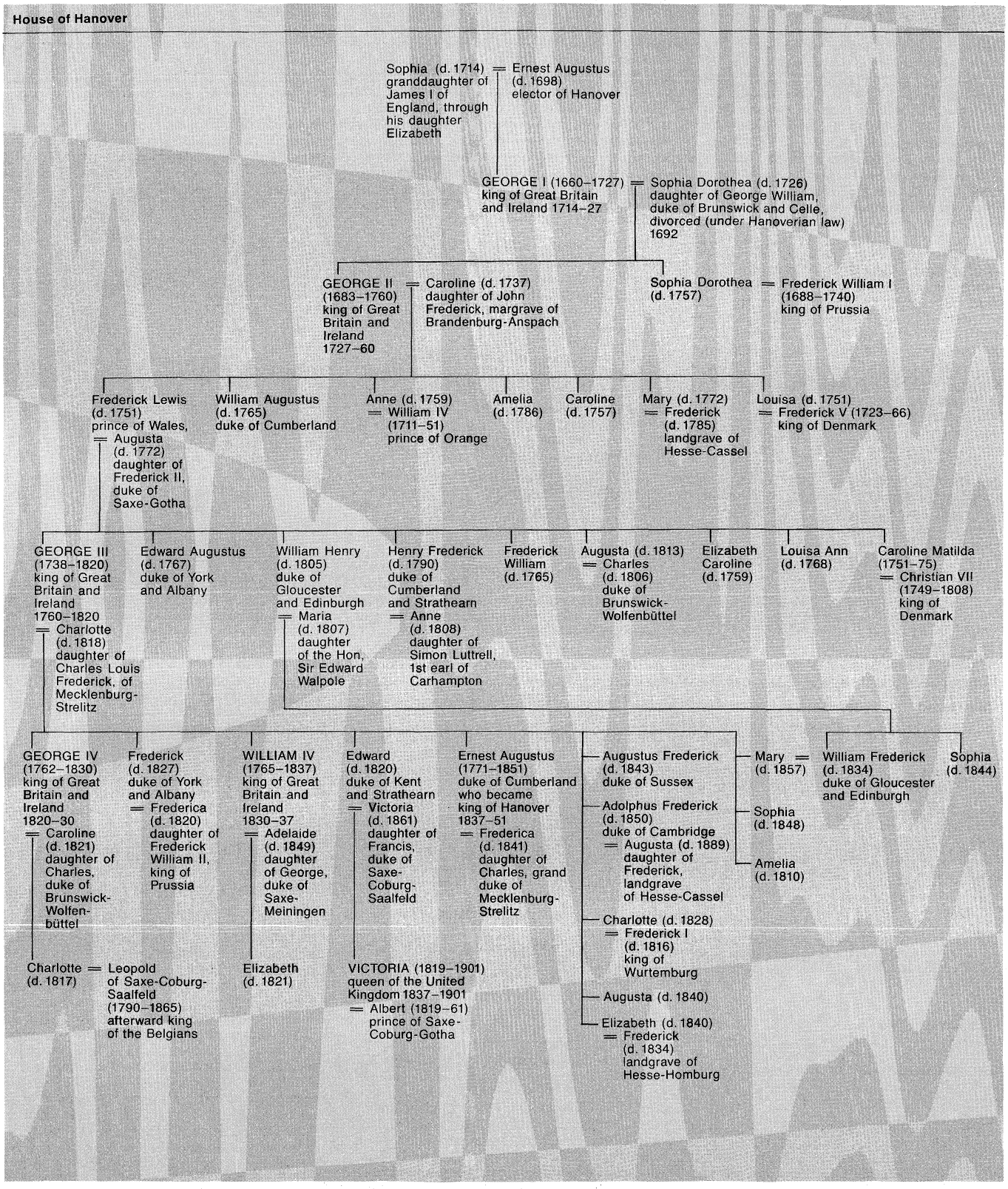
Hans (Danish, German personal name): *see under* John.

Hansberry, Lorraine (b. May 19, 1930, Chicago—d. Jan. 12, 1965, New York City), American playwright whose *Raisin in the Sun* (1959) was the first drama by a black woman to be produced on Broadway.

Hansberry's father, a prosperous real-estate broker, fought a lengthy legal battle in the late 1930s against restrictive covenants that kept Chicago's black inhabitants in ghettos. As part of this struggle the Hansberry family moved into a white neighbourhood, where Lorraine met daily hostility in her walks to and from school. Although her father took the case to the Supreme Court and won, he became disillusioned with the prospects for black equality in the United States and moved to Mexico.

Hansberry attended the University of Wisconsin for two years and then studied painting in Chicago and Mexico, before she decided she had no talent for it. Moving to New York in 1950, she held a number of jobs, meanwhile perfecting her skill as a writer.

Raisin in the Sun, a penetrating psychological study of the personalities and emotional conflicts within a working-class black family in Chicago, was directed by actor Lloyd Richards, the first black to direct a play on Broadway since 1907. It won the New York Drama Critics' Circle Award, and the film version of 1961 received a special award at the



Cannes Festival. Her next play, *The Sign in Sidney Brustein's Window,* a drama of political questioning and affirmation set in Greenwich Village, where she had long made her home, had only a modest run on Broadway in 1964. Her promising career was cut short by her early death.

To Be Young, Gifted and Black, adapted by Robert Nemiroff from her writings, was produced Off-Broadway in 1969 and published in book form in 1970.

Hanseatic League, also called HANSA, German HANSE, organization founded by north German towns and German commercial groups abroad to defend their mutual trading interests. It was an important economic and political force in northern Europe from the 13th to the 15th century. (*Hanse* was a medieval German word for "guild" or "association," derived from a Gothic word for "troop" or "company.")

The antecedents of the league were the local merchant associations in two principal areas where German merchants were active: the Rhineland, which had trade relations with the Low Countries and Britain, and the Baltic Sea region, where Germans served as middlemen in trade between the vast hinterland of northeastern Europe and the western Europe–Mediterranean region. By the 1280s the various groups of Rhenish merchants were cooperating to safeguard their common interests and formed a league with Lübeck and

the other north German towns that dominated the Baltic trade. The members aimed to secure their trade by quelling pirates and brigands, fostering safe navigation with lighthouses, training pilots, etc., and firmly establishing trading bases and monopolies. They established commercial enclaves (*Kontore*) in many foreign towns (*e.g.*, Bergen, Nor.; Novgorod, Russia; and the Steel Yard in London). After several decades, the Hanseatic League's aggressive, protectionist policy aroused opposition and even warfare from local merchants. In 1368–70 the league faced a stiff challenge from the Danish king Valdemar IV, who tried to master the southwestern Baltic and end its economic control there. Meeting in an ad hoc assembly, the league members decided to raise an armed force that then defeated the Danes decisively and resulted in the league's short-term domination of Denmark. In the 14th century the league claimed a membership of about 100 towns, mostly German; it had no constitution and no permanent army, navy, or governing body except for periodic assemblies (diets). These were convened less and less frequently from the early 15th century, as the towns' peculiar and regional interests began to outweigh their common concerns.

The Hanseatic League's strength was also reduced by the growing power of non-German Baltic states: Lithuania and Poland were united in 1386; Denmark, Sweden, and Norway formed a union *c.* 1400; and the Grand Principality of Moscow conquered Novgorod in 1478, expelling the German merchants. By the mid-16th century, the Dutch had won control of the carrying trade from the Baltic to the west, dealing a serious blow to Lübeck. In Germany itself, the consolidation of princely states such as Brandenburg-Prussia also weakened the league, which died slowly in the age of New World discoveries; its diet met for the last time in 1669.

Hansen, Alvin Harvey (b. Aug. 23, 1887, Viborg, S.D., U.S.—d. June 6, 1975, Alexandria, Va.), promiment U.S. economist who was particularly noted for his strong advocacy of the theories of John Maynard Keynes.

Hansen was educated at Yankton College and at the University of Wisconsin, where he studied under the great economists Richard T. Ely and John R. Commons. After obtaining his Ph.D. from Wisconsin (1918), he taught at Brown University and then at the University of Minnesota (1919–37). In 1937 Hansen was appointed as the first Littauer Professor of political economy at Harvard University.

He had long demonstrated a particular interest in fluctuations in economic activity, and his *Business Cycle Theory* (1927) is critical of under-consumptionist theories. His review of *General Theory*, the famous work of J.M. Keynes, had been in parts critical, but at Harvard Hansen became renowned as the foremost proponent of the views expressed in that book. Hansen extended Keynes's theory further by the development of it into Hansen's stagnation thesis, which states that because of the characteristics of a mature economy, compensatory expenditure by government would be permanently required. The tax mechanics of this were treated in *State and Local Finance* (1944). He was one of the advisors who worked to create the Social Security System.

Hansen was chiefly remembered by generations of students as the author of *Guide to Keynes* (1953), but his own independent theoretical contribution remains the work on long-run stagnation.

Hansen, Emile Christian (b. May 8, 1842, Ribe, Den.—d. Aug. 27, 1909, Copenhagen), Danish botanist who revolutionized the brewing industry by his discovery of a new method of cultivating pure strains of yeast.

Hansen, who began his career as a journeyman house painter, received a Ph.D. in 1877 from the University of Copenhagen. Two years later he was appointed head of the physiology department at the Carlsberg Laboratory in Copenhagen, where he remained until his death. His research was concerned mainly with yeasts that convert carbohydrates to alcohol, and in 1888 he published an article that described his method for obtaining pure cultures of yeast. The yeast grown from these single strains was widely adopted in the bottom-fermentation brewing industries. Further investigations led him to the discovery of a number of species of yeast. He defined the characters of the different species and devised a system of classification. After further study he devised additional methods for the culture and isolation of certain species.

Hansen, H(ans) C(hristian Svane) (b. Nov. 8, 1906, Århus, Den.—d. Feb. 19, 1960, Copenhagen), politician and statesman who, as foreign minister and prime minister, led Denmark to a prominent position in the North Atlantic Treaty Organization (NATO) and guided the stabilization of Denmark's post-World War II economy.

Hansen became secretary of the Social Democratic Party's youth organization in 1929 and four years later its chairman. Elected to Parliament in 1936, he gave up his seat in the early 1940s, during the German occupation of Denmark in World War II. Becoming secretary of the Social Democratic Party, he joined the resistance movement, for which he published an underground newspaper.

Hansen served effectively as finance minister in the minority Social Democratic government of Hans Hedtoft (1947–50). When the next Hedtoft government took office in 1953, Hansen was minister of foreign affairs. Named prime minister after Hedtoft's death in 1955, he served in both posts until his own death. With his predecessor he championed a strong defense policy and active membership in NATO. After the elections of 1957 he headed a coalition government that ended Denmark's critical economic instability.

Hansen, Jens Andersen (b. Jan. 7, 1806, Odense, Den.—d. June 1, 1877, Copenhagen), journalist and politician, a leading 19th-century champion of Denmark's peasantry.

A self-educated shoemaker, Hansen became co-editor, with Rasmus Sørensen, of the peasant newspaper *Almuevennen* ("Friend of the Common People") in 1842; he was sole editor from 1843 to 1856. A consistent advocate of universal suffrage and agrarian reform, he served in the Constituent Assembly of 1848–49 that produced the June Constitution of 1849, providing for a Parliament and a limited monarchy. Hansen sat in Parliament from 1849 and zealously supported Denmark's position in the Schleswig War (1848–50) and the Danish–German War (1864). After 1865 he broke with the peasant party, supporting the conservative regime of Count C.E. Frijs. His last days were clouded by the disclosure of his having defrauded insurance companies of large sums of money.

Hansen, Martin (Jens) Alfred (b. Aug. 20, 1909, Stroby, Den.—d. June 27, 1955, Copenhagen), one of the most widely read Danish authors of his day.

Hansen first was a farm worker and then became a teacher in the 1930s. From two early novels of social consciousness, *Nu opgiver han* (1935; "Now He Gives Up") and *Kolonien* (1937; "The Colony"), he went on to write a tale of extravagant imagery, *Jonatans rejse* (1941; "Jonathan's Journey"), and a historical novel, *Lykkelige Kristoffer* (1945; *Lucky Kristoffer*, 1974). After World War II he turned to the psychological novel with *Løgneren* (1950; *The Liar*, 1954), and finally to an attempt to arrive at the metaphysical through use of reason, a kind of supra-rationalism, in *Orm og tyr* (1952; "Serpent and Bull"). A somewhat conservative strain, a preoccupation with myth, and an awareness of the roots of culture are found in all his works. *Against the Wind* (1979) includes 12 stories of rural life, translated and with an introduction by H. Wayne Schow.

Hansen, Peter Andreas (b. Dec. 8, 1795, Tondern, Den.—d. March 28, 1874, Gotha, Ger.), astronomer whose most important work was the improvement of the theories and tables of the orbits of the principal bodies in the solar system.

Hansen became director of the Seeberg Observatory, near Gotha, in 1825, and in 1857 a new observatory was built for him. He worked on theoretical geodesy, optics, and the theory of probability. His most important books on the theory of the motion of the Moon are the *Fundamenta* (1838; "Foundation") and the *Darlegung* (1862–64; "Explanation"). The tables based on his theory were printed in Great Britain in 1857 and were used until 1923. From his theory of the Moon, Hansen

Peter Andreas Hansen, detail from a lithograph by Rudolf Hoffmann, 1856
Archiv fur Kunst und Geschichte, West Berlin

deduced a value close to that now accepted for the distance between the Earth and the Sun. Assisted by the astronomer Christian Olufsen, Hansen in 1853 compiled new tables of the Sun's positions at various times.

Hansen, William Webster (b. May 27, 1909, Fresno, Calif., U.S.—d. May 23, 1949, Palo Alto, Calif.), U.S. physicist who contributed to the development of radar and is regarded as the founder of microwave technology.

After earning the Ph.D. at Stanford University, Calif., in 1933, Hansen began teaching there the next year. In 1937 he began work on the problem of detecting approaching aircraft. Working with Russell H. Varian and Sigurd F. Varian, he developed the klystron—a vacuum tube essential to radar technology (1939). The klystron, which is based on amplitude modulation of an electron beam, rather than on resonant circuits utilizing conventional coils and condensers, permitted the generation of powerful and stable high-frequency oscillations.

In 1941 Hansen and his research group moved to the plant of the Sperry Gyroscope Company in Garden City, N.Y., contributing to developments on Doppler radar, aircraft blind-landing systems, electron acceleration, and nuclear magnetic resonance. During World War II Hansen was a scientific consultant on the Manhattan Project.

In 1945, as director of Stanford's microwave laboratory, Hansen began the design of a billion-volt linear electron accelerator powered by giant klystrons; this accelerator was completed at Stanford after his death.

Hansen's disease: *see* leprosy.

Hānsi, city, Hissār district, Haryāna state, northwestern India, on the road between Hissār town (northwest) and Delhi (southeast). Hānsi is an ancient town and was proba-

bly a Kushān stronghold in the 1st and 2nd centuries AD. It was captured in 1192 by Quṭb-ud-Dīn Aybak, general of the Muslim emperor Muḥammad Ghūrī; several mosques and tombs date from the 12th century. Hānsi was the capital of the independent kingdom carved out by George Thomas, a British adventurer, in the late 18th century. It was incorporated as a municipality in 1867. Hānsi is now a commercial and communications centre. Industries include cotton ginning, handloom weaving, and metalwork. Pop. (1981) 50,365.

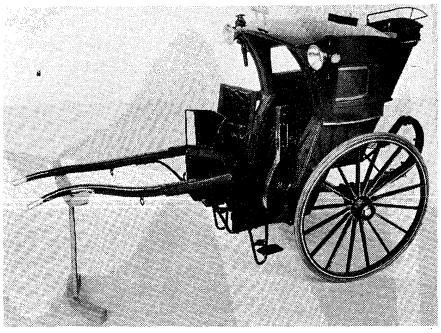
Hanslick, Eduard (b. Sept. 11, 1825, Prague—d. Aug. 6, 1904, Baden, near Vienna), celebrated music critic and a prolific author of works on music and concert life.

Hanslick studied philosophy and law in Prague, received his doctorate from the University of Vienna in 1849, and taught there from 1856, becoming a regular professor in 1870. He was music critic for the *Wiener Zeitung* and subsequently was music editor of *Die Presse* and of the *Neue Freie Presse.* An excellent pianist, Hanslick served as a juror at various exhibitions of musical instruments, and, for his accomplishments in advancing the prestige of Austrian instrument makers, he was honoured by the Austrian government.

Hanslick's elegant literary style gained him a wide reputation, as did his numerous controversies with other critics. His stance was conservative, and he rejected the accomplishments of Wagner and Liszt while advocating the music of Schumann and Brahms. He tended to deny the importance of emotional response to music; rather, he emphasized formalism. His rejection of the idea that music communicates feelings has occasioned attacks by later writers.

Hanslick's best known book, *Vom musikalisch-Schönen* (1854; *The Beautiful in Music,* 1891), has been published in many editions and translations.

hansom cab, low, two-wheeled, closed carriage patented in 1834, whose distinctive feature was the elevated driver's seat in the rear.



Hansom cab; in the Science Museum, London

By courtesy of the Science Museum, London, Crown copyright reserved

It was entered from the front through a folding door and had one seat above the axle with room for two passengers. The driver spoke to the passengers through a trapdoor on top.

Though named for its original designer, Joseph Hansom, the cab was redesigned and patented by John Chapman in 1836, after which it became the most popular cab in London. After additional improvements were made by coach builder F. Forder in 1873, the vehicle was introduced successfully in New York City and Boston.

Hanson, Howard (b. Oct. 28, 1896, Wahoo, Neb., U.S.—d. Feb. 26, 1981, New York City), composer, conductor, and teacher who was influential in promoting contemporary American music and was, in his own compositions, a principal representative of the Romantic tradition.

Howard Hanson

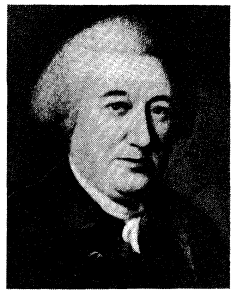
By courtesy of the Institute of American Music, the University of Rochester, New York

After studying in New York, Hanson taught in San Jose, Calif., and spent three years in Italy (1921–24) as winner of the American Prix de Rome. On his return to the United States he became director of the newly organized Eastman School of Music in Rochester, N.Y., a post he held until his retirement in 1964. He established annual festivals of American music and conducted more than 1,000 new works by young composers, many of them his own pupils. In 1958 he organized the Eastman Philharmonia, a student orchestra with which he toured Europe, the U.S.S.R., and the Middle East in 1961–62.

Hanson emphasized his Swedish ancestry in his *First Symphony* (1923; *Nordic*). The *Second Symphony* (1930; *Romantic*), his most successful symphony, proclaimed his faith in Romanticism. His *Fourth Symphony* (1943; *Requiem*), dedicated to the memory of his father, won a Pulitzer Prize. Among his other works are the *Fifth Symphony* (1955; *Sinfonia Sacra*); the *Lux Aeterna* for orchestra (1923); *Songs from Drum Tap* (1935; after Walt Whitman, for voices and orchestra); an opera, *Merry Mount* (1934), commissioned by the Metropolitan Opera; and chamber music. He also published a textbook for advanced students, *Harmonic Materials of Modern Music* (1960). Hanson's style belongs to the mid-20th century. His harmonies, although complex, are sonorous; his rhythms are strong and varied, and his orchestration is effective. Although he was influenced by Jean Sibelius and Modest Mussorgsky, his style is individual.

Hanson, John (b. April 13, 1721, Charles County, Md.—d. Nov. 22, 1783, Oxon Hill, Md., U.S.), American Revolutionary leader and president under the U.S. Articles of Confederation.

A member of the Maryland Assembly (1757–79), he represented Maryland in the Continental Congress (1780–82). On Nov. 5, 1781, he was elected by the Continental Congress "President of the United States in Congress Assembled," an office he held for one year. He is sometimes referred to as "the first president of the United States," but he was a congressional presiding officer and had none of the powers of the president under the Constitution.



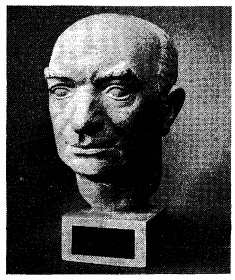
John Hanson, portrait by an unknown artist

By courtesy of the Library of Congress, Washington D.C.

Hansson, Ola (b. Nov. 12, 1860, Hönsinge, Swed.—d. Sept. 26, 1925, Büyükdere, Tur.), poet, prose writer, and critic, belatedly recognized as one of the most original of modern Swedish writers.

Of peasant stock, Hansson celebrated in *Dikter* (1884; "Poems") and *Notturno* (1885) the natural beauty and folkways of his native Skåne. The influence of contemporary psychology led him to produce *Sensitiva Amorosa* (1887), a collection of morbid, erotic sketches that shocked the Sweden of his day. He was embittered by their reception, and he lived abroad from 1889 in Germany, Switzerland, and Turkey. His later works reflect his admiration for Nietzsche and the Pan-Germanist Julius Langbehn.

Hansson, Per Albin (b. Oct. 28, 1885, near Malmö, Swed.—d. Oct. 5, 1946, Stockholm), Social Democratic statesman who, as four-time premier of Sweden between 1932 and 1946, led the nation out of the economic depression of the early 1930s, initiated key social-welfare legislation, and helped maintain Sweden's neutrality during World War II.



Hansson, portrait bust by Av Kjerstin Holm; in Gripsholm Castle, Sweden

By courtesy of Svenska Portrattarkivet, Stockholm

A store clerk with little formal education, Hansson joined the Social Democratic Youth Association in 1903 and became editor of its weekly journal, *Fram* ("Forward"). As a writer (1909–17) and editor (1917) of the Social Democrat Party organ *Social-Demokraten* and as a member of the Riksdag (parliament) after 1918, he argued for disarmament and reduction of the armed forces. With a few brief interruptions, he served as minister of defense under Karl Hjalmar Branting (1920–25) and Rickard Sandler (1925–26) and on Branting's death in 1925 became leader of the Social Democrat Party.

Hansson led the Social Democrats in gaining a sharp reduction of the nation's military expenditures in 1925 but supported funds for new battleships and in 1928 and 1932 opposed his party's plan of total disarmament. After serving on the government's Public Debt Commission (1929–32), he became prime minister in 1932 and effected with the Farmers' Party an agreement that enabled passage of his administration's strong anti-depression program.

Hansson's administration implemented measures for public-works construction, support for agriculture, and financial expansion, and later for unemployment insurance (1934) and old age pensions (1935, 1937). By 1936 wages had reached their pre-depression level, and unemployment dipped sharply by the end of the decade.

After 1936 Hansson sponsored an expansion of Sweden's defenses, refused Germany's offer of a nonaggression pact, and worked for cooperative security arrangements among the Scandinavian countries. With the outbreak of the Winter War between Soviet Russia and Finland in December 1939, he formed a coalition government that lasted for the duration of World War II and maintained Sweden's neutrality. At the end of World War II (1945),

he formed a Social Democrat administration but died the following year.

Hansteen, Christopher (b. Sept. 26, 1784, Christiania, Norway—d. April 15, 1873, Christiania), Norwegian astronomer and physicist noted for his research in geomagnetism.

At the beginning of the 19th century, measurements of geomagnetic intensity had just begun. Hansteen continued the task, taking measurements in London, Paris, Finland, and (1828–30) Siberia. In 1826 he published the first reliable chart of magnetic intensities. Hansteen's theories of geomagnetism, however, were less successful than his measurements. Like those of Halley before him, Hansteen's theories were ultimately disproved by Gauss in 1839, but Gauss credited Hansteen with influencing his thinking.

Hansteen established the first astronomical observatory in Norway (1815) and a magnetic observatory (1841). He was elected to the Académie des Sciences in 1833 and to the Royal Society in 1839.

Hanthawaddy kingdom: *see* Mon kingdom.

Hantzsch, Arthur Rudolf (b. March 7, 1857, Dresden, Saxony—d. March 14, 1935, Dresden), German chemist who won fame at the age of 25 for devising the synthesis of substituted pyridines.

Hantzsch was a professor at Zürich (1885), Würzburg (1893), and Leipzig (1903). With his student Alfred Werner he investigated the stereochemistry of nitrogen compounds. He discovered that many diazonium compounds are salts or bases. Investigating triphenylmethane dyes led him to pioneer in spectrophotometry. He also advanced a theory of chemical indicators. In his studies of the dissociation of acids, Hantzsch demonstrated the formation of oxonium salts and concluded that acid dissociation occurs after solvation. He early adopted the methods of physical chemistry and was responsible for nearly 1,000 papers.

Ḥanukka (Hebrew: Dedication), also spelled HANUKKAH, CHANUKAH, or CHANUKKAH, also called FEAST OF DEDICATION, FEAST OF LIGHTS, or FEAST OF THE MACCABEES, a Jewish observance commemorating the rededication (165 BC) of the Second Temple of Jerusalem after its desecration three years earlier by Antiochus IV Epiphanes; the Syrian king was thus frustrated in his attempt to extirpate the Jewish faith. Though modern Israel tends to emphasize the military victory of Judas Maccabeus, the distinctive rite of lighting the *menora* (*q.v.*) also recalls the Talmud story of how the small supply of nondesecrated oil—enough for one day—miraculously burned in the Temple for eight full days until new oil could be obtained. Beginning on Kislev 25 (in December), Ḥanukka is celebrated for eight days; during this time, in addition to the lighting of the ceremonial candles, gifts are exchanged and children play holiday games.

Lighting the Ḥanukka candles

Hanna W. Schreiber—Rapho/Photo Researchers

Hanumān, in Hindu mythology, the divine monkey chief, a central figure in the great Hindu epic the *Rāmāyaṇa* ("Romance of Rāma"). Hanumān is the child of a nymph by the wind god; accompanied by a host of monkeys, he aided Rāma in recovering his wife, Sītā, from the demon Rāvaṇa. His heroic exploits are many. He acted as Rāma's spy in the midst of the demon's kingdom; when he was discovered and his tail set on fire, he burnt down their city, Laṅkā. Hanumān flew to the Himalayas and carried back the mountain of medicinal herbs to restore the wounded among Rāma's army. He crossed the strait between India and Ceylon in one leap.

Hanumān carrying a mountain of healing herbs, detail of a Mughal painting, late 16th century; in the Freer Gallery of Art, Washington, D.C. (07.271, f. 234 recto)

By courtesy of the Smithsonian Institution, Freer Gallery of Art, Washington, D.C.

A beneficent guardian spirit, he is worshipped in the form of a monkey with a red face, who stands erect like a human. Temples in his honour are numerous. In his devotion to Rāma, Hanumān is upheld as a model for human devotion to god, an attitude beautifully depicted by South Indian bronze sculptors. He is also a popular deity in Japan, where many temples are erected to his honour and districts of towns bear his name. The hanuman monkey (*Presbytis entellus, see* langur), one of the most common Indian monkeys, is named after the god and in his honour is generally looked upon as sacred.

Hanumāngarh, also called SADULGARH, town, Gangānagar district, Rājasthān state, northwestern India, on the right bank of the Ghaggar River. Previously called Bhatner (The Fortress of the Bhattī Rājputs), it became Hanumāngarh in 1805 when annexed by the princely state of Bīkaner. The town with its fort was taken by the Mongol conqueror Timur (Tamerlane) in 1398; it has since changed hands several times.

Connected by rail with Bīkaner, Jodhpur, and Sri Gangānagar, the town is an agricultural market centre where cotton and wool are woven on handlooms. It has two colleges affiliated with the University of Rājasthān. Pop. (1981) 60,071.

Hanyu pinyin wenzi (Chinese Phonetic Alphabet): *see* Pinyin romanization.

Hanzhong (China): *see* Han-chung.

Hao-li (China): *see* Ho-kang.

Hao-pi (China): *see* Ho-pi.

haoma, in Zoroastrianism, sacred plant and the drink made from it. The preparation of the drink from the plant by pounding and the drinking of it are central features of Zoroastrian ritual. *Haoma* is also personified as a divinity. It bestows essential vital qualities—health, fertility, husbands for maidens, even immortality. The source of the earthly *haoma* plant is a shining white tree that grows on a paradisiacal mountain. Sprigs of this white *haoma* were brought to earth by divine birds.

Haoma is the Avestan form of the Sanskrit *soma.* The near identity of the two in ritual significance is considered by scholars to point to a salient feature of an Indo-Iranian religion antedating Zoroastrianism.

Haora (India): *see* Howrah.

Hap (Egyptian deity): *see* Apis.

Haphṭarah (Judaism): *see* Haftarah.

hapkido (Korean: "art of coordinated power"), a Korean form of unarmed self-defense based primarily on the circular foot sweeps and kicks of traditional Korean tae kyon but incorporating punches and circular throws and a yielding principle similar to that of aikido. The emphasis on circular motion allows for a free-flowing form of combat in which one technique can merge with the next and the direction of force can easily be changed by changing the axis of rotation. Primarily practiced for self-defense and for spiritual development, or for either, the techniques of hapkido came to be used in free-sparring contests of the karate type. *See also* martial arts.

haplite (petrology): *see* aplite.

haplosporidian, any protozoan of the sporozoan subclass Haplosporea. They are internal parasites of invertebrates and lower vertebrates. Representative genera are *Ichthyosporidium* in fish, *Coelosporidium* in cockroaches, and the type genus *Haplosporidium* in annelids and other invertebrates. Haplosporidians are amoeboid and may have one or many nuclei. In uninucleate forms, such as *Haplosporidium,* the nucleus divides repeatedly, and the parasite grows into a large plasmodium (amoeboid mass). The cytoplasm of the plasmodium later divides to form uninucleate bodies, which develop into spores that are transmitted to a new host. The spores have no polar filaments and are covered by a tough membrane that may continue into a tail-like process. Some spores have a lid at one pole.

Happy Valley-Goose Bay, town, south central Labrador, Newfoundland, Canada, on the western end of Lake Melville and at the mouth of the Churchill River near the lower Churchill Falls. Goose Bay was established in 1941 as a military and air ferrying base operated jointly by the United States and Canada. By the Goose Bay Agreement (1944) the U.S. Air Force has continued leasing a subsidiary base, which is also used as a transatlantic refuelling stop for Canadian commercial aircraft. Happy Valley (inc. 1970), immediately east, served as a residential community for air-base employees and amalgamated with Goose Bay in 1975. Pop. (1981) 7,103.

Hapsburg, HOUSE OF: *see* Habsburg, House of.

hapten, also spelled HAPTENE, relatively simple compound that can stimulate antibody formation when combined with a larger compound, most often a protein, but which is incapable of producing an immune response by itself. After antibodies have been formed to the hapten-protein complex, the hapten reacts specifically with the antibody to produce an immune or allergic response. The larger component of the complex, frequently one of the body's own proteins, does not take part in the reaction but is needed as a carrier for the hapten. Many drugs that cause allergic reactions, such as penicillin, act as haptens. *See also* antigen.

haptoglobin, a colourless protein of the α-globulin fraction of human serum (liquid portion of blood plasma after the clotting factor fibrinogen has been removed) that transports hemoglobin freed from destroyed red blood cells to the reticuloendothelial system, where it is broken down. Three common types—numbered 1-1, 2-1, and 2-2—and three uncommon types of haptoglobin are known and are believed to result from combinations among three alleles (forms of genes). The serum haptoglobin level is raised during inflammations and certain other conditions; it is lowered in hemolytic disease and some types of liver disease.

Hāqilāni, Ibrāhīm al-: *see* Ibrāhīm al-Hāqilāni.

ḥaqīqah (Arabic: "reality," "truth"), in Ṣūfī (Muslim mystic) terminology, the knowledge the Ṣūfī acquires when the secrets of the divine essence are revealed to him at the end of his journey toward union with God. The Ṣūfī must first reach the state of *fanāʾ* ("passing away of the self"), in which he becomes free from attachment to the earthly world and loses himself entirely in God. After he is awakened from that state he attains the state of *baqāʾ* ("subsistence"), and *ḥaqīqah* is revealed to him.

The Ṣūfīs called themselves *ahl al-ḥaqīqah* ("the people of truth") to distinguish themselves from *ahl ash-sharīʿah* ("the people of religious law"). They used the label to defend themselves against accusations by orthodox Muslims that Ṣūfīs deviated from Islāmic laws and principles laid down in the Qur'ān (Islāmic scripture) and Ḥadīth (sayings of Muḥammad). Such accusations, the Ṣūfīs maintained, were made because the orthodox relied too much on the external meaning of religious texts and did not have the ambition or energy to seek an understanding of the inner meaning of Islām.

Har Dayal, Lala, Har Dayal also spelled HARDAYAL, or HARDYAL (b. Oct. 14, 1884, Delhi—d. March 4, 1939, Philadelphia), Indian revolutionary and scholar who was dedicated to the removal of British influence in India.

Har Dayal graduated from the Government College, Lahore (University of the Punjab). On a government of India scholarship to St. John's College at Oxford, he became a supporter of the Indian revolutionary movement. In 1907 Har Dayal resigned his scholarship. He returned to India in 1908 to further indigenous Indian political institutions and to arouse his countrymen against British rule, but the government thwarted his work, and he soon left to return to Europe. He traveled through France and Germany at this time, disseminating anti-British propaganda and now lauding Western science and political philosophy as holding the key to a successful anticolonial struggle. In 1913 he formed the Ghadr (Gadar) Party, whose purpose was to organize a rebellion against the British government of India. In March 1914 he was arrested by U.S. immigration authorities for his undesirable activities. Released on bail, he fled to Switzerland and then to Berlin, where he tried to foment an anti-British rising in northwestern India.

After the German defeat in World War I, Har Dayal settled in Stockholm as a professor of Indian philosophy and wrote *Forty-Four Months in Germany and Turkey,* in which he related his wartime experiences with some distaste, arguing that if the weaker countries of Asia could not gain their independence, then British or French rule over them was better than that of Germany or Japan. In his later years Har Dayal decisively rejected his earlier revolutionary viewpoint. He abandoned his Anglophobia, advocated the mixed British and Indian administration of his country, and became a firm admirer of Western culture and values. He moved to the United States in the late 1920s and became a professor of Sanskrit at the University of California, Berkeley.

Har Rāī (b. 1630, Punjab, India—d. 1661, Punjab), seventh Sikh Gurū, whose administration marked a period of decline in the fortunes of the Sikh community. Unlike his grandfather, the great military Gurū Hargobind, Har Rāī was a man of peace, ill-suited to resist Mughal oppression.

The contemplative Har Rāī spent more time in spiritual exercises than in administrative or military duties, and he knew little about wielding political power. Sikh missionary activity declined, and his prolonged exile from the mainstream of Sikh life weakened a people who took heart at the sight of their leader. Thus, serious internal opposition to him arose. His first political blunder was to help Dārā Shikōh, brother of the reigning Mughal emperor Aurangzeb, foment rebellion. Har Rāī maintained that as a true Sikh he had simply helped a man who needed help. When Aurangzeb summoned him to explain his extraordinary conduct, Har Rāī sent his son Rām Rāī to represent him.

Legend has it that Rām Rāī worked many miracles at the court but finally had to win pardon for his father by altering a line of text in the Sikh scripture, the *Ādi Granth,* to appease the Emperor. Gurū Har Rāī never forgave his son for this blasphemy and shortly before his death passed over Rām Rāī as his successor in favour of his five-year-old son, Hari Krishen.

hara-kiri (ritual suicide): *see* seppuku.

Hara Takashi, also called HARA KEI (b. March 15, 1856, Morioka, Japan—d. Nov. 4, 1921, Tokyo), politician who was prime minister of Japan from 1918 to 1921 and who established the political party as a fundamental institution of politics in Japan.

Hara was the son of a high-ranking samurai family of northern Japan. After graduating from Tokyo University he became a journalist. In 1882 he entered the foreign service, upon which he rose rapidly with the support of Itō Hirobumi and other prominent figures in government. In 1900 Hara participated with Itō in the founding of the Rikken Seiyūkai (Friends of Constitutional Government Party). Hara became the Seiyūkai's secretary-general that year and was a principal leader of the party from then on, serving as its president after 1914. Elected to the Diet (parliament) in 1900 and reelected eight times thereafter, he rose to become home minister in 1906–1908, 1911–12, and 1913–14. Hara built the Seiyūkai into a U.S.-style party whose popular support came from the patronage it dispensed and the regional economic development it sought to promote. On Sept. 29, 1918, Hara obtained the premiership, ushering in almost two decades in which the Seiyūkai machine and its business and agricultural allies dominated civilian politics.

Hara lowered the property qualifications for voting, thus enlarging the electorate to include the small landholders among whom Seiyūkai strength lay. He refused, however, to use the absolute majority the Seiyūkai commanded in the lower house of the Diet to institute universal male suffrage in Japan. Hara also attempted to reduce the power of the military, and he opposed the use of Japanese soldiers in Siberia. In 1921 he was assassinated by a young rightist fanatic.

harai, also spelled HARAE, BARAI, or BARAE, in Japanese religion, any of numerous Shintō purification ceremonies. *Harai* rites, and similar *misogi* exercises using water, cleanse the individual so that he may approach a deity or sacred power (*kami*). Salt, water, and fire are the principal purificatory agents. Many of the rites, such as bathing in cold water, are traditionally explained as the method used by Izanagi (the mythical male creator of Japan) to rid himself of the polluting effect of seeing the decaying body of his wife and sister, Izanami, in the land of the dead.

The rites are observed to some degree before entering a temple, taking part in worship, beginning a festival, or taking out a religious procession. The simpler rites consist of washing the hands or rinsing the mouth or having the priest shake over the worshiper the *harai-gushi,* a wooden wand to which are attached folds of paper. Priests participating in public ceremonies are required to undergo much more extensive purification periods in which they must regulate the body (bathing, diet, abstention from stimulants), heart, environment, and soul. Great purification ceremonies called *ō-harai* are held regularly twice a year, on June 30 and December 31, and at times of national disasters to purge the entire country from sins and impurities.

Harald (Danish, Norwegian, etc., personal name): *see under* Harold, except as below.

Harald, name of rulers grouped below by country and indicated by the symbol •.

DENMARK

• **Harald I,** byname HARALD BLUETOOTH, Danish HARALD BLÅTAND (b. *c.* 910—d. *c.* 985, Jumne, Den.), king of Denmark from *c.* 940 to *c.* 985, credited with the first unification of the country.

He was the son of Gorm the Old, the first significant figure in a new royal line centred at Jelling (North Jutland). Harald completed the country's unification begun by his father, converted the Danes to Christianity, and conquered Norway. After Harald's Baptism (*c.* 960) his father's pagan tomb was transformed into a Christian place of worship with a church between two great mounds; and the newly appointed Jutland bishops, under the Archbishop of Hamburg, organized the country's conversion. The expansion begun by Harald in Norway was continued by his son Sweyn I, who conquered England in 1013. Under Sweyn's son Canute there grew up a great Anglo-Scandinavian kingdom that included parts of Sweden.

NORWAY

• **Harald I,** byname HARALD FAIRHAIR, or FINEHAIR, Norwegian HARALD HÅRFAGER, Old Norse HARALD HÁRFAGRI (b. *c.* 860—d. *c.* 940), the first king to claim sovereignty over all Norway. One of the greatest of the 9th-century Scandinavian warrior chiefs, he gained effective control of Norway's western coastal districts but probably had only nominal authority in the other parts of Norway.

The son of Halvdan the Black, ruler of part of southeastern Norway and a scion of the Yngling dynasty, the ancient royal house of Sweden, Harald succeeded his father at the age of 10. His first conquest came with the suppression of a revolt in the Uplands region. A pact with Haakon, earl of Lade, enabled him to pursue conquest of the western dis-

tricts, culminating in the battle of Hafrsfjord, dated 872 by medieval historians but placed 10 to 20 years later by modern historians.

Harald's conquests and taxation system led many chiefs and their followers to emigrate to the British Isles, adjacent lands, and perhaps to Iceland, which first became known to Scandinavians during the era of Harald's rule. He acquired wealth through his control of coastal trade but ruled indirectly through lesser chieftains in areas other than his own tightly controlled home district, in the southwest. His major governmental contribution lay in the development of provincial administrations (*lagtings*).

The most reliable, albeit sparse, information on Harald's life is contained in contemporary poems written down in Iceland in the 13th century. His career is also described in 12th- and 13th-century Icelandic and Norwegian historical works of questionable reliability, the fullest account being written by the Icelander Snorri Sturluson (died 1241) in the *Heimskringla.* Norwegian accounts of Harald's life are generally more favourable than their Icelandic counterparts.

• **Harald II** EIRIKSSON, byname HARALD GRAYCLOAK, Norwegian HARALD GRÅFELL, Old Norse HARALD GRÁFELDR (b. *c.* 935—d. *c.* 970), Norwegian king who, along with his brothers, overthrew Haakon I *c.* 961 and ruled oppressively until *c.* 970. He is credited with establishing the first Christian missions in Norway.

The son of Erik Bloodax, half brother of Haakon I, Harald took refuge in Denmark following his father's death. Aided by his uncle, the Danish king Harald Bluetooth (Blåtand), Harald and his brothers launched raids against Haakon I in Norway and killed him *c.* 961. Harald ruled harshly, killing two of the kings in the Oslo region and Haakon, earl of Lade, and he aroused opposition with his prohibition of the public worship of pagan gods. He was killed in battle *c.* 970 by the forces of Haakon (later Haakon the Great), son of the earl of Lade, with the connivance of Harald Bluetooth, some of whose Norwegian holdings had been appropriated by Harald.

• **Harald III** SIGURDSSON, byname HARALD THE RUTHLESS, Norwegian HARALD HARDRAADE, OR HARDRÅDE (b. 1015, Norway—d. Sept. 25, 1066, Stamford Bridge, Yorkshire, Eng.), king of Norway (1045–66) and, earlier, the leading Norse warrior of his day in the Byzantine military service. His harsh suppression of lesser Norwegian chieftains cost him their military support in his unsuccessful struggle to conquer Denmark (1045–62).

The son of Sigurd Sow (Syr), a chieftain in eastern Norway, and of Estrid, mother of the Norwegian king Olaf II Haraldsson (St. Olaf), Harald fought at the age of 15 against the Danes with Olaf II in the celebrated Battle of Stiklestad (1030) in which Olaf was killed. He then fled to Russia, where he served under the grand prince of Kiev, Yaroslav I the Wise, whose daughter Elizabeth he later married. After enlisting in the military service of the Byzantine emperor Michael IV (ruled 1034–41), he fought with the imperial armies in Sicily and Bulgaria and is said to have made a pilgrimage to Jerusalem. His military exploits under Michael IV were described by both Byzantine and Norse medieval historians.

When Harald returned to Norway in 1045, he agreed to share the Norwegian throne with the reigning king, his nephew Magnus I Olafsson. Harald became sole ruler in 1047, when Magnus died in a military expedition that the two rulers had launched against Denmark. He spent the next 15 years attempting to wrest the Danish throne from Sweyn (Svein) II. After Sweyn's defeat in the Battle of Niz (1062), the two rulers recognized each other as sovereign in their respective countries. Harald also quarreled with Pope Alexander II and Adalbert, the archbishop of Bremen and the Holy Roman emperor's vicar for the Scandinavian countries, who had allied with Sweyn II. Harald antagonized the two prelates by maintaining the independence of the Norwegian Church.

Harald expanded Norway's colonial possessions in the Orkney, Shetland, and Hebrides islands and in 1066 attempted to conquer England, allying himself with the rebel earl Tostig against the new English king, Harold II. After gaining initial victories, Harald's forces were routed by the English king in September 1066 at Stamford Bridge, where Harald was killed. His son Magnus (*c.* 1048–69) succeeded him and ruled jointly with Olaf III, another of Harald's sons, until Magnus' death in 1069.

• **Harald IV,** byname HARALD GILLE, or GILCHRIST (b. *c.* 1103, Ireland—d. 1136, Norway), king of Norway (1130–36), a ruthless sovereign whose feud with his fellow king Magnus IV the Blind over the Norwegian throne marked the beginning of a period of civil wars (1130–1240) during which the right to rule was constantly in dispute. Harald's weak character helped lay the foundation for the increasingly powerful role played by the aristocracy in the civil war period.

Harald arrived in Norway from Ireland in 1128, claiming to be a son of the Norwegian king Magnus III Barefoot (reigned 1093–1103). After Harald had passed an ordeal of walking over hot plowshares, Sigurd I Jerusalemfarer, Magnus III's son and reigning king, recognized him as his brother on the condition that Harald would not claim sovereignty during the lifetime of Sigurd or of his son Magnus (later Magnus IV the Blind). After Sigurd's death in 1130, Harald flouted the agreement and was accepted as king in half the kingdom, while Magnus ruled the rest of Norway.

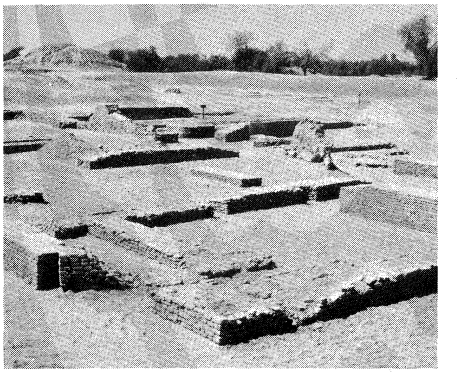
Hostilities broke out between Harald and Magnus IV in 1134; Harald was initially defeated at Fyrileif and retreated to Denmark to obtain reinforcements. On returning to Norway, he captured Magnus in 1135, maimed and blinded him, and put him in a monastery. Harald was then sole ruler of Norway, but he was killed the following year by a pretender to the throne, Sigurd Slembi, who also claimed to be a son of Magnus III Barefoot.

Harāmukh, mountain peak of the Great Himalaya Range that overlooks the Vale of Kashmir, in the Indian-held sector of Jammu and Kashmir state, in the northern part of the Indian subcontinent. Harāmukh rises to 16,872 feet (5,143 m) and is located 22 miles (35 km) north of Srīnagar. As with most of the Himalayan peaks, it has a core dating to the Precambrian Era (*i.e.,* it is more than 570,000,000 years old).

Haran (city): *see* Harran.

Harappā, village in Pakistan on the left bank of a now dry course of the Rāvi River, west-southwest of the town of Sāhiwāl, in the Punjab, in eastern Pakistan. The village stands on an extensive series of mounds in which excavations since 1921 have disclosed the remains of a large city of the Indus Valley Civilization (*q.v.*), in size second only to Mohenjo-daro, which lies about 400 miles (644 km) to the southwest. Sir John Marshall, the English director general of the Indian Archaeological Survey, initiated and directed the original excavations at the site beginning in 1921. His findings pushed back knowledge of Indian prehistory to about 3500 BC.

The excavations revealed that Harappā was similar in plan to Mohenjo-daro, with a citadel resting on a raised area on the western flank of the town and a grid-plan layout of workers' quarters on the eastern flank. The citadel was fortified by a tall mud-brick rampart that had an external revetment of baked brick and rectangular salients, or bastions, placed at frequent intervals. In the 300 yards (274 m) between the citadel and the former course of the Rāvi River, there existed barrack-like blocks of workmen's quarters, along with a series of circular brick floors that were used for pounding grain and two rows of ventilated granary buildings, 12 in all, arranged around a podium. The total floor space of the granaries was more than 9,000 square feet (836 square m), approximating closely that of the Mohenjo-daro granary in its original form.



Remains of the artisans' quarter excavated at Harappā, in Pakistan

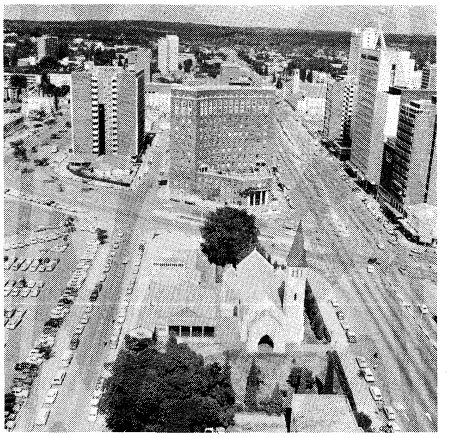
Paul Almasy

The whole layout, dominated by the citadel as it was, suggests the close administrative control of the food supplies within convenient proximity to the river-highway of the Rāvi. Unfortunately, no intelligible remains survive of the buildings of the citadel or of the main body of the town itself.

Harappan Civilization: *see* Indus Valley Civilization.

Harar (city, Ethiopia): *see* Harer.

Harare, formerly SALISBURY, capital of Zimbabwe, lying in the northeastern part of the country. The city was founded in 1890 at the spot where the British South Africa Company's Pioneer Column halted its march into Mashonaland; it was named for Lord Salisbury, then British prime minister. The name Harare, also the name of one of the city's former African townships, is derived from that of the outcast Chief Neharawe, who, with his people, occupied the *kopje* (the hill at the foot of which the commercial area grew) at the time the Pioneer Column arrived and seized the land. The city was created a municipality in 1897 and developed after the arrival of the railway (1899) from the port of Beira, Mozambique, becoming a market and mining



Jameson Avenue and the Presbyterian (City) Church (foreground) in Harare, Zimbabwe

J. Allan Cash—EB Inc.

centre. It was chartered as a city in 1935. Industrialization during and after World War II led to an influx of population. Salisbury was the capital of the colony of Southern Rhodesia, of the short-lived Federation of Rhodesia and Nyasaland (1953–63), and of Rhodesia during the period of the unilateral declaration of independence (1965–79). It was retained as capital by the new government of independent Zimbabwe (1980) and renamed Harare.

The city covers an area of 216 square miles (559 square km) and is modern and well-planned, with multistoried buildings and tree-lined avenues. It is the site of Anglican and Roman Catholic cathedrals, a Dutch Reformed church, the Queen Victoria Memorial Library and Museum, the National Archives, the University of Zimbabwe (opened 1957), and the Rhodes National Gallery.

Harare lies at an elevation of 4,865 feet (1,483 m) and has a temperate climate. It is a hub of rail, road, and air transport (the airport at nearby Kentucky handles international traffic) and is the centre of Zimbabwe's industry and commerce. It is also the main distribution point for the agricultural produce of the surrounding area, especially its Virginia tobacco. There are also important gold mines in the vicinity. Greater Harare includes residential Highlands and the industrial suburbs of Southerton, Graniteside, and Workington. The most populous of the adjoining townships is Highfield. Pop. (1983 est.) metropolitan area, 681,000.

Haraszthy de Mokcsa, Agoston (b. *c.* 1812, Futtak, Hungary, Austrian Empire—d. July 6, 1869, Hacienda San Antonio, near Corinto, Nicaragua), Hungarian-born pioneer who introduced viticulture (grape cultivation) into California.

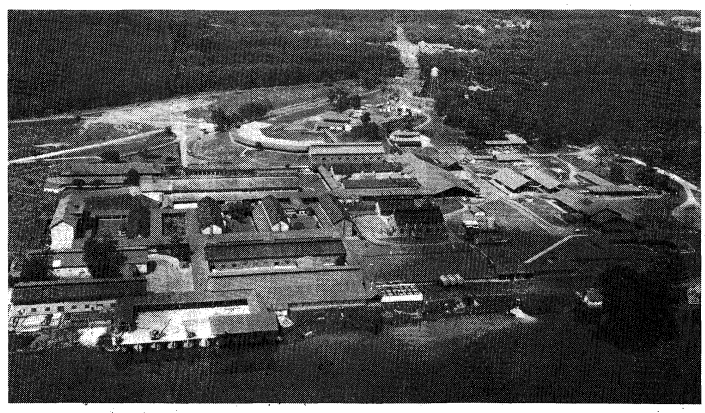
The son of a landowner, Haraszthy immigrated to the United States in 1840. He went to the upper Midwest and founded what is now Sauk City, Wis. In 1849 he journeyed with his family to San Diego, Calif., where he served as a county sheriff and was elected a member of the state legislature. In 1852 he began importing and planting grapevines, and in 1858 he planted the first large vineyard in California, in the Sonoma Valley near Buena Vista. In 1861 the California legislature commissioned him to report on ways of improving and expanding grape cultivation in the state, and Haraszthy thus visited grape-producing regions in Europe, returning with about 300 different varieties of vines to be planted in California. Haraszthy lost all his landholdings in 1866, after which he went to Nicaragua and bought a large tract of farmland upon which to grow sugarcane.

Harāt (Afghanistan): *see* Herāt.

Ḥarāṭīn, also spelled HARRATIN, black-skinned inhabitants of oases in the Sahara, especially in southern Morocco and Mauritania, who constitute a socially and ethnically distinct class of workers.

Scholars speculate that the Ḥarāṭīn came into being as a result of ancient interbreeding between indigenous blacks and Indo-Europeans, possibly Berbers. In the 17th century they were forcibly recruited into the ʿAbīd al-Bukhārī, the elite black army of the Moroccan Mawlāy Ismāʿīl. In modern times they are, in effect, serfs tied to the land, no longer slaves, as they originally are presumed to have been, but without the privileges of freedmen. The Ḥarāṭīn work in the palm groves or as herdsmen in the south; those who can migrate north are employed in menial jobs attached to the soil.

Harbel, town, west-central Liberia, West Africa. It lies along the Farmington River, 15 miles (24 km) upstream from the Atlantic.



Rubber plant on the Farmington River, Harbel
By courtesy of the Firestone Tire & Rubber Co.

Since 1926 it has been the centre of the vast Firestone rubber plantation operation. Liquid latex and crepe rubber are shipped via the company's river port to Monrovia (32 miles west) for export. At Harbel, Firestone operates a hospital, a hydroelectric power plant, a botanical research division, and a transatlantic radio service; it also maintains roads, housing, schools, and a literacy program. Roberts International Airport and the Liberian Institute of Tropical Medicine (1952) are at Robertsfield, 2 miles southwest. Pop. (1974) 11,445.

Harbin, Chinese (Wade–Giles romanization) HA-ERH-PIN, Pinyin HAERBIN, second largest city of Northeast China and capital of Heilungkiang Province (*sheng*), on the Sungari River. The city owes its origin to the construction of the Chinese Eastern Railway by the Russians at the end of the 19th and beginning of the 20th century. Before 1896 it was a small fishing village. Thereafter it became the construction centre for the railway, which by 1904 linked the Trans-Siberian Railroad from a point east of Lake Baikal in Siberia with the Russian port of Vladivostok on the Sea of Japan. Harbin was a base for Russian military operations in Manchuria during the Russo-Japanese War (1904–5). At the end of that war Harbin temporarily came under joint Chinese–Japanese administration. It became a haven for refugees from Russia after the Revolution of 1917 and for a time had the largest Russian population of any city outside the Soviet Union.

During the period of the Japanese-dominated state of Manchukuo (1932–45), Harbin was known as Pinkiang. Soviet troops occupied the city in 1945, and a year later Chinese Communist forces took it over and from it directed their conquest of Manchuria.

Since 1949 Harbin has become the chief industrial base of Northeast China. The city's traditional food-processing industries comprise soybean-processing plants, sugar refineries (for sugar beets), and flour mills. There are also tobacco, leather, and soap factories. Modern industries include the production of machine tools, mining and metallurgical equipment, agricultural equipment, plastics, and electric power turbines, boilers, and generators. The city is also the outfitting centre for the Tach'ing oil fields to the northwest.

The surrounding agricultural region supports the cultivation of wheat, soybeans, sugar beets, corn (maize), flax, and kaoliang (a grain sorghum). Harbin is a shipping centre for agricultural and forest products sent to the rest of China. An airport is located on the southern outskirts of the city.

The city hugs the right (south) bank of the Sungari, but winter port facilities are also located on the left (north) bank near the great railway bridge across the river. New urban development also has been taking place on the left bank. Like most foreign-developed cities in China, Harbin consists of a number of quarters. These include the port and industrial district on the right bank; the adjacent Tao-li commercial district; the old Chinese residential quarter, an area of shops and wholesale and retailing activities; a Japanese-built residential area; and the relatively newer areas of Harbin away from the river, which include the railway station and city administrative offices and which developed primarily after World War I. These areas have expanded very rapidly since 1949 as the total population of the city has grown. Large blocks of apartments have been constructed in recent years on the outskirts of these areas. In the city's layout, a rectangular grid pattern prevails.

The site of the city is generally level to undulating, except near the river itself, where low bluffs lead down to the floodplain in places. During the winter, skating and sledding on the river ice are popular sports. Bus services connect the various parts of the city, but automobiles and trucks are comparatively scarce. Theatres, libraries, hospitals, and schools are well-distributed. Although the city continues to have a Russian air, many of the Russian-built or Russian-influenced buildings have been replaced with contemporary ferroconcrete structures. Pop. (1985 est.) city centre, 2,217,300; city, 2,592,100; city and administratively attached counties, 3,770,900.

Orthodox church in the Russian section of Harbin, Heilungkiang Province, China
Emil Schulthess—Black Star

harbor: *see under* harbour.

Harborough, district, county of Leicestershire, England. With an area of 229 sq mi (593 sq km), it covers the southern edge of the county and is in general a rural area known for its fox hunting (*e.g.*, the Fernie and Pytchley hunts). The district contains two towns: Lutterworth, with its medieval church where the reformer John Wycliffe was parish priest in the 14th century, and Market Harborough, the district's administrative headquarters. The latter is a busy market town with some small industries and good rail and road links with Leicester and London. It has a fine 14th-century church with a 17th-century grammar school adjoining. Pop. (1982 est.) 61,900.

harbour, also spelled HARBOR, any part of a body of water that is sufficiently sheltered from wind, waves, and currents to be used by vessels for safe anchorage or the discharge and loading of cargo or passengers. A harbour is distinguished from a port in that a harbour does not necessarily have facilities for the transfer of cargo that a port always has.

A brief treatment of harbours follows. For full treatment, *see* MACROPAEDIA: Public Works.

The most important aspect of a harbour is the amount of shelter it provides. Some, such as the harbours of New York City and San Francisco, are naturally sheltered from the open sea by narrow straits and land barriers. Many harbours, however, have open sides, called exposures, that permit wind and waves to blow in from the exposed directions. Barriers built to protect exposed harbours are called breakwaters, which consist of an exterior protective layer of large stone or concrete boulders or of interlocking armour plates and an interior filled with rubble and small rocks. On some open coasts, such as Madras, India, harbours have literally been created by building breakwaters.

An equally important criterion is the depth of the harbour. The size of modern ships requires that harbours have designated ship routes, or channels, sometimes with depths in excess of 100 feet (30 metres). Since few natural harbours have such depths, periodic channel dredging is needed. For many years the main piece of dredging equipment was the bucket-ladder dredge, which is a vessel that temporarily moored itself at the dredging site and dropped a ladder with a belt of continuously moving scoops to the desired depth. The scoops brought up material from the bottom and dumped it over the top of the ladder into a chute. Newer suction dredges pull bottom silt along with water into hoppers where the silt settles and the water runs off. Dredged silt is either taken out to sea and dumped or used as landfill in reclamation projects ashore.

Most harbours are charted according to what is called a controlling depth, which indicates the shallowest areas that may be encountered. Ships are directed along the channels by colour-coded floating buoys, which may also be used to alert ships to the presence of navigation obstructions like shallow water, rocks, and submerged wrecks.

Inside a harbour, ships may be deployed in a number of ways. Some harbours have areas for anchorage only, where ships drop anchor at a distance from other docking facilities. These areas must have what is called holding ground, a bottom in which a ship's anchor can be embedded well enough to hold the ship against the pull of wind or current. Most docking facilities are used for the transfer of cargo and are built in a variety of ways. Concrete gravity walls, filled with earth from behind, rely on sheer weight for stability. This can be enhanced by sinking deep foundations with concrete monoliths or precast caissons. Piers built on piles of timber, reinforced concrete, or steel that have been driven deep into the bottom are called piled jetties and exhibit great durability. A more recent development is the sheet-piled quay, which is a seawall made of deeply corrugated steel sheets that interlock together and provide great strength.

The great shipping ports are lined with cargo piers and related facilities. The combined shorelines of New York Harbor are more than 480 miles (773 kilometres) long, but this distance is increased by about 150 mi if the berthing piers of the port are included. Besides traditional docks, some harbours provide for the bulk transfer of petroleum from giant tankers, which need large amounts of space and bottom clearance. Bulk terminals are set offshore from other port activity, and only a light pier is needed to carry a pipeline to them. Among other facilities found in major ports are dry docks, which are enclosed locks that can be emptied of water so that repairs can be made to the hulls of ships.

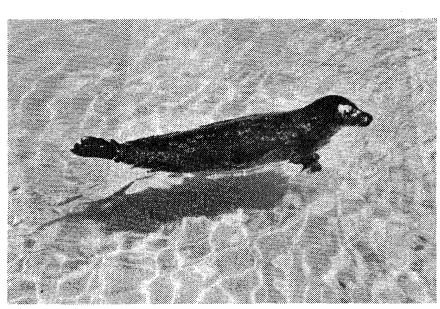
Harbours have played an important role in civilization for as long as people have gone to sea in boats. Throughout history, great cities have risen to power based on their ability to utilize their access to the sea. The Phoenicians built artificial harbours at the cities of Sidon and Tyre in the 13th century BC. A large harbour stood at the entrance to ancient Alexandria and was marked by Ptolemy's famous lighthouse, Pharos. The Mediterranean harbours of the ancient Greeks and Romans were also vital to their empires.

Most harbours are natural, and although there are examples of artificial-harbour construction dating back thousands of years, the vast majority were neither altered nor improved upon until the mid-1800s. Early ships were small, and the natural harbors of the world were adequate. With the growth of trade and commerce that accompanied the Industrial Revolution, however, ships also grew in size, necessitating the enlargment and deepening of harbours by artificial means. Modern harbours range from small enclosures crowded with pleasure craft to commercial ports covering thousands of acres.

harbour-finding chart: *see* portolan chart.

Harbour Grace, town, southeastern Newfoundland, Canada, on the northeast coast of Avalon Peninsula, 32 mi (51 km) west-northwest of St. John's, across Conception Bay. Settled about 1550, it was probably named for Le Havre-de-Grâce (Le Havre, Fr.). Peter Easton, the pirate, had his headquarters there *c.* 1600. Since 1856 the town has been the seat of a Roman Catholic bishop. Harbour Grace was a starting point for Atlantic flights during the early days of aviation. A disastrous fire in August 1944 entirely devastated the business district, which has since been rebuilt. Industries include fish filleting, cod-liver-oil processing, and the manufacture of footwear. Inc. 1945. Pop. (1981) 2,988.

harbour seal, also called COMMON SEAL, HAIR SEAL, or SPOTTED SEAL (*Phoca vitulina*), nonmigratory, earless seal (family Phocidae) found throughout the Northern Hemisphere. The harbour seal is whitish or grayish at birth and as an adult is generally gray with black spots. The adult male may attain a length and weight of about 1.8 metres (6 feet) and 130 kilograms (290 pounds); the female is somewhat smaller. Found along coastlines and in a few freshwater lakes in Canada and Alaska, the harbour seal is a gregarious animal that feeds on fish, squid, and crustaceans. It is of little economic value and in some areas is considered a nuisance by fishermen.



Harbour seal (*Phoca vitulina*)
Cy LaTour

Harburg, southern industrial district of the city and *Land* (state) of Hamburg, Germany, on the left bank of the southern arm of the Elbe River. It was first mentioned in 1142 as Horeburg, was united with the commune of Wilhelmsburg in 1927, and was incorporated into Hamburg in 1937. The Oettingen-Wallerstein library and art collection, housed in the palace, has illuminated manuscripts and incunabula from the 8th through 16th century. The district has port facilities and an electrical power station.

Articles are alphabetized word by word, not letter by letter

Harcourt, Henri de Lorraine, comte de (count of) (b. March 20, 1601—d. July 25, 1666), French general who distinguished himself against the Spanish and in the civil wars of the Fronde (1648–53), which began as an uprising of the members of the Parlement of Paris against royal absolutism.

Nicknamed "Cadet la Perle" because he was the youngest of his family and because he wore a pearl in his ear, he fought in the wars against Spain in Catalonia, Flanders, Italy, and France, as well as in Louis XIII's campaigns against the Huguenots (1621–28). Perhaps his most famous accomplishment was the taking of Turin after a three-month siege (1640). In 1643 he was made master of the horses by King Louis XIII.

When the Fronde broke out, Harcourt sided with the crown. He conducted Louis XIV to Normandy, where he succeeded in making the young king's authority respected. In 1651 he lifted the siege of Cognac and assured the obedience of Guyenne.

Finding that he was poorly rewarded for his services, Harcourt seized several towns in Alsace. Obliged to withdraw by Henri, duc de La Ferté-Senneterre, he made peace with the court and settled down as governor of Anjou.

Harcourt, Sir William (George Granville Venables Vernon) (b. Oct. 14, 1827, York, Yorkshire, Eng.—d. Oct. 1, 1904, Nuneham Courtnay, Oxfordshire), British lawyer, journalist, politician, and Cabinet member in five British Liberal governments, who in 1894 achieved a major reform in death duties, or estate taxation.

A lawyer from 1854, Harcourt briefly taught international law at Cambridge. Entering the House of Commons in 1868, Harcourt served Prime Minister William Ewart Gladstone as solicitor general (1873–74), home secretary (1880–85), and chancellor of the Exchequer (1886, 1892–94); he was knighted in 1873. On Gladstone's retirement (March 1894), he was a leading but an unsuccessful candidate to succeed him as prime minister. Although Harcourt remained as chancellor of the Exchequer in the 5th Earl of Rosebery's government (1894–95) and became leader of the House of Commons, he was not on friendly terms with Rosebery and, for reasons of policy and personality, drifted away from the other Liberals. After resigning as leader of the Liberal opposition in the Commons (1898), he attacked British imperialism in the Transvaal and, later (1903), the protective-tariff proposals of Joseph Chamberlain.

By imposing a graduated tax on the total estate of a deceased person, Harcourt's legislation of 1894 was capable of producing much more revenue than taxes only on the amounts inherited by beneficiaries. The new death duties were enacted over the opposition of Rosebery and Gladstone, who believed

Sir William Harcourt
By courtesy of the National Portrait Gallery, London

that easily increased taxes would encourage frivolous governmental spending. Other opponents regarded the tax as an attack on the great hereditary landowners.

hard-boiled fiction, a tough, unsentimental style of American crime writing that brought a new tone of earthy realism or naturalism to the field of detective fiction. Hard-boiled fiction used graphic sex and violence, vivid but often sordid urban backgrounds, and fast-paced, slangy dialogue. Credit for the invention of the genre belongs to Dashiell Hammett (1894–1961), a former Pinkerton detective and contributor to the pulp magazines, whose first truly hard-boiled story, "Fly Paper," appeared in *Black Mask* magazine in 1929. Combining his own experiences with the realistic influence of writers such as Ernest Hemingway and John Dos Passos, Hammett created a definitely American type of detective fiction that was separate and distinct from the English mystery story usually set in a country house populated by cooks, butlers, and relatives, a pattern that had been slavishly followed by American writers for generations. The first of Hammett's detective novels was *Red Harvest* (1929). His masterpiece is generally believed to be *The Maltese Falcon* (1930), which introduced Sam Spade, his most famous sleuth. His most successful story, *The Thin Man* (1932), was the last of an extraordinary quintet of novels.

Hammett's innovations were incorporated in the hard-boiled melodramas of James M. Cain (1892–1977), particularly in such early works as *The Postman Always Rings Twice* (1934) and *Double Indemnity* (1936). Another successor was Raymond Chandler (1888–1959), whose novels, such as *The Big Sleep* (1939), *Farewell, My Lovely* (1940), and *The Little Sister* (1949), deal with corruption and racketeering in Southern California. Other important writers of the hard-boiled school are George Harmon Coxe (1901–84), author of such thrillers as *Murder with Pictures* (1935) and *Eye Witness* (1950), and W.R. Burnett (1899–1982), who wrote *Little Caesar* (1929) and *The Asphalt Jungle* (1949). Hard-boiled fiction ultimately degenerated into the extreme sensationalism and undisguised sadism of what *Ellery Queen's Mystery Magazine* called the "guts-gore-and-gals-school," as found in the works of Mickey Spillane, writer of such phenomenal best-sellers as *I, the Jury* (1947).

The works of the hard-boiled school have been extensively translated into films, often through successive versions tailored to different generations of moviegoers.

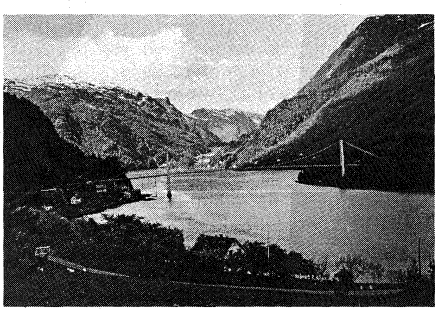
hard coal: *see* anthracite.

hard maple: *see* sugar maple.

hard water, water that contains salts of calcium and magnesium principally as bicarbonates, chlorides, and sulfates. Ferrous iron may also be present; oxidized to the ferric form, it appears as a reddish brown stain on washed fabrics and enameled surfaces. Water hardness that is caused by calcium bicarbonate is known as temporary, because boiling converts the bicarbonate to the insoluble carbonate; hardness from the other salts is called permanent. Calcium and magnesium ions in hard water react with the higher fatty acids of soap to form an insoluble gelatinous curd, thereby causing a waste of the soap. This objectionable reaction does not take place with modern detergents.

In boilers, the calcium and magnesium in hard waters form a hard, adherent scale on the plates. As a result of the poor heat conductivity of the scale, fuel consumption is increased, and the boiler deteriorates rapidly through the external overheating of the plates. Sodium carbonate, if present, hydrolyzes to produce free alkali that causes caustic embrittlement and failure of the boiler plates. Water is softened on a small scale by the addition of ammonia, borax, or trisodium phosphate, together with sodium carbonate (washing soda). The latter precipitates the calcium as carbonate and the magnesium as hydroxide. Water is softened on a large scale by the addition of just enough lime to precipitate the calcium as carbonate and the magnesium as hydroxide, whereupon sodium carbonate is added to remove the remaining calcium salts. In areas where the water is hard, home water softeners are used, making use of the properties of natural or artificial zeolite minerals. *See also* soft water; water softener.

Hardanger Fjord, inlet, Hordaland *fylke* (county), southwestern Norway. The country's second largest fjord and one of the most scenic, it extends inland northeastward for 70 miles (113 km) from Stord Island, at its entrance in the North Sea, to the Hardanger Plateau and has a maximum depth of 2,922 feet (891 m). Majestic mountains (rising to about 5,000 feet), from which pour many magnificent waterfalls, notably the Vørings Falls



Hardanger Fjord and the bridge at Fykse Sound, Nor.
Bjorn Bolstad

and Skjeggedals Falls, flank the fjord's clear waters. There are many smaller branch fjords, including Kvinnherads, Silde, Granvin, Aurs, Eid, and Osa fjords. The area is frequented by tourists, and there are hotels at the principal stations. Along the fjord's shores are salmon fisheries, electrochemical and electrometallurgical plants, boatbuilding yards, and furniture and other factories. There are mountainside orchards, and at Rosendal, near the mouth of Hardanger Fjord, stands one of the few baronial mansions in Norway, built (1660–65) by Baron Ludwig Rosenkrans.

Hardanger Plateau, also called VIDDA, plateau in Hordaland and Buskerud *fylker* (counties), southwestern Norway. The largest peneplain (an eroded, almost level plain) in Europe, it has an area of about 2,500 square miles (6,500 square km) and an average elevation of 3,500 feet (1,100 m). It has many lakes and rivers, which, draining westward, drop in huge waterfalls such as the Vørings Falls (476 feet). The Oslo–Bergen Railroad and a main east–west highway cross the plain. In 1979 the Hardanger Plateau was designated a national park, occupying about 1,300 square miles (3,400 square km).

Hardecanute, also spelled HARDICANUTE, or HARTHACNUT, Danish HARDEKNUD (b. *c.* 1019— d. June 8, 1042), king of Denmark from 1028 to 1042 and of England from 1040 to 1042.

Son of King Canute and Emma, daughter of Richard I, duke of Normandy, Hardecanute was made king of Denmark by Canute in 1028. On Canute's death in 1035, a party led by Emma and Godwine, earl of Wessex, wished to elect Hardecanute king of England, but Leofric, earl of Mercia, with the Londoners and the northern thanes obtained the appointment of Canute's illegitimate son Harold as regent of England, while Emma and her son's retainers stayed at Winchester to guard Hardecanute's interests. Hardecanute's delaying in Denmark resulted in Harold's recognition as king of England in 1037 and in Emma's exile. After Harold's death in 1040 Hardecanute became an unpopular king in England. He had Harold's body dug up and thrown into a fen; and when two officials collecting a tax were killed at Worcester, he sent an army that burned the city. The murder of Eadwulf, earl of Northumbria, while under Hardecanute's safe-conduct caused Hardecanute to be described as a pledge breaker in the Anglo-Saxon Chronicle.

Hardee, William J(oseph) (b. Oct. 12, 1815, near Savannah, Ga., U.S.—d. Nov. 6, 1873, Wytheville, Va.), Confederate general in the American Civil War (1861–65) who wrote a popular infantry manual used by both the North and the South.

An 1838 graduate of the U.S. Military Academy at West Point, N.Y., Hardee wrote the popular *Rifle and Light Infantry Tactics* in 1855. In 1856–60 he served as commandant of cadets at West Point.

When Georgia seceded from the Union in January 1861, Hardee resigned his commission and assumed command of Confederate forces in northeastern Arkansas. Promoted first to major general and then to lieutenant general, he amply demonstrated his military skills at the battles of Shiloh (April 1862), Perryville (October), Murfreesboro (December 1862–January 1863), and Chattanooga (November). He was one of the most brilliant corps commanders in the Army of the Tennessee. After taking part in the battles before Atlanta (May–September 1864), he assumed command of the military department of South Carolina, Georgia, and Florida, where he fought a dogged if unsuccessful rearguard action attempting to stem the advance of General William T. Sherman across Georgia. He joined forces with General Joseph E. Johnston shortly before the Confederate surrender (April 1865). After the war he retired to his plantation near Selma, Ala.

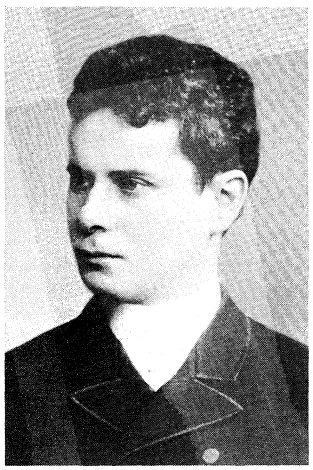
Harden, Sir Arthur (b. Oct. 12, 1865, Manchester—d. June 17, 1940, Bourne, Buckinghamshire, Eng.), English biochemist and corecipient, with Hans von Euler-Chelpin, of the 1929 Nobel Prize for Chemistry for work on the fermentation of sugar and the enzyme action involved.

After studies at Manchester and at Erlangen, Ger., Harden became a lecturer-demonstrator at the University of Manchester (1888–97). He took charge of the chemical and water laboratory at the Jenner Institute of Preventive Medicine and from 1907 to 1930 headed the

biochemistry department. He became professor of biochemistry at the University of London in 1912.

His more than 20 years of study of the fermentation of sugar advanced knowledge of intermediary metabolic processes in all living forms. He also pioneered in studies of bacterial enzymes and metabolism. He wrote *Alcoholic Fermentation* (1911), was co-author, with H.E. Roscoe, of *A New View of the Origin of Dalton's Atomic Theory* (1896), and served as joint editor of *The Biochemical Journal* (1913–37). He was knighted in 1936.

Harden, Maximilian Felix Ernst, original name FELIX ERNST WITKOWSKI (b. Oct. 20, 1861, Berlin—d. Oct. 30, 1927, Montana-Vermala, Valais, Switz.), political journalist, a spokesman for extreme German nationalism before and during World War I and a radical socialist after Germany's defeat.



Maximilian Harden, 1903
Archiv fur Kunst und Geschichte, West Berlin

Initially an actor, Harden founded and edited the weekly *Die Zukunft* (1892–1923; "The Future"), which attained great influence by tasteless methods. Calling war a "bracing educational experience," Harden was enraged when Germany's abortive challenge (1905–06) to French hegemony over nominally independent Morocco failed to result in war. Using evidence supplied by the privy councillor, Friedrich von Holstein, he published (1906) accusations of homosexuality against several associates of the German emperor William II, alleging that those men somehow were responsible for the Emperor's "weakness" in foreign policy. These attacks led to his prosecution for libel (1907–09), in which he largely proved his statements to the disgrace of William's closest friend, the diplomat Philipp zu Eulenburg und Hertefeld. During World War I, Harden advocated unrestricted submarine warfare and the appointment of Adm. Alfred von Tirpitz as imperial chancellor.

Hardenberg, Friedrich Leopold, Freiherr von (baron of): *see* Novalis.

Hardenberg, Karl August, Fürst von (prince of), also called (until 1814) FREIHERR (baron) VON HARDENBERG (b. May 31, 1750, Essenrode, near Gifhorn, Brunswick—d. Nov. 26, 1822, Genoa), Prussian statesman and administrator, who preserved the integrity of the Prussian state during the Napoleonic Wars. Domestically he was able to continue the reforms introduced by Karl, Freiherr vom Stein; in foreign affairs he exchanged Prussia's alliance with France for an alliance with Russia in 1813, and in 1814–15 he represented Prussia at the peace negotiations in Paris and Vienna. Hardenberg vainly fought for the establishment of a constitution but gained lasting fame for his liberalization of financial, economic, and agricultural policies and for his conduct of foreign affairs, which created the political requisites for Prussia's liberation from French rule in 1813–15.

Early years. Hardenberg's father, Christian Ludwig, a member of an aristocratic family with estates in the southern part of the electorate of Hanover in Germany, was a general. Karl August was born on his mother's estate near Brunswick, the oldest of seven children. He was tutored at home in languages, history, and geography and attended a prestigious private school in Hanover for a year (1762–63).

To prepare himself for a career in public administration, Hardenberg enrolled at the University of Göttingen in the fall of 1766. In 1768 he spent a year at the University of Leipzig. While there, Hardenberg attended lectures on archaeology, history, literature, mathematics, the natural sciences, and economics. He also took lessons in drawing and music, but his main field was law, in which Göttingen provided the best instruction in Germany—often paving the way for an appointment in the imperial civil service or in that of one of the German states.

In 1770 Hardenberg left Göttingen and entered the Hanoverian Ministry of Justice. In order to advance his career he set out in the summer of 1772—on the advice of King George III of England, who was also elector of Hanover—on a year's travel throughout the whole of Germany, primarily to widen his political horizons. In 1773 he went to England to be presented to King George III, who appointed him Hanoverian councillor.

In 1774 Hardenberg married the 15-year-old countess Juliane von Reventlow, who bore him a son and a daughter; they were divorced in 1788. Because his career had come to a standstill and his wife had involved him in a scandal by her liaison with the Prince of Wales, Hardenberg left the Hanoverian service and entered that of the Duke of Brunswick. There, however, he proved to be unsuccessful as head of the department of education; moreover, his personal life became the subject of public gossip, for immediately after his divorce he had married Sophie von Lenthe, who had been divorced from her husband on Hardenberg's account.

Prussian service. Hardenberg therefore gladly accepted the post of Prussian provincial minister in Ansbach-Bayreuth that was offered him in 1790, a post in which he performed splendidly. He had the knack of selecting highly capable experts and attracting talented junior executives; among the former was the naturalist Alexander von Humboldt, who was in charge of the technical improvement of the mines. All in all Hardenberg made a model Prussian province out of the two former margravates.

When, in 1798, he won the abiding trust of King Frederick William III of Prussia, he moved to Berlin. He was entrusted with the most important administrative and diplomatic tasks (*e.g.,* serving as foreign minister from 1804 to 1806). Meanwhile, in Ansbach his second marriage had come to grief when he took his mistress into his household. She stayed with him for more than 20 years, going with him to Berlin and later to his estate in the province of Brandenburg. He married her in 1807, six years after he had been divorced from his second wife, but shortly before his death he also separated from her.

Hardenberg, engraving, 1820
By courtesy of the Staatsbibliothek, Berlin

Up to 1806 Hardenberg advocated neutrality toward France with a view to gains in Germany. In domestic affairs, he, like Karl vom Stein, aimed to abolish the "cabinet" system of government and to establish the departmental ministers at the expense of the cabinet counselors, by obtaining for them direct access to the king as the king's most powerful advisers. This he finally achieved in April 1807.

Appointment as chancellor. After Prussia's collpase in the war of 1806–07 against France, Hardenberg, at Napoleon's behest, had to surrender his ministry and to withdraw from political life. When in 1810 Prussia was faced with insolvency and could hardly maintain payments of the indemnity to Napoleon, Hardenberg offered his services to restore the state's finances. He held the trust of King Frederick William III and the sympathy of Queen Louise, and Napoleon, to whom payment of the indemnity mattered most, agreed to his reinstatement. Thus, in 1810 Hardenberg became prime minister with full powers. At the same time he supervised the ministries of the interior and finance.

In domestic matters Hardenberg began the second stage of the reforms inaugurated in 1807–08 under Stein. After his enforced dismissal in the summer of 1807, the king had charged Hardenberg to draw up a report on the reorganization of the Prussian state. He thereupon set out his fundamental principles for reform in the comprehensive "Riga memorandum." He held fast to the absolute monarchy but showed sympathy for the liberal principles of the French Revolution and the administrative reforms in France, completed under Napoleon. His theme was "democratic principles in a monarchical regime." He recommended these principles to the King as the only means of overcoming the crisis of the state. The reforming legislation of 1810–12, inspired by Hardenberg, grew from these convictions. This legislation simplified and unified the excise duties, which had hitherto been levied only in the towns, and sought to impose the property tax on the nobility, which had previously been exempted. It also introduced freedom of trade and a profit tax, regulated the redemption of peasant holdings from the great landed estates, and brought civic equality for the Jews. Further legislation gave greater and more rapid efficacy to the executive in the intermediary administrative spheres. Hardenberg even made a bold attempt to bring the people into closer contact with the affairs of state by inviting the cooperation of the upper middle-class citizens—in accordance with the French example—and preparing a representative assembly with consultative powers. He hoped thus to win public opinion for the government and its unpopular measures, so often necessary during the emergency. However, the opposition of the aristocratic landowners and their influence with the King often attenuated the scope of his plans. The reaction after 1815 was unfavourable to the reforms and brought the agricultural reorganization to a halt, and the establishment of a representative assembly, which Hardenberg urged until his death, was postponed until 1847.

If Hardenberg gave less of his energies to reform after 1812, this was because foreign

policy made ever greater claims on him. Early in 1812 Prussia had to sign a military alliance with France. After Napoleon's disastrous Russian campaign, Hardenberg preserved the appearance of the alliance but increased armaments and watched for the favourable moment for liberation. With great discretion, he advised the king to break away only when Prussia had an alliance with Russia. This was achieved, on the basis of the Russian proposals delivered by Stein in February 1813, in the alliance of Kalisz. Accommodating and ready for compromise, Hardenberg, who represented Prussia in numerous international negotiations between 1813 and 1822, steered his country through the conflicting interests of the great European powers. Particularly at the Congress of Vienna, during the crisis between the great powers over the "Saxon-Polish question," he was able to bring about the rapprochement between Russia and Great Britain, the main adversaries: he yielded to pressure from Austria and Great Britain and waived the annexation of Saxony (which Prussia had stipulated as the price of consent to Russia's designs on Poland) in return for compensation elsewhere. In foreign affairs he associated himself, from 1815, with the conservative policy of the Holy Alliance. Hardenberg was created prince in 1814.

Assessment. As Hardenberg grew older, respect for his ideas increasingly declined in political circles. While patriots and reformers found him too accommodating and conciliatory, in the eyes of advocates of the return to absolutist rule he was too liberal. By 1822 his great diplomatic achievements and notable domestic reforms of 1810–13 had been largely forgotten. Later in the 19th century the great German historian Leopold von Ranke was to emphasize Hardenberg's achievements as a statesman, pointing out that he had preserved the Prussian state when it was on the verge of destruction at Napoleon's hands. Since then Hardenberg has been primarily remembered in that role. While the social progress achieved by his reform legislation has always been acknowledged, it has been truly appreciated only in the 20th century.

hardening, surface (metallurgy): *see* surface hardening.

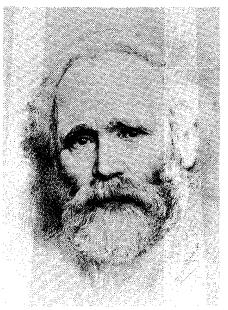
hardening of the arteries: *see* arteriosclerosis.

Harderwijk, *gemeente* (commune), in the Veluwe (wooded heath) district of Gelderland *provincie,* The Netherlands. Chartered in 1231, Harderwijk was an important port on the former Zuiderzee and was a member of the Hanseatic League. It now lies opposite Flevoland, Oost, one of the polders created by the Dutch in their 20th-century project to drain part of the Zuiderzee (now called the IJsselmeer). Although Harderwijk's port functions have greatly diminished, there are manufactures of metal products and rubber goods. Pop. (1987 est.) 33,866.

Hardicanute (king of Denmark and England): *see* Hardecanute.

Hardie, J(ames) Keir (b. Aug. 15, 1856, Legbrannock, Lanark, Scot.—d. Sept. 26, 1915, Glasgow), British labour leader, first to represent the workingman in Parliament as an Independent (1892) and first to lead the Labour Party in the House of Commons (1906). A dedicated socialist, he was also an outspoken pacifist (from the time of the South African, or Boer, War, 1899–1902) and the chief adviser (from 1903) to the militant suffragettes headed by Emmeline Pankhurst.

Unmarried at the time of Hardie's birth, his mother, a farm servant, later married a ship's carpenter who was an early trade unionist. In this setting, Hardie became the eldest of a family of nine children, and his childhood, passed partly in Glasgow and partly in the Lanarkshire coalfield, was one of great hardship. He never went to school. He began to work at age



Hardie, drawing by Cosmo Rowe; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

seven or eight and became a coal miner at 10. In the late 1870s he was fired and blacklisted by the Lanark mineowners for his strike activity. Moving to Ayr, he was chosen secretary of a miners' organization. From 1881 he helped to form miners' unions on a county basis, meanwhile earning his living as a journalist. In his own newspapers, *The Miner* (1887–89) and *Labour Leader* (from 1889), he expressed Christian socialist views on labour and on wider political issues. He founded the Scottish Labour Party in 1888, the year in which he was badly defeated in his first attempt at election to the House of Commons. Successful in the 1892 general election, he was a member of Parliament when, at Bradford, Yorkshire, in January 1893, he participated in organizing the Independent Labour Party (ILP). More a propaganda enterprise than a true political party, the ILP was the first socialist group having a genuine Christian, English, and working-class appeal; it was neither middle class and intellectual (as was the Fabian Society) nor specifically Marxist and thus foreign in inspiration and atheistic.

Following the loss of his Commons seat in 1895, Hardie assisted in planning a Labour Party resembling the Liberals and the Conservatives in parliamentary organization. Delegates at a labour conference in London on Feb. 27–28, 1900, formed the Labour Representation Committee, forerunner of the Labour Party. In the same year, Hardie was returned to Parliament, and, six years later, he was joined in the Commons by 28 other members of the committee, which then became a party organization with an elected leader (at first called the chairman) and party whips. Temperamentally unsuited to the routine administration of a group, Hardie ended his chairmanship in 1907.

As World War I approached, Hardie became primarily concerned with the role of labour in maintaining peace. He sought to bind the Second International to declaring a general strike in all countries in the event of war. His failure in this effort and the decision of a majority of the Labour Party to support British participation in the war caused Hardie to withdraw in disillusion from his colleagues.

BIBLIOGRAPHY. Biographies include Kenneth O. Morgan, *Keir Hardie: Radical and Socialist* (1975); Iain McLean, *Keir Hardie* (1975); and Fred Reid, *Keir Hardie: The Making of a Socialist* (1978).

Hardin, John Wesley (b. May 26, 1853, Bonham county, Texas, U.S.—d. Aug. 19, 1895, El Paso, Texas), most notorious killer and quick-draw gunman of the Texas frontier. He killed at least 21 men in gun duels and ambushes in the period 1868–77.

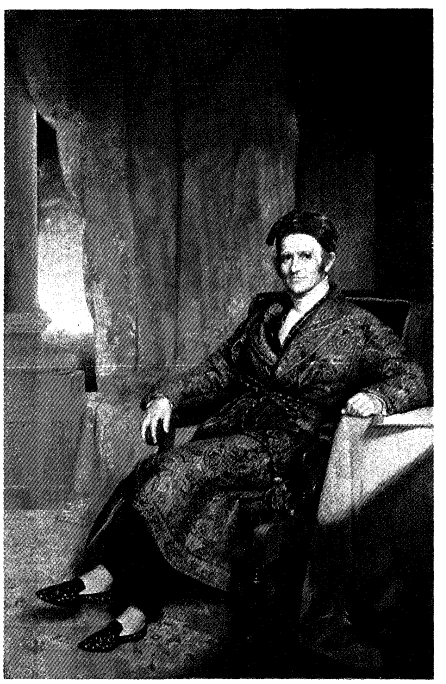
Reaching adolescence as the defeated South entered the Reconstruction period, Hardin was virulently antiblack and anti-Yankee and, in 1868 at the age of 15, killed his first man, an ex-slave. From then on he led a life of gunslinging, dueling, gambling, and drinking. In the course of his career he outgunned and killed at least eight Union soldiers and four black policemen pursuing him on various murder charges. Finally, in flight from Texas, he was caught in a Pensacola, Fla., train depot and returned to Austin, Texas, for trial in September 1877. He was sentenced to 25 years at hard labour in the state prison at Huntsville. In 1894 he was pardoned and retired to a peaceful life in Gonzales, Texas, with his three children (the wife whom he married in 1872 had died while he was in prison). He married again but then abandoned his wife and moved on to El Paso, where he began a life of dissipation and thievery. On Aug. 19, 1895, while standing at the bar of the Acme Saloon, he was shot in the back of the head by John Selman, Sr., an El Paso policeman and thief, with whom he had had a long feud. Subsequently tried, Selman was acquitted of murder.

Hardin's career and exploits were self-advertised in an autobiography published posthumously, *The Life of John Wesley Hardin as Written by Himself* (1896).

Consult the INDEX *first*

Harding, Chester (b. Sept. 1, 1792, Conway, Mass., U.S.—d. April 1, 1866, Boston, Mass.), American painter of portraits, in the Romantic manner, of prominent Americans and Englishmen of the early 19th century.

Harding was a chairmaker, peddler, innkeeper, and house painter, painting signs in Pittsburgh, Pa., and eventually became, self-taught, an itinerant portrait painter. He soon became proficient and in the early 1820s had



"Amos Lawrence," portrait by Chester Harding, *c.* 1845; in the National Gallery of Art, Washington, D.C.

By courtesy of the National Gallery of Art, Washington, D.C., given in memory of the Rt. Rev. William Lawrence by his children

such a vogue in Boston—80 portraits in six months—that he could afford a trip to England (1823). He set up a studio in London and met with great success, painting royalty and the nobility. Despite his lack of education and social experience, his backwoodsman charm and candour made him a favourite in

all circles. His best portraits, executed after his return (1826) to the United States, include his well-known likeness of Amos Lawrence (*c.* 1845; National Gallery of Art, Washington, D.C.).

Harding, Saint Stephen (b. *c.* 1060, Sherborne, Dorsetshire, Eng.—d. March 28, 1134, Cîteaux, Burgundy, Fr.; canonized 1623; feast day July 16), third abbot of Cîteaux (Latin Cistercium) and a founder of the Cistercian Order.

Educated at the Sherborne Abbey, Harding fled to Scotland some time after the Norman Conquest, studied in Paris, may have been a soldier, and made a pilgrimage to Rome. He joined the Cluniac abbey at Molesme, Fr., and assumed the name Stephen. In 1098 he and several companions, dismayed at the lax observance of the Rule of St. Benedict, left Molesme under the leadership of their abbot Robert and founded a monastery at Cîteaux. As abbot there from 1109, he proved an able administrator, founding several subsidiary abbeys, one of which was Clairvaux, where he installed St. Bernard as abbot; Bernard's subsequent fame contributed to the rapid growth and influence of the Cistercian Order.

Insisting on simplicity in all aspects of monastic life, Stephen was largely responsible for the severity of Cistercian architecture. It has been thought that Stephen wrote all or much of three major statements of Cistercian principles, but this is disputed by some 20th-century scholars. Drawing on Jewish authorities, he prepared his own edition of the Bible (1112; manuscript preserved at Dijon).

Harding, Warren G(amaliel) (b. Nov. 2, 1865, Corsica, Ohio, U.S.—d. Aug. 2, 1923, San Francisco), 29th president of the United States (1921–23), who was elected on a Republican platform pledging a nostalgic "return to normalcy" following World War I. He died during his third year in office and was succeeded by Vice Pres. Calvin Coolidge.

Warren G. Harding

By courtesy of the Library of Congress, Washington, D.C.

In his 20s Harding embarked on a barely successful newspaper venture in Marion, Ohio, but after he married Florence Kling DeWolfe in 1891, she took charge and the *Marion Daily Star* prospered. Harding became a director in many local corporations and prominent in fraternal orders. An able public speaker with an impressive manner, he participated in Republican Party campaigns, allying himself with the Ohio political machine.

He was elected a state senator (1899–1902), lieutenant governor (1903–04), and U.S. senator (1915–21). His terms in office were undistinguished and marked by conservatism. When three outstanding presidential contenders became deadlocked at the Chicago nominating convention (June 1920), powerful conservatives—meeting at night in what came to be known traditionally as the "smoke-filled room" of American politics—decided on Harding as a compromise candidate. Harding eschewed a speaking tour for a "front porch" campaign; the image of the unassuming, undemanding Midwesterner who did not press for domestic reform or international involvement was a welcome relief to war-weary and disillusioned Americans, who voted the Republican candidate into office by the widest popular margin—60.3 percent—recorded to that time.

On Harding's recommendation, Congress established a budget system for the federal government, passed the highly protective Fordney–McCumber Tariff, revised wartime taxes, and approved an act restricting immigration. His administration also convened the Washington Conference of 1922, at which treaties limiting and reducing naval strength among world powers were negotiated.

Harding's greatest weakness lay in his loosely selected and largely unsupervised Cabinet and in his lesser appointments, which included many patronage appointees and personal friends who were either completely unqualified for public office, political innocents, or plainly dishonest. By the spring of 1923 rumours of corruption were circulating in Washington, and Sen. Thomas J. Walsh was gathering evidence to expose the Oil Reserves, or Teapot Dome, Scandal, in which federal oil reserves had been secretly leased by Secretary of the Interior Albert B. Fall to associates in the business world. In the midst of the investigation Harding set out (June 20) on a transcontinental tour. He arrived in San Francisco in a state of exhaustion and died amid conflicting rumours as to the cause of his illness. Though Harding's personal integrity was not questioned after his death, his political naïveté and lax administrative standards were apparent after the exposure of gross misconduct by a number of his most trusted appointees, some of whom drew long prison terms for fraud.

Hardinge (of Penshurst) Charles Hardinge, 1st Baron (b. June 20, 1858, London—d. Aug. 2, 1944, Penshurst, Kent, Eng.), British diplomat and viceroy of India who improved British relations in India and was instrumental in securing India's support for Great Britain in World War I.

A grandson of Lord Hardinge, governor general of India in 1844–48, Charles Hardinge entered the diplomatic service in 1880. Appointed ambassador to Russia in 1904 and permanent under secretary for foreign affairs in 1906, he was raised to the peerage and appointed viceroy of India in 1910. His government reversed Lord Curzon's unpopular partition of Bengal and took the occasion of the December 1911 visit of King George V and his queen to announce the transfer of the capital of India from Calcutta to New Delhi.

Hardinge's early administration was marked by political upheaval and terrorism; he himself was wounded by a bomb at his state entry into Delhi in 1912, but his viceroyalty saw a great improvement in relations between government and nationalists. This was in part because of the Indian Councils Act of 1909 (popularly called the Morley-Minto reforms), Hardinge's criticism of the anti-Indian immigration act passed by the South African government, and the sympathy he expressed for the passive resistance movement started in India by Mahatma Gandhi.

Hardinge of Penshurst, oil painting by Sir William Orpen, 1919; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

At the outbreak of World War I (August 1914), Hardinge sent almost every European soldier available and large contingents of Indian soldiers to the British command, garnering local cooperation. On his return to England in 1916, he again became permanent undersecretary for foreign affairs. His subsequent offer to resign because of criticism of his part in arrangements for an abortive Mesopotamian campaign was refused. Hardinge became ambassador to Paris in 1920 and retired in 1922. A volume of memoirs, *My Indian Years, 1910–1916,* was published in 1948.

Hardinge (of Lahore), Henry Hardinge, 1st Viscount (b. March 30, 1785, Wrotham, Kent, Eng.—d. Sept. 24, 1856, South Park, near Tunbridge Wells, Kent), British soldier and statesman who was governor general of India in 1844–48.

Hardinge entered the army in 1799 and served with distinction as a staff officer in the Peninsular War (1808–14). In the Hundred Days (1815), he served as brigadier general with the Prussian Army at the Battle of Ligny and had his wounded left arm amputated two days before the Battle of Waterloo. In 1820–44 he was a member of Parliament, serving as secretary of war on two occasions, and was also chief secretary for Ireland twice.

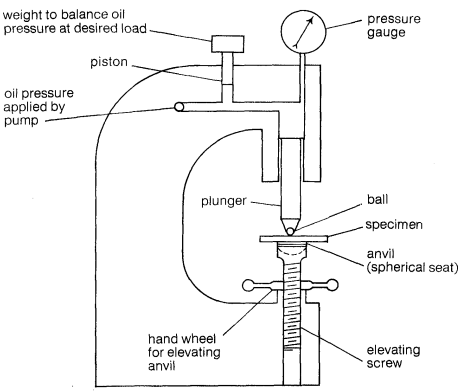
Viscount Hardinge, engraving by F. Holl after a portrait by Eden Upton Eddis

BBC Hulton Picture Library

In 1844 he succeeded his brother-in-law, Lord Ellenborough, as governor general of India. There he encouraged education by offering government employment to college-educated locals and sought to suppress human sacrifice. He also discouraged suttee and infanticide. He began construction of the Ganges canal and developed plans for an Indian railway system. He served in the First Sikh War and by the Treaty of Lahore (March 1846) sought to establish a friendly, if much reduced, Sikh state. For his part in the war Hardinge was awarded a viscountcy.

In 1852 Hardinge succeeded the Duke of Wellington as commander in chief of the British Army. Though responsible for the establishment of the first training camp at Chobham, for the purchase of the Aldershot military training camp, and for the introduction of the improved Enfield rifle, his lax administration and unwise choice of commanders were partly responsible for the disasters suffered by the British in the Crimean War (1853–56). Hardinge was demoted to field marshal in 1855 after the fall of Sevastopol.

hardness tester, device that indicates the hardness of a material, usually by measuring the effect on its surface of a localized penetration by a standardized rounded or pointed indenter of diamond, carbide, or hard steel.



Hydraulic Brinell hardness tester

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Brinell hardness is determined by forcing a hardened steel or carbide ball of known diameter under a known load into a surface and measuring the diameter of the indentation with a microscope. The Brinell hardness number is obtained by dividing the load, in kilograms, by the spherical area of the indentation in square millimetres; this area is a function of the ball diameter and the depth of the indentation.

The Rockwell hardness tester utilizes either a steel ball or a conical diamond known as a brale and indicates hardness by determining the depth of penetration of the indenter under a known load. This depth is relative to the position under a minor initial load; the corresponding hardness number is indicated on a dial. For hardened steel, Rockwell testers with brale indenters are particularly suitable; they are widely used in metalworking plants.

The Vickers hardness tester uses a square-based diamond pyramid indenter, and the hardness number is equal to the load divided by the product of the lengths of the diagonals of the square impression. Vickers hardness is the most accurate for very hard materials and can be used on thin sheets.

The Shore scleroscope measures hardness in terms of the elasticity of the material. A diamond-tipped hammer in a graduated glass tube is allowed to fall from a known height on the specimen to be tested, and the hardness number depends on the height to which the hammer rebounds; the harder the material, the higher the rebound. *See also* Mohs hardness.

Hardoi, town, administrative headquarters of Hardoi district, Uttar Pradesh state, northern India, northwest of Lucknow on the Northern Railway, at a major road junction. It is a market for grain and other crops; industries include sugar milling, processing of potassium nitrate, and woodworking.

Hardoi district, 2,321 sq mi (6,012 sq km) in area, is a level plain bordered (south) by the Ganges River and drained by its tributaries. In the southwest the terrain is uneven, with numerous sandy hillocks. The district contains several *jhīl*s, or swampy lakes, and large areas of forest and other wild vegetation. The Hardoi and Lucknow branches of the Sārda Canal system provide water for irrigation. Principal crops are rice, wheat, millet, gram (chick-pea), sugarcane, and barley. Towns include Hardoi, Shāhābād, Bilgrām, and the weaving centre of Sandīla. Pop. (1981) town, 67,259; district, 2,274,929.

Hardouin, Jean (b. Dec. 22, 1646, Quimper, Brittany—d. Sept. 3, 1729, Paris), French Jesuit scholar who edited numerous secular and ecclesiastical works, most notably the texts of the councils of the church.

Hardouin entered the Society of Jesus in 1666 and was professor of positive theology in the Jesuit Collège Louis-le-Grand at Paris (1683–1718) when he published his first works, editions of the classical writers Pliny and Themistius. A man of great learning, he developed strange theories and dismissed works that contradicted his opinions: he came to believe that most of the writings of Greek and Latin antiquity were medieval forgeries executed by a conspiracy of monks.

After the unauthorized publication in Amsterdam of his *Opera Selecta* (1708; "Selected Works"), he was compelled publicly to disavow the theory of a forged antiquity, but a similar theory appeared in his masterwork. This was his edition of the texts of the church councils, from New Testament times onward, *Conciliorum Collectio Regia Maxima: Acta Conciliorum*. . . . One of the notable works of scholarship of the period, it transformed the study of canon law and was basic to all later work in the field. It was published in 12 volumes at Paris (1714–15) but was withheld for several years by the French government because of the Ultramontanism (an emphasis on papal authority and centralization of the church) displayed in the notes.

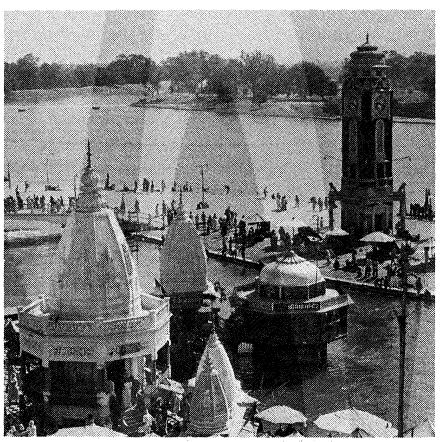
Because of his unorthodox theories, especially concerning the New Testament, which he believed had been written originally in Latin, three of his works were condemned by the church after his death.

Hardouin-Mansart, Jules (architect): *see* Mansart, Jules Hardouin-.

hardpan (calcareous rock): *see* calcrete.

Hardt Mountains (Germany): *see* Haardt Mountains.

Hardwār, town, Sahāranpur district, Uttar Pradesh state, northern India, on the Ganges River, at the boundary between the Ganges plain (south) and the Himalayan foothills (north). It is the site of the headworks of the Ganges Canal system. Hardwār is an ancient town and one of the most sacred Hindu pilgrimage centres in India. It has been known by many names; originally it was called Kapila, after the sage Gupila, who once lived there. Its present name means "door of Hari," one of the names of Vishnu, a principal deity of Hinduism.



Hari-kā-charan bathing *ghāṭ* on the Ganges at Hardwār, Uttar Pradesh, India

Courtesy, Government of India Tourist Office, London

Hardwār's chief object of pilgrimage is the Daksheshwar temple and adjoining bathing *ghāṭ*, or steps, along the river. The *ghāṭ* is called Hari-kā-charan, or "Vishnu's footprint," and has what believers consider to be a footprint of Vishnu impressed into a stone in its upper wall. Large numbers of pilgrims gather there annually at the beginning of the Hindu solar year in April; a Kumbha Melā (*q.v.*) is held every 12th year. Pop. (1981) town, 114,180; metropolitan area, 145,946.

Hardwicke, Philip Yorke, 1st earl of, VISCOUNT ROYSTON, also called (1733–54) BARON HARDWICKE OF HARDWICKE (b. Dec. 1, 1690, Dover, Kent, Eng.—d. March 6, 1764, London), English lord chancellor, whose grasp of legal principle and study of the historical foundations of equity, combined with his knowledge of Roman civil law, enabled him to establish the principles and limits of the English system of equity.

Called to the bar at the Middle Temple in 1715, he afterward joined Lincoln's Inn, of which he was bencher and treasurer in 1724. He sat in Parliament (1719, 1722–34) and was solicitor general (1720), attorney general (1724), lord chief justice and Baron Hardwicke (1733), and lord chancellor (1737).

For many years from 1740 onward Hardwicke held the controlling power in the government. During King George II's absences on the continent he was an influential member of the Council of Regency, and he had to cope with the Jacobite rising of 1745. After the Battle of Culloden he presided at the trial of the Scottish Jacobite peers; he carried out the great reform of 1746, which swept away the private heritable jurisdictions of the Scottish landed gentry. Among his other services was the reform of the English marriage laws (1753), which required, however, that weddings be performed in Anglican churches.

Hardwicke, who was created earl in 1754, retired with the Duke of Newcastle in November 1756 but helped to secure the coalition between Newcastle and William Pitt in 1757.

hardwood, timber obtained from hardwood trees—that is, angiospermous, or flower-bearing, trees—with broad leaves; they are deciduous, except in the warmest regions, shedding their leaves at the end of each growing season. Hardwood is the source of about 20 percent of the world's production of lumber. The term hardwood is a classification of material, known originally from such hard European woods as beech and oak but including both the hardest and the softest of woods. Many beautiful hardwoods are known, including such cabinet timbers as American black walnut, Indian rosewood, teak, ebony, primavera, maple, satinwood, greenheart, and American, African, and Lauan or Philippine mahoganies.

Hardy, Alexandre (b. 1572?, Paris—d. 1632?), playwright, the first Frenchman known to have made his living as a dramatist, who claimed authorship of some 600 plays.

Hardy was a hired poet for troupes of actors both in the provinces and in Paris. His works were widely admired in court circles, where he wrote for royal companies. The actors who bought his plays rarely allowed him to publish them, and fewer than 50 survived. Shortly after Hardy's death his plays ceased to be produced. Nearly all the succeeding dramatists, among them Pierre Corneille and Jean Racine, the two masters of the classical French tragedy, affected contempt for his work, but they profited from his dramatic technique.

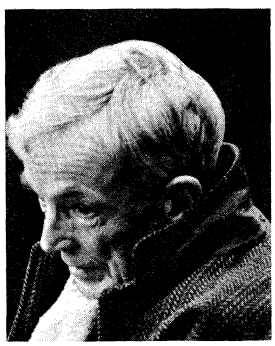
Hardy's work violated many of the later strictures of the Académie Française governing the writing of plays, especially in neglecting the unities of time and place. He cut down or eliminated the role of the chorus and depicted violence on stage. His plots were faster paced than those of the tragedies modelled on ancient Greek and Roman works. Action was linked with the psychology of the characters: the protagonists acted rather than declaimed, developed as human beings, and sometimes experienced inner conflict. His pastorals im-

proved on earlier ones through their fast-moving plots and naturalness. Many plays were demanded of him, and his style was unpolished.

Unlike other 17th-century playwrights, Hardy took few stories from the Greek and Latin dramatists or the Bible. He drew instead upon such writers as Ovid, Cervantes, and Boccaccio. Despite his lack of major achievements, his influence on the development of the French theatre was considerable.

Hardy, Godfrey Harold (b. Feb. 7, 1877, Cranleigh, Surrey, Eng.—d. Dec. 1, 1947, Cambridge, Cambridgeshire), English mathematician who solved many problems in prime number theory.

From 1906 to 1919 Hardy lectured in mathematics at Trinity College, Cambridge. In 1908



Godfrey Hardy, 1941
BBC Hulton Picture Library

he provided, concurrently with the German physician Wilhelm Weinberg, what is now known as the Hardy–Weinberg law, which resolved the controversy over what proportions of dominant and recessive genetic traits would be propagated in a large mixed population. He attached little importance to the law, but it became centrally important in the study of many genetic problems, including Rh blood group distribution and hemolytic disease.

In 1912 Hardy published, with John E. Littlewood of England, the first of a long series of papers that contributed fundamentally to many realms in mathematics, including the theory of Diophantine analysis, divergent series summation, Fourier series, the Riemann zeta function, and the distribution of primes. He also proved that when the Riemann zeta function (which is equal to the infinite series $1 + 1/2^s + 1/3^s + 1/4^s + \ldots$, where $s = u + iv$) has a zero value, an infinite number of (although perhaps not all) values of u are equal to $1/2$ when $v \neq 0$. Bernhard Riemann of Germany had hypothesized that all values of u would equal $1/2$ when $v \neq 0$.

In 1914 Hardy became Cayley lecturer at Cambridge University, and in 1919 he was appointed to the Savilian chair of geometry at Oxford University. He returned to Cambridge in 1931 as Sadleirian professor of pure mathematics and remained there until his death.

Hardy, Oliver: *see* Laurel, Stan; and Hardy, Oliver.

Consult the INDEX *first*

Hardy, Thomas (b. June 2, 1840, Upper Bockhampton, Dorset, Eng.—d. Jan. 11, 1928, Dorchester, Dorset), English poet and his nation's foremost regional novelist, whose most impressive novels are set in "Wessex," an imaginary county in southwestern England. They include *The Return of the Native* (1878), *The Mayor of Casterbridge* (1886), *Tess of the D'Urbervilles* (1891), and *Jude the Obscure* (1895).

Thomas Hardy
EB Inc.

Early years. Hardy was the son of Thomas Hardy, builder and master mason, and Jemima, born Hann; both were of long-established Dorset families. The writer was the eldest of four children. Though rather delicate in childhood, by the age of eight he was able to enter the new village school at Bockhampton. After one year he left to enter a Nonconformist school at Dorchester, and when the headmaster opened the Academy, a more ambitious school in the town, Hardy went with him. This master was a talented Latinist and aroused and encouraged in Hardy a love of classical writers that was to have a marked influence on his work. Leaving school in 1856, Hardy became a pupil of an architect and church-restorer named John Hicks, who practiced in Dorchester. At this time and for some years after, Hardy read widely with a view to taking holy orders.

In 1862 he left Dorchester for London and soon obtained a post with a well-known architect, Arthur Blomfield (later Sir Arthur), as a "Gothic" draftsman, capable of designing and restoring churches and rectories. He remained with Blomfield until 1867, when a deterioration in health compelled him to return to Dorset, where he again worked for Hicks. During his years in London, Hardy had begun seriously to write poetry: some of the poems of this period—for example, "Neutral Tones"—are among his finest and most characteristic work; it is notable that there is no line of development in Hardy's poetry from immaturity to maturity, followed by a falling-off; at any period, his best and inferior work are found mixed, and his style undergoes no significant change.

During 1867–68 he wrote his first novel, *The Poor Man and the Lady,* which was rejected, though with some favourable comment, by two publishers, chiefly on the grounds that it was too satirical and Socialistic. The novelist George Meredith, who worked as reader to Chapman and Hall, one of the publishers, advised him to attempt a novel with a purely artistic purpose and a more complicated plot—advice that he followed too faithfully in his first published novel, *Desperate Remedies* (1871).

In March 1870 Hardy was asked by a Weymouth architect, for whom he was working, to go to St. Juliot, near Boscastle, in Cornwall, in connection with the restoration of its church. There he met his future wife, Emma Lavinia Gifford, the rector's sister-in-law; this meeting and its setting were re-created more than 40 years later in his most poignant poems, a group known as *Veteris Vestigiae Flammae* ("Vestiges of an Old Flame").

Desperate Remedies had been published anonymously and had met with a mixed reception. In 1872 Hardy returned to London and architectural work, having meanwhile written *Under the Greenwood Tree,* which was published in May of that year. Although slight compared with the later tragic novels, it has much humour and sympathetic observation, both in the rather burlesque account of the Mellstock choir and in a delicately handled courtship. The first of the Wessex novels, it shows already how closely connected these stories are with the rhythms of the rural year.

Hardy's next novel, *A Pair of Blue Eyes,* published serially (1872–73) in *Tinsley's Magazine,* owes its setting and certain minor details to St. Juliot and its surroundings. In 1873 he began *Far from the Madding Crowd,* first published serially (1874) and anonymously in *Cornhill Magazine.* It was his first popular success, and he was encouraged by it to devote himself entirely to writing. It is also the first "typical" Hardy novel, for, although it has humour—not only in the treatment of the rustic characters—and what may pass for a happy ending, its scheme and general tone belong more to tragedy than to comedy.

That Hardy was obliged to publish most of his novels in serial form may well account for his somewhat detached attitude toward them; it also explains their strong melodramatic content, almost inevitable if each installment was to conclude forcefully enough to sustain the reader's interest until the next installment appeared one month later. He wrote to Leslie Stephen, during the serial appearance of *Far from the Madding Crowd,* "I may have higher aims some day . . . but, for the present, circumstances lead me to wish merely to be considered a good hand at a serial." Toward the end of his life he said that his only ambition was to have some poem in a good anthology such as Francis Palgrave's *Golden Treasury.*

Hardy married Emma Gifford in August 1874. For the first years of their married life they lived at various addresses in London and Dorset; in 1885 they settled at Max Gate, a house that Hardy had had built on the outskirts of Dorchester, where he lived for the rest of his life.

Writings of maturity. From 1878 to 1895 is the period of Hardy's greatest achievement as a novelist. During this time he published *The Return of the Native, The Trumpet-Major, The Mayor of Casterbridge, The Woodlanders, Tess of the D'Urbervilles,* and *Jude the Obscure.* In these books Hardy's stoical pessimism—based on his conception of the "Immanent Will" (to be developed most plainly in his prose-poetry drama *The Dynasts*)—and his sense of the inevitable tragedy of human life are continually apparent.

Sometimes, by his use of disastrous coincidence, Hardy gives the impression of wrenching his material to fit his outlook (for instance, the events leading to the death of Mrs. Yeobright in *The Return of the Native* and the fate of Tess's letter of confession to Angel Clare); and sometimes the tragedy topples over into melodrama (the whole episode of little "Father Time" in *Jude the Obscure*). Yet there is real tragic dignity in the story of Tess, as well as of Henchard, in *The Mayor of Casterbridge.* The latter, with the gradual, relentless revelation of Henchard's past, must be more than an unconscious recollection of Sophocles' *Oedipus,* while the function of the villagers or Casterbridge townsfolk in these books is clearly to provide a commentary akin to that of the chorus in Greek tragedy. But Hardy's intimate knowledge of the Wessex countryside and of rural life and speech (somewhat stylized though the latter may be) prevent the novels from being regarded only as attempts to transplant Greek tragedy into the 19th-century English countryside. With *Tess,* Hardy began to come into conflict with the conventions of Victorian morality. Certain scenes had been omitted from the serial publication, and others were altered; the subtitle, "A Pure Woman Faithfully Presented," aroused resentment. That a girl who had an illegiti-

mate baby and who was eventually hanged for the murder of the man she was living with should be treated with compassion and understanding seemed an affront to accepted moral standards. *Jude the Obscure* aroused even greater indignation: here a married man and a married woman left their respective partners, lived together, and had children—and yet the author appeared to have sympathy for them. The Bishop of Wakefield announced that he had thrown the book in the fire, and he certainly got it withdrawn from circulation by one important firm of booksellers. Yet there was little to take exception to in the ethics of these novels: all too clearly in either instance "the wages of sin is death." Hardy's crime had been to present the sinners as unhappy human beings, rather than as monsters of depravity.

The reception given to *Jude* so disgusted Hardy that he wrote no more novels, henceforth devoting his energies to poetry, which he had always regarded as far more important than his fiction. In 1898 *Wessex Poems,* including a good deal of poetry written earlier, was published; *Poems of the Past and the Present* followed in 1901, and several more volumes appeared during the remainder of his life.

From 1903 to 1908 appeared, in three installments, *The Dynasts,* a huge drama (unperformable and, indeed, not intended for performance) of the Napoleonic Wars, written mostly in blank verse; its lighter scenes are in prose, being chiefly concerned with the attitudes of the Wessex peasantry. Impressive though the endeavour is, the achievement is not altogether successful because of the pedestrian quality of much of the blank verse. It is in *The Dynasts* that Hardy's conception of the Immanent Will, implicit in the tragic novels, is most clearly stated. Put simply, this Will is an indifferent and unconscious force "that neither good nor evil knows" and is the motive power of the universe. The results of its impulses are almost invariably disastrous. In *The Dynasts* there is an implication that it may be growing into self-consciousness: perhaps the most striking expression of this concept is in "The Convergence of the Twain," a poem written on the sinking of the "Titanic" in 1912.

In 1910 Hardy was awarded the Order of Merit. On Nov. 27, 1912, Mrs. Hardy died. Although the marriage does not seem to have been a very happy one, Hardy's grief was deep and found expression in the summit of his poetic achievement, the *Veteris Vestigiae Flammae* group mentioned above, which includes such moving poems as "The Voice" and "After a Journey."

In 1914 Hardy married his secretary, Florence Emily Dugdale, who survived him and wrote his biography. He continued to write poetry almost up to his death. His ashes were placed in Westminster Abbey, and his heart was buried, as he had wished, in the church at Stinsford, near his birthplace.

Hardy remains—owing in some measure to interest stimulated by cinema and television adaptations of his work—one of the most widely read Victorian novelists, and his work has been the occasion of a number of critical essays and monographs. What might have pleased him more is the general recognition of his genius and importance as a poet.

(F.Ch.)

MAJOR WORKS. *Novels.* Desperate Remedies (1871); *Under the Greenwood Tree* (1872); *A Pair of Blue Eyes* (1873); *Far from the Madding Crowd* (1874); *The Hand of Ethelberta* (1876); *The Return of the Native* (1878); *The Trumpet-Major* (1880); *A Laodicean* (1881); *Two on a Tower* (1882); *The Mayor of Casterbridge* (1886); *The Woodlanders* (1887); *Tess of the D'Urbervilles* (1891); *Jude the Obscure* (1895, dated 1896); *The Well-Beloved* (1897); *Our Exploits at West Poley* (1952).

Short stories. Wessex Tales: Strange, Lively and Commonplace (1888), contained "The Distracted Young Preacher," "Fellow-Townsmen," "The Three Strangers," "Interlopers at the Knap," and "The Withered Arm," to which in the 1896 edition Hardy added "An Imaginative Woman"; *Life's Little Ironies: A Set of Tales with Some Colloquial Sketches Entitled a Few Crusted Characters* (1894), included "The Fiddler of the Reels," "On the Western Circuit," "To Please His Wife," and "Wessex People"—in 1927 Hardy transferred "An Imaginative Woman" to *Life's Little Ironies* and added "The Melancholy Hussar of the German Legion" and "A Tradition of Eighteen Hundred and Four" to *Wessex Tales; A Group of Noble Dames* (1891), including "Barbara of the House of Grebe," "The First Countess of Wessex," "The Duchess of Hamptonshire," and "The Honourable Laura"; *A Changed Man, The Waiting Supper, and Other Tales* (1913), containing "The Romantic Adventures of a Milkmaid"; *An Indiscretion in the Life of an Heiress* (1934), a reworking as a long short story of Hardy's lost, unpublished first novel, *The Poor Man and the Lady* (written 1867).

Poems. Wessex Poems and Other Verses (1898); *Poems of the Past and the Present* (1901, dated 1902); *Time's Laughingstocks and Other Verses* (1909); *Satires of Circumstances: Lyrics and Reveries with Miscellaneous Pieces* (1914), later combined with *Moments of Vision, and Miscellaneous Verses* (1917); *Late Lyrics and Earlier* (1922); *Human Shows, Far Phantasies: Songs and Trifles* (1925); *Winter Words in Various Moods and Metres* (1928); *Collected Poems* (1930); *The Complete Poems of Thomas Hardy* (1978), ed. by James Gibson.

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BIBLIOGRAPHY. Florence Hardy, *The Life of Thomas Hardy, 1840–1928* (1962), previously issued as two volumes, *The Early Life of Thomas Hardy, 1840–1891* and *The Later Years of Thomas Hardy, 1892–1928,* more an editing of Hardy's letters and diaries than a biography, is indispensable for Hardy's life, opinions, and sources of his work; Robert Gittings, *Young Thomas Hardy* (1975) and *Thomas Hardy's Later Years* (1978), shed new light on Hardy's life, as does *The Second Mrs. Hardy* (1979), written with J. Manton. Lionel P. Johnson, *The Art of Thomas Hardy* (1894), one of the first attempts at an appreciation of Hardy's art and definition of his ideas; Virginia Woolf, "The Novels of Thomas Hardy," in *The Second Common Reader* (1932), a perceptive essay on the power and excitement of the novels; D.H. Lawrence, "A Study of Thomas Hardy," in *Selected Literary Criticism,* ed. by Anthony Beal (1961), a brilliant though highly subjective study of the psychology of Hardy's characters; William R. Rutland, *Thomas Hardy: A Study of His Writings and Their Background* (1938), valuable for the background and origin of Hardy's beliefs; Lord David Cecil, *Hardy, the Novelist* (1943), attempts to relate Hardy's fiction to Elizabethan drama and 18th-century fiction; Douglas Brown, *Thomas Hardy,* 2nd ed. (1961), perhaps the best critical account of Hardy; Lance St. John Butler, *Thomas Hardy* (1978), is an introductory critical study; Richard L. Purdy, *Thomas Hardy: A Bibliographical Study* (1954), the definitive bibliography. *The Personal Notebooks of Thomas Hardy* (1979), Richard A. Taylor (ed.), includes in an appendix unpublished passages in the original typescript of Florence Hardy's biography.

Hardy-Weinberg law, an algebraic equation that describes the genetic equilibrium within a population. It was discovered independently in 1908 by W. Weinberg, a German physician, and G.H. Hardy, a British mathematician. The science of population genetics is based on this principle, which is as follows: in a large, random-mating population, the proportion of dominant and recessive genes present tends to remain constant from generation to generation unless outside forces act to change it. In such a way even the rarest forms of genes, which one would assume would disappear, are preserved. The outside forces that can disrupt this natural equilibrium are selection, mutation, and migration. The discovery of this law was especially significant in affirming natural selection as the primary mechanism of evolution. If the proportions of gene forms in a population do not change, the rate of evolution will be zero. Individual variations occur because of the various genetic combinations that result from random mating of individuals, but nonrandom, or selective, mating must occur for natural selection to take place. Certain gene-controlled traits are selected for or selected against by the partners involved. Over a long period of time, this selective pressure will change the frequency of appearance of certain gene forms, and the traits they control will become commoner or rarer in the population.

Medical geneticists can use the Hardy-Weinberg law to calculate the probability of human matings that may result in defective offspring. The law is also useful in determining whether the number of harmful mutations in a population is increasing as a result of radiation from industrial processes, medical techniques, and fallout.

hare, any mammal of the family Leporidae (hares and rabbits), order Lagomorpha, whose young are born fully haired, with open eyes, and sufficiently advanced to hop about a few minutes after birth. It is these characteristics that distinguish hares from rabbits, but the vernacular names hare and rabbit are often misapplied to particular species (*see* rabbit).

A typical species is the common hare (*Lepus europaeus*) of central and southern Europe,

(Top) Jackrabbit, and (bottom) varying hare

(Top) Willis Peterson, (bottom) Charlie Ott—The National Audubon Society Collection/Photo Researchers

the Middle East, and Africa. The blue, or varying, hare (*L. timidus*) occurs farther north and is probably the same species as the Arctic hare of northern North America. In North America the hares popularly called snowshoe hare (*L. americanus*) and jackrabbit (*L. townsendii, L. californicus,* and others) are widespread. Many other species occur naturally on all principal land masses except Australia, where the European species was introduced during the 19th century and has become prevalent to the point of being a pest. The Belgian hare is actually one of many domestic breeds of rabbit. The mouse hare, or little chief hare, is also known as the pika.

Hares have well-developed hindlegs, and their ears are usually longer than their head. Depending on the species, the body is about 40 to 70 centimetres (16–28 inches) long, without the short tail. Hares in northern latitudes are white in winter and usually grayish brown in summer. Hares elsewhere are usually gray brown throughout the year. Primarily vegetarians, they sometimes seriously damage commercial crops. They tend to remain in a small area, but may occasionally undertake mass migrations, especially in the far north. Like rabbits, hares provide man with food and fur. Because they are usually numerous (females may bear several yearly litters of one to seven young), they form the staple diet of various carnivorous birds, mammals, and reptiles.

Hare, David (b. June 5, 1947, St. Leonards, Sussex, Eng.), British playwright and director, noted for his deftly crafted satires examining British society in the post-World War II era.

Hare received his master's degree from Jesus College, Cambridge, in 1968 and founded an experimental touring theatre group that same year. He directed some of its productions and soon began writing plays for the group, including *How Brophy Made Good* (1969). With the plays *Slag* (1970), *The Great Exhibition* (1972), and *Knuckle* (1974), Hare established himself as a talented playwright and a vigorous critic of the dubious mores of British public life. *Teeth 'n' Smiles* (1975) examined the milieu of rock musicians, while the widely praised play *Plenty* (1978) was a searching study of the erosion of a woman's personality over a 20-year period, metaphorically evoking Britain's contemporaneous postwar decline. *A Map of the World* (1982), a complexly structured survey of Western and Third World ideologies, received a mixed reception.

With the notable exception of *Plenty,* many of Hare's plays were received unenthusiastically when produced in the United States after their British premieres. Hare also authored several plays for television and continued to direct productions at various London theatres during the 1970s and '80s.

Hare, Sir John, original name JOHN FAIRS (b. May 16, 1844, Giggleswick, Yorkshire, Eng.—d. Dec. 28, 1921, London), actor-manager of London's Garrick Theatre from 1889 to 1895 and recognized as the greatest character actor of his day, excelling in old men's parts.

Sir John Hare, *c.* 1898

By courtesy of the Victoria and Albert Museum, London

After a Liverpool debut in 1864, Hare moved to London, where he appeared for the first time in 1865. For the next 10 years he acted with Squire and Mrs. Bancroft (later Sir Squire and Lady Bancroft), succeeding in comedy roles. He became actor-manager at the Court Theatre (1875) and from 1879 to 1888 worked at the St. James's Theatre, establishing his position as a leading actor. He became actor-manager of the Garrick Theatre in 1889, producing Sir Arthur Wing Pinero's plays *The Profligate* and *The Notorious Mrs. Ebbsmith* and making a personal success in Sydney Grundy's *Pair of Spectacles.* He became manager of the old Globe Theatre in 1898, appearing there in Pinero's play *The Gay Lord Quex.* Hare was also popular in the United States, which he visited between 1895 and 1901. He was knighted in 1907 and appeared for the last time in 1917 in *A Pair of Spectacles.*

Hare, William: *see* Burke, William, and Hare, William.

Hare–Hawes–Cutting Act (1933), the first law setting a specific date for Philippine independence from the United States. It was passed by Congress as a result of pressure from two sources: American farmers, who, during the Great Depression, feared competition from Filipino sugar and coconut oils; and Filipino leaders, who were eager to run their own government.

The bill was passed by the Senate in December 1932 but was vetoed by Pres. Herbert Hoover. To Hoover's surprise, Congress promptly overrode his veto, and the bill became law on Jan. 17, 1933. The act, however, required approval by the Philippine Senate, and this was not forthcoming. Filipino political leader Manuel Quezon led a campaign against the bill because of provisions in it that allowed the indefinite retention of U.S. military bases in the islands. The Tydings–McDuffie Act, substantially similar to the rejected measure but incorporating minor changes, was accepted by the Philippine Senate in 1934.

Hare Krishna, formally INTERNATIONAL SOCIETY FOR KRISHNA CONSCIOUSNESS, religious movement founded in the United States by A.C. Bhaktivedanta (Swami Prabhupāda; 1896–1977) in 1966. The movement claims a lineage of spiritual masters dating to Caitanya (1485–1533), whom it regards as an incarnation of both the deity Krishna, the warrior god with an alternate form, Vishnu, of the *Bhagavadgītā,* and Krishna, the lover god in the *Bhāgavata-Purāṇa.*

The Hare Krishna movement is authoritarian and conservative and emphasizes religious enthusiasm. Its appeal has been largely to alienated youths, who could frequently be seen on city streets, shaven-headed and swathed in Hindu garments, chanting and soliciting contributions from passers-by. Devotees accept a four-caste system whose positions are determined by aptitude, rather than birth.

Humans are regarded as souls composed of Krishna's highest energy, with bodies of *māyā,* his lowest, material, and illusory energy. In order to achieve peace and happiness believers are urged to return to their original relationship with Krishna (called Krishna Consciousness) through *bhakti-yoga.* This involves recognizing Krishna as the highest personality of godhead, whose servants perform his works with no thought of reward, and surrendering to Krishna and his representative, the spiritual master on Earth. It also entails taboos against gambling, using intoxicants, eating meat, and engaging in illicit sex. Besides congregational chanting, believers are to chant privately each day in order to purify themselves from illusory *māyā.*

Hare Krishna temples are communes in which unmarried men and women live separately, with married couples having other quarters. Each temple has its own officers and supports itself by soliciting funds and selling publications of the Bhaktivedanta Trust. Temples are subservient to members of a governing commission. Of the governors, some are empowered as spiritual masters to initiate new members and oversee spiritual life in the temples. Hare Krishna members assume Hindu customs and dress. They have been especially criticized for their aggressive proselytizing in public places.

harebell, also called SCOTTISH BLUEBELL (*Campanula rotundifolia*), widespread, slender-stemmed perennial of the family Campanulaceae. The harebell bears nodding blue bell-like flowers. It is native to woods, meadows, and cliffsides of northern Eurasia and North America and of mountains farther south. There are more than 30 named wild varieties of *Campanula rotundifolia.* Small, round, basal leaves disappear before the flowers form, leaving only long, slender stem leaves. The delicate stems of harebells grow in clumps and reach a height of 30 to 60 centimetres (1 to 2 feet). Each stem bears one to several drooping blue-violet bells.

harelip, also called CLEFT LIP, relatively common (one out of every 1,000 births) congenital deformity in which the central to medial lip fails to fuse properly during the first month of prenatal life, resulting in a fissure in the lip beneath the nostril. Harelip may be unilateral or bilateral, it may take the form of anything from a small pit to a complete fissure the height of the lip, and it may occur alone or in conjunction with cleft palate (a fissure in the roof of the mouth). The deformity is sometimes familial; animal experiments suggest it may also occur following some abnormality of intrauterine environment. It is a frequent finding in certain chromosomal disorders. Surgery to repair the defect is performed in the first two months of life and is usually successful.

harem (Arabic *ḥarīm*), in Muslim countries, that part of a house set apart for the women of the family. The word *ḥarīmī* is used collectively to refer to the women themselves. *Zanāna* (from the Persian word *zan,* "woman") is the term used for harem in India, *andarūn* (Persian: "inner part" [of a house]) in Iran.

Although usually associated in Western thought with Muslim practices, harems are known to have existed in the pre-Islāmic civilizations of the Middle East; there the harem served as the secure, private quarters of women who nonetheless played various roles in public life. Muḥammad did not originate the idea of the harem or of the seclusion and veiling of women, but he sponsored them, and, wherever Islām spread, these institutions went with it. The virtual removal of women from public life was more typical of the Islāmic harem than of its predecessors.

In pre-Islāmic Assyria, Persia, and Egypt, most of the royal courts included a harem, consisting of the ruler's wives and concubines, their female attendants, and eunuchs. These royal harems performed important political, as well as social, roles. Rulers often added wives to their harems as a means of cementing political alliances. As wives attempted to maneuver themselves and their sons into positions of power, the harem became an arena in which rival factions fought for ascendancy at the court. Since these women were usually from influential and powerful families, harem intrigues frequently had wide-ranging repercussions, including, in some cases, the downfall of dynasties.

Large harems were common in the wealthy households in Arab countries through the early decades of the 20th century. In the wealthier

houses, each wife had her own set of rooms and servants; women in less affluent households had smaller quarters and less privacy, but even the poorest Arab household provided separate living quarters for men and women. By the second half of the 20th century, the full harem system existed only among the more conservative elements of Arab society.

In imperial Turkey the sultan had an elaborately organized harem, or seraglio (from Italian *serraglio,* "enclosure"), with disciplinary and administrative officers, overseen by the sultan's mother, the *vâlide sultan.* After 1926, when the Turkish republic made polygamy illegal, the seclusion of women became less popular.

Haremhab (Egyptian king): *see* Horemheb.

Hārer, also spelled HARAR, city, eastern Ethiopia, in the Ch'erch'er Mountains, at an elevation of 6,000 feet (1,800 m). Probably founded in the 7th century AD by immigrants from Ḥaḍramawt in southern Arabia, Hārer became the capital of the Muslim state of Adal. Conflict with Christian Ethiopia and Oromos (Gallas), however, forced removal of the capital in 1577 to the Aussa desert 100 miles (160 km) north. Sir Richard Burton, the first European visitor, described the city of Hārer in *First Footsteps in East Africa* (1856); and the French poet Arthur Rimbaud lived there (1880–91) as a trader in arms and ammunition. Occupied by the Egyptians (1875–85), Hārer was conquered in 1887 by Menelik II, king of Shewa and afterward emperor of Ethiopia. Ras Makonnen was then appointed governor of Hārer province, and in 1910 his son, the future emperor Haile Selassie I, assumed the governorship. Ras Makonnen's Hārer Palace was mostly destroyed in World War II; his mausoleum is south of the city at the foot of Mount Ghirella.

Modern Hārer surrounds the old capital, which is Ethiopia's only walled city. The ancient walls, with six gates, enclose a crowded Muslim town with alleyways that wind to a central marketplace. Outside the walls, the city spreads across the plateau and is characterized by northern Ethiopian and European architecture. Because of ritual differences in slaughtering, separate Muslim and Christian marketplaces are maintained.

Hārer's trading activities, eclipsed by those of Dirē Dawa (35 miles [56 km] northwest)

Marketplace in Hārer, Eth.
Victor Englebert—De Wys Inc.

in the 20th century, are now limited for the most part to coffee and grain distribution. Local, diversified agriculture is supplemented by oilseed pressing and the processing of sansevieria fibre. Basket weaving is a commercially important craft, as is the production of silver jewelry. The population includes the local Hareri (Adere), who speak a Semitic language and have a literature written in Arabic script, as well as Amharas, Oromos (Gallas), and Somalis. The Ethiopian College of Agriculture and Mechanical Arts in 'Alem Maya (which operates the only zoo in Ethiopia) is situated nearby. Pop. (1986 est.) 67,977.

hare's-tail grass (species *Lagurus ovatus*), annual grass of the family Poaceae, native to shores of the Mediterranean region, naturalized in Australia, and cultivated as an ornamental in North America. The oval flower

Hare's-tail grass (*Lagurus ovatus*)
Hartmut Noeller—Peter Arnold

cluster is soft, hairy, and long-lasting. Grayish green hare's-tail grass, about 30–60 cm (1–2 feet) tall, with narrow, soft, flat leaf blades, is grown for use in dried bouquets.

Hargeysa, also spelled HARGEISA, town, northwestern Somalia. It is located in an enclosed valley of the Galgodon (Ogo) highlands, at an elevation of 4,377 feet (1,334 m). During the Somalian civil war that began in the 1980s, the town was severely damaged; much of the town was reduced to rubble, and most of the population fled.

In the past, Hargeysa was quite prosperous. The region has a fairly equable climate, and Hargeysa was originally the summer capital of former British Somaliland, of which it became the permanent administrative centre in 1941. No large industries developed, but the town became an important watering and trading locus for the nomadic stock herders who formed the majority of the population. Meat, livestock, skins, and ghee were exported through Berbera, 117 miles (188 km) northeast, on the Gulf of Aden. Imports were consumer goods, including tea, sugar, and cotton cloth. Pop. (1981 est.) 70,000.

Harghita, *județ* (county), north-central Romania, with an area of 2,552 square miles (6,610 square km). It is dominated by the Eastern Carpathian mountain ranges of Baraolt, Gurghiu, and the volcanic Harghita. Settlement areas lie in intermontane valleys, including the Ciuc and Gurge depressions. The Olt (southward) and Mureş (northward) rivers drain the county. Miercurea-Ciuc is the county seat. Miercurea-Ciuc and the towns of Sîncrăieni, Odorheiu Secuiesc, and Sînsimion have industries that produce textiles, timber, and foodstuffs; machinery is manufactured in Odorheiu Secuiesc and Vlahiţa. Iron mines operate at Lueta, and salt is quarried at Praid. Agricultural activities in the county consist of livestock raising and cereal and fruit cultivation. Borsec, Jigodin, Sîncrăieni, and Tuşnad are resorts located near mineral springs; and Saint Anne's Lake, the only volcanic lake in Romania, is near Tuşnad.

A collection of Dacian silver was found in Sîncrăieni. A Roman citadel (1st century BC) built of earthworks and timber is located in Jigodinu. During the 17th century, Gheorgheni town was inhabited by Armenians fleeing the Turks. In 1944 the town was destroyed by the Germans but was later rebuilt. Mădăraş town has been known for its production of a distinctive black pottery since Dacian times. Highway and rail connections extend through Miercurea-Ciuc, Gheorgheni, and Odorheiu Secuiesc. Pop. (1987 est.) 359,205.

Hargobind (b. 1595, Wadāli, India—d. 1644, Kīratpur, near the Himalayas), sixth Sikh Gurū, who developed a strong Sikh army and gave the Sikh religion its military character, in accord with the instructions of his father, Gurū Arjun, the first Sikh martyr and victim of the ruling Mughals (1606).

Up to the time of Hargobind, the Sikh religion had been passive. Hargobind sat on the Gurū's throne fully armed as a symbolic gesture and devoted much time to military training and the martial arts, becoming an expert swordsman, wrestler, and rider. Despite opposition, Hargobind built up his army and fortified his cities. In 1609 he built at Amritsar the Akāl Takht ("Throne of God"), a temple and assembly hall combined, where both spiritual and temporal matters pertaining to the Sikh nation could be resolved. He built a fort near Amritsar and named it Lohgarh. Deftly, he instilled the will to fight and established high morale in his followers. The Mughal emperor Jahāngīr viewed the buildup of Sikh power as a threat and had Gurū Hargobind jailed in the fortress of Gwalior. For 12 years Gurū Hargobind remained a prisoner, while Sikh devotion to him only intensified. Finally, the emperor, apparently seeking the favour of the Sikhs as possible allies against the Indian states still defying Mughal rule, relented and set the gurū free. Hargobind followed his former militant course, recognizing that a clash with Mughal power was coming.

After Jahāngīr's death (1627) the new Mughal emperor, Shāh Jahān, began to persecute the Sikh community in earnest. The Sikhs under Hargobind defeated Shāh Jahān's armies four times, crushing the myth of Mughal invincibility. To the Sikh ideals of his predecessor, Gurū Hargobind thus added another: the right and duty of the Sikhs to defend their faith by the sword if necessary. Shortly before his death, Gurū Hargobind appointed his grandson, Har Rāī, his successor.

Hargrave, Lawrence (b. Jan. 29, 1850, Greenwich, London, Eng.—d. July 6, 1915, Sydney, Australia), Australian aeronautical pioneer best known for his invention of the box kite. He also made important studies of wing surfaces and worked with rotary engines and gliders.

Born and educated in England, Hargrave emigrated to Australia, where he began work in 1866 as a draftsman. In 1872, 1875, and 1876, he participated in explorations of New Guinea, but in 1877 he settled down as assistant astronomical observer at the Sydney Observatory. Leaving in 1883 to begin research on the problems of flight, he made careful studies of the flight of birds and insects. He constructed monoplane models between 1884 and 1892, experimenting with different methods of propulsion. He developed a crude compressed-air rotary engine in 1889. In 1892, after discovering that curved wing surfaces gave twice the lift of flat ones, Hargrave began to work with kites; and, on Nov. 12, 1894, at Stanwell Park, New South Wales, he was lifted 16 feet (4.8 m) off the ground by four box kites of his own construction. Using airplane models, he found that a vertical tailpiece increased stability. He visited England in 1899, read papers describing his experiments, and also exhibited his models. A severe illness in 1903 caused him to turn to other work, and his models eventually were given to museums.

Because Hargrave worked in Australia and was thus isolated from other flight pioneers in Europe and the United States, some critics have claimed that his work had little influence

upon the history of flight. He never patented his inventions, although he did publicize them in England on one occasion. Thus, some of the ideas that appeared in Europe in Hargrave's day seem traceable to him.

Hargreaves, James, Hargreaves also spelled HARGRAVES (d. April 22, 1778, Nottinghamshire, Eng.), English inventor of the spinning jenny, the first practical application of multiple spinning by a machine. At the time he devised the machine, he was a poor, uneducated spinner and weaver living at Standhill, near Blackburn, Lancashire.

About 1764 Hargreaves is said to have conceived the idea for his hand-powered multiple spinning machine when he observed a spinning wheel that had been accidentally overturned by his young daughter Jenny. As the spindle continued to revolve in an upright rather than a horizontal position, Hargreaves reasoned that many spindles could be so turned. He constructed a machine with which one individual could spin several threads at one time. After he began to sell the machines to help support his large family, hand spinners, fearing unemployment, broke into his house and destroyed a number of jennies, causing Hargreaves to move to Nottingham in 1768. With a partner, Thomas James, he built a small mill in which they used the jennies to spin yarn for hosiers. He received a patent for the jenny on July 12, 1770. Until his death he worked at the mill, which proved moderately successful.

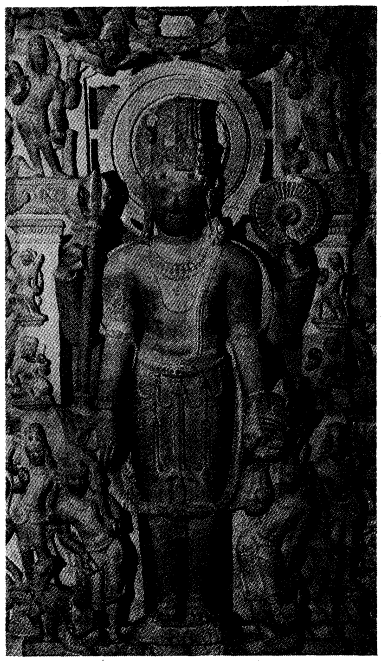
Hari Krishen (b. 1656, Kīratpur, near the Himalayas, India—d. 1664, Delhi), eighth Sikh Gurū who, although he was installed at five years of age and reigned for only three years, was apparently possessed of vast wisdom and amazed visiting Brahmans by his great knowledge of the *Bhagavadgītā*. Many wondrous feats are attributed to him. A raja, Jai Singh, wishing to test the boy's perception, sent one of his queens disguised as a slave to sit inconspicuously among slave girls at the Gurū's feet. Hari Krishen is said to have recognized her at once as the queen.

Hari Krishen's older brother Rām Rāī, already in favour with the Mughal emperor Aurangzeb, protested his appointment to the Gurū's throne. Aurangzeb called the eight-year-old Hari Krishen to Delhi to decide the matter, and the boy arrived there during a severe cholera epidemic. After restoring many people to health, he himself fell ill. As he was dying, the boy muttered the words "Bābā Bakāle," meaning that his successor should be sought in the village of Bakāla.

Haribhadra, also called HARIBHADRA SŪRĪ (fl. 8th century), one of the most famous Jaina authors, known for his works in Sanskrit and Prākrit on Jaina doctrine and ethics and for his brilliant commentaries.

Haribhadra was born into the Brahman caste in Cittaur, India, and received a thorough education in the Sanskrit classics. On adopting the Jaina faith, he entered a Śvetāmbara order of monks. Haribhadra is best known for his *Ṣaḍdarśanasmuccaya*, which deals with six philosophical systems of India. He also wrote on logic and on yoga and made some contributions to popular Prākrit literature.

Harihara, also spelled HARI-HARA, in Hinduism, a syncretic deity, combining the two major gods, Vishnu (Hari) and Śiva (Hara). Images of Harihara (also known as Śambhu-Viṣṇu and Śaṅkara-Nārāyaṇa, variants of the names of the two gods) began to appear in the classical period after sectarian movements, which elevated one god as supreme over the others, had waned sufficiently for efforts at compromise to be attempted. The dual form found special favour in Cambodia, where inscriptions and images in the 6th–7th century are known. In images of Harihara, the right half is depicted as Śiva and the left as Vishnu. The visage of the Śiva half is awesome, befitting his function as destroyer, and its hands hold the *triśūla* ("trident"); the Vishnu side is "pacific," appropriate to the preserver role of



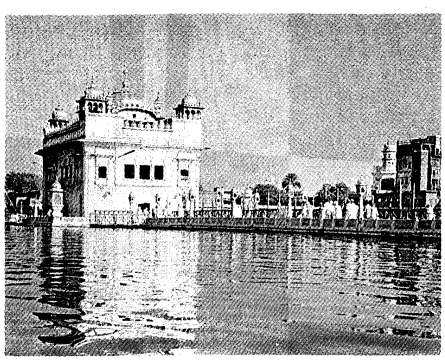
Harihara, detail of a sandstone carving from north India, 10th century AD; in the British Museum

P. Chandra

that deity, and its hands hold weapons characteristic of him. Half the headdress is shown with Śiva's matted locks and half as Vishnu's crown, and, on the forehead, half of Śiva's third eye is visible.

Harijan (Indian social class): *see* untouchable.

Harimandir, also spelled HARMANDIR, also called DARBĀR SĀHIB (Punjabi: "Sacred Audience"), or GOLDEN TEMPLE, the chief *gurdwārā*, or house of worship, of the Sikhs of India, and their most important pilgrimage site; it is located in the city of Amritsar, in the Punjab state. The Harimandir was built in 1604 by Gurū Arjun, who symbolically had it placed on a lower level so that even the humblest had to step down to enter it, and with entrances on all four sides, signifying that it was open to worshipers of all castes and creeds. The foundation stone was laid by Mian Mīr, a Muslim divine of Lahore. The temple was destroyed several times by Afghan invaders and was rebuilt in marble and copper overlaid with gold foil during the reign (1801–39) of Maharaja Ranjit Singh. The structure



Harimandir, Amritsar

G. Reitz—De Wys Inc.

thus became known as the Golden Temple. The temple occupies a small island in the centre of the *amrit-sar* ("pool of nectar") tank, or pool, and is connected to land on its west by a marble causeway running across the water of the pool.

The Harimandir building sustained only minor damage on June 6, 1984, when Indian troops fought their way into the temple complex to crush Sikh extremists using it as a fortress and refuge. The nearby building known as the Akal Takht, which is the headquarters of the Sikh religion, was heavily damaged in the attack, however.

Haringey, inner borough of Greater London, including suburbs such as Highgate, Hornsey, and Tottenham on London's northern heights and the adjacent Lea Valley to the east. Suburban London spread over the area in the 19th century as the railway tramway systems were extended. The borough has an area of 12 sq mi (30 sq km). Although largely residential in character, Haringey has varied industries (mainly in Tottenham), including light engineering and the manufacture of furniture, clothing, and footwear. Open spaces include Finsbury Park, Highgate and Queen's woods, and Alexandra Park, with its racecourse. Alexandra Palace, former home of BBC Television News, is now an exhibition and conference centre. Highgate has notable historical and literary associations. Several fine Georgian houses line Highgate Hill. Pop. (1984 est.) 200,100.

Harington, James: *see* Harrington, James.

Harington, Sir John (b. 1561—d. Nov. 20, 1612, Kelston, Somerset, Eng.), English Elizabethan courtier, translator, author, and wit who also invented the flush toilet.

Harington's father enriched the family by marrying an illegitimate daughter of Henry VIII; his second wife was an attendant to the Princess Elizabeth, who stood as godmother for Sir John. Educated at Eton, Cambridge, and Lincoln's Inn, London, Harington married in 1583. For translating and circulating among the ladies a wanton tale from the 16th-century Italian poet Ariosto, he was banished from court until he should translate the whole of Ariosto's epic poem *Orlando Furioso*. The translation, published in 1591, remains one of the finest of the age. Probably while translating he invented the flush lavatory (toilet) and installed one for the Queen in her palace at Richmond, Surrey. In 1596, in *The Metamorphosis of Ajax* (a jakes; *i.e.,* privy), Harington described his invention in terms more Rabelaisian than mechanical and was again banished by Elizabeth. In 1599 he went on a military expedition to Ireland, winning a knighthood. His barbed epigrams and wanton writings gave too much offense, particularly under James I, to advance him beyond a reputation as Queen Elizabeth's "saucy godson." T. Rich wrote a study of him and his work in *Harington and Ariosto* (1940).

Haringvliet, freshwater channel, Zuidholland *provincie* (province), southwestern Netherlands. A distributary of the Hollandsch Diep, it ultimately (through other streams) has its origin in the Lower Rhine (Neder Rijn). The Haringvliet flows for about 20 mi (32 km) between the joined islands of Voorne and Putten and the island of Beijerland to the north and the joined islands of Goeree and Overflakke to the south. It discharges into the North Sea. Its low shores were much devasted during the disastrous floods of February 1953. As part of the Delta Plan for land reclamation and both Rhine and tidal flood protection, a dam with numerous sluices was completed at the Haringvliet's mouth in 1971. A large lock built as part of the Haringvlietdam allows the channel to remain open to shipping.

Hariot, Thomas: *see* Harriot, Thomas.

Haripunjaya, an ancient Mon kingdom centred in the Mae Nam (river) Ping Valley in northwestern Thailand. It was founded in the mid-7th century by a queen of Lopburi, the capital of the Mon Dvaravati kingdom to the south. Although originally established as a colony of Dvaravati, Haripunjaya maintained its independence and its own ruling dynasties as a member of a loose confederation including the Mon states of Dvaravati and Thaton.

Haripunjaya flourished and developed an advanced civilization. Espousing the conservative Theravāda Buddhism, the kingdom acted as a transmitter of Indian cultural influences. The development of irrigation systems, law, and art forms were among its accomplishments.

Haripunjaya was barely able to maintain its independence against attacks by the Thai in the 9th century and the Khmer (Cambodians) in the 10th century. It also conducted continual warfare against Dvaravati, which was conquered by the Khmer in the early 11th century.

After centuries of independence, the advanced civilization of Haripunjaya was absorbed by the Thai when the Thai ruler Mangrai conquered Haripunjaya in 1292, establishing the city of Chiengmai a few miles from Lamphun, the old capital of Haripunjaya. The Mon became the teachers of the Thai and influenced the development of Thai writing, scholarship, and art forms.

Ḥarīrī, al-, in full ABŪ MUḤAMMAD AL-QĀSIM IBN ʿALĪ AL-ḤARĪRĪ (b. 1054, near Basra, Iraq—d. 1122, Basra), scholar of Arabic language and literature and government official who is primarily known for the refined style and wit of his collection of tales, the *Maqāmāt,* published in English as *The Assemblies of al-Harîrî* (1867, 1898).

His works include a long poem on grammar (*Mulḥat al-ʾirāb fī annaḥw*), for which he also wrote a commentary, and a book on errors of expression in Arabic (*Durrat al-ghawwāṣ fī awhām al-khawaṣṣ*). *The Assemblies* recounts in the words of the narrator, al-Ḥārith ibn Hammām, his repeated encounters with Abū Zayd as-Sarūjī, an unabashed confidence artist and wanderer possessing all the eloquence, grammatical knowledge, and poetic ability of al-Ḥarīrī himself. Time and again, al-Ḥārith finds Abū Zayd at the centre of a throng of people in a new city. Abū Zayd brings tears to his listeners' eyes with the vivid description of his pretended hardships and dazzles them with his poetry, then suddenly disappears with their presents. Al-Ḥarīrī's *Assemblies* seems to unite his experiences as an information officer with his authoritative knowledge of Arabic grammar, style, and verse. These tales are filled not only with humour and adventure but with linguistic and poetic feats as well. This *maqāmah* ("assembly") style was not al-Ḥarīrī's invention. He openly acknowledged his debt to its creator, al-Hamadhānī (969–1008).

Ḥarīrī, Tall al- (Syria): *see* Mari.

Harīrūd, in full RŪDKHĀNEH-YE HARĪRŪD, Turkmen TEDZHEN, Latin ARIUS, river, Central Asia. It rises on the western slopes of the rugged Selseleh-ye Kūh-e Bābā range, an outlier of the Hindu Kush mountains, in central Afghanistan. Flowing west past Chaghcharān and the ancient city of Herāt (whence its name is derived), then north, it forms sections of the Afghan–Iranian and Iranian–Soviet frontiers. After crossing into the Turkmen S.S.R., where it is called the Tedzhen, the river disappears into the wastes of the Kara-Kum Desert. The Harīrūd irrigates some of Afghanistan's productive, cultivated land. Its estimated length is 700 miles (1,100 km).

Harischandra Range, eastward-extending spur of the Western Ghāts, in west central India. The range lies between the Godāvari and the Bhīma rivers in the northwestern Deccan Plateau. With an average elevation of about 2,000 feet (600 m), its peaks decrease in height gradually to the southeast and comprise parts of Mahārāshtra state. The range is flat-topped, consisting of basaltic lava, and the slopes of the hills have weathered to form terraces corresponding to the direction of the lava flow. The range attains higher elevations in the west until it merges into the Western Ghāts. The range is named for the Harischandragarh, its highest peak. Forests of hardwood including teak (covered with climbing vines) are found on the mountains' slopes. The undergrowth consists of tangled masses of cane, bamboo, climbing vines, and ferns. Ahmadnagar is the chief town in the area.

Harishchandra, also called BHARTENDU (b. Sept. 9, 1850, Vārānasi, India—d. Jan. 6, 1885, Vārānasi), Indian poet, dramatist, critic, and journalist, commonly referred to as the "father of modern Hindi." His great contributions in founding a new tradition of Hindi prose were recognized even in his short lifetime, and he was admiringly called Bhartendu ("Moon of India"), an honorific that has taken precedence over his own name.

Harishchandra was born into a distinguished family that traced its descent from Aminchand, the prosperous banker whose intrigues against his master, the Nawab of Bengal, and deception by Robert Clive is a celebrated incident of modern Indian history. His father, Gopalachandra (pen name Giridharadaja), was a poet who composed a considerable amount of traditional Braj Bhasa (a dialect of Hindi) verse of technical virtuosity but with little poetic feeling.

Harishchandra began his own literary career at the age of 17, when he established (1867) the first literary magazine in Hindi, the *Kavi-vachana-sudha,* followed in 1872 by *Harishchandra Magazine,* later called *Harishchandra Chandrika.* A circle of distinguished poets and litterateurs whom he generously patronized gathered around him, and their work resulted in a radical transformation of Hindi language and literature in the pages of his magazine.

Harishchandra's influence was deep and far-reaching: his works mark the end of the Rīti period of Hindi literature (*c.* 1650–1850) and usher in what is called the Bhartendu epoch, which in turn leads into the modern period. His advocacy of the development of the Hindi language and his opposition to the undue importance given to Urdu in official circles had important political results, leading ultimately to the establishment of modern Hindi as the state language of India.

Harishchandra's poetry, in contrast to the rather dry poetry of the Rīti period, was simple, deeply felt, and filled with devotional ardour and emotional lyricism. His numerous plays, written partly in modern Hindi and partly in Braj Bhasa verse, are among the first in the language and concern themselves with a wide range of themes. They include satirical farces and several dramas in which the poet expresses his intense grief at the stultifying poverty of India and the decline of its civilization under centuries of foreign domination and colonialism.

Harishchandra's passionate participation in social and educational activities did not, however, prevent him from taking delight in the world around him. He was known also as an accomplished actor, a keen and witty polemicist, and, within the circle of his own caste and religious community, an outrageous practical joker.

Hārītī, Japanese KISHI-MOJIN, in Buddhist mythology, a child-devouring ogress who is said to have been converted from her cannibalistic habits by the Buddha to become a protectress of children. He hid the youngest of her own 500 children under his begging bowl, and thus made her realize the sorrow she was causing other parents. Hārītī is usually represented surrounded by children or carrying a child, a pomegranate, or a cornucopia. Her cult traveled north into Central Asia and China, where she is regarded as the special guardian of children and of women in childbirth, and to Japan, where she has sometimes been confounded with a feminine form of the protective deity, Kannon.

Harizi, Judah ben Solomon (b. *c.* 1170, Spain—d. *c.* 1235), man of letters, last representative of the golden age of Spanish Hebrew poetry. He wandered through Provence and also the Middle East, translating Arabic poetry and scientific works into Hebrew.

His version of the *Guide of the Perplexed* of Maimonides is more artistic if less accurate than that of Ibn Tibbon. His skillful adaptation of the difficult *Maqāmāt* of al-Ḥarīrī, under the title *Mahberot Ithi'el,* encouraged him to compose original Hebrew *maqāmah*s entitled the *Tahkemoni,* on which his fame primarily rests. His writing is characterized by its rich vocabulary and remarkable linguistic dexterity.

Härjedalen, *landskap* (province), northern Sweden, comprising the upper valley of the Ljusnan (river) in Norrland region. It is bounded by Norway on the west, the *landskap* of Jämtland on the north, those of Medelpad and Hälsingland on the east, and that of Dalarna on the south. Its land area of 4,615 square miles (11,954 square km) is included in the inland administrative *län* (county) of Jämtland. Mountains and forests characterize the sparcely inhabited landscape. Until the Peace of Brömsebro in 1645, Härjedalen belonged to Norway, and traces of its Norwegian heritage are still evident today. The province's leading industries are those connected with forestry. Sveg is the principal town, and there are ski resorts at Fjällnäs, Funäsdalen, and Bruksvallarna. Points of interest include the 4,000-year-old rock paintings of Flatruet Plateau in the west and the "frozen sea" of the Rogen area with its Ice Age boulders. Pop. (1985 est.) 11,726.

Harkhuf (fl. *c.* 2290–70 BC), governor of southern Upper Egypt who journeyed extensively throughout Nubia (the modern Sudan).

As attested by his tomb biography, Harkhuf, a native of Elephantine, was appointed governor of the southern part of Upper Egypt and overseer of caravans under King Merenre, third king of the 6th dynasty. His primary business, however, was trade with Nubia. His first journey originated from Memphis, near modern Cairo; its destination was either the Second Nile Cataract region or beyond, and it entailed seven months' travel. A second journey passed uneventfully. On the third trip, Harkhuf found the nation at war with a Libyan tribe. As part of his duty was to keep trade routes open, he persuaded the warring chief to desist from strife. Following an exchange of goods, Harkhuf returned with 300 asses laden with incense, ebony, skins, and ivory; an armed escort guided him through the territory of the potentially dangerous tribal coalition.

Under Pepi II, fourth king of the 6th dynasty, Harkhuf traveled south again and brought back a Pygmy from inner Africa. The young king was delighted and sent a letter to Harkhuf, which was reproduced in his tomb.

Harkins, William Draper (b. Dec. 28, 1873, Titusville, Pa., U.S.—d. March 7, 1951, Chicago), American chemist whose investigations of nuclear chemistry, particularly the structure of the nucleus, first revealed the basic process of nuclear fusion, the fundamental principle of the thermonuclear bomb.

Harkins received his Ph.D. (1908) from Stanford University, Calif., and taught chemistry at the University of Montana, Missoula, from 1900 to 1912. He spent the rest of his career at the University of Chicago.

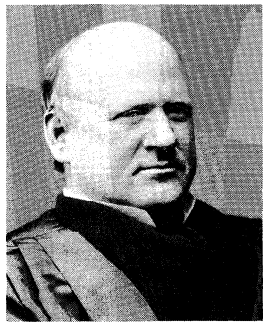
Harkins predicted the existence of the neutron and heavy hydrogen (or deuterium) and introduced the concept of the packing fraction, a measure of the energy involved in the association of protons and neutrons within the nucleus of an atom. Utilizing Einstein's concept of the equivalence of mass and energy, he demonstrated that by combining four hydrogen atoms to produce one helium atom, a small amount of mass would be converted to energy; he correctly theorized that this process was a source of stellar energy. Harkins made one of the first attempts to calculate the proportions of elements in the universe.

Harlan, city, seat of Harlan County, southeastern Kentucky, U.S. It lies in the Cumberland Mountains, on the Clover Fork of the Cumberland River. It was settled in 1819 by Virginians led by Samuel Hoard and was known as Mount Pleasant until renamed for Maj. Silas Harlan, who was killed at the Battle of Blue Licks (Aug. 19, 1782). After the railroad arrived in 1911, the town developed as a shipping point for lumber and coal. Between 1900 and 1938, and again in 1974, Harlan was the scene of violent labour disputes between the miners and the operators of the local coal mines; this continual unrest played an important role in the development of organized labour.

Coal and hardwood timber remain the city's economic mainstays. Kingdom Come State Park and the Redbird Purchase Unit of the Daniel Boone National Forest are nearby. Pop. (1982 est.) 2,901.

Harlan, John Marshall (b. June 1, 1833, Boyle County, Ky., U.S.—d. Oct. 14, 1911, Washington, D.C.), associate justice of the United States Supreme Court from 1877 until his death and one of the most forceful dissenters in the history of that tribunal. His best known dissents favoured the rights of blacks as guaranteed, in his view, by the post-Civil War constitutional amendments (Thirteenth, Fourteenth, and Fifteenth). In the 20th century the Supreme Court vindicated his positions on civil rights and on many other issues in which he was in dissent at the time.

In the 1850s Harlan, a lawyer and county judge in Kentucky, was active in the Know-Nothing Party. From 1861 to 1863 he commanded a Union infantry regiment in the American Civil War. In 1863 and again in 1865 he was elected attorney general of Kentucky. Critical of the Emancipation Proclamation and other wartime emergency measures taken by President Abraham Lincoln, Harlan opposed Lincoln's reelection in 1864 and supported the unsuccessful Democratic Party candidate, General George B. McClellan. After the war he attacked the Thirteenth Amendment (1865), which abolished slavery, although as Kentucky attorney general he showed moderation toward the freed blacks. Later in the decade he was appalled by white-racist violence and espoused the Radical Republicans' policy for reconstructing the South. As a Republican he was defeated for governor of Kentucky in 1871 and 1875.



Harlan

By courtesy of the Library of Congress, Washington, D.C.

On Nov. 29, 1877, Harlan was appointed to the Supreme Court by President Rutherford B. Hayes. He wrote 1,161 opinions (including 316 dissents) in nearly 34 years and was the Court's outstanding liberal justice during that time. He issued a famous dissent in *Pollock* v. *Farmers' Loan and Trust Co.* (1895), in which the Court ruled the federal income tax to be unconstitutional, and in various cases arising under the Sherman Anti-Trust Act of 1890, he insisted that Congress had intended to destroy monopolies entirely, not merely to keep them under control.

Harlan dissented from the Supreme Court's ruling in the Civil Rights cases (1883) that Congress could not punish discrimination against blacks by private persons but only by those acting in an "official" or "state" capacity. In his dissents in the Insular cases involving overseas territories recently annexed by the United States, he opposed the withholding of the Bill of Rights from those unincorporated territories.

Perhaps the most famous of Harlan's dissents was that in *Plessy* v. *Ferguson* (1896), the case in which the Supreme Court established the "separate but equal" principle of racial segregation. Asserting that "our Constitution is color-blind, and neither knows nor tolerates classes among citizens," he expressed the justified fear that the majority of the court was consigning black citizens of the United States to a permanent "condition of legal inferiority." From 1954, when the school segregation cases (*Brown* v. *Board of Education of Topeka* and *Bolling* v. *Sharpe*) were decided, the court repudiated the "separate but equal" doctrine and other theories of racial discrimination.

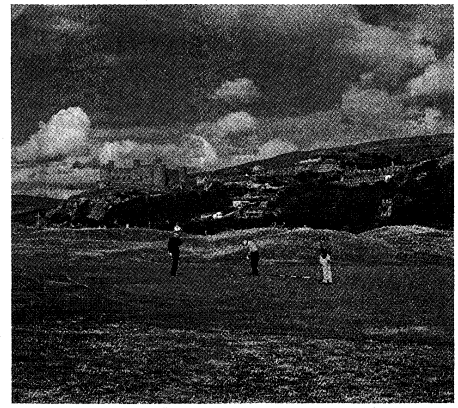
Articles are alphabetized word by word, not letter by letter

Harlan, John Marshall (b. May 20, 1899, Chicago—d. Dec. 29, 1971, Washington, D.C.), U.S. Supreme Court justice from 1955 to 1971.

He was the grandson of John Marshall Harlan, who sat on the Supreme Court from 1877 to 1911. The younger John Marshall graduated from Princeton University in 1920, took his master's degree from the University of Oxford in 1923, and received his law degree from the New York Law School in 1924, being admitted to the bar the following year. He then practiced law and held several public posts, served in the Army Air Forces during World War II, and resumed his prestigious law practice after the war. In 1954 he was appointed judge of the U.S. Court of Appeals by President Dwight D. Eisenhower, and a few months later Eisenhower appointed him to the Supreme Court.

Harlan proved to be a conscientious and firmly independent member of the Court who was noted for his lucid, closely reasoned opinions. He believed in maintaining a strict dividing line between federal and state authority and opposed the tendency of the Court under Chief Justice Earl Warren to intrude into what Harlan considered matters not under its strictly constitutional purview. This stance earned him the reputation of a conservative, despite the moderate cast of some of his opinions.

Harlech, castle and village, Meirionnydd district, Gwynedd county, Wales, on the coast of Cardigan Bay. In 1283, after his defeat of Llywelyn ap Gruffyd, the English king Edward I began the construction of a fortress there on the edge of a prominent cliff. Harlech Castle has had a long history of occupation and assault: in the early 15th century, Owen Glendower captured it and held a parliament there; the English queen Margaret took refuge there in 1460, when Henry VI, her husband, had been captured; Harlech was the last Welsh fortress to surrender to the Yorkists in 1468



The Royal St. David's Golf Club at Harlech, Gwynedd, overlooked by Harlech Castle

Shostal—EB Inc.

(an event commemorated in the battle song "March of the Men of Harlech"); and in 1647 it was the last Welsh fortress surrendered to the Parliamentary armies in the English Civil War. The castle, now an imposing ruin, sheltered a small borough. Today the village is a resort with magnificent beach and dune scenery, the Royal St. David's Golf Club, the nature reserve of Morfa Harlech, and access to the mountains of Snowdonia. It also has a long-established residential adult-education college, Coleg Harlech. Pop. (1981) 1,356.

Harlech, William George Arthur Ormsby-Gore, 4th Baron: *see* Ormsby-Gore, William George Arthur.

Harlem, district of New York City, U.S., occupying a large part of northern Manhattan Island and Borough. Harlem as a neighbourhood has no fixed boundaries; it may generally be said to lie between 155th Street on the north, the East and Harlem rivers on the east, 96th Street (east of Central Park) and 110th Street and Cathedral Parkway (north and west of Central Park) on the south, and Amsterdam Avenue on the west.

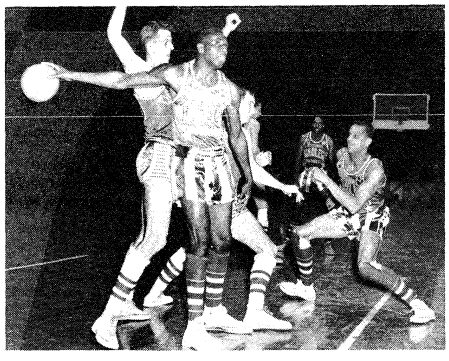
In 1658 Peter Stuyvesant, Dutch governor of New Netherland, established the settlement of Nieuw Haarlem, named after Haarlem in the Netherlands. During the Revolution, George Washington, retreating from Long Island, regrouped his forces and fought the delaying Battle of Harlem Heights (Sept. 16, 1776) just west of modern Harlem between 103rd and 120th streets. Through the 18th century, Harlem was a farming and pastoral area; in the 19th century, it became a fashionable residential district with many houses used as summer retreats. Apartment houses arose during the building boom of the 1880s. High rates of vacancy in the years following the panic of 1893 led property owners to rent to blacks, especially along Lenox Avenue, and by World War I much of Harlem was firmly established as a black residential and commercial area. The chief artery of black Harlem is 125th Street, popularly called "the Main Stem."

After World War I, Harlem became the centre of the creative literary development called the "Harlem Renaissance." Such figures as the poets Countee Cullen, James Weldon Johnson, Alain Locke, and Claude McKay were leaders of this new realism. An important anthology of writings of this movement is Alain L. Locke's *The New Negro* (1925). As the neighbourhoods surrounding Harlem

resisted expansion of its growing black population, residential overcrowding increased. At the same time, the aging dwellings there received only minimal maintenance—many were abandoned by their owners when the cost of rehabilitation and compliance with city housing codes became high. This still-continuing vicious circle, aggravated by high rates of unemployment and residential mobility, has caused severe deterioration of the neighbourhood. By the 1980s private community organizations and the city administration had taken measures to arrest these trends and their attendant social maladjustments. Public housing, new approaches in community-controlled schools, and better medical facilities were important developments.

The term Harlem is often used inaccurately as a synonym for New York's black community; in fact, the black population has expanded beyond this area to other parts of Manhattan and to large parts of the Bronx and Brooklyn. Further, New York City's large Puerto Rican community has a principal centre in eastern Harlem, along Park Avenue from 96th Street northward. This district, known pejoratively as "Spanish Harlem," shares the economic and social problems of black Harlem. From Lexington Avenue east to the East River, with an axis along 116th Street, are the remains of "Italian Harlem." There has been considerable friction between the ethnic groups making up Harlem's population.

Harlem Globetrotters, black professional U.S. basketball team that plays exhibition games all over the world, drawing crowds as large as 75,000 to see the players' spectacular ball handling and humorous antics. The all-black team was organized in 1927 by



Reece "Goose" Tatum, of the Harlem Globetrotters, holding the ball, 1952

UPI—EB Inc.

sports promoter Abe Saperstein, who owned it until his death in 1966. Lacking a hometown, they began touring the United States in Saperstein's car. Later they travelled abroad to popularize their entertaining brand of basketball. They play against a team that they call the Opposition, which is made up largely of white players. The Opposition never wins and functions much like the straight man in a two-man comedy team. Some outstanding Globetrotters have been Reece "Goose" Tatum, Marques Haynes, Clarence Wilson, "Meadowlark" Lemon, and Wilt "the Stilt" Chamberlain.

Harlem Renaissance, also called NEW NEGRO MOVEMENT, period of outstanding literary vigour and creativity that took place in the 1920s, changing the character of literature created by black Americans, from quaint dialect works and conventional imitations of white writers to sophisticated explorations of black life and culture that revealed and stimulated a new confidence and racial pride. The movement centred in the vast black ghetto of Harlem, in New York City, where aspiring black artists, writers, and musicians gathered, sharing their experiences and providing mutual encouragement. One of the leading figures of the period was James Weldon Johnson, author of the pioneering novel *Autobiography of an Ex-Coloured Man* (1912), and perhaps best known for *God's Trombones* (1927), a collection of seven sermons in free verse, expressing the characteristic style and themes of the black preacher in pure and eloquent English. Johnson also acted as mentor to many of the young black writers who formed the core of the Harlem group. Claude McKay, an immigrant from Jamaica, produced an impressive volume of verse, *Harlem Shadows* (1922), and a best-selling novel, *Home to Harlem* (1928), about a young Negro's return from World War I. Countee Cullen was another important black poet. Cullen helped bring more Harlem poets to public notice by editing *Caroling Dusk: An Anthology of Verse by Negro Poets* in 1927. Langston Hughes published his first collection of verse, *The Weary Blues,* in 1926, and his novel *Not Without Laughter* appeared in 1930. Wallace Thurman and William Jourden Rapp collaborated on a popular play, *Harlem,* in 1929. Thurman, one of the most individualistic talents of the period, also wrote a satirical novel, *The Blacker the Berry* (1929), that ridiculed some elements of the New Negro movement. The Harlem Renaissance was accelerated by philanthropic grants and scholarships and was supported by white writers such as Carl Van Vechten, author of *Nigger Heaven* (1926).

The Great Depression caused the Harlem group of writers to scatter; many were forced to leave New York or to take other jobs to tide them over the hard times.

Harlequin, Italian ARLECCHINO, French ARLEQUIN, one of the principal stock characters of the Italian commedia dell'arte; often a facile and witty gentleman's valet and a capricious swain of the serving maid. In the early years of the commedia (mid-16th century), the Harlequin was a *zanni* (a wily and covetous comic servant), and he was cowardly, superstitious, and plagued by a continual lack of money and food. By the early 17th century, Harlequin had become a faithful valet, patient, credulous, and amorous. This last quality often led him into difficulties from which he managed to extricate himself by cleverness and irrepressible high spirits. He was amoral without being vicious, and, unlike his fellow commedia servants, he did not hold a grudge or seek revenge against those who tricked or cheated him.

"Seated Harlequin," oil painting by Pablo Picasso, 1923; in the Kunstmuseum, Basel, Switz.

By courtesy of the Public Art Museum, Basel, Switz., permission S.P.A.D.E.M. 1972 by French Production Rights Inc.; photograph, H.Hintz (J.P. Ziolo)

Harlequin's costume was originally a peasant's shirt and long trousers, both covered with many coloured patches. It later developed into a tight-fitting costume decorated with triangles and diamond shapes, and it included a *batte,* or slapstick. His black half mask had tiny eyeholes and quizzically arched eyebrows that were accentuated by a wrinkled forehead. The effect was of satyric sensuality, catlike slyness, and astonished credulity.

Popular in the commedia from the 16th century, Harlequin survived the commedia dell'arte to take a place in later theatrical productions. He occupied a central role in the Comédie-Italienne, the Gallicized adaptation of commedia dell'arte; in mid-18th-century England, John Rich incorporated the role into dance pantomimes based on the combination of a commedia plot and a classical fable. Harlequin was also the principal character of the slapstick pantomime form known as a harlequinade in England and elsewhere.

harlequin cabbage bug (*Murgantia histrionica*), insect belonging to the stinkbug family (Pentatomidae) of the order Heteroptera. Though of tropical or subtropical origin this insect now ranges from the Atlantic Ocean to the Pacific Ocean in North America. Shield-shaped, about 1.25 centimetres (0.5

Harlequin cabbage bug (*Murgantia histrionica*)

E.S. Ross

inch) long, and brilliantly coloured with red, yellow, and black, the harlequin bug sucks sap and chlorophyll from crops such as cabbage, causing them to wilt and die. Fifty to 60 adult harlequin bugs may simultaneously feed on one large plant.

The barrel-shaped white eggs, ringed with black, are laid in double rows of 12 on the underside of leaves. Within a month the eggs hatch, and the active young, which resemble the adult except that they are wingless, molt five times. In warm climates there may be three or four generations annually; the adults may live several months.

Removal of host plants when a crop is harvested and the use of trap crops such as mustard, on which the bugs concentrate in the spring and can subsequently be killed by insecticides, reduce losses of cabbage, Brussels sprouts, turnips, and related crops. This insect pest is sometimes known as calico back, terrapin back, firebug, and harlequin bug. The name harlequin bug has been used in South America for a longhorn beetle (*Acrocinus longimanus*). In Australia an insect (*Dindymus versicolor*) of the order Heteroptera, injurious to apples and other fruits, is called the harlequin fruit bug.

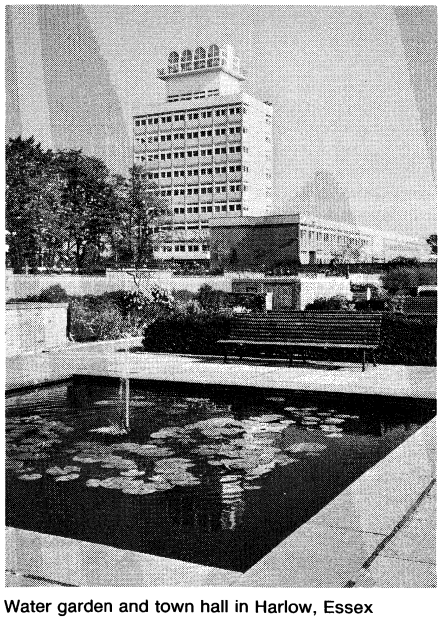
harlequinade, play or scene, usually in pantomime, in which Harlequin, a male character, has the principal role. Derived from the Ital-

ian commedia dell'arte, harlequinades came into vogue in early 18th-century England, with a standard plot consisting of a pursuit of the lovers Harlequin and Columbine by the latter's father, Pantaloon, and his bumpkin servant Pedrolino. In the Victorian era the harlequinade was reduced to a plotless epilogue to the main pantomime, which was often a dramatized fairy tale.

Harley, Robert: *see* Oxford, Robert Harley, 1st earl of.

Harlingen, city, Cameron County, southern Texas, U.S., 28 mi (45 km) northwest of Brownsville, with which it forms an industrial–agribusiness–port complex. Founded in the early 1900s and named after Harlingen, Neth., by its pioneer settler, Lon C. Hill, Sr., it became a station on the St. Louis, Brownsville, and Mexico (now Missouri Pacific) Railroad. The city, modern and well planned, is located in the centre of an intensively cultivated agricultural region. It has food-processing plants and is a major transport and distribution hub for cotton, citrus fruits, and vegetables of the Lower Rio Grande Valley. Port Harlingen, with a grain elevator, oil terminals, chemical plants, and other industries, is on the Arroyo Colorado Canal, a spur of the Gulf Intracoastal Waterway. Immediately south is Six Shooter Junction (a reconstructed frontier village); the Confederate Air Force Ghost Squadron and Museum, featuring historic combat aircraft, is at Rebel Field, 4 mi northeast in Harlingen Industrial Air Park. The Marine Military Academy (1963) is close by. Inc. city, 1910. Pop. (1980) city, 43,543; metropolitan area (SMSA), 209,680.

Harlow, new town and coextensive district, county of Essex, England, with an area of 10 sq mi (26 sq km). It was designated by British planners in 1947 as one of London's eight post-World War II new towns to promote the decentralization of the metropolis. The planned growth has taken place in neighbourhoods west of Old Harlow and the main



Water garden and town hall in Harlow, Essex
W. Tasker—Bruce Coleman Inc.

London–Cambridge road. Sir Frederick Gibberd landscaped the town and designed many of the main buildings. Offices of major British firms have located at Harlow, and industries include printing, metallurgy, and the manufacture of scientific and surgical apparatus and furniture. Pop. (1982 est.) 78,700.

Harlow, Jean, original name HARLEAN CARPENTIER (b. March 3, 1911, Kansas City, Mo., U.S.—d. June 7, 1937, Los Angeles), U.S. movie star, the sex symbol of the 1930s, who portrayed frankly sensuous types.

Harlow adopted her mother's maiden name,

Jean Harlow
Brown Brothers

worked as a film extra, and from 1928 played bit parts in comedies at the Hal Roach Studios. *Hell's Angels* (1930) was a box-office hit that established her stardom and initiated a nationwide craze for platinum-blonde hair. Paired with Hollywood's most popular leading men, including Clark Gable, Spencer Tracy, and William Powell, Harlow became one of the cinema's chief money-makers by the early 1930s. She emerged as a comedienne in such films as *Platinum Blonde* (1931), *Red-Headed Woman* (1932), *Red Dust* (1932), *Bombshell* (1933), and *Hold Your Man* (1933), with even greater success. Other well-remembered films in which she appeared include *Dinner at Eight* (1933), *China Seas* (1935), and *Libeled Lady* (1936). Harlow was married briefly to the motion-picture executive Paul Bern, whose suicide in 1932 caused widespread scandal. The following year she married the Hollywood cameraman Hal Rosson (married 1933, divorced 1935). Her untimely death from uremic poisoning occurred during the filming of *Saratoga* (1937).

Harman, Martin Coles, byname KING OF LUNDY (b. 1885, Steyning, Sussex, Eng.—d. Dec. 5, 1954, Oxted, Surrey), English financier and one of the few private individuals—particularly, one of the few persons while alive—to have his portrait on coins.

Harman engaged in questionable dealings that led to bankruptcy in 1932 and imprisonment in 1933–34 for fraud. In 1925 he purchased for £16,000 the island of Lundy, in the Bristol Channel off the northern coast of Devon. He was an absolute ruler of the island, making laws and controlling all employment.

For use on Lundy, Harman issued bronze coins bearing his portrait, the date 1929, and the valuation of one puffin (equivalent to the British penny) or half-puffin, the name referring to a seabird that breeds on Lundy. The coins were issued contrary to British law, and in April 1930 a nominal fine was imposed on Harman. The British government, however, did not protest the issuance of private postage stamps by Harman and subsequent owners of Lundy. Souvenir sets of the Lundy coins were struck in 1965 from the original dies.

harmattan, hot, dry wind that blows from the northeast or east in the southern Sahara, mainly in winter. It usually carries large amounts of dust, which it transports hundreds of kilometres out over the Atlantic Ocean; the dust often interferes with aircraft operations and settles on the decks of ships. The harmattan is locally called "the doctor" because its dryness provides relief from the dampness of the summer.

The harmattan is a trade wind strengthened by a low-pressure centre over the north coast of the Gulf of Guinea. In the summer it is undercut by the cooler winds of the southwest monsoon, blowing in from the ocean; this forces the harmattan to rise to an altitude of about 900 to 1,800 metres (about 3,000 to 6,000 feet). The interaction between the harmattan and the monsoon sometimes produces West African tornadoes.

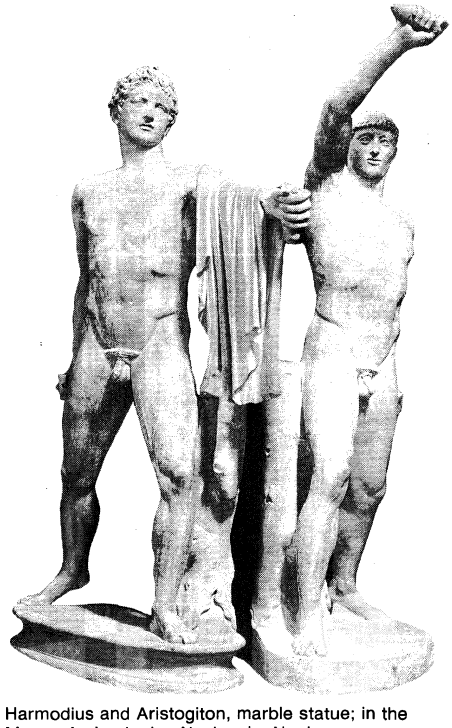
Harmensen, Jacob: *see* Arminius, Jacobus.

Harmhab (Egyptian king): *see* Horemheb.

harmine, hallucinogenic alkaloid found in the seed coats of a plant (*Peganum harmala*) of the Mediterranean region and the Middle East, and also in a South American vine (*Banisteriopsis caapi*) from which natives of the Andes Mountains prepared a drug for religious and medicinal use. Chemically, harmine is an indole hallucinogen that can block the action of serotonin (the indole amine transmitter of nerve impulses) in brain tissue. Harmine occurs as the free alkaloid and may be converted to the hydrochloride salt, which is more soluble. Both are crystalline in form.

Harmodius and Aristogiton (d. 514 BC), the *tyrannoktonoi*, or "tyrannicides," who according to popular, but erroneous, legend freed Athens from the Peisistratid tyrants. They were celebrated in drinking songs as the deliverers of the city, their descendants were entitled to free hospitality in the *prytaneion* ("town hall"), and their statues were set up in the agora. But the truth was less edifying.

Thucydides (*History of the Peloponnesian War*, book vi) explains that the plot against the tyrants derived from Aristogiton's resentment



Harmodius and Aristogiton, marble statue; in the Museo Archeologico Nazionale, Naples
Alinari—Art Resource/EB Inc.

of the advances made by the younger brother of the ruling tyrant Hippias toward his young friend Harmodius. The two friends, with a

small band of accomplices, planned to kill both Hippias and his brother Hipparchus during the armed procession at the Panathenaic festival (514). The plot miscarried. They succeeded in killing only Hipparchus. Harmodius was slain on the spot; Aristogiton was captured and died under torture. The tyranny of Hippias became more ruthless and continued for four more years.

Harmon, Tom, byname of THOMAS DUDLEY HARMON (b. Sept. 28, 1919, Rensselaer, Ind., U.S.—d. March 15, 1990, Los Angeles, Calif.), American football player, a Heisman Trophy winner, who was one of the greatest tailbacks in collegiate football history.

Harmon grew up in Gary, Ind., where he had a superior athletic career at Horace Mann High School. He entered the University of Michigan, Ann Arbor, in 1937 and gained national fame from 1938 to 1940, joining with quarterback Forest Evashevski to give the Michigan Wolverines remarkable victories. In three years Harmon carried 398 times for more than 2,100 yards and scored 237 points on 33 touchdowns, points after touchdown, and field goals. In his senior year (1940) he received both the Heisman Trophy and the Maxwell Trophy and was named the Associated Press's Athlete of the Year.

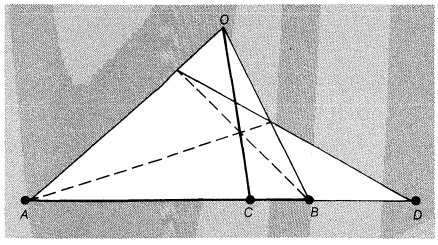
Harmon was a U.S. Army Air Force pilot in World War II in the South Pacific and the China theatre, receiving the Silver Star and the Purple Heart (partly for severely burned legs). After the war he played professional football briefly for the Los Angeles Rams (1946–47). He then became a radio and television sportscaster.

Harmonia, in Greek mythology, the daughter of Ares and Aphrodite, according to the Theban account; in Samothrace she was the daughter of Zeus and the Pleiad Electra. She was carried off by Cadmus, and all the gods honoured the wedding with their presence. Cadmus or one of the gods presented the bride with a robe and necklace, the work of Hephaestus. This necklace brought misfortune to all who possessed it; it led to the death of Amphiaraus, Eriphyle, Alcmaeon, and Phegeus and his sons. Both Harmonia and Cadmus were ultimately metamorphosed into snakes.

harmonic analyzer, also called SPECTRUM ANALYZER, mathematical instrument, used for measurement of the relative amplitudes of sinusoidal components of a periodically recurrent function. The instrument has been applied to studies of physical phenomena such as sound waves, alternating electric currents, tides, machine motions, and sunspots. Many complicated problems yield to the technique of breaking down a periodic function into its components.

The mathematical principle underlying operation of harmonic analyzers is that of Fourier series. The first instrument for performing harmonic analysis was invented by the British mathematician and physicist William Thomson (later Lord Kelvin) in 1876. This instrument, used for the harmonic analysis of tidal observations, embodied 11 sets of mechanical integrators, one for each harmonic to be measured (*see* integrator). A still more complicated machine, handling up to 80 coefficients, was designed in 1898 by the American physicists A.A. Michelson and Samuel W. Stratton. In general, 20th-century harmonic analyzers and synthesizers tend to be electromechanical devices rather than purely mechanical ones. Some modern electronic spectrum analyzers and synthesizers display their results by means of a cathode-ray tube.

harmonic construction, in projective geometry, determination of a pair of points *C* and *D* that divides a line segment *AB* harmonically (*see* Figure); that is, internally and externally in the same ratio, the internal ratio *CB/AB* being equal to the external ratio *BD/AD* on the extended line. The theorem of harmonicity



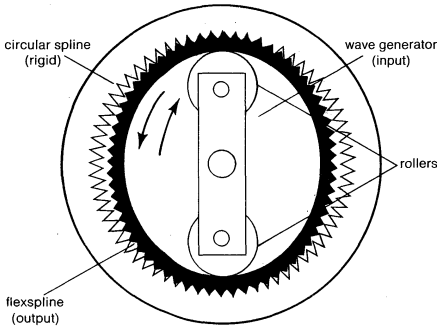
Projective construction of fourth harmonic point

states that if the external point of division of a line segment is given, then the internal point can be constructed by a purely projective technique; that is, by using only intersections of straight lines. To accomplish this, an arbitrary triangle is drawn on the base *AB*, followed by an arbitrary line from the external point *D* cutting this triangle in two. The corners of the quadrilateral formed thus joined and the point determined by the intersection of these diagonals together with the point at the vertex of the triangle determine a line that cuts *AB* in the proper ratio.

This construction is of interest in projective geometry because the location of the fourth point is independent of the choice of the first three lines in the construction, and the harmonic relationship of the four points is preserved if the line is projected onto another line.

Harmonic Drive, mechanical speed-changing device, invented in the 1950s, that operates on a different principle from, and has capabilities beyond the scope of, conventional speed changers. It consists of a thin ring that deflects elastically as it rolls on the inside of a slightly larger rigid circular ring.

The three elements of the basic Harmonic Drive are shown in the Figure. The circular



Harmonic Drive

spline has internal teeth that mesh with external teeth on the flexspline. The flexspline has fewer teeth and consequently a smaller effective diameter than the circular spline. The wave generator is a link with two rollers that rotates within the flexspline, causing it to mesh with the circular spline progressively at diametrically opposite points. If the wave generator (the input) rotates clockwise while the circular spline is fixed, the flexspline (the output) will rotate or roll around on the inside of the circular spline at a much slower rate in a counterclockwise direction.

The ratio of the input speed to the output speed depends on the difference in the number of teeth in the circular spline and in the flexspline. Speed ratios as high as 320 to 1 can be produced in single-reduction Harmonic Drives that are lighter, smaller, and more efficient than conventional high-ratio drives. Compound drives can produce ratios as high as 1,000,000 to 1. Either the circular spline, the flexspline, or the wave generator may be fixed while the other two elements serve as input and output.

A unique and useful characteristic of the Harmonic Drive is its ability to transmit motion through sealed walls. The flexspline teeth can be placed near the centre of a long, hermetically sealed, flexible, cylindrical tube. The wave generator can be inside the tube and by its rotation deflect the flexspline and produce a slow rotation of the encircling circular spline. A rotary-to-linear version of the Harmonic Drive uses a screw and moves the control rod in a nuclear reactor head without mechanical contact through a sealed tube. Harmonic Drives have been employed in a variety of applications that range from such low-cost consumer applications as vending machines and rotating home-television antennas to sophisticated systems for military and aerospace use.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

harmonic function, mathematical function of two variables having the property that its value at any point is equal to the average of its values along any circle around that point, provided the function is defined within the circle. An infinite number of points are involved in this average, so that it must be found by means of an integral, which represents an infinite sum. In physical situations, harmonic functions describe those conditions of equilibrium such as the temperature or electrical charge distribution over a region in which the value at each point remains constant.

Harmonic functions can also be defined as functions that satisfy Laplace's equation, a condition that can be shown to be equivalent to the first definition. The surface defined by a harmonic function has zero convexity, and these functions thus have the important property that they have no maximum or minimum values inside the region in which they are defined. Harmonic functions are also analytic, which means that they possess all derivatives (are perfectly smooth) and can be represented as polynomials with an infinite number of terms, called power series.

Spherical harmonic functions arise when the spherical coordinate system (a system that locates a point in space by coordinates in which one, r, represents distance from the origin and two others, θ and φ, represent the angles of elevation and azimuth, as in astronomy) is used in investigating physical problems in three dimensions involving fields such as gravitational, magnetic, electrical, and those arising from certain types of fluid motion.

There are two types of spherical harmonics: (1) solid spherical harmonics, $R_n(x, y, z)$, which are special nth-degree polynomials having a value for all points inside a sphere; and (2) surface spherical harmonics, $S_n(\theta, \varphi)$, which describe a function only on the surface of a sphere. These two types of harmonics are related by the equation $R_n(x, y, z) = r^n S_n(\theta, \varphi)$, and it is the determination of the surface spherical harmonic that thus represents the difficult part of the theory. The surface spherical harmonic $S_n(\theta, \varphi)$ can be written as the product of two functions, one of which is $\exp(\pm im\varphi)$, in which m is a positive integer or zero, and another more complicated function that depends only on θ. The part that depends on θ is called an associated Legendre function, and these functions are the solutions of a differential equation called the associated Legendre equation.

Any solution of the Laplace equation can be written as a (possibly infinite) sum of solid spherical harmonics.

harmonic motion, simple: *see* simple harmonic motion.

harmonica, either of two musical instruments, the friction-sounded glass harmonica (*q.v.*) and the mouth organ, a free-reed wind instrument produced by Friedrich Buschmann of Berlin in 1821 as the *Mundäoline.* It consists of free metal reeds set in slots in a small, metal-enclosed wooden frame and supplied with wind through two parallel rows of wind channels. The notes of the diatonic (seven-note) scale are obtained by alternately blowing and sucking, the reeds positioned to sound by alternate directions of wind flow. The tongue covers channels not required. In chromatic (12-note scale) models, a finger-operated stop selects either of two sets of reeds tuned a semitone apart. Compass ranges from two to four octaves, and harmonica bands include bass models. The virtuosity of some modern players has stimulated several eminent composers to write for the instrument.

The harmonica is only one of several free-reed mouth organs. The oldest, the Chinese *sheng,* brought to Europe in the 18th century, provided the principle both for the harmonica and for the short-lived symphonium, in which buttons channelled air from a single mouth hole to the proper reeds.

harmonium, also called REED ORGAN, free-reed keyboard instrument that produces sound when wind sent by foot-operated bellows through a pressure-equalizing air reservoir causes metal reeds screwed over slots in metal frames to vibrate through the frames with close tolerance. There are no pipes; pitch is determined by the size of the reed. Separate sets of reeds provide different tone colours, the quality of the sound being determined by

Harmonium by Jacob Alexandre, Paris, 19th century
Behr Photography

the characteristic size and shape of the tone chamber surrounding each reed of a given set; constricted chambers, for instance, induce powerful vibration and incisive tone. Volume is controlled by a knee-operated air valve or directly from the bellows pedals by an expression stop that allows the wind supply to bypass the reservoir. The instrument's compass is normally four to five octaves.

The earliest instrument of the harmonium group was the physharmonica, invented in 1818 by Anton Haeckl in Vienna. His invention was inspired by the Chinese mouth organ, or *sheng,* which, taken to Russia in the 1770s, had introduced the free reed to Europe and aroused the interest of certain physicists and musicians. Now extinct, other types (such as John Green's seraphine) appeared before Alexandre Debain produced his harmonium in Paris in 1840. The main improvements after 1850 were made by Victor Mustel in Paris and Jacob Estey in the United States.

The harmonium was a popular church and household instrument until the electronic organ drove it from the market after the 1930s. Compositions for the instrument include numerous works by the French composers César Franck and Louis Vierne and a quartet for two violins, cello, and harmonium by the Bohemian composer Antonín Dvořák.

Harmony, borough, Butler County, western Pennsylvania, U.S., on Connoquenessing Creek, 25 mi (40 km) north of Pittsburgh. It is known as the first settlement in America of the Harmonist Society (Rappites) led by "Father" George Rapp (*q.v.*) from Württemberg, Ger., who held religious-communistic views and espoused celibacy. The town was laid out in 1805 as a "Community of Equality" and named Harmony for one of the society's principles. The graveyard (just southeast of the borough where more than 100 Harmonists lie buried), a few brick houses, the Harmony Museum, and the Tower Clock (dating from 1650 and brought from Germany by Rapp) are reminders of the original settlers who in 1815 migrated to Indiana and founded New Harmony (*q.v.*). Rapp's followers returned to Pennsylvania in 1825 and established the village of Economy (now Ambridge [*q.v.*]).

Oil, natural gas, coal, and iron deposits are characteristic of the vicinity, and Harmony has acquired some industry—notably the manufacture of paper tissue, fabricated metals, machine tools, and exhaust fans. Pop. (1980) 1,334.

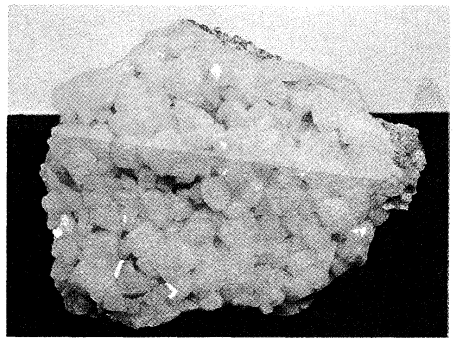
harmony, two or more musical notes heard simultaneously or, more narrowly, in Western music, the sounding of two or more sonorities (chords) and their movement to other chords. Harmony is both a vertical dimension of music, in that the notation of chords requires the placing of noteheads on the same vertical axis, and a horizontal one, the process of movement from one chord to the next, or harmonic progression. As such, harmony is inextricably linked to counterpoint (*q.v.*), the interaction of simultaneously sounding melodic lines. Harmony and counterpoint are two constantly interacting dimensions of music; the melodic lines can be thought of as giving rise to the harmony, and the harmonic progressions influence linear movement.

A brief treatment of harmony follows. For full treatment, *see* MACROPAEDIA: Music, The Art of.

Central to harmony throughout the history of Western music are the concepts of consonance and dissonance. A consonant chord is perceived as being at rest, whereas a dissonant one is in a state of tension that requires a resolution. This tension–resolution relationship has been a key aspect of music composition from its beginnings. The perception of which intervals constitute a consonant or dissonant chord, however, has been in a constant state of flux. The relative degree of tension in a chord is, therefore, not an intrinsic quality but an associative one, as the presence of consonance and dissonance are associated with particular chords and intervals according to their place in the context of the prevailing style. The same chord found in compositions from different musical eras will often have different significance and meaning and, therefore, use. Broadly speaking, the pattern of historical development has been a constantly expanding group of chords considered consonant, as chords of greater complexity enter the musical vocabulary and chords formerly of relative intensity become less intense in the new context.

In the prevailing harmonic practice from the 9th century, organum, octaves, fifths, and fourths were the only consonant intervals. These intervals are simplest in their intervallic proportions, that is, the numerical proportion of the frequencies (cycles per second) of the constituent members of the chord. More complex proportions, such as those at thirds and sixths were considered dissonant at the time, though by the early 15th century these intervals were heard as consonant. The seconds and sevenths, however, retained their dissonant associations until the late-19th and early-20th centuries, when Claude Debussy and Arnold Schoenberg, among others, used these intervals in ways that were not part of the immediately preceding harmonic system. Harmony, then, is a system of classification of chords that is relevant to a particular and limited body of musical works—providing order and facilitating structural meaning.

harmotome, hydrated barium aluminosilicate mineral, $BaAl_2Si_6O_{16} \cdot 6H_2O$, in the zeolite family. Harmotome is isostructural with the mineral phillipsite; that is, the three-dimensional structure of the aluminosilicate framework is the same in the two substances. Its glassy, crosslike twinned crystals vary in colour from white to gray, yellow, red, and



Harmotome from Strontian, Scot.
By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard—EB Inc.

brown. It is ordinarily found with chabazite in basalts, as in Bodenmais, Ger.; Kongsberg, Nor.; and Strathclyde region, Scot. *See also* phillipsite. For detailed physical properties, *see* zeolite (table).

Harmsworth, Alfred Charles William: *see* Northcliffe, Alfred Charles William Harmsworth, Viscount.

Harmsworth, Harold Sidney: *see* Rothermere, Harold Sidney Harmsworth, 1st Viscount.

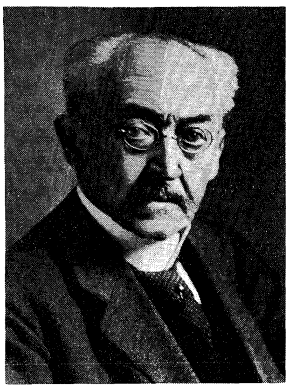
Harmsworth Cup, formally BRITISH INTERNATIONAL TROPHY FOR MOTORBOATS, motorboat racing award established in 1903 by the British publisher Sir Alfred Harmsworth (later Viscount Northcliffe), the first perpetual international event in the sport. A contest between boats representing nations, the trophy is open to challenge by any boat under 40 feet (12 metres) in length, all parts of which have been produced in the country represented. The first nation to win two heats of a contest takes the trophy, a bronze plaque.

Competition has been irregular. The trophy was first won in 1903 by Englishman S.F. Edge's "Napier I," a displacement (through-the-water) craft, with a speed of 19.53 miles per hour. Since 1911 the contest has been dominated by hydroplanes (over-the-water craft) of unlimited engine displacement. U.S. boats defeated all challengers between 1920 and 1959. The Canadian entry "Miss Supertest III" won in 1959 and defeated U.S. challenges in 1960 (averaging better than 116 miles per hour) and 1961 to become the first boat to win the trophy three times. Competition for the trophy was revived in 1980.

Harnack, Adolf (Karl Gustav) von (b. May 7, 1851, Dorpat, Estonia, Russian Empire—d. June 10, 1930, Berlin), German theologian, historian, and leading scholar on the early Church Fathers; he was recognized also for his scientific endeavours. In such seminal works as *The History of Dogma,* 3 vol. (1886–89; 4th ed. 1909) and *The History of Ancient Christian Literature,* 3 vol. (1893–1904), he

sought to demonstrate that the relevance of Christianity to a modern world lay not in theological dogmatism but in the understanding of the religion as a historical development. He was ennobled (with the addition of *von* to his name) in 1914.

Harnack was born in Dorpat, Livonia (Estonia), where his ancestors had moved from



Harnack, photographed during the 1920s
The Bettmann Archive

Germany. His father, Theodosius Harnack (1817–89), was a professor of practical and systematic theology, first in Dorpat, then for 13 years in Erlangen, Ger., and again, until his death, in Dorpat. His chief work, dealing with the theology of Luther, is still widely read.

Adolf von Harnack was educated at the universities of Erlangen, Dorpat, and Leipzig. After obtaining the doctorate with a dissertation on a text of an early Christian heresy (Gnosticism), he became a lecturer at the University of Leipzig in 1874. Two years later, he was promoted to a professorship in church history. In 1879 he moved to Giessen and in 1886 to Marburg. From there he was called in 1888 to a professorship at the University of Berlin. Because of his liberal theological views, especially with respect to the validity of the historical Christian creeds, his appointment to the post at Berlin was opposed by the supreme council of the Evangelical Church of Prussia, but the opposition was overruled by Chancellor Otto von Bismarck and, on his advice, by the emperor William II; the latter had become emperor in 1888, the year of Harnack's appointment at Berlin.

Throughout his life, though maintaining academic appointments in theology and church history, Harnack was denied ecclesiastical posts. Nevertheless, he exercised broad influence in Protestant churches, because, through his masterful teaching and his solid learning, he won an enthusiastic following among his students, many of whom rose to positions of ecclesiastical leadership.

He also was highly effective as a historian, not only because he completely mastered the primary sources but also because he regarded himself as called upon to assume the royal function of a judge. "We study history," he said,

> in order to intervene in the course of history, and it is our right and duty that we do this, for if we lack historical insight we either permit ourselves to be mere objects placed in the historical process or we shall tend to lead people down the wrong way. To intervene in history—this means that we must reject the past when it reaches into the present only in order to block us. It means also that we must do the right thing in the present, that is, anticipate the future and be prepared for it in a circumspect manner.

In his voluminous writings, he brought to a culmination the interpretation of the Christian religion as a historical "development" as it had been taught by the earlier German biblical and historical theologians Johann Salomo Semler, Ferdinand Christian Baur, and Albrecht Ritschl. His purpose was to replace theological dogmatism by historical understanding. His chief works were *The History of Dogma; The Mission and Expansion of Christianity in the First Three Centuries*, 2 vol. (1902; 4th ed. 1924); and *The History of Ancient Christian Literature*. He was the chief editor of a critical edition of *The Greek-Christian Authors of the First Three Centuries* (1891–). In addition to these writings he published numerous monographs on the New Testament and on the doctrines and institutions of the ancient church. It was a signal honour that, though a theologian, he was asked to write *The History of the Prussian Academy of Sciences* in connection with the celebration of its 200th anniversary (3 vol.; 1900). Harnack revealed himself in this work as a comprehensive historian of modern learning. Indeed, he was a master of many fields of knowledge. Throughout his life, he concerned himself with the life and thought of the German Romantic poet Johann Wolfgang von Goethe (1749–1832) and devoted to him several profound studies.

His most popular book, *Das Wesen des Christentums* (1900; *What Is Christianity?*, 1901, 15th ed. 1950), is a transcript of a student's stenographic record of a course of lectures, which were delivered in the University of Berlin.

In all these works it was Harnack's purpose to show how it happened that the gospel of Jesus, which in his view has nothing in common with authoritarian ecclesiastical statutes and doctrines, became embodied in the doctrines of the church. He also wanted to offer support for his conviction that, if the gospel is to retain power in the modern world, it must be freed from its connection with the dogmas of God and Christ with which it became identified necessarily to survive in the Hellenistic world.

Holding three important positions at the height of his career, each one of which normally would have demanded a man's whole effort, Harnack had a profound impact on historical theological scholarship and was a major influence in the natural sciences. A professor of church history at the University of Berlin, he made important and creative contributions to historical and theological scholarship, in recognition of which he became a member of the Academy of Sciences in Berlin. In addition, he was the general director of the Prussian State Library and, after 1911, president of the Kaiser-Wilhelm-Gesellschaft (now called Max-Planck-Gesellschaft zur Förderung der Wissenschaften). Harnack secured the support of government and industry for this foundation and established research institutes in the natural and medical sciences.

Harnack never left his position at the University of Berlin until he retired in 1921, at which time he was granted the title professor emeritus. At the memorial service held in Berlin after his death, the rector of the university characterized him as follows:

> He was of a noble aristocratic character; his outward distinction was softened by a generous, considerate, and kind disposition. In conversation, he never let one feel his superiority; on the contrary, he enhanced the self-confidence of the one who was speaking with him by rearranging in a most agreeable way whatever was said to him and putting it in such a form that the other took great delight in the thought he had expressed.

(W.P.)

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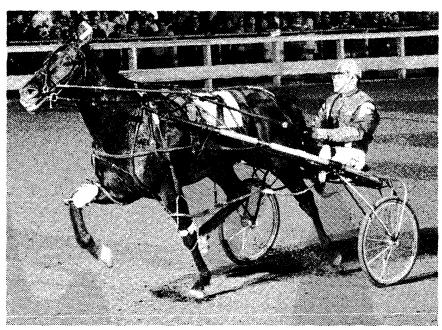
harness, the gear or tackle other than a yoke of a draft animal (as a horse, dog, or goat). The modern harness appears to have been developed in China some time before AD 500 and to have been in use in Europe by 800.

The basic harness used for horses in Western cultures consists of a padded leather collar resting on the horse's shoulders and several associated straps. Two rigid pieces of metal called hames rest on this collar, fastened at top and bottom by hame straps. To this assemblage are attached the traces, straps that pass back along the animal's sides and are connected to the load. Other straps encase the animal's body and reinforce the rig. Reins are long straps that pass from the bridle (*q.v.*) on the horse's head, through loops in the hames, and back to the hands of the driver, who uses the reins to control the animal.

harness racing, sport of driving at speed a Standardbred (*q.v.*) horse pulling a light two-wheeled vehicle called a sulky. Harness racing horses are of two kinds, differentiated by gait: the pacing horse, or pacer, moves both legs on one side of its body at the same



Pacer
Pictorial Parade—EB Inc.

time; the trotting horse, or trotter, strides with its left front and right rear leg moving forward simultaneously, then right front and left rear together. Harness racing is one of the two main kinds of horse racing; the other involves horse racing astride in a saddle. For the latter, *see* horse racing.

Origins. Early records of the antecedents of harness racing are ancient. Assyrian kings of 1500 BC maintained elaborate stables, and professional trainers for horses used to draw chariots, originally used in war but soon also used in the sport of hunting. Homer's account of the chariot race in the Iliad is later. There were four-horse hitch chariot races in the Olympic Games of the 7th century BC and races with two-horse hitches earlier. Horses were locally bred with others from Asia Minor and Northern Africa.

Chariot racing came into great prominence as a sport after its transfer to Rome. Public records were kept of the bloodlines of horses; exceptional horses were buried with stelae giving their records (one had 1,300 first place victories, 88 second places, and 37 third places). A perfect site was found between the Palantine and Aventine hills, where the Circus Maximus was built. By the 4th century AD the permanent stands could hold 200,000 spectators. In Greece chariot racing had been a sport of rich men, but in Rome the sport involved companies, distinguished by their colours: white, red, blue, and green. In the reign of Augustus (27 BC–AD 14) there were 12 races a day; by Flavius' reign (69–96), the number rose to 100, from daybreak until sundown, the length of races being shortened to accomodate the larger number. The sport had professional racing officials, starting chutes, disputes at law, accusations of doping horses, widespread gambling (spectators wore their favourite company's colour), and riots. The

chariot disappeared as a military vehicle and chariot racing ended with the fall of Rome in the 4th century; modern harness racing did not begin to evolve until early in the 19th century.

Early history. As early as 1554 the fastest of 3,000 horses at a horse fair in Valkenburg in Holland competed in trotting matches. The Golden Whip, Holland's most famous trotting event, was first run in 1777 at Soestdijk. About the same time Aleksey, Count Orlov, began to develop a powerful trotting strain at his stud farm in Russia. From his stallion Barss came the Orlov trotter that became the foundation of Russian trotting stock.

England's Norfolk Trotter, which emerged as a breed around 1750, was purely a road horse, but its speed led to its being used for road racing as a diversion for its owners. Most of its matches were trotting a given distance within a specified time.

Trotting in North America also had its heritage in road racing, but in the early 19th century there were trotting tracks in the United States. Yankee trotted a mile over the track at Harlem, New York, in 1806 in 2:59. This time was lowered to 2:48½ by an unnamed trotting gelding from Boston at the Hunting Park track in Philadelphia in 1810. By mid-century harness racing also thrived at county fairs in the United States and agricultural fairs in eastern and central Canada.

By 1840 trotting was an organized sport in New England, and a new era was underway. In 1871 the Grand Circuit, originally known as the Quadrilateral Trotting Combination, was established and grew from 4 to 23 tracks. In 1879 the Standardbred horse was established in the United States, based on a standard of time performance—2 minutes 30 seconds—for one mile.

The creation and evolution of the Standardbred horse and that breed's impact on world trotting rested on the prepotency of the English Thoroughbred stallion Messenger, imported to Philadelphia in 1788. He became both a major contributor to the American Thoroughbred through his undefeated grandson American Eclipse, but also immortal for harness racing as a sire of Thoroughbred runners that became trotting stallions. Ten of his sons became leading trotting sires in the early 19th century, and his great-grandson Hambletonian 10, foaled in 1849, sired 1,331 sons and daughters between 1851 and 1875 and obliterated all other strains of the trotting horse in the United States. He founded a line so dominant that all American Standardbreds after him and many trotters in the rest of the world can be traced to him.

The American pacer descended a different path from that of the trotter. Pacer heritage fuses the blood of the Narragansett pacer, a saddle horse that disappeared by 1850, and the Canuck of French Canada. The trotter began in the East, but the great growth of the pacer was in the Midwest and South, primarily in Ohio, Indiana, Kentucky, and Tennessee. Before the pacer attained popularity late in the 19th century, it was a despised horse.

Worldwide development. Trotting spread rapidly, being introduced to France in 1836. In Italy there had been cart racing as early as 1808, but the introduction of French blood stock made it much more popular, as it did in Belgium and Holland. Sweden began harness racing in the 1880s, and Austria and Germany began late in the century. Only in Great Britain did it not take hold. U.S. stock was introduced to Australia and New Zealand, but real popularity there came only in the 20th century.

As American trotting moved from county and agricultural fairs to regular harness racing tracks, such champions as Lady Suffolk, nicknamed the "old gray mare"; Flora Temple, the "bobtailed mare" of the well-known song "Camptown Races"; the legendary Goldsmith Maid and Dexter; and especially the popular Maud S. led to extremely active European and worldwide interest in American breeding stock.

A rival of Lady Suffolk, the gelding Americus, had made a highly successful invasion against English road trotters in the 1850s, and in the same decade the trotting mares Lady Pierce and Miss Bell had been exported to France, where both raced well. Lady Pierce produced a line that led to Fuchsia, the greatest early trotting progenitor of the French breed. As the 19th century ended, American blood stock was introduced into virtually all trotting nations of the world. In the 1890s 2,000 American Standardbreds had been exported by 1898 and 3,000 by 1903. The American influence was to remain a dominant factor. Only in France and Russia was there resistance. The Orlovs remained dominant in Russia. The French had established their own breeds in the strong *demisangs* (half-bloods) of Normandy. The French closed their studbook to foreign horses in 1937.

The arrival of the Big Four—Mattie Hunter, Sleepy Tom, Rowdy Boy, and Lucy—in the 1870s; the coming of the first two-minute harness horse, the pacer Star Pointer in 1897; and the overwhelming popularity of Dan Patch in the early years of the 20th century did much to foster the popularity of pacers.

The sulky. The modern harness racing vehicle developed from a single-seat pleasure conveyance. Earlier racing had used carts. In its final form it is little more than a U-shaped shaft mounted on two wheels with a seat at the end of the U. When it was introduced in harness racing early in the 19th century it weighed about 125 lb (56 kg), but by the 1870s it had been reduced to 46 lb (21 kg). The addition of ball bearings and pneumatic tires in the 1880s and of bicycle wheels in the 1890s established the present form, though there have been refinements. The driver's seat was lowered. When in 1903 the trotter Lou Dillon broke the two-minute mile barrier, his record was exceeded by only four horses through 1969. In the preceding 58 years the record had been successively lowered by half a minute. Lou Dillon's sulky weighed 25 lb (11.3 kg).

The decline and rise of harness racing. From the zenith at the turn of the 20th century, with popular horses, new records, and larger attendance, harness racing then declined, though it persisted at county fairs, on the Grand Circuit, and in Europe. Some attributed the change to the rise of the automobile and the passing of the road horse, though most racing had long been on tracks. Others attribute the decline to a revulsion from corruption arising from gambling, which resulted in fixed races, the disqualification of a racer for breaking gait or the pulling up of a horse by a driver being easily accomplished without provable detection.

Two changes turned the tide. Pari-mutuel (*q.v.*) racing under lights was introduced at Roosevelt Raceway in New York City in 1940 (there had been occasional night racing in the 1890s and under the lights in Toledo, Ohio, in 1927); and the mobile starting gate (a pair of retractable metal wings mounted on the rear of an automobile that moves off slowly, getting the horses off to an even running start, and then accelerates away and off the track) was instituted, also at Roosevelt, in 1946.

The sport surged in some ways in the same manner as did horse racing on the flats. In the quarter century after 1948 attendance nearly tripled; state revenue increased nearly eightfold; purses nearly tenfold; the number of horses starting fourfold; and membership in the United States Trotting Association (founded in 1938 as a merger of other groups after the governance of harness racing had fallen into disarray) nearly quintupled.

The U.S. classic races show some difference. Of the trotting triple crown races, the Hambletonian (from 1926), Yonkers Futurity (from 1958), and the Kentucky Futurity (from 1893), one began in the revival period; and of the pacing triple crown races, the William H. Cane Futurity (from 1955), Messenger Stake (from 1957), and Little Brown Jug (from 1946), none dated before the revival period. These classic races preserved heat racing, a winner needing two heat victories; but generally races were at a mile.

Notable American horses included the trotter Greyhound in the 1930s, the pacers Adios in the 1940s and his son Adios Butler in the 1950s, the pacer Bret Hanover and the trotter Nevele Pride in the 1960s, and the pacer Niatross retired to stud in 1981. The French trotting mare Une de Mai was at one time one of the leading money winning horses in purses.

Harness racing expanded greatly in New Zealand and Australia, France, Italy, Sweden, Austria, and Russia. New York City's Roosevelt and Yonkers raceways, and Meadowlands in New Jersey dominate U.S. and Canadian harness racing; but there are major centres in Chicago, Philadelphia, and Los Angeles, and in Toronto and Montreal. Meanwhile, the county and state fair meets prosper. The advent of the Roosevelt International Trot in 1959, the International Pace series at Yonkers in the 1960s, and the introduction of the World Driving Championship in 1970 all fostered international competition.

The state of harness racing. By 1980 harness racing seemed to have no limit to its growth in purse amounts, attendance, stud fees, and prices paid for horses. The $1,000,000 earning horses were topped by $2,000,000 winners. A pace at Meadowlands in 1980 had a purse value of more than $2,000,000 with more than $1,000,000 going to the winner. Drugs used on horses for medication complicated the problem of controlling corruption. There was over-racing (a day's card was normally ten races). Harness racing and flat racing serve different constituencies, but a determined horseplayer could leave after the ninth race at a flat-course track and have time for a meal before the evening's harness racing began.

See Sporting Record: *Horse racing.*

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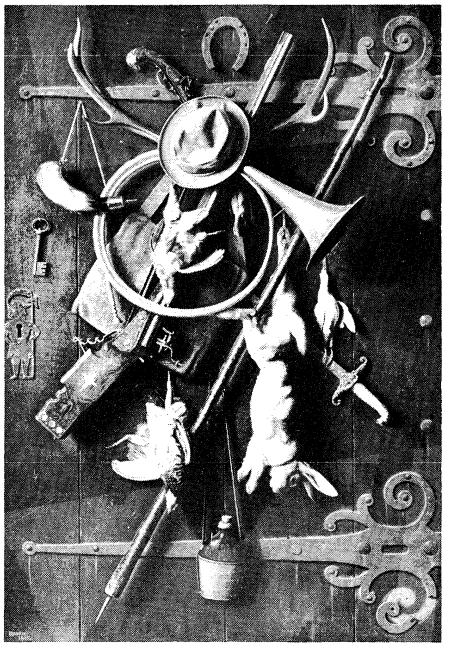
harnessed antelope: *see* bushbuck.

Harnett, William (Michael) (b. Aug. 10, 1848, Clonakilty, County Cork, Ire.—d. Oct. 29, 1892, New York City), U.S. still-life painter who was one of the masters of trompe l'oeil painting in the 19th century.

As a child Harnett was brought to Philadelphia, where he later trained as an engraver and studied at the Pennsylvania Academy of the Fine Arts. His early work shows the influence of the Philadelphia still-life artists Raphaelle and James Peale. In 1880 he went to Europe, visiting London, Frankfurt, Munich, and finally Paris, where he painted his best known work, "After the Hunt" (1885; California Palace of the Legion of Honor, San Francisco). He returned to the United States in 1886 and, except for another European trip in 1889, lived in New York City until his death. Among his favourite subjects were firearms ("The Faithful Colt," 1890; Wadsworth Atheneum, Hartford, Conn.), books ("Job Lot, Cheap," 1878; Reynolds House, Winston-Salem, N.C.), and musical instruments ("The Old Violin," 1886; William J. Williams Collection, Cincinnati, Ohio).

Harnett's paintings were extremely popular with the public, but most critics thought his works were mere trickery. Both groups ignored



"After the Hunt," oil on canvas by William Harnett, 1885; in the California Palace of the Legion of Honor, San Francisco

By courtesy of the California Palace of the Legion of Honor, San Francisco, Mildred Anna Williams Collection; photograph, Joseph Schopplein

his outstanding skill in abstract composition. After a long period of disrepute, Harnett's works again were appreciated and sought after in the mid-20th century.

Harney Peak, highest point (7,242 ft [2,207 m]) in the Black Hills and in South Dakota, U.S., and the highest point in the nation east of the Rockies. It lies 10 mi (16 km) north-northeast of Custer near the Mount Rushmore National Memorial. The granite peak, noted for its scenic views and mountain goats, was named for Gen. William A. Harney, who in 1857 passed nearby with a military force en route to Ft. Pierre.

Härnösand, city and port, capital of the administrative *län* (county) of Västernorrland, northeastern Sweden, on the Gulf of Bothnia, near the mouth of Ångermanälven. It is set amid hills partly on the mainland and partly on Härnön, an island just offshore. From its founding (1585), it grew into the principal town of the *landskap* (province) of Ångermanland and later of Västernorrland, and into the seat of a Lutheran bishopric. It was burned by the Russians in 1721 and afterwards rebuilt. Its economy centres on forestry and shipping. It is also an educational and cultural centre. Pop. (1984 est.) mun. 27,708.

Haro, Luis Méndez de (b. Feb. 17, 1598, Valladolid, Spain—d. Nov. 26, 1661, Madrid), chief minister and favourite of King Philip IV (reigned 1621–65), who failed to stem the decline of Spanish power and prestige.

Haro's political career advanced under the patronage of his uncle the Count of Olivares, who was chief minister during 1621–43 and whom he succeeded when Olivares fell from favour. Shortly thereafter the era of Spanish military preeminence ended with the defeat at the Battle of Rocroi (May 1643). Haro was able to claim success in the suppression of rebellion in Spain's Italian possessions in the province of Catalonia, but he could not arrest economic decline and consequent social distress. He also failed to subdue the rebellious Portuguese or stem English colonial encroachments. Haro gained moderate terms in the Peace of the Pyrenees (1659), which ended the long war with France; nevertheless, Spanish power was on the wane.

Haro Strait, passage of the eastern North Pacific, lying between Vancouver and Saturna islands of the province of British Columbia, Can. (west), and the San Juan and Stuart islands of the state of Washington, U.S. (east). Part of the United States–Canadian border passes down the centre of the strait, which extends north to the Strait of Georgia and south to Juan de Fuca Strait. Mid-channel depths average 600–900 ft (180–275 m), but at its southern end submerged islands reduce the depth to 60–300 ft. Vessels approaching Vancouver usually follow Haro Strait through the islands to the Strait of Georgia. The strait was named for Gonzalo López de Haro, a Spaniard who probably explored the waters in 1790.

Harold, Danish and Norwegian HARALD, name of rulers grouped below by country and indicated by the symbol •.

DENMARK

• **Harold I:** *see* Harald I *under* Harald (Denmark).

ENGLAND

• **Harold I,** byname HAROLD HAREFOOT (d. March 17, 1040, Oxford), king of England from 1035 to 1040. He was the illegitimate son of King Canute, the Dane who ruled England from 1017 to 1035. Harold was made regent of England after his father's death in 1035 because Canute's legitimate son, Hardecanute, king of Denmark and claimant to the English throne, was occupied with affairs in Denmark. In 1036 Harold was responsible for the brutal murder of another royal claimant, Alfred the Aetheling, son of King Ethelred II the Unready (ruled 978–1016). Harold then proclaimed himself king and banished Hardecanute's mother. He protected his realm from Welsh and Scot invaders, and upon his death Hardecanute ascended the throne.

• **Harold II,** also called HAROLD GODWINESON, or GODWINSON (b. *c.* 1020—d. Oct. 14, 1066, near Hastings, Sussex, Eng.), last Anglo-Saxon king of England. A strong ruler and a skilled general, he held the crown for nine months in 1066 before he was killed at the Battle of Hastings by Norman invaders under William the Conqueror. Harold's father, Godwine, earl of Wessex and Kent, was the most powerful man in the kingdom during the first years of the reign of Edward the Confessor (1042–66). In about 1044 Godwine obtained for Harold the earldom of East Anglia. In 1051 Edward banished Godwine and his sons for defying royal authority, but Harold led the forces that in 1052 invaded England and forced the King to restore the family.

Harold II, silver penny with design attributed to Theodoric, 1066; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Upon Godwine's death in 1053, Harold succeeded to his father's earldoms and became the chief power in the land. By 1057 he had obtained earldoms for his three brothers, Tostig, Gyrth, and Leofwine. His only rival was the house of Leofric of Mercia. Leofric's outlawed son, Aelfgar, raided Mercia with help from the Welsh, and in retaliation Harold and Tostig subjugated Wales in 1063. In 1065 the Northumbrians revolted against Tostig, their earl. Bowing to rebel demands, Harold gave Tostig's earldom to Morcar of the house of Mercia, but by doing so he made Tostig his bitterest enemy. Nevertheless, Harold's position remained unshaken.

On his deathbed Edward the Confessor had supposedly designated him the royal heir. Earlier, Edward had, however, promised the crown to William, duke of Normandy. Moreover, Harold himself, when shipwrecked on the coast of Normandy, had been forced to promise to support William's claim. Hence, when Harold assumed power on the death of Edward (Jan. 5, 1066), he was immediately threatened with the rivalry of William and another royal claimant, Harald III Hardraade, king of Norway, as well as with the enmity of Tostig. In May, Harold mobilized his fleet and army against an expected invasion by William. Instead, he had to use his forces to repel Tostig's raids on the south and east coasts of England. He dismissed his men in early September because he had run short of supplies. Thus, William was free to cross the English Channel unopposed. Tostig and Harald III Hardraade joined forces and invaded England in that month, but they were defeated and killed by Harold at Stamford Bridge, near York, on September 25. Three days later William landed in England. Harold attacked him near Hastings on October 14, and in an all-day battle the King, Gyrth, and Leofwine were killed. The accession of William to the English throne as King William I ended the Anglo-Saxon phase of English history.

NORWAY

• **Harold I–IV:** *see* Harald I–IV *under* Harald (Norway).

harp, stringed instrument in which the resonator, or belly, is perpendicular, or nearly so, to the plane of the strings. Each string produces one note, the gradation of string length from short to long corresponding to that from high to low pitch. The resonator is usually of wood or skin. In arched, or bow-shaped, harps the neck extends from and forms a curve with the body. In angular harps, body and neck form an angle. In frame harps (mostly confined to Europe) body and neck are set at an angle and are connected by a column, or forepillar, that braces against the tension of the strings. Harps lacking a forepillar are strung at relatively low tension, which results in a lower pitch than frame harps. The modern double-action pedal harp combines the basic structure and sound of ancient harps with a complex mechanism in order to obtain a full chromatic range.

Harps were widely used in the ancient Mediterranean and Middle Eastern civilizations, although rare in Greece and Rome; depictions survive from Egypt and Mesopotamia from *c.* 3000 BC. Many were played in vertical position and plucked with the fingers of both hands, but Mesopotamia also had horizontal harps. Placed on the player's lap, strings toward him, they were plucked with a plectrum. Horizontal harps are pictured in India as late as AD 800 but apparently died out in the Middle East around 600. At this same time arched harps fell out of use in the Middle East but survive today in Africa, Burma, and a few isolated areas. Angular harps survived until the 19th century in Iran.

Double-action pedal harp
By courtesy of Lyon-Healy

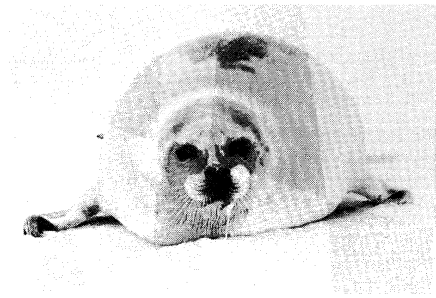
Frame harps appeared in Europe by the 9th century; their ultimate origin is uncertain. Medieval harps were apparently wire strung, typically had outcurving forepillars, and eventually were tuned diatonically (seven notes per octave). They were particularly important in Celtic societies. In the late 14th century the earlier form was displaced on the Continent by the Gothic harp, with a slender, straighter neck; thin, shallow soundbox; and nearly straight pillar. By about 1500, possibly earlier, it was strung with gut strings. This European diatonic harp developed into the modern harp and survives in the folk harps of Latin America.

From the 17th century the harp was progressively subject to efforts to give it the chromatic notes demanded by changing musical styles. Two approaches were used: hooks or pedal mechanisms that altered the pitch of selected strings when necessary, and harps with 12 strings per octave (chromatic harps).

Hooks were first used in the Tirol in the 17th century. In 1720 the Bavarian Celestin Hochbrucker added seven pedals that controlled the hooks via levers set in the forepillar. Hochbrucker's single-action pedal harp was improved in 1750, when Georges Cousineau replaced the hooks with metal plates that gripped the strings while leaving them in plane, and in 1792, when Sébastian Érard substituted rotating disks for the metal plates.

Chromatic harps were built as early as the 16th century—*e.g.*, the double harp, with two rows of strings, and the Welsh triple harp, with three rows. They also include the chromatic harp, invented in the late 19th century by the Pleyel firm of Paris, with two crossing sets of strings (like an X), and its U.S. predecessor, in which each set of strings has a separate neck and forepillar.

harp seal, also called SADDLEBACK (*Pagophilus groenlandicus,* sometimes *Phoca groenlandica*), migratory northern seal of the family Phocidae, found in the North Atlantic and Arctic oceans. The adult male is light grayish or yellowish with brown or black on the head and a similarly coloured U-shaped marking on the back and sides. The female is not as clearly marked, and the young seal (known as bedlamer, beater, or grayback depending on its age) is gray with black spots. As an adult the harp seal attains a length and weight of about 1.8 m (6 feet) and 180 kg (400 pounds).



Female harp seal (*Pagophilus groenlandicus*)
John M. Terhune

Harp seals are strong swimmers; they feed on fish and crustaceans and spend much of the year at sea. They migrate in late winter to breeding grounds located near Newfoundland and in the Greenland and White seas. The pups (usually one, sometimes twins) are born on the pack ice and, until they are about two weeks old, bear fluffy white coats that are highly valued by the fur trade. Harp seals have been hunted for many years—for about two centuries near Newfoundland. In the 1960s public indignation at the sealers' method of clubbing to death (and in some instances reportedly skinning alive) tens of thousands of newborn pups led to increased regulation and supervision of sealing activities in the Newfoundland area, particularly with regard to humane killing and strict enforcement of annual quotas. Widespread public disapproval of the slaughter of pups continued, however, rallied by the efforts of protective organizations to publicize the annual kill.

Harpagus (fl. 6th century BC), Median general who first served Astyages, the last king of the Median Empire, but later deserted to the Achaemenid king Cyrus II.

Harpagus, leading an army, was sent by Astyages to fight his disloyal vassal Cyrus; instead, Harpagus and his troops joined with Cyrus, perhaps, as some scholars have suggested, in revenge for Astyages' murder of Harpagus' son. Harpagus remained an important military figure under Cyrus, undertaking among other efforts the conquest of western Asia Minor. He was later made a satrap (governor), and his family continued to hold high positions throughout the Achaemenid Empire.

Harper, formerly CAPE PALMAS, town and Atlantic seaport, southeastern Liberia, West Africa. It is situated on Cape Palmas. The cape was settled (1833) by a group of North American freed slaves sponsored by the Maryland Colonization Society. In 1857 troubles with the local Grebo people led the colony to request annexation with Liberia. Named for Robert Goodloe Harper of the American Colonization Society, the town is the site of Maryland College of Our Lady of Fatima (Roman Catholic, 1953), the William V.S. Tubman College of Technology (1978), the J.J. Dossen Memorial Hospital (1958), government and church secondary schools, a public library, and several churches. Its port (1960) mainly exports lumber cut by the Maryland Logging Company and rubber from the Firestone company's Cavalla Plantation 15 miles (24 km) inland. A sugar refinery was opened in 1978. Harper is connected by air with Monrovia and by road with Ganta. Pop. (1974) 11,714.

Harper BROTHERS, printers and members of a distinguished American publishing firm which exerted a significant influence on letters and politics throughout the 19th century.

The Harper family had settled on Long Island before the American Revolution, and the four brothers were reared in a stern and pious home where circuit-riding Methodist preachers often spent the night.

James Harper (b. April 13, 1795, Newton, N.Y., U.S.—d. March 27, 1869, New York City) was apprenticed when he was 16 years old to a printer in New York City who was a friend of the family and a faithful Methodist. He went into business with his brother John in 1817.

John Harper (b. Jan. 22, 1797, Newton, N.Y.—d. April 22, 1875, New York City) was apprenticed to a New York City printer named Jonathan Seymour, and when he reached journeyman status he entered the printing business with his brother James, as J. & J. Harper. In 1818, a year after they launched their business, the two brothers published John Locke's *Essay on Human Understanding,* their first publishing venture. They quickly developed a reputation for fast work of high quality.

Joseph Wesley Harper (b. Dec. 25, 1801, Newton, N.Y.—d. Feb. 14, 1870, New York City) purchased a partnership in the brother's firm in 1823. He was the brother whose literary judgment was relied on by the others.

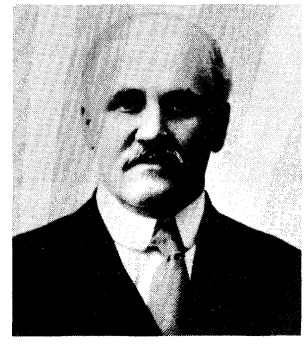
Fletcher Harper (b. Jan. 31, 1806, Newton, N.Y.—d. May 29, 1877, New York City), the youngest, was 10 years old when his parents moved to New York City from Long Island in 1816. He was apprenticed to his brothers and was admitted to the firm in 1825.

The name of their company, Harper & Brothers, was adopted in 1833. The brothers divided the duties of the company informally, with James serving as pressroom supervisor, John as business manager and production overseer, Wesley as the firm's chief editor and critic, and Fletcher as a general executive officer. Allocation of alms and contributions to churches and other worthy causes devolved upon Wesley.

Harper & Brothers went into periodical publishing with the establishment of *Harper's New Monthly Magazine* in 1850. *Harper's Weekly* followed in 1857 and *Harper's Bazar*—later *Bazaar*—in 1867. The *New Monthly Magazine* serialized many novels and carried articles by leading American writers. In 1925 it became *Harper's Magazine. Harper's Weekly* attracted readers by printing outstanding illustrations, including Thomas Nast's cartoons, and by crusading for political and civic reforms. Fletcher had managed to sell very large orders of textbooks to the New York City schools under the Tweed administration, and the brothers demonstrated their integrity repeatedly as they gave Nast complete freedom in his devastating attacks on the corruption of "Boss Tweed" and his ring. The firm faced a financial crisis in 1899 but was rescued by the financier J. Pierpont Morgan. In 1900 the business passed out of the family's hands.

Harper, Robert Almer (b. Jan. 21, 1862, Le Claire, Iowa, U.S.—d. May 12, 1946, Bedford, Va.), American biologist who identified the details of reproduction in the development of the fungus ascospore (sexually produced spores of fungi in the class Ascomycetes).

After graduating from Oberlin (Ohio) College (M.A., 1891), Harper did graduate study at the University of Bonn while on leave of absence from Lake Forest (Ill.) College, where he was professor of botany and geology (1891–98). In 1896 he received his Ph.D., after which he



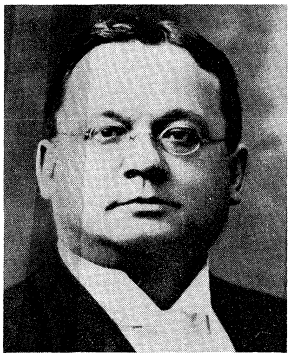
Robert Almer Harper
By courtesy of the American Phytopathological Society and the Hunt Institute, Pittsburgh

taught at the University of Wisconsin, Madison (1898–1911), and at Columbia University (1911–30).

Working on spore formation of the powdery mildew, *Sphaerotheca,* at Bonn, he determined that the cytoplasmic division that resulted in eight equal uniform spores was the result of dividing strands emanating from the nucleus of the cell. Harper also did research on plant pathology and on the production of structural traits in fungi.

Harper, William Rainey (b. July 26, 1856, New Concord, Ohio, U.S.—d. Jan. 10, 1906, Chicago), U.S. Hebraist and first president of the University of Chicago.

Harper's interest in Hebraic studies began in Muskingum College, New Concord, from which he graduated in 1870. In 1875, when



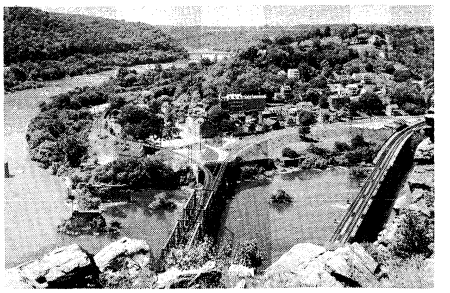
William Rainey Harper
By courtesy of the University of Chicago

only 19 years of age, he received his Ph.D. at Yale for studies in the Indo-Iranian and Semitic languages. In 1880, after several years of academy teaching, he was given a professorship in Hebrew at the Baptist Union Theological Seminary in Chicago. There he founded *The Hebrew Student* and *Hebraica* and organized the American Institute of Hebrew. He published a number of textbooks and study helps for the teaching of Hebrew which found wide use. In 1886 he accepted a professorship in Semitic languages at Yale and in 1889 was appointed Woolsey professor of biblical literature, filling both positions simultaneously.

In 1891 Harper became president of the newly established University of Chicago. His liberal aims and comprehensive plans for the new university attracted wide attention. He proposed, for example, dividing the traditional collegiate program into two parts, devoting the first two years to general education and the last two years to the study of more advanced subjects. His other innovations included the introduction of correspondence courses. Harper remained at Chicago as president and head of the department of Semitic languages until his death. Among his more important books are *Religion and the Higher Life* (1904); *A Critical and Exegetical Commentary on Amos and Hosea* (1905); *The Prophetic Element in the Old Testament* (1905); *The Trend in Higher Education* (1905).

Harpers Ferry, town, Jefferson County, West Virginia, U.S., at the confluence of the Shenandoah and Potomac rivers, in the Blue Ridge Mountains where West Virginia, Virginia, and Maryland converge. It was the site of Harpers Ferry Raid, one of the major incidents precipitating the U.S. Civil War, and it was the site of several battles of the war.

The town was settled in 1734 by Robert Harper, who established a ferry across the Potomac and a grist mill on the Shenandoah. The site was selected by Pres. George Washington for a federal armoury because of its waterpower potential and was purchased from



Harpers Ferry, W.Va., at the confluence of the Shenandoah and Potomac rivers
By courtesy of the West Virginia Department of Commerce

Harper's heirs in 1796. The town developed as an important U.S. arsenal and centre for the manufacture of rifles.

On Oct. 16–18, 1859, the arsenal of Harpers Ferry (then located in Virginia) was the target of an assault by an armed band of Abolitionists led by John Brown. The raid was intended to be the first stage in an elaborate plan to establish an independent stronghold of freed slaves in the mountains of Maryland and Virginia—an enterprise that had won moral and financial support from several prominent Bostonians. Choosing Harpers Ferry because of its arsenal and because of its location as a convenient gateway to the South, John Brown and his band of 16 whites and 5 blacks seized the armoury on the night of October 16. The entire countryside was quickly alerted, and combined state and federal troops overwhelmed the raiders in two days. Seventeen men died in the fighting, and Brown and six surviving followers were hanged before the end of the year. Although the raid on Harpers Ferry was denounced by a majority of Northerners, it outraged Southern slaveholders, who were already fearful of slave insurrections, and convinced them that Abolitionists would stop at nothing to eradicate their "peculiar institution."

Once the war began, Harpers Ferry served as an important link in the defense of Washington, D.C., was repeatedly attacked by both Union and Confederate armies. Confederates under Gen. Thomas J. "Stonewall" Jackson captured the town (Sept. 13–15, 1862) and took more than 12,500 prisoners, the largest Union surrender in the war.

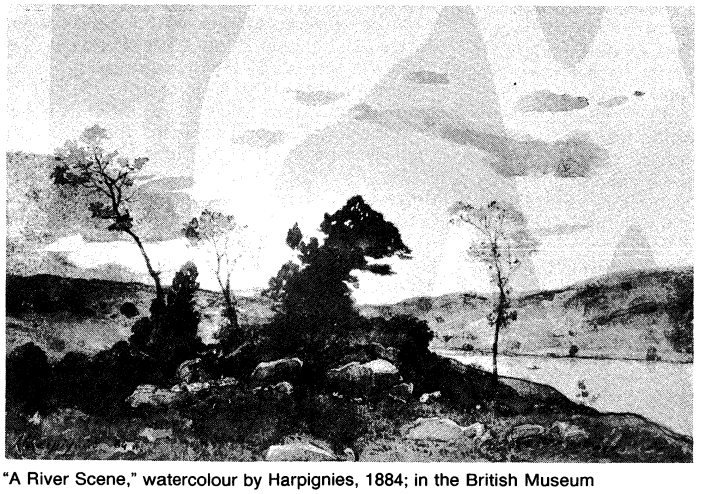
Harpers Ferry is now a quiet residential village and is the headquarters for a resort area including the Harpers Ferry National Historic Park (1,909 ac [772 ha], authorized as a national monument in 1944; changed to a national historic park in 1963), with museums, monuments, and historic buildings. Inc. 1763. Pop. (1980) 361.

Harper's Magazine, monthly magazine published in New York City, one of the oldest and most prestigious literary and opinion journals in the United States. It was founded in 1850 as *Harper's New Monthly,* a literary journal, by the printing and publishing firm of the Harper brothers. Noted in its early years for its serialization of great English novels and for the fine quality of its own essays and other literature of the period, *Harper's* was the first U.S. magazine to introduce the extensive use of woodcut illustrations. It was a leader in publishing the writings of the most illustrious British and American authors, and before 1865 it had become the most successful periodical in the United States. In the late 1920s the periodical changed its editorial format to that of a forum on public affairs; its contributors included such figures as the philosopher-historian Charles A. Beard and the philosopher-mathematician Bertrand Russell. The magazine balanced its primary concern for social and political issues with short stories by Aldous Huxley and other contemporary writers. Increasing publication and mailing expenses exceeded revenues in the late 1960s, and the magazine's economic problems worsened until its certain closing in 1980 was averted by grants by a philanthropic organization, the John and Catherine MacArthur Foundation.

The circulation of *Harper's* in the early 1980s approximated 325,000.

Harpignies, Henri (b. June 28, 1819, Valenciennes, Fr.—d. Aug. 28, 1916, Saint-Prive), French landscape painter and engraver whose finest works include watercolours showing the influence of Jean-Baptiste-Camille Corot.

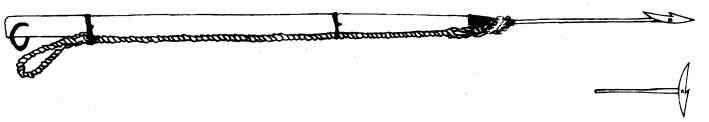
Harpignies turned to art at the age of 27, studying and painting in Italy and France and coming more and more under the influence of Corot. Distinguished by constructive drawing and breadth of treatment, his landscapes are pervaded by a silvery tone. He scored his first great success at the Paris Salon of 1861 and afterward was a regular exhibitor, receiving his first medal in 1886 for "Evening in the Roman Campagna," chosen for the Luxembourg Gallery, Paris. Many of his best works were painted in the Bourbonnais, Nivernais, and Auvergne regions of France.



"A River Scene," watercolour by Harpignies, 1884; in the British Museum
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.—EB Inc.

harpoon, barbed spear used to kill whales, tuna, swordfish, and other large sea creatures, formerly thrown by hand but now, in the case of whales, shot from especially constructed guns.

The hand-thrown harpoon has two sets of sharp barbs and is made in two parts, the lily iron, about 5 inches (13 centimetres) long, which contains the barbs, and a shaft about 18 in. long. The gun-projected harpoon explodes



Hand harpoon still used in the Azores in the 1960s and used by U.S. whalers in the 19th century

By courtesy of the National Institute of Oceanography

when it has struck the whale, expanding the barbs and killing the animal instantly.

harpsichord, keyboard musical instrument in which strings are set in vibration by plucking. Generally, there are two or more sets of strings, each of which produces different tone qualities. One set may sound an octave higher than the others; it is called a 4-foot register, whereas a set of strings at normal pitch is called an 8-foot register. In some 20th-century harpsichords, a 16-foot register, sounding an octave lower, is added, but this addition was extremely rare in old harpsichords. Two sets of 8-foot strings may produce distinct tone quality because they are plucked at different points or with plectra of different material.

The tone of the harpsichord is amplified by a soundboard placed beneath the horizontal plane of the strings, which pass over a bridge that is glued to the soundboard and that transmits their vibration to it. The plucking mechanism consists of sets of jacks, thin vertical strips of wood that rest on the far ends of the keys and pass through a lower fixed guide and an upper slide, or movable guide;

Harpsichord with soundboard by Hans Ruckers, Amsterdam, 1612

From the National Trust Property, Fenton House, Hampstead, London; by gracious permission of Her Majesty Queen Elizabeth, the Queen Mother

the slide moves a given set of jacks either slightly toward or slightly away from its set of strings, depending on whether that set is to be used or unused. A pivoted tongue at the top of each jack is pierced in its upper half to take a plectrum of quill or leather and is held upright by a spring of wire or bristle. A cloth or felt damper completes the jack; this quiets the string when the key is released and the plectrum falls beneath the string.

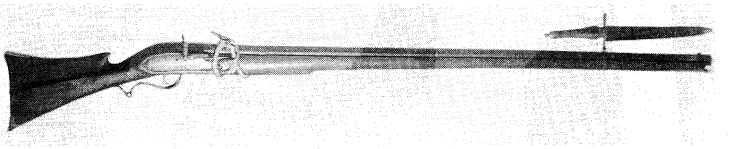
The earliest known harpsichord, now in the Victoria and Albert Museum in London, was made in Rome in 1521 by Gerolamo Bolognese. Little is known of the early history of the harpsichord, but, during the 16th–18th century, it underwent considerable evolution and became one of the most important European instruments. National schools of construction arose, notably in Italy, Flanders, France, England, and Germany; and highly decorated cases with painted lids became fashionable. Most of the great Baroque composers played or wrote for the harpsichord. By the middle of the 18th century the harpsichord had grown to a normal compass of five full octaves, three or more sets of strings and jacks, and often two keyboards. At this time it began to compete with the new pianoforte, which was capable of playing soft or loud according to the fingers' pressure on the keys. The harpsichord is incapable of this dynamic gradation and was overwhelmed in popularity by the piano. The harpsichord was revived in the late 19th century, and it continues to evolve—but not necessarily to improve—in the hands of modern builders and composers. *See also* clavicytherium; spinet; virginal.

Harpur, Charles (b. Jan 23, 1813, Windsor, N.S.W., Australia—d. June 10, 1868, Windsor), early Australian poet whose verse, though often lacking intensity and originality, reflects a gentle and sincere personality.

Harpur's father was parish clerk and schoolmaster at Windsor. His home life was stable, and he had a good education. He went to Sydney to work as a postal clerk and possibly in a lawyer's office. In 1842 he went to live with his brother on a farm and published his first volume of verse, *Thoughts; A Series of Sonnets* (1845). By 1850 he was a schoolteacher, and in 1853, his second book, *The Bush-rangers: A Play in Five Acts, and Other Poems,* appeared. Though the play is considered a failure, the poems are ranked among his best. In 1858 he was appointed Gold Commissioner at Araluen, a post he held for seven years. A collection of his work, *Poems by Charles Harpur,* was published by his widow in 1883.

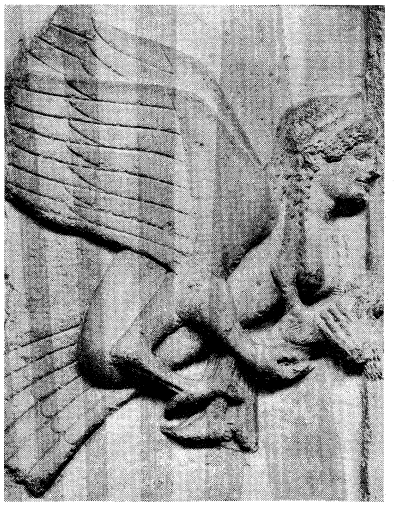
Harpy, in Greco-Roman classical mythology, a fabulous creature, probably a wind spirit. The presence of harpies as tomb figures, however, makes it possible that they were also conceived of as ghosts. In Homer's *Odyssey* they were winds that carried people away. Elsewhere, they were sometimes connected with the powers of the underworld. Homer mentions one Harpy, Podarge (Swiftfoot), who seems to have been of equine nature, because, according to the *Iliad,* she became by the west wind the dam of Achilles' horses. Hesiod mentions two, Aello and Okypete (Stormswift and Swiftwing), daughters of Thaumas and of Electra, the daughter of Oceanus.

These early Harpies were in no way disgusting. Later, however, especially in the legend of Jason and the Argonauts, they were represented as birds with the faces of women, horribly foul and loathsome. They were sent to punish the Thracian king Phineus for his ill-treatment of his children, but Calais and Zetes, the sons of Boreas, finally delivered him. Virgil imitated the episode in the *Aeneid;* he called the chief Harpy Celaeno (Dark).



Harquebus, English, 16th century

By courtesy of the West Point Museum Collections, United States Military Academy



Harpy from a tomb frieze from the acropolis of Xanthus, Asia Minor, c. 500 BC; in the British Museum

Hirmer Fotoarchiv, Munchen

harquebus, also spelled ARQUEBUS, also called HACKBUT, first weapon fired from the shoulder, a smoothbore matchlock with a stock resembling that of a rifle, invented in Spain in the mid-15th century. It was often fired from a support, against which the recoil was transferred from a hook on the gun. Its name seems to derive from German words meaning "hooked gun." The bore varied, and its effective range was less than 650 feet. The harquebus was superseded by the larger musket (*q.v.*) in the mid-16th century.

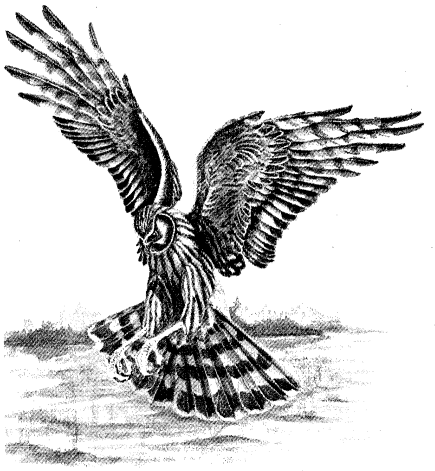
Harran, also spelled HARAN, Roman CARRHAE, ancient city of strategic importance, now a village, on the Balīkh River, in Urfa *il* (province), Turkey. The town was located on the road that ran from Nineveh to Carchemish and was regarded as of considerable importance by the Assyrian kings. Its chief cult in Assyrian times was that of the moon god. It is frequently mentioned in the Bible; Abraham's family settled there when they left Ur of the Chaldeans (Genesis 11:31–32).

In Roman times, Carrhae was the scene of a disastrous defeat of the Roman governor Crassus by the Parthians (53 BC; *see* Carrhae, Battle of) and of a later defeat of the emperor Galerius by the Persian king Narses (AD 297). Pop. (1975) 684.

harrier, any of about 11 species of hawks of the subfamily Circinae (family Accipitridae). They are plain-looking, long-legged, and long-tailed birds of slender build that cruise low over meadows and marshes looking for mice, snakes, frogs, small birds, and insects. Harriers are about 50 centimetres (20 inches) long. They have small beaks, and their face feathers are arranged into facial discs. They nest in marshes or in tall grass and lay four to six dull whitish or bluish eggs.

The best known harrier is the hen harrier (British), usually called marsh hawk in the United States (*Circus cyaneus*), which breeds in temperate and boreal regions throughout the Northern Hemisphere and in southern South America. Also common are the marsh harrier (*C. aeruginosus*) and Montagu's harrier (*C. pygargus*) ranging over most of Europe and from the Mediterranean shores of North Africa to Mongolia. The pallid harrier (*C. macrourus*) breeds from the Baltic to southeastern Europe and Central Asia. Al-

lied species include the cinereous harrier (*C. cinereus*), found from Peru to the Straits of Magellan; the long-winged harrier (*C. buffoni*), ranging over all of South America, es-



Marsh hawk (*Circus cyaneus*)
Painting by H. Jon Janosik

pecially east of the Andes; the South African marsh harrier (*C. ranivorus*), ranging north to Uganda on the east; and the pied harrier (*C. melanoleucus*), of central eastern Asia.

Harrier, also called AV-8, single-engine, "jump-jet" fighter-bomber designed to fly from combat areas and aircraft carriers and to support ground forces. Manufactured by British Aerospace in the United Kingdom and by McDonnell Douglas in the United States, it first flew on Aug. 31, 1966. Its several versions could take off straight up or with a short roll (Vertical and Short Take-off and Landing, or V/STOL), and thus the Harrier did not need conventional runways. Powered by a vectored-thrust turbofan engine, it diverted engine thrust downward for takeoff using rotatable engine exhaust ports. It could carry a combination of armaments, including air-to-air missiles, air-to-surface antiship missiles, rockets, and bombs. Ground-attack versions of the Harrier could carry a 30-millimetre cannon as well as rockets and bombs. The Sea Harrier saw combat in the British Falklands campaign of 1982. A larger and heavier version built for the U.S. Marines was used for both air defense and support of ground forces.

Harrigan, Edward, byname NED HARRIGAN (b. Oct. 26, 1845, New York City—d. June 6, 1911, New York City), American actor, producer, and playwright, half of the comedy team of Harrigan and Hart.

His theatrical career began in San Francisco, where in 1861 he was singing with Lotta Crabtree. After developing his skill as a comedian, Harrigan formed a team with Sam Rickey and returned to New York City. In 1872 he formed a new partnership with Tony Hart (original name Anthony Cannon; 1857–91), and Harrigan and Hart remained together until 1885. In 1876 they became comanagers of the Theatre Comique in New York City. After a new theatre was destroyed by fire in 1884, Harrigan became sole manager of Harrigan's Park Theatre. During his long career he wrote several hundred sketches and plays, mostly burlesques.

Harriman, Edward Henry (b. Feb. 25, 1848, Hempstead, N.Y., U.S.—d. Sept. 9, 1909, near Turner, N.Y.), American financier and railroad magnate, one of the leading builders and organizers in the era of great railroad expansion and development of the West during the late 19th century.

Harriman became a broker's clerk in New York at an early age and in 1870 was able to buy a seat on the New York Stock Exchange on his own account. His career in railroad management started with executive positions with the Illinois Central. In 1898 his career as a great railway organizer began with his formation, by the aid of the bankers Kuhn, Loeb & Co., of a syndicate to acquire the Union Pacific Railroad Company, which was then in receivership. Having brought the Union Pacific out of bankruptcy into prosperity, he utilized his position to draw other lines within his control, notably the Southern Pacific in 1901. His abortive contest in 1901 with James J. Hill for the control of the Northern Pacific led to one of the most serious financial crises ever known on Wall Street. At his death in 1909, Harriman's influence was estimated to

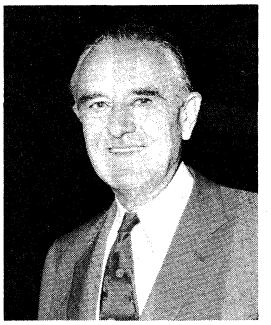
E.H. Harriman, 1909
By courtesy of the Union Pacific Railroad Museum Collection

extend over 60,000 miles of track. His business methods excited bitter criticism, culminating in a stern denunciation from Pres. Theodore Roosevelt in 1907.

Harriman, W(illiam) Averell (b. Nov. 15, 1891, New York City—d. July 26, 1986, Yorktown Heights, N.Y., U.S.), statesman who was a leading U.S. diplomat in relations with the Soviet Union during World War II and the Cold War period following World War II.

The son of the railroad magnate E.H. Harriman, W. Averell Harriman began his employment with the Union Pacific Railroad Company in 1915; he served as chairman of the board (1932–46). During the Franklin D. Roosevelt administration he was an officer of the National Recovery Administration and during 1940–41 served with the National Defense Advisory Commission and its successor agency, the Office of Production Management. In 1941 President Roosevelt sent him to Britain and the Soviet Union to expedite U.S. lend-lease aid. He then served as U.S. ambassador to the Soviet Union (1943–46), ambassador to Great Britain (April to October 1946), and secretary of commerce (1947–48).

From 1948 to 1950 he was special U.S. representative in Europe to supervise administration of the European Recovery program; in 1950 he was named special assistant to the president and in 1951 director of the Mutual Security Agency. He was twice unsuccessful in



W. Averell Harriman, 1963
London Daily Express–Pictorial Parade/EB Inc.

his attempt to win the Democratic nomination for the presidency (1952 and 1956). Governor of New York from 1954 to 1958, Harriman lost the position to Nelson A. Rockefeller. He served as Pres. John F. Kennedy's assistant secretary of state for Far Eastern affairs from 1961 to 1963. During that period he advocated U.S. support of a neutral government in Laos and helped to negotiate the Nuclear Test-Ban Treaty. Under Pres. Lyndon B. Johnson Harriman served as ambassador-at-large and headed the U.S. delegation to the Paris peace talks between the United States and North Vietnam (1968–69). He retired in 1969 (though he remained active in foreign affairs in an unofficial capacity) and was replaced by Henry Cabot Lodge.

Harriman's reflections on his relations with the Soviet Union, *America and Russia in a Changing World,* appeared in 1971 and his *Special Envoy to Churchill and Stalin, 1941–1946* (with Elie Abel) in 1975.

Harrington, James, Harrington also spelled HARINGTON (b. Jan. 7, 1611, Upton, Northamptonshire, Eng.—d. Sept. 11, 1677, London), English political philosopher whose major work, *The Common-wealth of Oceana* (1656), was a restatement of Aristotle's theory of constitutional stability and revolution.

Although Harrington was sympathetic to republicanism, he was a devoted friend of King Charles I and was briefly imprisoned shortly before the King was executed in 1649 in the course of the English Civil War. His views did not favourably impress Oliver Cromwell, lord protector (1653–58) during the Commonwealth; *Oceana* was seized from its printer, and the intervention of Cromwell's daughter Elizabeth (Mrs. John Claypoole) was required

James Harrington, oil painting by an unknown artist; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

to release the book for publication. Imprisoned in the early 1660s on a dubious charge of plotting against the restored monarchy under Charles II, Harrington was freed after his physical and mental health had been permanently impaired.

Oceana presents Harrington's vision of the ideal state—an aristocracy of limited, balanced powers. Harrington believed that democracy is most stable where a strong middle class exists and that revolution is a consequence of the separation of economic and political power. These beliefs particularly influenced U.S. Pres. Thomas Jefferson's democratic agrarianism and the antitrust policies of Theodore Roosevelt and Woodrow Wilson. Harrington also advocated the division of the country into landholdings of a specified maximum value, a referendum on each law proposed by the legislature, and a complicated scheme of rotation

for public officials. His ideas are said to have been partly responsible for such U.S. political developments as written constitutions, bicameral legislatures, and the indirect election of the president.

An edition of *Oceana* prepared by Sten Bodvar Liljegren appeared in 1924.

Harrington, William Stanhope, 1st earl of, VISCOUNT PETERSHAM OF PETERSHAM, also called from 1730 BARON HARRINGTON (b. *c.* 1690—d. Dec. 8, 1756, Westminster, near London), British diplomat and statesman in the Walpole-Pelham era.

Educated at Eton College, Harrington was elected a member of Parliament for Derby in 1715, became envoy to Turin (1718–20), and was then ambassador to Spain (1720–27). As a reward for his successfully negotiating in 1729 the Treaty of Seville, which settled disputes between England and Spain, he was named secretary of state for the northern department by Sir Robert Walpole in May 1730. Although Harrington had the backing of George II, he was nonetheless unsuccessful in 1733 in persuading Walpole to support the Empire against France in the War of the Polish Succession. He again disagreed with Walpole in the early 1740s, favouring war with Spain and amity with France. In 1741 Harrington negotiated a treaty for the neutrality of Hanover without Walpole's knowledge.

When Walpole's government fell in 1742, Harrington lost his secretaryship, but in November 1744 he returned as secretary of state in the Pelham administration. When the King asked Harrington to desert the Pelhams' peace policy in February 1746, Harrington refused, and joined Newcastle and the Pelhams in their joint resignation the same month. They formed a new ministry several days later, but Harrington had incurred the King's lasting hostility by being the first among them to resign. Harrington's eventual split with Newcastle over accepting French terms to end the war led to Harrington's resignation in October 1746. Through the agency of the Pelhams, to whom he had been intensely loyal, Harrington was appointed lord lieutenant of Ireland (serving until 1751).

Harriot, Thomas, Harriot also spelled HARIOT (b. 1560, Oxford—d. July 2, 1621, London), mathematician and astronomer who founded the English school of algebra.

Sir Walter Raleigh sent Harriot as a scientific adviser for the expedition of 1585–86 to Roanoke Island, off the coast of present North Carolina. Harriot's observations are found in *A Briefe and True Report of the New Found Land of Virginia* (1588), which was later often reprinted. He became the leading scientist of the circle around Raleigh and received a pension from the Earl of Northumberland. In *Artis Analyticae Praxis ad Aequationes Algebraicas Resolvendas* (1631; "The Analytical Arts Applied to Solving Algebraic Equations"), Harriot improved the theory of equations, noting an important relation between coefficients and roots. In *Artis* he detailed the formation of equations from known roots and revealed that any *n*th degree equation and the product of *n* linear equations are equivalent. He also introduced the signs > (greater than) and < (less than). Harriot constructed telescopes—the first was made contemporaneously with Galileo's—and he studied comets. He also discovered sunspots and the moons of Jupiter independently of Galileo, and the law of refraction before Willebrord Snell, but he failed to publish his discoveries.

Harris (Scotland): *see* Lewis and Harris.

Harris, Alexander (b. Feb. 7, 1805, London—d. Feb. 1, 1874, Copetown, Ont., Can.), English author whose *Settlers and Convicts; or, Recollections of Sixteen Years' Labour in the Australian Backwoods* (1847) is an outstanding fictional account of life in Australia.

Harris was well educated by his clergyman father in London, and at age 21 he shipped out for Australia. He soon headed for the back country and for some time lived a very strenuous life, working up to 18 hours a day at various jobs. By 1842 his health began to deteriorate, and he returned to England. In later years he worked as a missionary and schoolteacher in Canada.

Settlers and Convicts is a fictionalized autobiography; Harris' detailed, unbiased observations and ability to characterize pioneer life with striking realism made the book a historical classic. His real autobiography, written in 1858, was published in 1961 under the title *The Secrets of Alexander Harris.*

Harris, Sir Arthur Travers, 1ST BARONET, byname BOMBER HARRIS (b. April 13, 1892, Cheltenham, Gloucestershire, Eng.—d. April 5, 1984, Goring-on-Thames, Oxfordshire), British air officer who initiated and directed the "saturation bombing" that the Royal Air Force inflicted on Germany during World War II.

Harris was reared in Rhodesia and educated in English public schools. He joined the first Rhodesian Regiment at the outbreak of World War I and served in South Africa and South West Africa. Following his return to England in 1915, he joined the Royal Flying Corps and eventually commanded various squadrons in France and at home. After the war he was given a permanent commission in the RAF. Throughout the 1920s and 1930s, he served at several posts in Iraq, India, and Britain and in the Air Ministry.

Made an air commodore in 1937, Harris was named air vice marshal in 1939 and rose to air marshal in 1941 and commander in chief of the RAF bomber command in February 1942. As a firm believer in mass raids, Air Marshal Harris developed the "saturation" technique of mass bombing—that of concentrating clouds of bombers in a giant raid on a single city, with the object of completely demolishing it. He applied this method with great destructive effect on Axis-occupied Europe from 1942 to the end of World War II.

Harris was made marshal of the Royal Air Force in 1945 and retired soon after. He had been knighted in 1942 and was created a baronet in 1953. From 1946 to 1953 he was managing director of the South African Marine Corporation.

Harris, Benjamin (fl. 1673–1716), English bookseller and writer who was the first journalist in the British-American colonies.

An ardent Anabaptist and Whig, Harris published argumentative pamphlets in London, especially ones attacking Roman Catholics and Quakers, and in 1679 he joined Titus Oates in exposing the Popish Plot. In 1686, to escape fines and further imprisonment, he fled to Boston, where he established a successful bookstore and coffeehouse with his son Vavasour. His newspaper, *Publick Occurrences, Both Foreign and Domestick* (Sept. 25, 1690), the first newspaper printed in the colonies, was suppressed by Boston authorities after one issue. Sometime before 1690 Harris published *The New-England Primer,* adapted from his earlier, savagely political speller, *The Protestant Tutor* (1679); the primer was for half a century the only elementary textbook in America. Its 80 pages, measuring 4½ by 3 inches, contained woodcuts illustrating the alphabet, crude couplets, and moral texts, including the child's prayer, "Now I lay me down to sleep." Harris returned to London and journalism in 1695. His *London Post* appeared regularly from 1699 to 1706.

Harris, Frank, byname of JAMES THOMAS HARRIS (b. Feb. 14, 1856, County Galway, Ire.—d. Aug. 26, 1931, Nice, Fr.), Irish-born American journalist and man of letters best known for his unreliable autobiography, *My Life and Loves,* 3 vol. (1923–27), the sexual frankness of which was new for its day and created trouble with censors in Great Britain and the United States. He was also an editor of fearless talent, which he sometimes abused by turning out scandal sheets.

He moved to the United States at 15 and, after a series of jobs around the country, took a law degree at the University of Kansas, Lawrence. Later he moved to England and edited a series of important journals, notably the *Saturday Review* (1894–98), for which he hired George Bernard Shaw. He returned to the United States with a biography of Wilde, which no one in England would publish, and in 1922 moved to Nice, Fr. Among his other works are *Oscar Wilde: His Life and Confessions* (1916) and a biography of Shaw (1931).

Harris, George Washington (b. March 20, 1814, Allegheny City, near Pittsburgh—d. Dec. 11, 1869, on a train en route to Knoxville, Tenn., U.S.), American humorist who combined the skill of an oral storyteller with a dramatic imagination.

Harris was a steamboat captain from an early age. From 1843 until his death, he wrote humorous tales for the New York *Spirit of the Times* and other publications that were reprinted widely over the entire country. The best of them, published in *Sut Lovingood: Yarns Spun by a "Natural Born Durn'd Fool"* (1867), in the words of a leading critic, surpassed anything before Twain, who himself knew and liked the tales. Harris' tales are introduced by his comic narrator, Sut Lovingood, who takes the reader into a world of fantasy where anything can happen—and does. Camp meetings, quiltings, frolics, horse races, and political gatherings spring to life in scent, sound, form, colour, and motion that remain hilariously comic.

Harris, Joel Chandler (b. Dec. 9, 1848, Eatonton, Ga., U.S.—d. July 3, 1908, Atlanta), American author, creator of the folk character Uncle Remus.

As apprentice on a weekly paper, *The Countryman,* he became familiar with the lore and dialects of the plantation slave. He established a reputation as a brilliant humorist and writer of dialect while employed on newspapers at Macon, Ga., New Orleans, Forsyth and Savannah, Ga., and, after 1876, on the staff of the *Atlanta Constitution* for 24 years. In 1879 "Tar-Baby," a story probably inspired by his

Joel Chandler Harris

By courtesy of the Emory University Library, Atlanta, Ga.

reading of William Owens' work on black folklore, appeared in the *Atlanta Constitution* and created a vogue for a distinctive type of dialect literature. This and successive Uncle

Remus stories won for Harris a secure place in American literature. The pattern was new: Uncle Remus, the wise, genial old black man, tells stories about Brer Rabbit, Brer Fox, and other animals to the little son of a plantation owner and interweaves his philosophy of the world about him. *Uncle Remus: His Songs and His Sayings* was published in book form in 1880, followed by others. Included in a series of children's books were: *Little Mr. Thimblefinger and His Queer Country* (1894), *The Story of Aaron* (1896), and *Aaron in the Wildwoods* (1897). *Mingo, and Other Sketches in Black and White* (1884); *Free Joe and Other Georgian Sketches* (1887); *Sister Jane, Her Friends and Acquaintances* (1896); and *Gabriel Tolliver* (1902) reveal Harris' ability to vitalize other Southern types and to delve into issues faced by the South after Reconstruction. *On the Plantation* (1892) is valuable for its autobiography. From 1907 until his death he edited *Uncle Remus's Magazine.*

Harris, John Wyndham Parkes Lucas Beynon: *see* Wyndham, John.

Harris, Louis (b. Jan. 6, 1921, New Haven, Conn., U.S.), U.S. pollster and public opinion analyst, founder of Louis Harris and Associates, Inc. (1956), and director of the Time Magazine–Harris Poll since 1969.

The son of a real-estate developer, Harris studied in economics at the University of North Carolina (A.B., 1942) and served in the U.S. Naval Reserve (1942–46). In 1947 he joined the polling firm headed by Elmo Roper, writing Roper's newspaper columns and radio scripts and engaging in political research. In 1956 he left Elmo Roper and Associates and established his own firm in New York City. By 1962 he was the chief polling analyst for CBS News; in 1969 he switched to ABC News. He concurrently was a columnist for the *Washington Post* and *Newsweek* (1963–68) and for the Chicago Tribune–New York Daily News Syndicate (from 1969).

Harris' services were especially associated with election campaigns—initially and most notably with John F. Kennedy's campaign and later with the campaigns of hundreds of other candidates, including presidents, governors, U.S. senators and representatives, mayors, and other officials, both Democrats and Republicans. Harris' firm helped candidates to determine what strategies and issues and aspects of personality might be most effective with voters. Harris also did much of his work outside politics—in market research for commercial clients.

Harris is the author of *Is There a Republican Majority?* (1954), *The Negro Revolution in America* (1964, with William Bunk), *Black and White* (1967), and *Black-Jewish Relations in New York City: The Anguish of Change* (1973).

Harris, Marvin (b. Aug. 18, 1927, New York City), U.S. anthropological historian and theoretician known for his work on cultural materialism. His fieldwork in the Islas (Islands) de la Bahía and other regions of Brazil and in Mozambique focussed on the concept of culture.

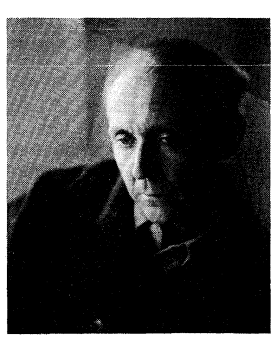
Harris saw functionalism in the social sciences as being similar to "adaptation" in biology. His work on the surplus controversy and ethnoenergetic exchange in primitive cultures led him to comparisons with medieval European economies, in which he saw two distinct types, feudalism and manorialism. His best known works include *The Rise of Anthropological Theory* (1968), *Cannibals and Kings: The Origins of Cultures* (1977), *Cultural Materialism: The Struggle for a Science of Culture* (1979), and *Cultural Anthropology* (1983).

Harris received his Ph.D. from Columbia University (1953), where he taught anthropology from 1952. He served as technical adviser to the Brazilian Ministry of Education. His theoretical work led to an active role in the anthropological controversies of his day.

Harris, Renatus, also called RENÉ HARRIS (b. *c.* 1652, France—d. August or September 1724, Bristol?, Eng.), English organ builder whose fine instruments were highly regarded by his contemporaries. Harris was the son and grandson of organ builders; his maternal grandfather was Thomas Dallam (*c.* 1575–*c.* 1630), three of whose sons also became well-known builders. Renatus' father, Thomas, worked in France during the period when organ building was discouraged in England by the Commonwealth. The family returned to England in 1660, and Renatus worked with his father for some time afterward. Independently, Renatus built about 39 organs, including a number for colleges and large cathedrals. His instruments were mechanically superior to those of his bitter rival, Bernard Smith. His pipes and voicing were considered to be surpassed by the best of Smith's; Harris' reed pipes, however, were justly famous and perhaps better than Smith's. Some Harris pipework is extant. His sons became active builders, and a daughter married into the Byfield family, organ builders into the 19th century.

Harris, Roy, byname of LEROY ELLSWORTH HARRIS (b. Feb. 12, 1898, Lincoln County, Okla., U.S.—d. Oct. 1, 1979, Santa Monica, Calif.), composer, teacher, and a prominent representative of nationalism in U.S. music. He came to be regarded as the musical spokesman for the American landscape.

His family moved to California during his childhood. He was a truck driver for four years, then at age 24 studied music in California. Later he studied in Paris with Nadia Boulanger, who trained many distinguished composers. His first significant work was a



Roy Harris
Clara Sipprell

concerto for clarinet, piano, and string quartet (1927). After returning to the United States he held teaching positions (composer in residence at California State University at Los Angeles, and professor emeritus of music at the University of California at Los Angeles at the time of his death) and was active as an organizer of music festivals.

Harris' works are marked by broad tonal melodies and asymmetrical rhythms. Many reflect American scenes and music: *When Johnny Comes Marching Home* (1935), a symphonic overture on a Civil War song; the *Fourth (Folksong) Symphony* with chorus (1940); and *Kentucky Spring* (1949), for orchestra. His *Sixth Symphony* (1944) is subtitled *Gettysburg Address,* and his *10th Symphony* (1965) the *Abraham Lincoln Symphony.*

Of his 16 symphonies, the best known and most often performed is the *Third* (1939), written in a single movement with contrasting sections of lyrical and dramatic nature. The *Fifth Symphony* (1943) has a vigorous proclamatory quality, and his *Seventh* (1952) shows his characteristic harmonic, melodic, and rhythmic features to be further strengthened and developed. In chamber music he followed classical models. He wrote three string quartets, a piano trio, a piano quintet, and a string quintet. Particularly interesting is the *Third String Quartet* (1939), in the form of four preludes and fugues in modal harmony.

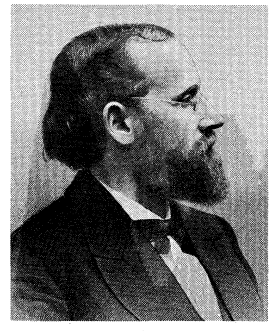
Harris, Townsend (b. Oct. 3, 1804, Sandy Hill, N.Y., U.S.—d. Feb. 25, 1878, New York City), U.S. politician and diplomat, the first Western consul to reside in Japan, whose influence helped shape the future course of Japanese–Western relations.

A minor Democratic politician, Harris became the president of the New York City Board of Education in 1846 and was responsible for the establishment of the Free Academy (now City College of The City University of New York) in 1847. He left New York after 1847 to embark on a series of financially disastrous trading voyages in the Pacific and Indian oceans. He was living in Shanghai in 1853 when Commo. Matthew C. Perry passed through the city on his way to Japan, which he opened to trade with the West. Harris' bid to accompany Perry was rejected, whereupon Harris used his political connections in Washington, D.C., to have himself appointed (1855) the first consul general to Japan.

Harris arrived in Japan in the summer of 1856 and prepared to take up residence in accordance with the terms of the Treaty of Kanagawa, signed between the Japanese government and Perry in 1854. The Japanese, however, did not welcome Harris, and their repeated attempts to create difficulties for him forced him to establish his consulate in a Buddhist temple in the small town of Shimoda.

Unlike Perry, Harris had no means for enforcing his demands, and for a long time the Japanese authorities simply ignored his presence. Eventually his sincerity and perseverance were rewarded; a change within the Japanese ruling circle brought to power a group more favourably disposed to concessions to the West, and Harris was even granted several audiences with the shogun, or hereditary military dictator. Taking advantage of the British and French defeat of China in the opening rounds of the "Arrow" War (1856–60), Harris persuaded the Japanese to sign a commercial treaty (*see* Harris treaty) on July 29, 1858. Similar treaties soon were signed between Japan and other Western countries. Although these agreements were not without inequalities, they were, nonetheless, more fair than most other treaties between Asian and Western countries of the time, largely because of Harris' efforts. He resigned in 1861 and returned to New York City, where he was active in politics until his death.

Harris, William Torrey (b. Sept. 10, 1835, North Killingley, Conn., U.S.—d. Nov. 5, 1909, Providence, R.I.), U.S. educator, probably the most widely known public school educator and philosopher in the United States during the late 19th century.



W.T. Harris, engraving by J.C. Buttre after a photograph
By courtesy of the Missouri Historical Society

Harris attended Yale College and then worked as a teacher and later as superintendent of schools in St. Louis, Mo. (1868–80). He served as U.S. commissioner of education from 1889 to 1906. As a practical school man, Harris was an effective administrator and reformer. He introduced into the curriculum such studies as art, music, science, and manual arts, and he favoured the professional study of education for teachers in training. He worked to extend the public high school and incorporated the kindergarten into the regular school system of St. Louis.

As a philosopher and psychologist, Harris was conservative and synthetic rather than original, embracing German Idealism, American Transcendentalism, Christianity, phrenology, and mental discipline. He lectured for several summers at the Concord School of Philosophy, but Hegelian Idealism was retreating, and Harris was not creative enough to stem the rising tide of Naturalism. A prolific writer of several hundred philosophical and educational articles, Harris was also editor of *The Journal of Speculative Philosophy,* Appleton's International Education Series, and *Webster's New International Dictionary.*

Harris, Zellig S(abbetai) (b. Oct. 23, 1909, Balta, Russia), U.S. scholar known for his work in structural linguistics. He carried Bloomfieldian ideas of linguistic description to their furthest logical development: to discover the linear distributional relations of phonemes and morphemes.

Harris was taken to the United States as a child in 1913, and he received his B.A., M.A., and Ph.D. (1934) from the University of Pennsylvania, where he began teaching in 1931 and became Benjamin Franklin professor of linguistics in 1966.

Harris' *Methods in Structural Linguistics* (1951) established his scholarly reputation. In subsequent work on discourse analysis, Harris suggested the use of transformations as a means of expanding his method of descriptive analysis to cross sentence boundaries. Since Harris was Noam Chomsky's teacher, some linguists have questioned whether Chomsky's transformational grammar is as revolutionary as it has been taken to be, but the two scholars developed their ideas of transformation in different contexts and for different purposes. For Harris, a transformation relates surface structure sentence forms and is not a device to transform a deep structure into a surface structure, as it is in transformational grammar.

Harris movement, largest mass movement toward Christianity in West Africa, named for the prophet William Wadé Harris (*c.* 1850–1929), a Grebo of Liberia and a teacher-catechist in the American Episcopal mission.

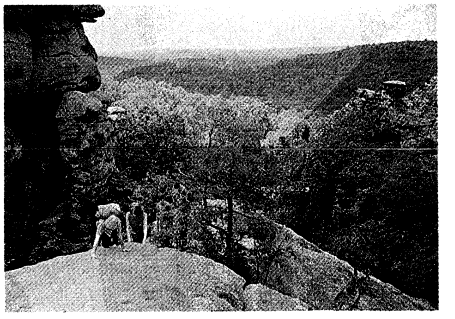
While in prison for a political offense in 1910, Harris was commissioned in a vision to become a preacher; he then travelled along the coast, reaching Ghana by 1914. The response to his message so disturbed the French colonial government of the Ivory Coast that he was deported to Liberia in 1915. An estimated 120,000 followers discarded traditional ritual and magic objects, were baptized, adopted the sabbath, built churches, and waited in anticipation for the white teachers who, as Harris promised, would come to teach them the Bible.

In western Ghana the Methodists and Roman Catholics each benefitted by some 9,000 converts and catechumens in 1914–20, and a follower, John Swatson, pioneered Anglican work. British Methodism sent missionaries to the Ivory Coast in 1924 and had gained 32,000 members by 1926. Other Harris converts developed a wide range of Harris independent churches, such as the Church of the Twelve Apostles in Ghana, the loosely grouped Églises Harristes, which, in the 20th century, have some 100,000 adherents in the Ivory Coast, and other more syncretic groups.

Harris treaty (July 29, 1858), agreement that secured commercial and diplomatic privileges for the United States in Japan and constituted the basis for Western economic penetration of Japan. Negotiated by Townsend Harris, first U.S. consul to Japan, it provided for the opening of five ports to U.S. trade, in addition to those opened in 1854 as a result of the Treaty of Kanagawa; it also exempted U.S. citizens living in the ports from the jurisdiction of Japanese law, guaranteed them religious freedom, and arranged for diplomatic representation and a tariff agreement between the United States and Japan.

Harris was aided by the fact that British and French squadrons were on their way to Japan to obtain new treaties by force; he persuaded the Japanese authorities that they would obtain better terms by first negotiating a new treaty with the United States. And, indeed, the Harris treaty became the basis of agreements signed shortly afterward with most European nations. Although the treaty provided for the possibility of revision in 1872, the Iwakura Mission to the United States that year failed to secure modification of the agreements.

Harrisburg, city, Saline County, southeastern Illinois, U.S. It was laid out in 1853 and named in honour of James Harris, an attorney who helped establish the community. The economy is based on coal mining, agriculture, and manufacturing (building materials and fabricated metals). Channelization of the Saline River, a few miles east, affords barge transportation. Harrisburg is the seat of Southeastern Illinois (junior) College (1960) and has

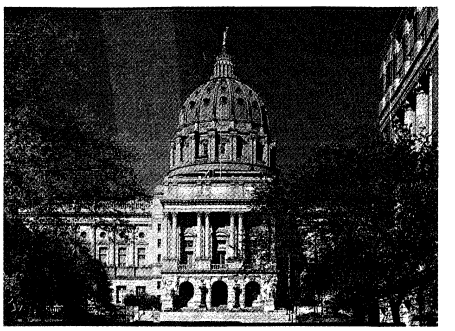


Shawnee National Forest, to the south of Harrisburg, Ill.

By courtesy of the Illinois Department of Business and Economic Development

one of the nation's oldest radio stations, WEBQ (broadcasting since 1920). It is the headquarters of the Shawnee National Forest (to the south). The A.L. Bowen Developmental Center for the mentally retarded is nearby (west). Inc. 1861. Pop. (1980) 9,322.

Harrisburg, capital (1812) of Pennsylvania, U.S., and seat (1785) of Dauphin County, on the east bank of the Susquehanna River, 90 mi (145 km) west of Philadelphia. It is the hub of an urbanized area that includes Steelton, Paxtang, Penbrook (in Dauphin County) and Camp Hill, Lemoyne, New Cumberland,



The Capitol, Harrisburg, Pa.

R.B. McCoy—Shostal/EB Inc.

Shiremanstown, West Fairview, and Wormleysburg (in Cumberland County).

After receiving a license (1705) to trade with the Indians, John Harris, an Englishman, established (*c.* 1718) a trading post and ferry service. The settlement, known as Harris' Ferry, was called Louisbourg in honour of Louis XVI, when it was laid out in 1785 by William Maclay for John Harris, Jr. The name Harrisburg, however, was used on the borough and city charters of 1791 and 1860. Harrisburg was the scene of the National Tariff Convention of 1827, and the first national Whig convention in 1839, which nominated William Henry Harrison for U.S. president. It developed as a transportation centre after the opening of the Pennsylvania Canal in 1834, the arrival of the first railroad train (1836), and the completion (1847) of the Pennsylvania Railroad's main line from Harrisburg to Pittsburgh. A Civil War skirmish was fought at Camp Hill, 3 mi southwest, in June 1863.

The city has continued as a transportation hub, and industrial development has added to its economic diversification. Manufactures include steel, clothing, shoes, electronic equipment, and precision and road machinery. The New Cumberland Army Depot, the U.S. Naval Supply Depot, the U.S. Army War College, and Ft. Indiantown Gap Military Reservation are nearby. Educational and research institutions include the Harrisburg Area Community College (1964), the Milton S. Hershey Medical Center, and the Pennsylvania State University Center at Harrisburg; the Capitol Campus of Pennsylvania State University is in nearby Middletown. The state capitol, with a 272-ft (84-m) dome patterned after St. Peter's in Rome, was completed in 1906 to replace the first capitol destroyed (1897) by fire. The William Penn Memorial Museum is among the group of buildings occupying a 68-ac (28-ha) downtown park. The remodelled John Harris Mansion (1766) is now the headquarters of the Dauphin County Historical Society.

Ringed by independent boroughs and townships, Harrisburg was unable to expand its boundaries and after 1950, because of slum clearance and reduced housing, lost population to the suburbs. Pop. (1970) 68,061; (1980) 53,264.

Harrison, city, seat (1869) of Boone County, northwestern Arkansas, U.S., in the Ozark Mountains on Crooked Creek. The Union general M. Larue Harrison laid out the townsite *c.* 1860. The arrival in 1900 of the Missouri and North Arkansas Railway gave impetus for development, and Harrison became a shipping point for livestock, dairy products, timber, limestone, dolomite, and marble. Its farm- and forestry-based economy is now supplemented by light manufacturing. Tourism became significant after completion of the White River dams, which created such recreational areas as Bull Shoals Lake and State Park (to the northeast). Dogpatch, U.S.A., sections of the Ozark National Forest, and several stalactite and stalagmite caves are nearby. Inc. town, 1876; city, 1954. Pop. (1980) 9,567.

Harrison, Benjamin (b. Aug. 20, 1833, North Bend, Ohio, U.S.—d. March 13, 1901, Indianapolis, Ind.), 23rd president of the United States (served 1889–93), a moderate Republican who won an electoral majority while losing the popular vote by more than 90,000 to his opponent, Democrat Grover Cleveland.

Grandson of the ninth U.S. president, William Henry Harrison (elected 1840), young Harrison found an inviting arena for his political ambitions in the newly formed Republican Party when he moved to Indianapolis to practice law in the mid-1850s. After three years of service as a Union officer in the U.S. Civil War

(1861–65), Harrison resumed his law practice and political interest, publicly supporting the Radical Republicans' firm Reconstruction policy toward the South. Although he failed to win the governorship of Indiana in 1876, his energetic campaign brought him national

Benjamin Harrison, photograph by George Prince, 1888

By courtesy of the Library of Congress, Washington, D.C.

prominence. Elected to the U.S. Senate in 1881, he was nominated for the presidency by the Republicans in 1888 and won the election by 233 electoral votes to Cleveland's 168.

Harrison's administration was marked by an innovative foreign policy and expanding U.S. influence abroad. His secretary of state, James G. Blaine, presided over the country's first Inter-American Conference in Washington, D.C. (1889–90), which established the Pan-American Union for exchange of cultural and scientific information and set a precedent for the entire Pan-American movement. In addition, Blaine successfully resisted pressure from Germany and Great Britain to abandon U.S. interests in the Samoan Islands (1889), and he negotiated a treaty with Great Britain to refer to arbitration a long-standing controversy over the hunting of seals in the Bering Sea (1892). The administration also concluded treaties of commercial reciprocity with a number of foreign governments.

Harrison's domestic program was less successful, despite the fact that the Republicans controlled both houses of the U.S. Congress. An economic depression in the agrarian West and South led to pressure for legislation that conservative Republicans would normally resist. The result was an accommodation in which the conservatives gained the McKinley Tariff Act (1890), which substantially raised duties on most imports, but yielded to agrarians and reformers in such measures as the Sherman Anti-Trust Act (1890), which outlawed business combinations in restraint of trade, and the Sherman Silver Purchase Act of the same year, which increased the amount of money in circulation.

In the congressional elections of 1890, the Democrats recaptured the House of Representatives by a large majority, and during the remaining two years of his term Harrison had little, if any, influence on legislation. He was renominated at the party convention in Minneapolis (1892), but growing Populist discontent and several national strikes occurring late in his term largely accounted for his defeat by an electoral vote of 145 to 277 for his old rival, Cleveland.

Retiring to his law practice in Indianapolis, Harrison emerged briefly to serve as leading counsel for Venezuela in the arbitration of its boundary dispute with Great Britain (1898–99). A good but incomplete biography is Harry J. Sievers, S.J., *Benjamin Harrison, Hoosier Warrior, 1833–1865* (1952), and *Benjamin Harrison, Hoosier Statesman, 1865–1888* (1959).

Harrison, Francis Burton (b. Dec. 18, 1873, New York City—d. Nov. 21, 1957, Flemington, N.J., U.S.), U.S. governor general of the Philippines (1913–21) and later adviser to Philippine presidents.

Harrison was born into a wealthy and prominent family; his father was a successful New York lawyer who had been a private secretary to Jefferson Davis, and his mother was a well-known Virginia-born novelist. After receiving an A.B. from Yale University (1895) and a law degree from New York Law School (1897), he taught law, served in the Spanish–American War, and was elected to Congress as a Democrat, serving from 1903 to 1905 and from 1907 to 1912. The Harrison Narcotics Act (1914), which he espoused, laid the basis for the later Pure Food and Drug Act.

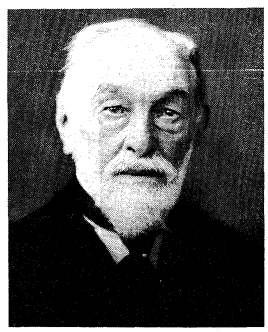
A vigorous anti-imperialist and opponent of "Dollar Diplomacy," he was appointed by Pres. Woodrow Wilson to ameliorate U.S. governance of the Philippines. In Manila, as governor general, he declared the Democratic Party's intention to seek independence for the Philippines and locally introduced a number of reforms, that brought more Filipinos into responsible administrative positions and added other elements of self-government.

After the Democratic defeat in the United States in 1920, Harrison lived abroad, on an estate in Scotland and at resorts on the Mediterranean. In 1935 he returned to the Philippines to become a "presidential adviser" to the fledgling Philippine government under Pres. Manuel Quezon and served the Philippine government-in-exile in Washington, D.C., during World War II. After the war, he was special adviser to the first three presidents of the independent Republic of the Philippines. In his last years (1950–56), however, he and his sixth wife lived secluded in Spain. On his death he was given a state funeral in Manila and was buried there.

He wrote *Cornerstone of Philippine Independence* (1922). *Origins of the Philippine Republic: Extracts from the Diaries and Records of Francis Burton Harrison* was published in 1974.

Harrison, Frederic (b. Oct. 18, 1831, London—d. Jan. 14, 1923, Bath, Somerset, Eng.), English author who publicized the Positivism of the French sociologist Auguste Comte in Great Britain.

Like Richard Congreve, the first important English Positivist, Harrison accepted Positivism not only as a secular philosophy but also as the basis of a religion, which the



Frederic Harrison, 1920

BBC Hulton Picture Library

two embodied in the Church of Humanity, founded in London. A practicing lawyer from 1858, Harrison was a member of royal commissions on trade unions and law digests. He was the author of *Positivism: Its Position, Aims and Ideals* (1901); *The Positive Evolution of Religion* (1913); and *The Philosophy of Common Sense* (1907).

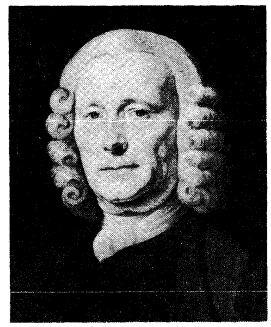
Harrison, G(eorge) Donald (b. April 21, 1889, Huddersfield, Yorkshire, Eng.—d. June 14, 1956, New York City), English-born U.S. organ designer and builder, who designed or extensively rebuilt many of the largest and finest instruments of the 20th century.

Although he studied organ as a boy, Harrison began his career as an engineer. In 1912 he passed the qualifying examination of the Chartered Institute of Patent Agents and joined his father's firm. In 1914 he began work as patent attorney for Henry Willis & Sons (organ builders). Upon his return from military service he acted as an assistant to Willis, studied voicing methods, and, with his growing reputation as an organ designer and craftsman, was elevated to a directorship.

Harrison left Willis in 1927 to join the Aeolian-Skinner Organ Company of Boston, a company with which he remained for 29 years. In 1933 he became technical director of the company, in charge of the mechanical and tonal design of all instruments, and in 1940 he was elected president and treasurer. He continued to have a great influence on the development of voicing and tone-production throughout the industry.

Among the best known examples of his work are the organs at the Cathedral of St. John the Divine and Riverside Church, New York City; the Mother Church and the First Church of Christ, Scientist, Boston; and the Mormon Tabernacle, Salt Lake City, Utah.

Harrison, John (b. March 1693, Foulby, Yorkshire, Eng.—d. March 24, 1776, London), English horologist who invented the first practical marine chronometer, which enabled



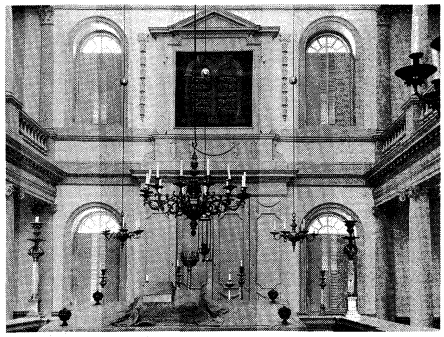
John Harrison, detail of an oil painting by Thomas King; in the Science Museum, London

By courtesy of the Science Museum, London, lent by W.H. Barton

navigators to compute accurately their longitude at sea.

Harrison, the son of a carpenter and a mechanic himself, became interested in constructing an accurate chronometer in 1728. Several unfortunate disasters at sea, caused ostensibly by poor navigation, prompted the British government to create a Board of Longitude empowered to award £20,000 to the first man who developed a chronometer with which longitude could be calculated within half a degree at the end of a voyage to the West Indies. Harrison completed his first chronometer in 1735 and submitted it for the prize. He then built three more instruments, each smaller and more accurate than its predecessor. In 1762 Harrison's famous No. 4 marine chronometer was found to be in error by only five seconds (1¼′ longitude) after a voyage to Jamaica. Although his chronometers all met the standards set up by the Board of Longitude, he was not awarded any money until 1763, when he received £5,000, and not until 1773 was he paid in full. The only feature of his chronometers retained by later manufacturers was a device that keeps the clock running while it is being wound.

Harrison, Peter (b. June 14, 1716, York, Yorkshire, Eng.—d. April 30, 1775, New Haven, Conn.), British-American architect who became popular through his adaptations of designs by the great architects of history.



Interior of Touro Synagogue, Newport, R.I., U.S., designed by Peter Harrison, 1759–63
Wayne Andrews

As a sea captain, Harrison went to Rhode Island in 1740 and settled in Newport, where he engaged in agriculture and the rum trade. Considered an amateur architect, he depended upon plans found in printed handbooks and engraved editions of historic architects, using the plans with outstanding success. Purity and exactness within the Palladian tradition were characteristic of his execution of plans. Among his Newport buildings were Redwood Library (1748–49), Touro Synagogue (1759–63), and Brick Market (*c.* 1760). Among his other buildings were Christ Church (Cambridge, Mass., 1761) and King's Chapel (Boston, 1749–54). In 1761 he moved to New Haven, where he became collector of customs in 1768.

Harrison, Sir Rex (Carey) (b. March 5, 1908, Huyton, Lancashire, Eng.—d. June 2, 1990, New York, N.Y., U.S.), English stage and motion-picture actor.

Harrison's early career was spent with the Liverpool Repertory Theatre, which he joined at the age of 16. He first appeared on the London stage in 1930, the same year as his first film, *The Great Game,* was released. During World War II, Harrison served as a flight lieutenant in the Royal Air Force. His return to films in 1945 was spectacular, with highly praised roles in *Blithe Spirit* and *The Rake's Progress.* His first American film was *Anna and the King of Siam* (1946).

One of Harrison's most famous roles began in 1956 with his stellar portrayal of Professor Henry Higgins in the Broadway musical *My Fair Lady,* a role for which he received a Tony award; in 1964 he received an Oscar from the Academy of Motion Picture Arts and Sciences for the filmed version. As an international star he then made a number of films, including a musical version of *Doctor Dolittle* (1967), before successfully reviving *My Fair Lady* for the stage in 1980. He appeared to rave reviews as Captain Shotover in a 1983 Broadway production of George Bernard Shaw's *Heartbreak House.* He was knighted in 1989. An autobiography, *Rex,* was published in 1974.

Harrison, Ross Granville (b. Jan. 13, 1870, Germantown, Pa., U.S.—d. Sept. 30, 1959, New Haven, Conn.), American zoologist who developed the first successful animal-tissue cultures and pioneered organ-transplantation techniques.

Ross Harrison
By courtesy of Yale University Archives, Yale University Library

During his first year as professor of comparative anatomy and biology at Yale (1907–38), where he also served as chairman of the zoology department, Harrison cultivated tadpole tissue and found that nerve fibres grew from it. He observed that the nerve-cell outgrowths display protoplasmic movement, settling a controversy concerning the formation and nature of nerve fibres. This observation constituted the foundation of modern nerve physiology and neurology, and his culture technique was to have vital biological applications, such as its use in cancer research and the development of polio vaccines.

During this period he also invented devices for tissue grafting, allowing him to observe the effect of embryonic tissue transplants. In one such experiment he found that tissue from an amphibian embryo that would have formed a left limb formed a right limb if it was inverted and transferred to the embryo's right side. Harrison's discoveries not only established asymmetry rules for vertebrates and proved that the embryonic mid-layer, or mesoderm, gives rise to the animal's limbs, but also led to a great number of profitable experiments in embryology utilizing his methods. After his retirement from teaching, Harrison served as chairman of the National Research Council (1938–46).

Harrison, Thomas (b. 1616, Newcastle-under-Lyme, Staffordshire, Eng.—d. Oct. 13, 1660, London), English Parliamentarian general and a leader in the Fifth Monarchy sect (men who believed in the imminent coming of Christ and were willing to rule until he came). He helped to bring about the execution of King Charles I.

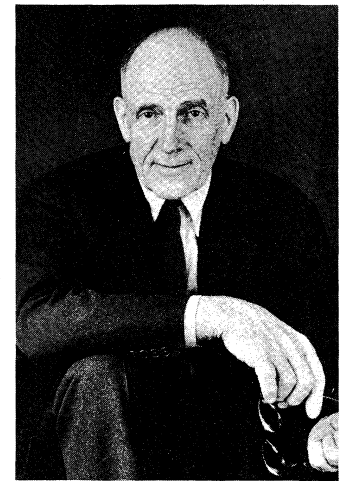
In the first phase of the English Civil Wars, Harrison fought in the battles of Edgehill, Marston Moor, and Naseby. When he was elected member of Parliament in 1646, he urged the prosecution of Charles I as "a man of blood." As a Fifth Monarchy man, he wished to institute a government of "saints" and was an active patron of radical preachers. He commanded the guard that brought Charles I to London for his trial in 1648, became a member of the Council of State in 1651, and fought at Worcester (Sept. 3, 1651). He pressed Oliver Cromwell to dissolve the Rump Parliament and was the leading advocate of the subsequent "Parliament of Saints." When it collapsed, he refused to acknowledge the Protectorate (because it impeded the divine plan), lost his commission in the army, and was imprisoned several times. At the Restoration he was arrested, tried, and executed.

Consult the INDEX *first*

Harrison, Wallace K(irkman) (b. Sept. 28, 1895, Worcester, Mass., U.S.—d. Dec. 2, 1981, New York, N.Y.), American architect best known as head of the group of architects that designed the United Nations building, New York City (1947–50).

Harrison studied at the École des Beaux-Arts, Paris, and in 1921 won a traveling fellowship to Europe and the Middle East. He was one of the architects responsible for Rockefeller Center, New York City (1929–40). The partnership he formed with J. André Fouilhoux in 1935 became Harrison, Fouilhoux and Abramovitz in 1941. Harrison designed the Trylon and Perisphere theme centre at the New York World's Fair (1939).

Harrison's partnership with Max Abramovitz, formed in 1945, became one of the largest architectural firms in the United States specializing in office buildings. Among his office buildings are the Alcoa Building, Pittsburgh, Pa. (1953), notable for its large aluminum panels cut by relatively small panels, and the Socony Mobil Building, New York City (1956). His First Presbyterian Church, Stamford, Conn., is considered an outstanding example of modern church design. Shaped like a fish, the interior is flooded with coloured light from large expanses of stained glass.



Wallace Harrison, 1966
Katrina Thomas

Harrison's organizational skills were well utilized in his major projects, such as the United Nations complex and the Lincoln Center for the Performing Arts, New York City (1962), for which he served as overall design coordinator. He also designed the new Metropolitan Opera House (1965) and its office alterations (1978).

Harrison, William Henry (b. Feb. 9, 1773, Charles City county, Va. [U.S.]—d. April 4, 1841, Washington, D.C.), ninth president of the United States whose successful Indian campaigns, while a territorial governor and army officer, thrust him into the national limelight and led to his election in 1840. He was the first chief executive to die in office, after only one month's service.

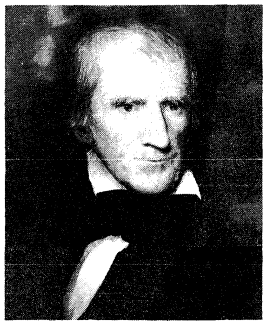
Descended from a Virginia family long active in politics, Harrison enlisted at 18 as an army officer, serving as an aide-de-camp to General Anthony Wayne against the Northwest Indian Confederation in the successful campaign that ended in the Battle of Fallen Timbers, near present Maumee, Ohio (Aug. 20, 1794). He was named secretary of the Northwest Territory in 1798 and sent to Congress as a territorial delegate the following year. In May 1800 Harrison was appointed governor of the newly created Indiana Territory, where, succumbing to the demands of land-hungry whites, he negotiated between 1802 and 1809 a number of treaties that stripped the Indians of that region of millions of acres of land.

Resisting this expansionism, the Shawnee intertribal leader Tecumseh organized an Indian uprising. Leading a force of seasoned regulars and militia, Harrison defeated the Indians at the Battle of Tippecanoe (Nov. 7, 1811), near present Lafayette, Ind., a victory that largely established his military reputation in the public mind. A few months after the War of 1812 broke out with Great Britain, Harrison was made a brigadier general and placed in command of all federal forces in the Northwest Territory. On Oct. 5, 1813, troops under his command decisively defeated the British and their Indian allies at the Battle of the Thames, in Ontario. Tecumseh was killed in the battle, and the British–Indian alliance was permanently destroyed; thus ended resistance in the Northwest.

After the war Harrison settled in Ohio, where

he quickly became prominent in Whig politics. He served in the U.S. House of Representatives (1816–19), the Ohio Senate (1819–21), the U.S. Senate (1825–28), and as minister to Colombia (1828–29). In 1836 he was one of three presidential candidates of the splintered Whig Party, but lost the election to Democrat Martin Van Buren. In 1840 Harrison received the regular Whig nomination, largely because of his military record and his noncommittal political views. To attract Southern Democrats, the Whigs nominated John Tyler of Virginia for vice president. Capitalizing on voter discontent with the economic depression caused by the Panic of 1837, the campaign deliberately avoided discussion of national issues and substituted political songs, partisan slogans, and appropriate insignia: miniature log cabins and jugs of hard cider were widely distributed to emphasize Harrison's frontier identification, and the cry of "Tippecanoe and Tyler too" rang throughout the land. These emotional appeals triumphed, with Harrison winning 234 electoral votes to his rival's 60.

Inauguration ceremonies at the capital were held in a cold drizzle on March 4, 1841, and the old campaigner insisted on delivering his address without a hat or an overcoat. He contracted pneumonia and died a month later,



William Henry Harrison, detail of an oil painting by Abel Nichols (1815–60); in Essex Institute, Salem, Mass.

By courtesy of Essex Institute, Salem, Mass.

undoubtedly weakened by the fatigue brought on by innumerable demands of office seekers.

Biographies include Freeman Cleaves, *Old Tippecanoe: William Henry Harrison and His Time* (1939); James A. Green, *William Henry Harrison: His Life and Times* (1941).

Harrod, Sir (Henry) Roy (Forbes) (b. Feb. 13, 1900, London—d. March 9, 1978, Holt, Norfolk, Eng.), British economist who pioneered the economics of dynamic growth and the field of macroeconomics.

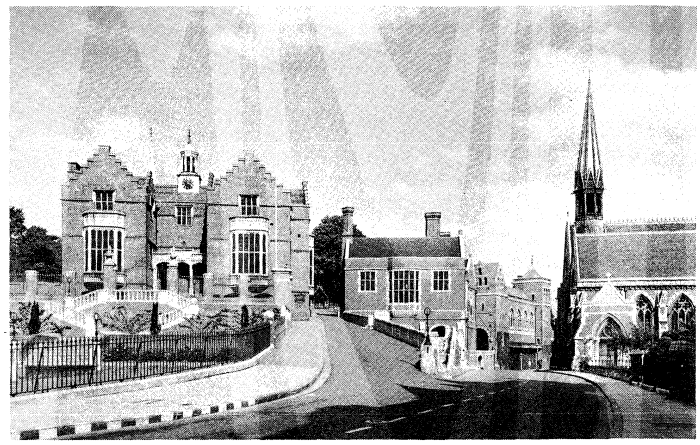
Harrod was educated at Oxford and at Cambridge, where he was a student of John Maynard Keynes. His career at Christ Church, Oxford (1922–67), was interrupted by World War II service (1940–42) under Frederick Lindemann (later Lord Cherwell) as adviser to Winston Churchill. He was also an adviser to the International Monetary Fund (1952–53). He was knighted in 1959.

Harrod first formulated his concepts of growth dynamics in the 1930s and '40s, emphasizing the analysis of the determining factors, rather than the quantities, of equilibrium growth rates. These ideas were put forth in *Towards a Dynamic Economics* (1948). The Harrod–Domar model of economic growth (named for Harrod and the U.S. economist E.D. Domar) has been applied to the problems of economic development.

Harrod also wrote *International Economics* (1933), *The Trade Cycle* (1936), *Economic Essays* (1952), *The International Monetary Fund* (1966), *Towards a New Economic Policy* (1967), and *Economic Dynamics* (1973) and, as a biographer, *The Life of John Maynard Keynes* (1951) and *The Prof: A Personal Memoir of Lord Cherwell* (1959). He also produced *Foundations of Inductive Logic* (1956) and *Sociology, Morals and Mystery* (1971).

Harrods, Ltd., in London, renowned department store founded by a miller, Henry Charles Harrod, as a grocery store in 1849. The enterprise expanded in the late 1800s, and many new departments were added. It is considered the United Kingdom's best department store.

Although the store still provides gourmet food items, its emphasis is on high-fashion clothing. The store's owners expanded customer service to provide for every need and once boasted that Harrods had "the best circulating library in London." Using the store's services, customers could buy theatre tickets, make travel reservations, and arrange funerals.



Harrow School in Harrow borough, London

A.F. Kersting

Over the years Harrods made innovations in many areas of store operation. In the 1880s cash desks were placed at convenient points to take customers' payments. About the same time the store began to allow limited credit to approved customers.

Harrodsburg, city, seat of Mercer County, central Kentucky, U.S., near the Salt River, in the Bluegrass region, 30 mi (48 km) southwest of Lexington. The oldest permanent settlement west of the Alleghenies, it was founded in 1774 on the Wilderness Road as Harrodstown (later Oldtown, then Harrodsburg) by James Harrod and his pioneer group. In Old Fort Harrod State Park is a replica of the original fort (1776) where Daniel Boone once lived; it includes the George Rogers Clark Block House and the Lincoln Marriage Temple (a brick building sheltering the cabin removed from Springfield, where Abraham Lincoln's parents were married). Other historic restorations include Morgan Row Houses (a five-unit row with a museum, built [1807–30] by Joseph Morgan), and the Old Mud Meeting House of the Dutch Reformed Church (*c.* 1800). The preserved Shaker town at Pleasant Hill is 7 mi northeast.

Harrodsburg's basic market economy (horses, tobacco, dairy products) is supplemented by tourism and a spa dispensing mineral waters. Inc. town, 1776; city, 1875. Pop. (1980) 7,265.

Harrogate, district (borough), county of North Yorkshire, England, covering an area of 515 sq mi (1,334 sq km). Harrogate originated in the 17th century as a spa, with chalybeate, sulfur, and saline springs. It originally consisted of two settlements: High Harrogate, with the Queen Hotel (1687), and Low Harrogate, where the majority of the 88 springs were eventually discovered. The Royal Baths (1897, extended 1939) still provide some spa amenities, but since World War II the economic base of the town has been diversified with the introduction and growth of light industry and research establishments. The large hotels and public buildings are used for conferences and trade fairs.

Lying between York and Leeds, within easy reach of the Yorkshire Dales National Park, Harrogate is increasingly important both as a tourist centre and residential town. Local attractions include the Valley Gardens and the extensive common, called the Stray, permanently preserved from development by act of Parliament. Pop. (1981 prelim.) city, 66,475; (1982 est.) district, 140,400.

Harrow, outer borough of Greater London, forming part of its northwestern perimeter. The borough has an area of 20 sq mi (51 sq km). The medieval Church of St. Mary stands on Harrow Hill and is a conspicuous landmark rising above flat clay country that has been overspread by housing since the development of the electrified suburban railways. Also on the hill is the eminent public (fee-paying) Harrow School (*q.v.*). The town centre by the railway station has become one of the main shopping centres of the northwestern sector of Greater London, and there are light industries at nearby Wealdstone. Pop. (1982 est.) 198,800.

harrow, farm implement used to pulverize soil, break up crop residues, uproot weeds, and cover seed. In Neolithic times, soil was harrowed, or cultivated, with tree branches; shaped wooden harrows were used by the Egyptians and other ancient peoples, and the Romans made harrows with iron teeth.

Three section tractor-mounted, spring-toothed harrow

By courtesy of International Harvester Co.

Modern harrows comprise several varieties. Disk harrows mount concave disks and are frequently referred to simply as disks. One type, the single-action two gang, has two groups of disks, more or less horizontally aligned, with opposing concavities, that throw the soil in opposite directions. The tandem harrow has two to four gangs in tandem, and the offset has two to three gangs in tandem on one side of the

tractor, used particularly under low-hanging fruit trees. The horse-drawn or tractor-drawn spike-tooth harrow, or drag, developed in the early 19th century, has sections 3 to 5 feet (1 to 1.5 metres) wide with long spike teeth mounted nearly vertically on horizontal bars. It is used chiefly for pulverizing soil and for early cultivation. Spring-tooth harrows (developed in the 1860s) have curved, springy teeth designed for use in rough, stony ground and around roots. Knife-tooth harrows, with twisted blades spaced several inches apart, are driven in a rotary motion usually by a small gasoline motor. They are used chiefly by gardeners and are often referred to as rototillers or rotary plows. *See also* plow.

Harrow School, in Harrow, Greater London, one of the foremost public schools of England and one of the highest in prestige.

Its founder, John Lyon (d. 1592), whose brass is in the church, was a yeoman of neighbouring Preston and had yearly set aside 20 marks for the education of poor children of Harrow. The charter was granted by Elizabeth I in 1571, and the statutes were promulgated by Lyon in 1590, but it was not until 1611 that the first building was opened. In about 1660 the headmaster began to receive "foreigners"—*i.e.,* boys from other parishes who could pay fees. Control was originally vested in six parishioners of standing, but under the Public Schools Act of 1868 the governing body consisted of six members elected respectively by the lord chancellor, the universities of Oxford, Cambridge, and London, the Royal Society, and the assistant masters of the school.

The main buildings are 19th-century, but the old Fourth Form Room dates from 1611, and on its panels are cut names of eminent alumni, among whom are Robert Peel, Henry John Temple (Lord Palmerston), Richard Brinsley Sheridan, Lord Byron, and Henry Cardinal Manning. Other famous pupils include Lord Rodney, John Galsworthy, Anthony Trollope, Lord Shaftesbury, and Sir Winston S. Churchill. The Vaughan Library, named for C.J. Vaughan, distinguished headmaster (1844–59), and the Chapel were built by Sir George Gilbert Scott. The War Memorial Building is the work of Sir George Gilbert Scott. The War Memorial Building is the work of Sir Herbert Baker. Harrow songs, the Bill (roll call in the schoolyard), Harrow football, and Harrow straw hats are features peculiar to the school.

Harry THE MINSTREL, also called HENRY THE MINSTREL, OR BLIND HARRY (fl. 1470–92), author of the Scottish historical romance *The Acts and Deeds of the Illustrious and Valiant Champion Sir William Wallace, Knight of Elderslie,* which is preserved in a manuscript dated 1488. He has been traditionally identified with the Blind Harry named among others in William Dunbar's *Lament for the Makaris* ("poets") and with a "Blin Hary" who is listed from time to time as having received a few shillings from the royal bounty in the treasurer's accounts (1490–92). According to a contemporary historian, John Major, Harry was a wandering minstrel, blind from birth, who collected and recited legends about the Scottish hero Sir William Wallace. From his own account he was an unlearned man, but his own work, which shows his acquaintance with John Barbour's *Bruce*; with Chaucer; and with Scots, Latin, and French chronicles, belies this.

The *Wallace,* which runs to 11 books and nearly 12,000 lines, is a historical novel in verse, fabricated from the events of the Scottish War for Independence, popular legend about Wallace, and earlier romances. Though Harry claims historicity for his work, he portrays Wallace on a superhuman scale, and many of the hero's astonishing feats actually take place long after the historical capture and execution of Wallace in 1305. Judged simply as a romance, the *Wallace* is inferior to the *Bruce* in arrangement and literary finish. Because of its patriotic fervour it was immensely more popular among the Scots than the *Bruce* and remained so into the 19th century.

Harṣa, also spelled HARSHA, also called HARṢAVARDHANA (b. *c.* 590—d. *c.* 647), ruler of a large empire in northern India (606–647). He was a Buddhist convert in a Hindu era. His reign seemed to mark a transition from the ancient to the medieval period, when decentralized regional empires continually struggled for hegemony.

The second son of Prabhākaravardhana, king of Sthāṇvīśvara (Thānesar, Punjab), Harṣa was crowned at age 16 after the assassination of his elder brother, Rājyavardhana, and an encouraging "communication" with a statue of the Buddhist Avalokiteśvara Bodhisattva. He soon made an alliance with King Bhāskaravarman of Kāmarūpa and warred against King Śaśāṅka of Gauḍa, his brother's assassin. At first he did not assume the title of king but merely acted as a regent; after making his position secure, however, he declared himself sovereign ruler of Kannauj and formally transferred his capital to that city. Though never defeating Śaśāṅka, his large army waged incessant warfare for six years, conquering the "five Indies," thought to be Valabhī, Magadha, Kashmir, Gujarāt, and Sind. His influences extended from Gujarāt to Assam, but the area directly under his control probably comprised no more than the modern Uttar Pradesh, with parts of Punjab and Rājasthān. He attempted to conquer the Deccan (*c.* 620) but was driven back to the Narmada River by the Cālukya emperor Pulakeśin II. Bringing most of the north under his hegemony, Harṣa apparently made no attempt at building a centralized empire but ruled according to the traditional pattern, leaving conquered kings on their thrones and contenting himself with tribute and homage.

Harṣa is known mainly through the works of Bāṇa, whose *Harṣacarita* ("Deeds of Harṣa") describes Harṣa's early career, and of the Chinese pilgrim Hsüan-tsang, who became a personal friend of the King, though his opinions are questionable because of his strong Buddhist ties with Harṣa. The pilgrim depicts the Emperor as a convinced Mahāyāna Buddhist, though in the earlier part of his reign Harṣa appears to have supported orthodox Hinduism. He is described as a model ruler—benevolent, energetic, and just, and active in the administration and prosperity of his empire. In 641 he sent an envoy to the Chinese emperor and established the first diplomatic relations between India and China. He established benevolent institutions for the benefit of travellers, the poor, and the sick throughout his empire. He made large gifts and held quinquennial assemblies at the confluence of the Ganges and the Yamuna at Prayāg (Allahābād), at which he distributed treasures he had accumulated during the previous four years. A patron of men of learning, Harṣa sponsored the chronicler Bāna and Mayūra, a lyric poet. Himself a poet, Harṣa composed three Sanskrit works: *Nāgānanda, Ratnāvalī,* and *Priyadarśikā.*

A period of anarchy, or at least a splintering of his empire, followed Harṣa's death, with the later Guptas ruling over a portion of it.

Harsdörfer, Georg Philipp (b. Nov. 1, 1607, Nürnberg—d. Sept. 22, 1658, Nürnberg), German poet and theorist of the Baroque movement who wrote more than 47 volumes of poetry and prose and, with Johann Klaj (Clajus), founded the most famous of the numerous Baroque literary societies, Pegnitzer Hirtengesellschaft ("Pegnitz Shepherds").

Of patrician background, Harsdörfer undertook university studies and an extended *Bildungsreise* ("educational journey") through England, France, Italy, and the Netherlands. In 1632 he became a junior judge in Nürnberg and in 1655 a member of the town senate. His poetry, typical of the Baroque movement, is characterized by elaborate and sometimes playful rhetoric and exaggerated poetic forms. He laid particular emphasis, in his poetry and in his theoretical work, on *Klangmalerei* ("painting in sound"). His most famous theoretical work, a handbook for the Baroque poets, is ironically titled *Poetischer Trichter, die Teutsche Dicht und Reimkunst, ohne Behuf der Lateinischen Sprache, in sechs Stunden einzugiessen* (1647–53; "A Poetic Funnel for Infusing the Art of German Poetry and Rhyme in Six Hours, Without Benefit of the Latin Language"). Widely read in its time was *Frauenzimmer Gesprech-Spiele* (1641–49; "Women's Conversation Plays"), which, like many of his works, had a didactic purpose. It consists of eight dialogues aimed at teaching women all they need to know to become useful members of society. His *Pegnesisches Schäfergedicht,* written with Klaj and modelled on English poet Sir Philip Sidney's *Arcadia,* did much to spread the fashion of pastoral drama. Harsdörfer also translated works from French, Spanish, and Italian.

Hart, district, county of Hampshire, southern England, occupying an area of 84 sq mi (218 sq km) in the northeastern part of the county. Lying south of the borough of Reading, the district is drained by the Blackwater and Hart rivers, southerly tributaries of the Thames. Hart is generally a low-lying area of clays and gravels reaching into the most westerly extension of the North Downs chalk uplands in the south. Woodlands and heath are interspersed with agricultural land throughout the district. Fleet, the district seat and largest parish (town), is a dormitory community for London (38 mi [61 km] northeast). Primarily agricultural (cereals, dairy products, and lettuce), the district has little industry except for motor-vehicle and textile industries in the locality of Fleet. Some chalk is quarried in the uplands. Odiham is a historic market parish with the Old Pest House that sheltered victims of the Great Plague of 1664–65, the 13–14th-century Church of All Saints, 17th-century almshouses (poorhouses), and Georgian homes. Northwest of Odiham is the ruins of an octagonal Norman castle. Hook and Hartley Wintney are other towns. Pop. (1982 est.) 78,100.

Hart, Charles (d. August 1683, Stanmore, Middlesex, Eng.), English actor, probably the son of the actor William Hart, nephew of Shakespeare.

Hart is first heard of as playing women's parts at Blackfriars Theatre, London, as an apprentice. During the Commonwealth he played surreptitiously at the Cockpit, Holland House, and other noblemen's residences. After the Restoration he appeared on the reopened public stage and in 1663 went to the Theatre Royal in Thomas Killigrew's company, with which he remained until 1682, taking leading parts in plays by Dryden, Jonson, and Beaumont and Fletcher. He is highly spoken of by contemporaries in such Shakespearean parts as Othello and Brutus. He is often mentioned by Samuel Pepys. Thomas Betterton praised him and would not himself play the part of Hotspur until after Hart's retirement. Hart is said to have been the first lover of Nell Gwyn and to have trained her for the stage.

Hart, Charley: *see* Quantrill, William C(larke).

Hart, Heinrich and Julius (respectively b. Dec. 30, 1855, Wesel, Westphalia—d. June 11, 1906, Tecklenburg, Ger.; b. April 9, 1859, Münster, Westphalia—d. July 7, 1930, Berlin), brothers who as critics and writers were

key figures of the Berlin group that introduced Naturalism into German literature.

In Berlin the brothers led the movement to modernize German literature by establishing a critical basis for Naturalism and providing a forum for its discussion and dissemination. From 1882 to 1884 they published *Kritische Waffengänge,* the periodical that decisively launched the Naturalist movement in Germany. After 1884 they worked for the popularization of Naturalism through other journals that they edited (*i.e., Berliner Monatshefte, Kritisches Jahrbuch,* and *Die Freie Bühne*), in which they published essays on Naturalistic aesthetics. They organized Durch (1886), an avant-garde literary coterie, and were founding members of the Freie Bühne (1889), a theatre group whose performances of controversial modern plays (including some by Henrik Ibsen) marked the climax of German Naturalism. The Harts were also lyrical poets, short-story writers, playwrights, and dramatic critics, but it was as theoreticians and critics that they made their most lasting contributions.

Hart, Lorenz, byname LARRY HART (b. May 2, 1895, New York City—d. Nov. 22, 1943, New York City), U.S. song lyricist whose commercial popular songs incorporated the careful techniques and verbal refinements of serious poetry. His 25-year collaboration with the composer Richard Rodgers resulted in about 1,000 songs that range from the simple exuberance of "With a Song in My Heart" (1929) to the glib sophistication of "The Lady Is a Tramp" (1937).

A descendant of the family of the poet Heinrich Heine, Hart worked as a translator of German while attending Columbia University. In 1918, when he was 23, he met Rodgers, then 16, and their partnership began. They wrote the Columbia University varsity show of 1920. Their first Broadway success was *The Garrick Gaieties* (1925), which includes the songs "Manhattan" and "Mountain Greenery." It was followed by a series of increasingly sophisticated musical comedies, among which were *A Connecticut Yankee* (1927), *The Boys From Syracuse* (1938), and, perhaps their masterwork, *Pal Joey* (1940).

As Rodgers matured into a hard-working, hard-driving professional, Hart remained the gifted amateur. His aversion to sustained work, keeping appointments, and meeting deadlines lent credence to Rodgers' description of him as "a partner, a best friend—and a source of permanent irritation." In time Hart became increasingly addicted to alcohol and less and less reliable. The last show that they wrote together was *By Jupiter* (1942), a year before Hart's death.

Their long list of successful songs includes "Here in My Arms" (1926), "My Heart Stood Still" (1927), "Lover" (1933), "Blue Moon" (1934; their only song not introduced in a stage or film production), "My Funny Valentine" (1937), "Falling in Love with Love" (1938), "I Didn't Know What Time It Was" (1939), and "Bewitched, Bothered, and Bewildered" (1940).

Hart, Marvin (b. Sept. 16, 1876, Jefferson County, Ky., U.S.—d. Sept. 17, 1931, Fern Creek, near Louisville, Ky.), U.S. world heavyweight boxing champion from July 3, 1905, to Feb. 23, 1906. Hart's claim to the championship has not been universally accepted, although that of Tommy Burns, who defeated Hart in a title match, is not seriously challenged.

After James J. Jeffries, undefeated and lacking suitable opponents, resigned the championship in 1904, he arranged a fight to determine his successor. In this bout Hart knocked out Jack Root, a former 175-pound champion. Hart's only defense of the championship resulted in a 20-round decision in favour of Burns in Los Angeles. From 1899 to 1910, Hart had 48 bouts, winning 29, 20 by knockouts.

Hart, Moss (b. Oct. 24, 1904, New York City—d. Dec. 20, 1961, Palm Springs, Calif., U.S.), one of the most successful U.S. playwrights of the 20th century.

At 17 Hart obtained a job as office boy for the theatrical producer Augustus Pitou. He wrote his first play at 18, but it was a flop. He then worked as director of amateur theatre groups, spending his summers as entertainment director of vacation resorts in the Catskills, known in the theatrical world as "the borscht circuit." In 1929 he wrote the first draft of *Once in a Lifetime,* a satire on Hollywood that became a hit the following year, after its exuberant humour had been tempered by the sardonic skill of George S. Kaufman. Hart then wrote books for musicals for Irving Berlin and Cole Porter; but until 1941 he continued to work with Kaufman, a collaboration that produced such popular comedies as *You Can't Take It with You* (1936) and *The Man Who Came to Dinner* (1939). His success continued with his musical play *Lady in the Dark,* which he himself directed in 1941. Among other plays he directed was the long-running *My Fair Lady* (1956). In 1959 he published *Act One,* the story of his theatrical apprenticeship.

Moss Hart
AP/Wide World Photos

Hart, Sir Robert 1ST BARONET (b. Feb. 20, 1835, Portadown, County Armagh, N. Ire.—d. Sept. 20, 1911, Fingest Grove, Buckinghamshire, Eng.), Anglo-Chinese statesman employed by the Ch'ing dynasty (1644–1911/12) to direct the Chinese customs bureau and thus satisfy Western demands for an equitable Chinese tariff.

A British consular official in China (1854–59), Hart became customs inspector at Canton (1859); four years later he was appointed inspector general of the Maritime Customs Bureau, which was organized by Western nations to collect Chinese Imperial tariffs on foreign imports.

The bureau, at that time, annually collected more than 8,000,000 taels a year at 14 different ports. Hart expanded the bureau into a department, which by 1895 employed more than 700 Westerners and 3,500 Chinese, and collected more than 27,000,000 taels a year. Hart's employees not only collected tariffs but also charted the China coast, managed government port facilities, and supervised the lighting of coastal and inland waterways.

By 1896 the department was managing the first modernized national postal service in China. In addition, Hart and his men served as advisers to the dynasty in its dealings with Western countries. Hart retired to England in January 1908 after his office was made subordinate to a bureau of Chinese officials.

Hart was knighted in 1882 and awarded a baronetcy in 1893.

Hart, William S. (b. Dec. 6, 1870, Newburgh, N.Y., U.S.—d. June 23, 1946, Newhall, Calif.), U.S. stage and silent motion-picture actor who was the leading hero of the early westerns.

William S. Hart in *The Gunfighter,* 1916–17
Museum of Modern Art—Film Stills Archive

Hart was brought up in the Dakotas, where he lived until he was 16. He made his first appearance on the stage in 1889. Sixteen years later his role in the play *The Squaw Man* (1905) made him a western hero. After playing in *The Virginian* (1907) and *The Trail of the Lonesome Pine* (1912/14), he went to Hollywood, where his portrayals of stern, taciturn Westerners became enormously successful. Working under the director Thomas H. Ince, Hart created harshly realistic films of frontier life that were popular throughout the world. Among his many pictures were *The Passing of Two-Gun Hicks* (1914–15), *Hell's Hinges* (1916), *The Captive God* (1916), *The Dawnmaker* (1916), *Truthful Tulliver* (1917), and *The Square-Deal Man* (1917).

After a brief retirement, he returned to films in 1923 and made nine more pictures, including *Wild Bill Hickok* (1923), *Singer Jim McKee* (1924), *Tumbleweeds* (1925), *Desert Dust* (1927), and *A Lighter of Flames* (1923). Later, Hart turned to writing, producing several volumes of fiction and an autobiography, *My Life East and West* (1929).

Hartack, Bill, byname of WILLIAM JOHN HARTACK, JR. (b. Dec. 9, 1932, Ebensburg, Pa., U.S.), U.S. jockey, the second, after Eddie Arcaro, ever to win five Kentucky Derbies and the first, in 1956, to win $2,000,000 in a single year, a record he broke the following year by earning $3,000,000. For three consecutive years—1955, 1956, and 1957—he was the national champion jockey, winning 417, 347, and 341 races respectively. Again, in 1960, he was the national champion, with 307 winning mounts.

In 1956 Hartack rode Fabius to victory at the Preakness Stakes, and in 1957 he rode Iron Liege to victory at the Kentucky Derby. His four other Kentucky Derby winners were Venetian Way, 1960; Decidedly, 1962; Northern Dancer, 1964; and Majestic Prince, 1969. In 1964, riding Northern Dancer, he won the Preakness for a second time and, in 1969, for a third time, on Majestic Prince. He also rode the winner Celtic Ash in the Belmont Stakes in 1960 and Ridan in the Arlington Futurity in 1961. In 1972, Hartack became the fifth jockey ever to win 4,000 races.

hartal, in Ceylon, general strike, organized in 1953 by Marxist parties to express public dissatisfaction over the rise in the cost of living, especially the cost of rice. (Generically,

the word *hartal* means "strike" in most North Indian languages.) Because of a chronic shortage of rice, the Ceylonese government since World War II had rationed rice and instituted government rice subsidies to keep the price of rice stable in the face of a fluctuating world market. By 1952 the subsidies accounted for 20 percent of government expenditure. In July 1953, Prime Minister Dudley Senanayake of the United National Party drastically reduced the subsidies, causing the price of rice to triple.

The *hartal* followed, and, in order to end it, the government employed repressive measures, resulting in 10 deaths. Senanayake was forced to resign, and, soon after, the new prime minister partially restored the subsidy. The *hartal* symbolized the general public dissatisfaction with the rule of the United National Party. As an issue, it was employed to the advantage of the opposition Sri Lanka Freedom Party, which rose to power in the next general election in 1956.

Harte, Bret, original name FRANCIS BRETT HARTE (b. Aug. 25, 1836, Albany, N.Y., U.S.—d. May 5, 1902, London, Eng.), American writer who helped create the local-colour school in American fiction.

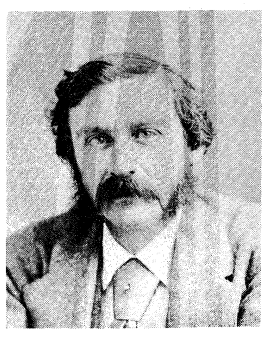
Harte's family settled in New York City and Brooklyn in 1845. His education was spotty and irregular, but he inherited a love of books and managed to get some verses published at age 11. In 1854 he left for California and went into mining country on a brief trip that legend has expanded into a lengthy participation in, and intimate knowledge of, camp life. In 1857 he was employed by the *Northern Californian,* a weekly paper. There his support of Indians and Mexicans proved unpopular; after a massacre of Indians in 1860, which he editorially deplored, he found it advisable to leave town.

Returning to San Francisco, he was married and began to write for the *Golden Era,* which published the first of his *Condensed Novels,* brilliant parodies of James Fenimore Cooper, Charles Dickens, Victor Hugo, and others. He then became a clerk in the U.S. branch mint, a job that allowed freedom for editorship of the *Californian,* for which he engaged Mark Twain to write weekly articles.

In 1868, after publishing a series of Spanish legends akin to Washington Irving's *Alhambra,* he was named editor of the *Overland Monthly.* For it he wrote "The Luck of Roaring Camp" and "The Outcasts of Poker Flat." Following *The Luck of Roaring Camp, and Other Sketches* (1870), he found himself world famous. He furthered his reputation with "Plain Language from Truthful James" (1870), better known as "The Heathen Chinee," a poem that attracted national attention. On it he based his best play, *Ah Sin* (1877), a collaboration with Twain.

Flushed with success, Harte in 1871 signed with *The Atlantic Monthly* for $10,000 for 12 stories a year, the highest figure offered an American writer up to that time. Resigning a professorship at the University of California, Harte left for the East, never to return. In New England he was greeted as an equal by the writers Henry Wadsworth Longfellow, James Russell Lowell, Oliver Wendell Holmes, and William Dean Howells, and was lionized and toasted to the point of spiritual and moral breakdown. With personal and family difficulties, his work slumped. After several years of indifferent success on the lecture circuit, Harte in 1878 accepted consulships in Crefeld, Ger., and later in Glasgow, Scot. In 1885 he retired to London. His wife and family joined him at wide intervals, but he never returned to the United States.

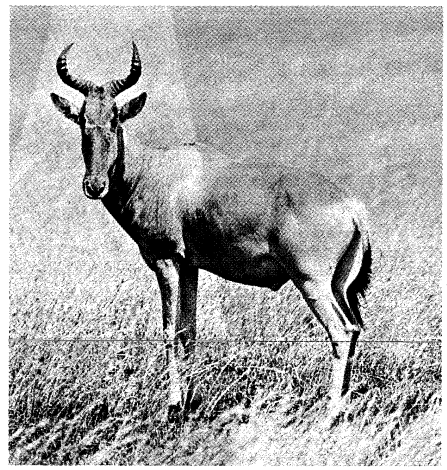
He found in England a ready audience for his tales of a past or mythical California long after American readers had tired of his formula. "Ingénue of the Sierras" and "A Protégée of Jack Hamlin's" (both 1893) are perhaps better than his earlier stories.



Harte

By courtesy of the Library of Congress, Washington, D.C.

hartebeest (genus *Alcelaphus*), either of two swift, slender antelopes, family Bovidae (order Artiodactyla), found in herds on open plains and scrublands of sub-Saharan Africa. They often mingle with herds of zebras or of other antelope. Hartebeests stand about 1.2 m (4 feet) at the shoulder. Their backs slope downward from heavy forequarters to narrow hindquarters, and their long faces are accentuated, in both sexes, by ringed, lyre-shaped horns that are united at the base.



Coke's hartebeest (*Alcelaphus buselaphus cokii*)

Leonard Lee Rue III

In one system of classification, the red hartebeest (*A. buselaphus*) includes such subspecies as the bubal, lelwel, tora, and Cape hartebeest. It is pale reddish brown with a lighter rump and sometimes has black on the head and legs. Lichtenstein's hartebeest (*A. lichtensteini*) is pale brownish with a bright reddish brown back. Swayne's hartebeest (*A. buselaphus swaynei*) and the tora (*A. b. tora*) are listed in the *Red Data Book* as endangered animals.

Other antelopes known as hartebeest are members of the genus *Damaliscus.* Hunter's hartebeest (*Beatragus hunteri*) is sometimes included in that genus.

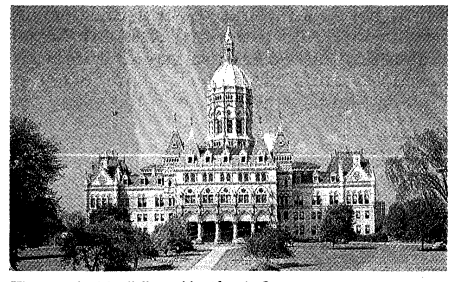
Hartford, capital of Connecticut and a city coextensive with the town ("township") of Hartford, Hartford county, U.S., in the north-central part of the state. It is a major industrial and commercial centre and a port of entry at the head of navigation on the Connecticut River, 38 miles (61 km) from Long Island Sound. Dutch traders from New Amsterdam built a fort in 1633 at the mouth of Park River, a tributary of the Connecticut, but the first settlement was made in 1635, when 60 English pioneers came from New Towne (now Cambridge, Mass.). In 1636 the First Church of Christ (Centre Congregational), which was organized in New Towne (1632), moved to Hartford with most of its congregation under the leadership of Thomas Hooker and Samuel Stone. In 1637 the settlement was named for Stone's birthplace, Hartford, Eng. The Fundamental Orders of Connecticut, a document which later served as a model for the U.S. Constitution, were adopted (1639) in Hartford. On Charter Oak Avenue a monument marks the site of an oak tree where Captain Joseph Wadsworth supposedly secreted the colony's royal charter when Governor Sir Edmund Andros attempted to seize it in 1687.

Hartford was the scene of the convention of 1814 called by New England Federalists to protest the War of 1812 policies of President James Madison. Shipping never recovered from the depression the war caused. Insurance, the city's outstanding business, dates from Feb. 8, 1794, when the first Hartford fire insurance policy was issued.

The marble and granite state capitol, completed in 1879, contains many objects of historic interest, including the tombstone of the American Revolutionary War hero Israel Putnam. A gem of colonial architecture is the old three-story brick statehouse (1796) designed by Charles Bulfinch. Wadsworth Atheneum, the oldest free public art museum in the United States, was opened in Hartford in 1844. The city's nationally famous urban-renewal project, Constitution Plaza, was dedicated in 1964.

Hartford is the seat of Trinity College (1823), Hartford Seminary Foundation (1834), Morse School of Business (1860), Hartford College for Women (1939), Hartford State Technical College (1946), the Greater Hartford Community College (1967), and an extension (1940) of the University of Connecticut. The University of Hartford (1957) is in West Hartford.

The *Hartford Courant* (1764) is one of the nation's oldest surviving newspapers. The city is the birthplace of the writer and lecturer John Fiske and the financier J.P. Morgan; it was the home of the writers Harriet Beecher Stowe and Mark Twain (both houses preserved) and the writer Charles Dudley Warner; the educator Henry Barnard; and the theologian Horace Bushnell. The Hartford Wits, a group of poets, flourished there in the 18th century. The city and town, both incorporated in 1784, were consolidated in 1896. Pop. (1988 est.) city, 141,180; PMSA, 755,400; Hartford-New Britain-Middletown CMSA, 1,067,600.



The capitol building, Hartford, Conn.

Arthur Griffin—EB Inc.

Hartford Convention (Dec. 15, 1814–Jan. 5, 1815), in U.S. history, a secret meeting of Federalist delegates from Connecticut, Rhode Island, Massachusetts, New Hampshire, and Vermont, at Hartford, Conn., inspired by Federalist opposition to President James Madison's mercantile policies and the War of 1812. The convention adopted a strong states' rights position and expressed its grievances in a series of resolutions against military conscription and commercial regulations. News of the signing of the Treaty of Ghent ending the War of 1812, along with the secrecy of the Hartford proceedings, discredited the convention and its work. Its unpopularity was a factor in the demise of the Federalist Party.

Hartford wit, also called CONNECTICUT WIT, any of a group of Federalist poets centred around Hartford, Conn., who collaborated to produce a considerable body of political satire just after the American Revolution. Employing burlesque verse modelled upon Samuel Butler's *Hudibras* and Alexander Pope's *Dunciad,* the wits advocated a strong, conservative central government and attacked such proponents of democratic liberalism as Thomas Jefferson. Leaders of the group, all graduates of Yale College, were John Trumbull (1750–1831), Timothy Dwight (1752–1817), and Joel Barlow (1754–1812). Barlow, who was probably the most creative member of the group, later turned apostate and espoused Jeffersonian democracy.

Although the wits sought to demonstrate the possibility of a genuinely American literature based on American subjects, they conventionalized styles of early 18th-century British verse, and the works that they produced are generally more notable for patriotic fervour than for literary excellence. Their most important effort was a satirical mock epic entitled *The Anarchiad: A Poem on the Restoration of Chaos and Substantial Night* (1786–87), attacking states slow to ratify the American Constitution.

Harthacnut (king of Denmark and England): *see* Hardecanute.

Hartington, Spencer Compton Cavendish, marquess of: *see* Devonshire, Spencer Compton Cavendish, 8th duke of.

Hartington, William Cavendish, marquess of: *see* Devonshire, William Cavendish, 4th duke of.

Hartleben, Otto Erich (b. June 3, 1864, Clausthal, Hanover—d. Feb. 11, 1905, Salò, Italy), German poet, dramatist, and short-story writer known for his Naturalistic dramas that portray with ironic wit the weaknesses of middle-class society.

Hartleben studied law and held minor judicial appointments and then, from 1890, lived a bohemian life as a free-lance writer. The most popular of his dramas was the tragedy *Rosenmontag* (1900; *Love's Carnival,* 1904), which portrays the tragedy of a Prussian officer in love with a working class girl. Social criticism in his works gave way to humorous anecdote, satire, and eroticism reminiscent of Guy de Maupassant, as seen in the tales *Vom*

Hartleben
Historia Photo

gastfreien Pastor (1895; "From the Hospitable Pastor"). He also wrote graceful, though superficial, poetry in an impressionistic style, collected in *Meine Verse* (1905; "My Verses").

Hartlepool, district (borough), county of Cleveland, England. It has an area of 36 sq mi (94 sq km).

The old town occupies a limestone peninsula that sheltered a fishing harbour on the North Sea coast, and it enjoyed the patronage of the medieval prince bishops of Durham, who granted its charter of 1201. Modern development dates from the coming of the railway in 1835, when it became a port for the Durham coalfield, exporting coal and importing pitprops. In 1847 the West Hartlepool dock was added, and a new town was laid out alongside. It grew rapidly with iron and steel, shipbuilding, and marine engineering industries.

As these have declined, Hartlepool has come to depend increasingly upon its association with Teesside. The port is now concerned mainly with servicing North Sea petroleum fields. Construction of a nuclear power station was begun in the 1970s to the southeast at Seaton Snook, and light industries have been established northwest of the town. Pop. (1982 est.) 94,000.

Hartley (town, Zimbabwe): *see* Chegutu.

Hartley, David (b. Aug. 8, 1705, Armley, Yorkshire, Eng.—d. Aug. 28, 1757, Bath, Somerset), English physician and philosopher credited with the first formulation of the psychological system known as associationism. Attempting to explain how thought processes occur, Hartley's associationism, with later modifications, has endured as an integral part

David Hartley, detail of an engraving
BBC Hulton Picture Library

of modern psychological theory. Hartley was also noted for advocating a physiological psychology divorced from metaphysics.

Though he was educated for the Anglican ministry, an unwillingness to assent entirely to the Thirty-nine Articles of the Church of England precluded his taking holy orders. Turning to medicine, he held practices at Newark, Nottinghamshire, London, and Bath. His major work was *Observations on Man, His Frame, His Duty, and His Expectations* (2 vol., 1749). Though Hartley regarded *Observations* as a contribution to philosophy, the work is important in the history of psychology for suggesting that body and mind function in concert. From John Locke's *Essay Concerning Human Understanding* (1700) he adopted the concept of the association of ideas—that ideas are interconnected, sequential, and descriptive of experience. By fusing Locke's concept with his own view of the nervous system, Hartley sought to explain how the most complex mental processes—imagining, remembering, reasoning—might be analyzed into clusters or sequences of elementary sense impressions and that ultimately all psychological acts might be explained by a single law of association.

Hartley, David, THE YOUNGER (b. 1731, Bath, Somerset, Eng.—d. Dec. 19, 1813, Bath), radical English pamphleteer, member of the House of Commons (1774–80, 1782–84), and inventor, son of the philosopher David Hartley. As British plenipotentiary he signed the Treaty of Paris (Sept. 3, 1783), ending the U.S. War of Independence, which he had opposed.

About 1776 he became well known for his method of protecting buildings against fire, and he attracted crowds to experiments performed at his house on Putney Common, London. In London he became a close friend of Benjamin Franklin, with whom he corresponded for several years following Franklin's return to the U.S. Believing that a peaceful reconciliation between Great Britain and the North American colonies was possible, he attacked the conflict both in parliamentary speeches and in his *Letters on the American War* (1778–79). He was also sympathetic toward the French Revolution and critical of the African slave trade.

Hartley, L(eslie) P(oles) (b. Dec. 30, 1895, Fletton Tower, near Peterborough, Northamptonshire, Eng.—d. Dec. 13, 1972, London), English novelist, short-story writer, and critic whose works fuse a subtle observation of manners traditional to the English novel with an interest in the psychological nuance.

After he got his degree at the University of Oxford (1922), Hartley wrote criticism for the literary reviews and published short stories, many of them fantastic or macabre. A collection, *Night Fears,* appeared in 1924. His novella *Simonetta Perkins* (1925) was a light exercise in cosmopolitan manners, with a plot that recalls Henry James's "international" stories. *The Killing Bottle* (1932) was another collection of stories. *The Shrimp and the Anemone* (1944), his first novel in 19 years, was the first part of a trilogy about a brother and sister, Eustace and Hilda. The first volume treats their childhood. *The Sixth Heaven* (1946) and *Eustace and Hilda* (1947) follow them in adulthood. Adept at depicting childhood, Hartley focusses the action of another of his novels, *The Go-Between* (1953; filmed 1971), on a 12-year-old boy who inadvertently causes a tragedy through his ignorance of the complexity of adult relations.

Relations between brothers and sisters were further explored in *My Sisters' Keeper* (1970). Hartley's most complex and fully realized novel is *The Boat* (1949), in which he explores the struggles of a crowd-avoiding individual in England during World War II, when group effort and identification were the norm. A volume of essays, *The Novelist's Responsibility,* appeared in 1967 and *The Collected Stories of L.P. Hartley* in 1968.

Hartley, Marsden (b. Jan. 4, 1877, Lewiston, Maine, U.S.—d. Sept. 2, 1943, Ellsworth), U.S. painter who, after extensive travels had brought him into contact with a variety of modern art movements, arrived at a distinc-

"Painting Number 5," oil on canvas by Marsden Hartley, 1914–15; in the Whitney Museum of American Art, New York City
By courtesy of the Whitney Museum of American Art, New York City, anonymous gift

tive, personal type of Expressionism, seen best in his bold paintings of the harsh landscape of Maine. After study at the Cleveland School of Art, he went to New York City, where he

studied at the Chase School and the National School of Design. He returned to Maine in 1900, after which, for nearly a decade, he spent his summers there and his winters in New York. In 1909 Alfred Stieglitz gave a one-man exhibition of Hartley's New England landscapes at Stieglitz' 291 Gallery on Fifth Avenue, New York City.

From then until World War I, Stieglitz continued to show Hartley's work. Hartley visited Europe for the first time in 1912–13, where he admired the work of the Cubists. In 1914 he began a series of abstract paintings with strongly outlined forms and brilliant colours. During the early years of World War I he was in Berlin and Dresden. From 1915 until 1933 he traveled widely in Europe and the United States. In 1932 he was in Mexico, where he painted a notable series on the volcano Popocatépetl.

In his last 10 years Hartley alternated between New York City and Maine. His "Mt. Katahdin, Autumn, No. 1" (*c.* 1941–42; University of Nebraska Art Galleries, Lincoln) expresses the austere, brooding Maine landscape with monumental power.

Hartlib, Samuel (b. *c.* 1600, Elbing, Prussia—d. March 12, 1662, London), English educational and agricultural reformer and a tireless advocate of universal education.

After attending the University of Cambridge, Hartlib settled in England (1628) and associated himself with the educational philosopher John Dury, sharing his ideas on the necessity for the unity of the Protestant churches, school reforms, and teacher training. Hartlib presented treatises supporting the views of the churchman-reformer John Amos Comenius, such as *A Reformation of Schooles* . . . (1642). He also translated many of Comenius' works, including *Pansophiae,* after which Comenius visited England (1641). During this time, Hartlib persuaded John Milton to write his pamphlet "Of Education" (1644), which Milton dedicated to him.

Among the more than 30 tracts and treatises published by Hartlib, *Macaria* (1641) is notable; it is an outline of a utopia based on the philosophy of Francis Bacon and Comenius. His plan for English education was set forth in *Considerations Tending to the Happy Accomplishment of England's Reformation in Church and State* (1647), in which he proposed a labour exchange and an international bureau for the dissemination of religious and educational ideas. Hartlib further showed his concern for universal education in his many treatises on animal husbandry—*e.g.,* his *Essay for [the] Advancement of Husbandry* (1651). He also advocated the founding of an agricultural college. His *True and Readie Way to Learne the Latine Tongue* (1654) was an effort to make learning available to all.

For his concern with the education legislation of the Long Parliament (1640–53) and his fight for the reformation of church and school, Hartlib was awarded by Oliver Cromwell an annual pension of £300, which ended with the Restoration (1660).

Hartline, Haldan Keffer (b. Dec. 22, 1903, Bloomsburg, Pa., U.S.—d. March 17, 1983, Fallston, Md.), American physiologist who was a cowinner (with George Wald and Ragnar Granit) of the 1967 Nobel Prize in Physiology or Medicine for his work in analyzing the neurophysiological mechanisms of vision.

Hartline began his study of retinal electrophysiology as a National Research Council Fellow at Johns Hopkins University, Baltimore, receiving his M.D. in 1927. After attending the universities of Leipzig and Munich as an Eldridge Johnson traveling research scholar, he became professor of biophysics and chairman of the department at Johns Hopkins in 1949. He joined the staff of Rockefeller University, New York City, in 1953 as professor of neurophysiology.

Hartline investigated the electrical responses of the retinas of certain arthropods, vertebrates, and mollusks because their visual systems are much simpler than those of humans and are thus easier to study. He concentrated his studies on the eye of the horseshoe crab (*Limulus polyphemus*). Using minute electrodes in his experiments, he obtained the first record of the electrical impulses sent by a single optic nerve fibre when the receptors connected to it are stimulated by light. He found that the receptor cells in the eye are interconnected in such a way that when one is stimulated, others nearby are depressed, thus enhancing the contrast in light patterns and sharpening the perception of shapes. Hartline thus built up a detailed understanding of the workings of individual photoreceptors and nerve fibres in the retina, and he showed how simple retinal mechanisms constitute vital steps in the integration of visual information.

Hartmann VON AUE (fl. 1190–1210), Middle High German poet, one of the masters of the courtly epic.

Hartmann's works indicate that he received a learned education at a monastery school, that he was a *ministerialis* at a Swabian court, and that he took part in Henry VI's ill-fated crusade of 1197. Hartmann's extant works consist of four extended narrative poems (*Erec, Gregorius, Der arme Heinrich, Iwein*), two shorter allegorical love poems (*Büchlein I* and *II*), and 16 lyrics (13 love songs and three crusading songs). The lyrical poems and the two *Büchlein* appear to have been written first, followed by the narrative poems—his most important works—in the above order. *Gregorius* and *Der arme Heinrich* are religious works with an openly didactic purpose. The latter, Hartmann's most perfect poem, tells the story of a leper who is healed by the readiness of a pure young girl to sacrifice her life for him. The two secular epics *Erec* and *Iwein,* both based on works by Chrétien de Troyes and belonging to the Arthurian cycle, enshrine Hartmann's ethical ideal of restraint and moderation in human conduct, and are complementary in that they depict the return to grace of wayward knights.

Hartmann regarded his works as instruments of a moral purpose. Edifying content mattered more to him than elegance of style, and his narratives are characterized by clarity and directness, and by the avoidance of rhetorical devices and displays of poetic virtuosity.

Hartmann, (Karl Robert) Eduard von (b. Feb. 23, 1842, Berlin—d. June 5, 1906, Gross Lichterfelde, Ger.), German metaphysical philosopher, called "the philosopher of the unconscious," who sought to reconcile two conflicting schools of thought, rationalism and irrationalism, by emphasizing the central role of the unconscious mind.

Hartmann, the son of a Prussian artillery officer, was educated for the army, but a knee injury in 1861 made a military career impossible, and he began the study of philosophy. His numerous writings include studies of Immanuel Kant, Arthur Schopenhauer, and G.W.F. Hegel; metaphysical and psychological works; and studies in religion, politics, and ethics. His reputation, however, rests primarily on *Die Philosophie des Unbewussten,* 3 vol. (1870; *The Philosophy of the Unconscious,* 1884), which went through many editions. Notable for the diversity of its contents, its many concrete examples, and its vigorous and lucid style, the book also gained for Hartmann an exaggerated reputation for pessimism. Although he adopted the pessimistic view of the state of civilization held by Schopenhauer, he modified it with Hegel's optimistic outlook for the future of mankind.

Hartmann centred his system on the single phenomenon of the human unconscious, thought by him to evolve through three stages. In the first, called the "unconscious," both reason and will, or rationalism and irrationalism, were united as an absolute, all-embracing spiritual principle underlying all existence. With the fall of man, reason and will were separated, and will, as blind impulse, began to determine the melancholy career of the unconscious. The second stage, called "cosmic," began with the origin of conscious life, in which man began to strive for such idealistic goals as happiness. According to Hartmann, mankind presently lives in this stage, when the forces of irrational will and rational mind compete. Both human misery and civilization will continue to advance until misery and decay reach the maximum. Only then will the third stage be possible, a Hegelian triumph by which the will is checked and reason prevails. For individual human beings, the present requires that temptations to commit suicide and all other forms of selfishness be overcome by rational thinking. Mankind must devote itself to gradual social evolution, rather than strive after an illusory and impossible happiness in the immediate future. Despite his ultimate optimism, Hartmann has been considered a pessimist whose views contributed to such extreme 20th-century philosophies as nihilism.

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Hartmann, Nicolai (b. Feb. 20, 1882, Riga, Latvia, Russian Empire—d. Oct. 9, 1950, Göttingen, W.Ger.), one of the dominant figures in German philosophy during the first half of the 20th century.

After serving Germany in World War I, Hartmann taught philosophy at the universities of Marburg (1920–25), Cologne (1925–31), Berlin (1931–45), and Göttingen (1945–50). His first work, *Platos Logik des Seins* (1909; "Plato's Logic of Being"), reflects his early Kantianism.

Nicolai Hartmann
Archiv fur Kunst und Geschichte, West Berlin

In his two-volume *Die Philosophie des deutschen Idealismus* (1923–29; "The Philosophy of German Idealism"), however, Hartmann showed signs of rejecting Neo-Kantian views. The rejection was completed by his reversal of the Kantian position that mind constructs reality through thought, a position renounced in *Neue Wege der Ontologie* (1942; *New Ways of Ontology*). According to his new ontology, epistemology depends on ontology, not the opposite. Thus, the "being" of objects is a necessary prerequisite for thought or knowledge about them. The knowledge that people have of reality is itself a part of reality, as an event among other events.

The basic forms of human thought, which Hartmann called the "subjective categories," are not to be considered identical with the basic structures of reality, or "objective categories." Because of the irrational will that clouds mental activity, and because of pure time-and-space limitations, human beings will forever be surrounded by a vast expanse of unobjectifiable being. Consequently, all that scientists or philosophers can hope to achieve

is a partial assimilation of their subjective categories to those of the object.

Following Max Scheler, Hartmann considered reality, though orderly and partly rational, to be devoid of meaning, with the result that humanity must perform the heroic feat of living human life in a world entirely alien to human aspirations.

Hartmann's other writings include *Philosophie der Natur* (1950) and *Asthetik* (1953).

Hartmann, (Carl) Sadakichi (b. Nov. 8, 1869, Nagasaki, Japan—d. Nov. 21, 1944, St. Petersburg, Fla., U.S.), American art critic, novelist, poet, and man of letters.

Born of a German father and Japanese mother, Hartmann came to the United States as a boy and developed an interest in the theatre and the visual arts. He became a naturalized citizen in 1894. Acquainted with many of the major artistic and literary figures in Europe and the United States, he was quick to appreciate the importance of French Symbolism and became friends with Stéphane Mallarmé. A prolific writer for Boston and New York City newspapers in the 1880s and '90s, he started the *Art Critic* in 1893, wrote Symbolist dramas, lectured, and became a disciple of the American photographer Alfred Stieglitz, writing about photography with the same zeal as about art.

Hartmann published *History of American Art,* 2 vol. (1901; rev. ed., 1938), and many other works advocating recognition of avant-garde artistic figures and developments. The Hartmann archives are at the University of California, Riverside, where a number of his out-of-print volumes have been edited for republication. They include *Composition in Portraiture* (1909, 1973) and *Landscape and Figure Composition* (1910, 1973), both under the pseudonym Sidney Allen; *Conversations with Walt Whitman* (1895, 1972), under the pseudonym Sadakichi; *Shakespeare in Art* (1901, 1973) and *Japanese Art* (1904, 1971); and *The Valiant Knights of Daguerre* (1978), a collection of Hartmann's critical essays and biographical studies.

Hartnup disease, inborn metabolic disorder involving the amino acid tryptophan. Normally, one of the metabolic pathways of tryptophan leads to the synthesis of nicotinic acid, or niacin, a vitamin of the B group, a deficiency of which causes pellagra. In Hartnup disease, it is believed that the transport system in the kidney tubule that normally reabsorbs tryptophan into the body circulation is defective. As a result, the concentration of tryptophan increases in the urine and decreases in the blood, and there is less tryptophan available for the synthesis of niacin.

Clinical features of Hartnup disease include episodic scaly red rashes over exposed areas of the body, identical in appearance with those of classical pellagra; thought processes and behaviour may also be abnormal. In addition to defective kidney transport, there also seems to be a delayed and incomplete absorption of dietary tryptophan through the intestinal tract. The pellagra-like symptoms can be controlled with supplementary doses of the amide of niacin (nicotinamide); affected persons generally respond well to a high-protein diet.

Hartog, Dirck (fl. 1616), Dutch explorer who made the first recorded exploration of the western coast of Australia.

Traveling an eastward route from Amsterdam around the Cape of Good Hope to Java, Hartog sighted and explored the western Australian coastline. He landed (October 1616) and spent three days exploring a desolate offshore island that he named for himself. To mark his landing, he left a flattened pewter plate, inscribed with the details of the visit, nailed on a post on the northern end of the island, now called Cape Inscription. In 1696 another Dutch explorer, Willem de Vlamingh, landed on Dirk Hartogs Island, found Dirck's plate, replaced it with a newly inscribed dish, and sent the original to Amsterdam, where it can now be seen in the Rijksmuseum.

Until the 19th century the coast of Australia parallel to Dirk Hartogs Island was called Eendrachtsland, in honour of the explorer's ship, *Eendracht.*

Hartog, Jan de (b. April 22, 1914, Haarlem, Neth.), Dutch-American novelist and playwright who wrote adventure stories in both Dutch and English.

His first major novel, *Hollands glorie: roman van de zeesleepvaart* (1947; *Captain Jan: A Story of Ocean Tugboats*), relates with humour the tale of a young boy's career in the merchant navy. Having fled to England in 1943, de Hartog later settled in the United States, writing, in English, novels of mainly entertainment value. Among these are *A Sailor's Life* (1956), *The Inspector* (1960), *The Peaceable Kingdom: An American Saga* (1972), *The Lamb's War* (1980), *The Trail of the Serpent* (1983), and *Star of Peace* (1984). Of his plays, the most popular is the comedy *The Four-poster,* first produced in 1951.

Hartshorne, Charles (b. June 5, 1897, Kittanning, Pa., U.S.), American philosopher, theologian, and educator, known as the most influential proponent of a "process philosophy," which considers God a participant in cosmic evolution.

After earning a doctorate at Harvard University in 1923, Hartshorne studied in Germany, lectured at Harvard, and then taught philosophy at the University of Chicago (1928–55), Emory University in Atlanta, Ga. (1955–62), and the University of Texas, from which he retired in 1976.

While at Harvard, Hartshorne was influenced by the ideas of philosophers Alfred North Whitehead and Charles Sanders Pierce. Hartshorne adapted Whitehead's philosophy into a creative variation of metaphysics in which God's perfection is seen in the evolution and the creativity of living beings and in which God is conceived as dualistic—being both free and unfree, conscious and unconscious, and eternal and temporal. Hartshorne's principal works include *Beyond Humanism* (1937), *The Divine Relativity* (1948), *Reality as Social Process* (1953), *The Logic of Perfection* (1962), *Aquinas to Whitehead: Seven Centuries of Metaphysics of Religion* (1976), *Omnipotence and Other Theological Mistakes* (1983), and *Creativity in American Philosophy* (1984).

Hartsville, city, Darlington county, northeastern South Carolina, U.S., on Prestwood Lake. First settled in 1760, it grew around Thomas Edward Hart's plantation. Major James L. Coker established a crossroads store (1866) there, built a railroad connection with the Atlantic Coast Line, and eventually founded Coker College (1908). The community developed into an agricultural-trade centre, acquired textile and paper-plastic industries, and became noted for its production of pedigreed seeds. Coker Experimental Seed Farms were designated a national historic landmark in 1964. Kalmia Gardens of Coker College displays shrubs and trees native to the state. Inc. 1891. Pop. (1986 est.) 9,380.

Section of Kalmia Gardens, Hartsville, S.C.
Milt and Joan Mann from CameraMann

Hartung, Hans (b. Sept. 21, 1904, Leipzig, Ger.—d. Dec. 7, 1989, Antibes, Fr.), French painter of German origins, one of the leading European exponents of a completely abstract style of painting. He became particularly well known for his carefully composed, almost calligraphic arrangements of black lines on coloured backgrounds.

Hartung, 1971
Archiv fur Kunst und Geschichte, Berlin

Hartung received conventional training at art academies in Leipzig and Dresden, but even as a young man he made inkblot abstractions. An early influence was the Russian painter Wassily Kandinsky, who also had eschewed recognizable objects.

In 1931 Hartung had a one-man exhibition in Dresden, but success was not forthcoming. Sick and short of funds, he spent the next three years on Minorca. He returned to Germany but, abhorring Nazism, settled in Paris in 1935; he became a French citizen in 1946. In World War II he served with the French Foreign Legion in North Africa and Alsatia, where he was seriously wounded. His service was interrupted by confinement in a Spanish concentration camp, from which he was released as a result of U.S. intervention.

Hartung's mature style, which involved swirling, energetic linear motifs, found an eager public after the war. A successful showing of his work in Paris (1947) was followed by exhibits elsewhere in Europe and in the United States, Japan, and Latin America. In 1960 he was awarded the Grand Prix of the Venice Biennale, where an entire room of the French Pavilion was devoted to his work. He had a decisive influence on the postwar generation of abstract painters in Europe.

Hartung's later works became progressively calmer and more stable. Many of his works are titled by letters and numbers.

Harty, Sir (Herbert) Hamilton (b. Dec. 4, 1879, Hillsborough, County Down, Ire.—d. Feb. 19, 1941, Hove, Sussex, Eng.), British conductor and composer, noted for his performances of Hector Berlioz.

Harty was an organist in Belfast and Dublin before going to London (1900), where he gained a reputation as an accompanist and composer. In addition to giving many recitals with his wife, the soprano Agnes Nicholls (1877–1959), he became known as a conductor in concerts with the London Symphony Orchestra. From 1920 to 1933 he was conductor of the Hallé Orchestra in Manchester.

His compositions include a violin concerto, a tone poem, *With the Wild Geese*, and the *Irish Symphony*. He was knighted in 1925.

Hartz Mountains, mountains in southern Tasmania, Australia, extending for 30 mi (50 km) north–south. They are heavily glaciated and rise to 4,111 ft (1,253 m) at Hartz Mountain. The lower slopes, clad in rain forest, give way to peaks that are snow-capped almost year-round, the melting snow draining away to form the Picton, Arve, and Esperance rivers. A national park of 25 sq mi (65 sq km) enclosing the range is accessible from Hobart by the Huon Highway through Geeveston.

Hartzenbusch, Juan Eugenio (b. Sept. 6, 1806, Madrid—d. Aug. 2, 1880, Madrid), one of the most successful of the Spanish romantic dramatists, editor of standard editions of Spanish classics, and author of fanciful poetry in a traditional style.

Hartzenbusch was the son of a German cabinetmaker. Early tribulations ended with the production of *Los amantes de Teruel* (1837), a vivid dramatization of a legend, followed by successes with *comedias de magia* ("comedies of magic")—*e.g., Los polvos de la madre Celestina,* 1840—and adaptations of Golden Age plays. He entered the Spanish Academy (1847) and became director of the national library (1862).

Harūj al-Aswad, al-, hilly basaltic plateau of central Libya. A startlingly black expanse (area 15,500 sq mi [40,150 sq km]), it rises out of the surrounding sand to 2,600 ft (800 m) and is crowned by a series of volcanoes, Qārat as-Sab'ah, attaining altitudes of 3,900 ft. Ancient lava streams run in all directions between sandy basins with grasses, bushes, and acacia groves appearing after the rains. The western edge breaks off sharply, while in the east, wadis (seasonal rivers) extend into the surrounding desert. The south is demarcated by the 'Unqūd al-Yāsirāt, two lines of 40 volcanoes; an outcrop to the southeast contains the oasis of Wāw an-Nāmūs, which lies in the bottom of a crater 330 ft deep and 2 to 2½ mi (3 to 4 km) in diameter. Three swampy lakes support reeds, palms, water hens, reptiles, and migrating birds. Mosquitoes, however, make the place uncomfortable for man, and it is visited only periodically by passing caravans in search of water.

Hārūn ar-Rashīd, in full HĀRŪN AR-RASHĪD IBN MUḤAMMAD AL-MAHDĪ IBN AL-MANṢŪR AL-'ABBĀSĪ (b. February 766/March 763, Rayy, Iran—d. March 24, 809, Ṭūs), fifth caliph of the 'Abbāsid dynasty (786–809), who ruled Islām at the zenith of its empire with a luxury in Baghdad memorialized in *The Thousand and One Nights* (*The Arabian Nights Entertainment*).

Family and early life. Hārūn ar-Rashīd was the son of al-Mahdī, the third 'Abbāsid caliph (ruled 775–785), and al-Khayzurān, a former slave girl from Yemen and a woman of strong personality who greatly influenced affairs of state in the reigns of her husband and sons. The elder prince, al-Hādī, was four when Hārūn was born. The princes were brought up in the court at Baghdad and educated in the Qur'ān (the holy book of Islām), poetry, music, anecdotes about the Prophet Muḥammad, early Islāmic history, and current legal practice. Hārūn had as tutor Yaḥyā the Barmakid, a loyal supporter of his mother. In 780 and 782 Hārūn was nominal leader of expeditions against the Byzantine Empire, though the military decisions were doubtless made by the experienced generals accompanying him. The expedition of 782 reached the Bosporus, opposite Constantinople, and peace was concluded on terms favourable to the Muslims. For this success Hārūn received the honorific title of ar-Rashīd, "the one following the right path," and was named second in succession to the throne and appointed governor of Tunisia, Egypt, Syria, Armenia, and Azerbaijan, with his tutor Yaḥyā acting as actual administrator. These moves were presumably engineered by al-Khayzurān and Yaḥyā. The two are even said to have induced al-Mahdī to make Hārūn his immediate successor, but al-Mahdī died in August 785 without officially changing the succession. Al-Hādī became caliph and Hārūn acquiesced. When al-Hādī died mysteriously in September 786, rumour suggested that al-Khayzurān was behind the death, because he had resisted her domination.

Hārūn ar-Rashīd thus became caliph on Sept. 14, 786, succeeding to the rule of an empire reaching from the western Mediterranean to India. He made Yaḥyā the Barmakid his vizier, or chief minister. With Yaḥyā were associated his sons al-Faḍl and Ja'far, for the vizier at this period was not only an initiator of policy but also had attached to himself a corps of administrators to carry out his decisions. Al-Khayzurān had a considerable influence over the government until her death in 789. Thereafter until 803 the Barmakids largely controlled the empire, but the caliph was not wholly dependent on them, since certain offices of state were held by other men.

The reign was one of much internal trouble. At various times there were revolts for local reasons in Egypt, Syria, Yemen, and several eastern provinces, but the central government was strong enough to quell these and restore order. Ifrīqīyah (or Tunisia), after having had a series of incompetent governors, was given in 800 to Ibrāhīm ibn al-Aghlab, who agreed to make a substantial yearly payment to Baghdad in return for semi-independent status. This was immediately advantageous to Hārūn financially but was the beginning of the loss of power by the caliphs, for the Aghlabid family continued to rule the province for over a century without interference from Baghdad, and similar status was granted to other regional dynasties. Though the revolts fill the pages of the historians, much of the empire was peaceful most of the time. This led to a great development of industry (textiles, metal goods, paper, etc.) and to an expansion of trade. The resulting prosperity made possible the concentration of vast wealth in the hands of the caliph and leading men and women of the empire.

'Abbāsid wealth under Hārūn. The fabulous descriptions of Hārūn and his court in *The Thousand and One Nights* are idealized and romanticized, yet they had a considerable basis in fact. Untold wealth had flowed into the new capital of Baghdad since its foundation in 762. The leading men, and still more their wives, vied in conspicuous consumption, and in Hārūn's reign this reached levels unknown before. His wife Zubaydah, herself a member of the 'Abbāsid family, would have at her table only vessels of gold and silver studded with gems. Hārūn's palace was an enormous institution, with numerous eunuchs, concubines, singing girls, and male and female servants. He himself was a connoisseur of music and poetry and gave lavish gifts to outstanding musicians and poets. The brilliant culture of the court had certain limits, however, since, apart from philology, the intellectual disciplines were in their infancy in the Arabic world. There was also a rougher and more sombre side. Instead of listening to music, Hārūn might watch cocks and dogs fighting. As caliph he had power of life and death and could order immediate execution. In the stories of his nocturnal wanderings through Baghdad in disguise, he is usually accompanied by Masrūr the executioner as well as friends like Ja'far the Barmakid and Abū Nuwās, the brilliant poet.

The fall of the Barmakids. The less pleasant aspects of Hārūn's character are highlighted by the fall of the Barmakids, who for more than 16 years had been mainly responsible for the administration of the empire and who had provided the money for the luxury and extravagance of the court. Moreover, Ja'far the Barmakid had become Hārūn's special friend, so that gossip spoke of a homosexual relationship. Gossip also alleged that Hārūn had arranged that Ja'far should secretly marry his sister 'Abbāsah, on condition that he did not consummate the marriage, but Ja'far fell in love with her, and she had a child. Whether in anger at this or not, Hārūn had Ja'far executed on Jan. 29, 803. The other members of the family were imprisoned and their goods confiscated. Modern historians reject this gossip and instead suggest that Hārūn felt dominated by the Barmakids and may even have coveted their wealth. Moreover, diverse interests within the empire were being attracted to two opposing poles. On the one side were the "secretaries," or civil servants, many Persians, and many men from the eastern provinces; on the other side were the religious scholars (*'ulamā'*), many Arabs, and many from the western provinces. Since the Barmakids favoured the first group of interests and the new vizier, al-Faḍl ibn ar-Rabī', favoured the second, it is likely that this political cleavage was involved in the change of ministry.

The struggle between the two groups of interests continued for at least half a century. Hārūn recognized its existence by assigning Iraq and the western provinces to his son al-Amīn, the heir apparent, and the eastern provinces to the second in succession, his son al-Ma'mūn. The former was son of the Arab princess Zubaydah and after 803 had al-Faḍl ibn ar-Rabī' as tutor. Al-Ma'mūn was son of a Persian slave girl and after 803 had as tutor a Barmakid protégé, al-Faḍl ibn Sahl. Hārūn has been criticized for so dividing the empire and contributing to its disintegration, for there was war between his two sons after his death; but it may well be that by making the cleavage manifest, he contributed to its eventual resolution after 850.

As vizier, al-Faḍl ibn ar-Rabī' lacked the efficiency of the Barmakids, and Hārūn's personal decisions may have had more weight. There were further successful operations against the Byzantine Empire, but in the autumn of 808, while on his way to deal personally with a serious two-year-old revolt in Khorāsān (in Iran), Hārūn fell ill at Ṭūs (near modern Meshed) and died there several months later. Al-Amīn succeeded him as caliph.

Hārūn was neither a great ruler nor a man of prepossessing character, though he was a lavish patron of the arts. He owes his fame to the wealth and luxury of his court, surpassing anything previously known, and to his place in Arabic legend. (W.M.W.)

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Haruspices, ancient Etruscan diviners, "entrail observers" whose art consisted primarily in deducing the will of the gods from the appearance presented by the entrails of the sacrificial animal. They also interpreted all portents or unusual phenomena of nature, especially thunder and lightning, and prescribed the expiatory ceremonies after such events. This formed a most complicated pseudoscience, in sharp contrast to native Roman divination. The art was practiced in Rome by Etruscans, and, although of great importance especially under the early republic, it never became a part of the state religion. Under the empire there existed a collegium of 60 haruspices; however, it was never a state priesthood but a body of salaried expert advisers.

Hārūt and Mārūt, in Islāmic mythology, two angels who unwittingly became masters of evil. A group of angels, after observing the sins being committed on earth, began to ridicule man's weakness. God declared that they would act no better under the same circumstances and proposed that some angels be sent to earth to see how well they could resist idolatry, murder, fornication, and wine. No sooner did Hārūt and Mārūt, the angels chosen, alight on earth than they were seduced by a beautiful woman. Then, discovering that there was a witness to their sin, they killed him. The angels in heaven were then forced to admit that God was indeed right, whereas the fallen angels faced atonement for their sins either on earth or in hell. Hārūt and Mārūt chose to be punished on earth and were condemned to hang by their feet in a well in Babylonia until the Day of Judgment.

Hārūt and Mārūt are first mentioned in the Qur'ān (2:102) as two angels purveying evil in Babylon, and the legend probably appeared to explain how they happened to be in that position. The story itself parallels a Jewish legend about the fallen angels Shemḥazaī, 'Uzza, and 'Aza'el. The names Hārūt and Mārūt appear to be etymologically related to those of Haruvatāt and Ameretāt, Zoroastrian archangels.

Harvard, John (b. Nov. 1607, London, Eng.—d. Sept. 14, 1638, Boston, Mass. [U.S.]), New England colonist whose bequest permitted the firm establishment of Harvard College.

John Harvard was the son of a butcher and of the daughter of a cattle merchant and alderman of Stratford-on-Avon. The plague killed his father and most of his brothers and sisters in 1625. His mother remarried, and John was sent by his mother and stepfather to Emmanuel College, Cambridge, in 1627. He was graduated in 1631 and received a masters degree in 1635. He married in 1637 and sailed for New England the following year.

On Nov. 2, 1637, Harvard became a freeman of Charlestown, Massachusetts Bay Colony, where he immediately was recognized as a learned and pious man. He served as assistant pastor of the First Church of Charlestown, and he was appointed a member of the committee to help compile the Body of Liberties.

Harvard had inherited considerable property in England, and he was wealthier than most of his colonial contemporaries. When he died of tuberculosis a little less than a year after arriving in Charlestown, he left an estate of about £1,600. In his will he directed that half his money, along with his collection of classical and theological literature, be given to a school recently created in neighbouring New Towne, soon to be renamed Cambridge. The school had been founded in 1636, and Harvard's gift assured its continued operation. In 1639 the Massachusetts General Court decreed that the school be named Harvard College in gratitude to its first large benefactor.

In 1828 Harvard alumni erected a granite monument to John Harvard's memory, and a seated statue of the "ever-memorable benefactor of learning and religion in America," as Edward Everett called him, was given to Harvard University in 1884.

Harvard classification system, scheme for assigning stars to types according to their temperatures as estimated from their spectra. In the 1860s the Italian astronomer Angelo Secchi distinguished four main spectral types of stars. At Harvard University in the 1880s, during the compilation of the *Henry Draper Catalogue* of stars, more types were distinguished and were designated by letter in alphabetical sequence. As the work progressed, the types were rearranged in a nonalphabetical sequence to put them in order by temperature. From hot stars to cool, the order of stellar types is: W, O, B, A, F, G, K, M. Additional letters, R, N, S, serve to classify very cool stars into three types. Novas are assigned the spectral type Q, and the letter P indicates a "peculiar" star not easily fitted into the system. Numbers from 0 to 9 are used to subdivide the types, the higher numbers applying to cooler stars. The hotter stars are sometimes referred to as early and the cooler as late.

Class W are Wolf–Rayet stars, extremely hot objects that have surface temperatures of 80,000 kelvin (K) or even more. Class O includes bluish white stars with surface temperatures as great as 50,000 K; lines of ionized helium appear in the spectra. Class B stars have a maximum surface temperature of around 25,000 K and are also bluish white, but the spectral lines of ionized helium are no longer present. The surface temperatures of A-type stars range to about 11,000 K; lines of hydrogen are prominent, and these stars are white. F-type stars are yellow-white, at about 7,000 K, and many spectral lines caused by metals are visible. The Sun is a class G star; these are yellow, with surface temperatures of about 6,000 K. Class K stars are yellow to orange, at about 4,000–5,000 K, and M stars are red, at about 3,000 K, with titanium oxide prominent in their spectra.

Supplementary classes of cool stars include R (2,000–3,000 K, prominent spectral bands caused by carbon), N (much like R but radiating less in the blue and violet spectral regions), and S, resembling class M stars but with spectral bands of zirconium oxide prominent instead of those of titanium oxide.

Harvard University, in Cambridge, Mass., oldest institution of higher learning in the United States (founded 1636) and one of the nation's most prestigious. The main university campus lies along the Charles River a few miles west of Boston.

Harvard's history began when a college was established at New Towne (renamed Cambridge, after the English alma mater of some of the leading colonists). Classes began in the summer of 1638 with one master in a single frame house and a "college yard." Harvard was named for a Puritan minister, John Harvard, who left the college his books and half of his estate. In the early 19th century, the schools of divinity, law, and medicine were begun.

At its inception Harvard was under church sponsorship. But during its first two centuries, the college was gradually liberated, first from clerical and later from political control, until in 1865 the university alumni began electing members of the governing board. During his long tenure as Harvard's president (1869–1909), Charles W. Eliot made Harvard into an institution with national influence.

The alumni and faculty of Harvard have been closely associated with many areas of American intellectual and political development. By the 1960s Harvard had educated six U.S. presidents—John Adams, John Quincy Adams, Rutherford B. Hayes, Theodore Roosevelt, Franklin D. Roosevelt, and John F. Kennedy—and a number of justices, cabinet officers, and congressional leaders. Literary figures among Harvard graduates have included Ralph Waldo Emerson, Oliver Wendell Holmes, Henry David Thoreau, James Russell Lowell, Henry James, Henry Adams, Robert Frost, T.S. Eliot, John Dos Passos, e.e. cummings, Walter Lippmann, Robert Lowell, and Norman Mailer. Other notable intellectual figures who either graduated from or taught at Harvard include the historians Francis Parkman, W.E.B. Du Bois, and Samuel Eliot Morison; the astronomer Benjamin Pierce; the chemist Wolcott Gibbs; and the naturalist Louis Agassiz. William James introduced the experimental study of psychology into the United States at Harvard in the 1870s.

Harvard's undergraduate schools—Harvard College and Radcliffe College—contain about one-third of the total student body. The core of the university's teaching staff consists of the faculty of arts and sciences, which includes the graduate faculty of arts and sciences. The university has graduate or first-professional schools of medicine, law, business, divinity, education, government, dental medicine, design, and public health. The schools of law, medicine, and business are particularly prestigious. Among the advanced research institutions affiliated with Harvard are the Museum of Comparative Zoology, the Gray Herbarium, the Peabody Museum of Archaeology and Ethnology, the Arnold Arboretum, and the William Hayes Fogg Art Museum. Also associated with the university are an astronomical observatory in Harvard, Mass.; the Dumbarton Oaks Research Library and Collection in Washington, D.C., a centre for the study of Byzantine and medieval humanities; and the Harvard-Yenching Institute in Cambridge for research on the Far East. Harvard has one of the largest and most important university libraries in the world.

Radcliffe College (1879), formerly the coordinate women's college, has now merged with Harvard College, and diplomas are granted by Harvard University.

Harvard University Library, largest university library and the first institutional library in what became the United States, established when John Harvard, a young Puritan minister, left his collection of 260 volumes to the new Harvard College in Cambridge, Mass., in 1638. The core of the collection now contains 10,000,000 volumes, housed in three adjacent buildings. There are works for advanced study and research, rare books and manuscripts, and a reading collection for undergraduates. Beyond this core are scores of books in departmental and special libraries, the most notable being those of law, business, biological sciences, Chinese and Japanese languages and culture, astronomy, anthropology, and ethnology. Among the special holdings are remarkable collections of books and manuscripts by John Keats, Emily Dickinson, Ralph Waldo Emerson, James Russell Lowell, and Oliver Wendell Holmes; a theatre collection unique for its 18th- and 19th-century British and American materials; a Theodore Roosevelt collection; and the John F. Kennedy School of Government Library, containing a large archival collection of the papers of John and Robert Kennedy and those of Ernest Hemingway.

Harvest Home, also called INGATHERING, traditional English harvest festival, celebrated from antiquity and surviving to modern times in isolated regions. Participants celebrate the last day of harvest by singing, shouting, and decorating the village with boughs. The *cailleac,* or last sheaf of corn, which represents the spirit of the field, is made into a harvest doll and drenched with water as a rain charm. This sheaf is saved until spring planting.

The ancient festival also included the symbolic murder of the grain spirit, as well as rites for expelling the devil.

A similar festival was traditionally held in parts of Ireland, Scotland, and northern Europe.

harvest mite: *see* chigger.

harvest moon, the full moon nearest the autumnal equinox (about September 23). At this time, because of the balancing of two opposite factors acting on the time of moonrise, it rises at nearly the same hour for several nights in succession. Because the harvest moon, like any full moon, must rise near the hour of sunset, harvest workers in the Northern Hemisphere may be aided by bright moonlight after sunset on several successive evenings. A similar effect is observed in corresponding southern latitudes around March 21.

harvest mouse, either of two genera of small, climbing mice, the American harvest mouse (*Reithrodontomys*) or the Old World harvest mouse (*Micromys minutus*).

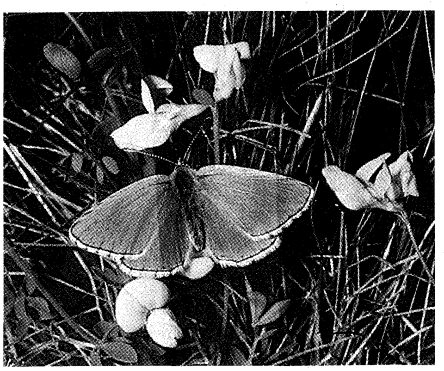
Eighteen species of American harvest mice, belonging to the family Cricetidae (order Rodentia), are found from southern Canada to

Harvest mouse (*Micromys minutus*)
John Markham

northern South America, generally in areas of short grass. A nocturnal rodent, it lives in a globe-shaped nest built of vegetation in grass, planted grain, shrubs, or trees. It is primarily a seedeater, of little economic importance. From 5 to 10 cm (2 to 4 inches) long, excluding the long, slender tail, it is pale brown to blackish with whitish or buffy underparts. The salt-marsh harvest mouse (*R. raviventris*), found only in California, is an endangered species.

The Old World harvest mouse, of the family Muridae, is a bright yellowish or reddish brown mouse with white underparts. An inhabitant of tall grasses and other vegetation in Europe and Asia, it may live in a burrow, in piles of hay or straw, or in a round nest built of grass and suspended in a bush or other plant. The Old World harvest mouse is active by day and feeds on seeds and insects. Among the smallest of rodents, it attains a length, exclusive of the scantily haired tail, of 6 to 7.5 cm (2 to 3 inches).

harvester, in biology, any member of the insect subfamily Gerydinae of the widely distributed Lycaenidae family of common but-



Harvester (*Lysandra bellargus*)
From the Natural History Photographic Agency—EB Inc.

terflies (order Lepidoptera). Adult lycaenids, sometimes known as gossamer-winged butterflies, are small and delicate, with an 18- to 38-millimetre (0.75- to 1.5-inch) wingspan. They are rapid fliers and are usually distinguished by iridescent wings. The wings of the harvester are usually brownish above and spotted below; the male's forelegs are reduced, but the female's are fully developed.

Harvesters are distinguished by their predatory habits during the larval stage. The squat, hairy larvae of *Feniseca tarquinius,* known in some areas as wanderers, attack aphids and are generally found on hawthorn and alder trees. It is the only species of harvester found in the United States.

harvester, in farming, any of several machines for harvesting; the design and function of harvesters varies widely according to crop. *See* binder; combine; corn harvester; cotton harvester; header; reaper; thresher; windrower. *See also* entries for particular crops (*e.g.,* hay, for hay-cutting equipment).

harvester ant, any of several different genera of ants (*e.g., Messor, Atta, Pheidole, Pogonomyrmex*) that gather seeds and leaves. *Messor* species collect, husk, and store seeds in their nests. *Atta* species collect leaves and use them to grow fungi, which they eat.

Some *Pheidole* members have large strong jaws that are probably used to crush the harvested seeds. *Pogonomyrmex,* another seed harvester, can inflict a painful sting. *See* ant.

harvestman (arachnid): *see* daddy longlegs.

Harvey, Fred, byname of FREDERICK HENRY HARVEY (b. 1835, London—d. Feb. 9, 1901, Leavenworth, Kan., U.S.), American restauranteur, who operated a chain of restaurants along the Atchison, Topeka and Santa Fe Railroad, each called the Harvey House and often staffed by "Harvey Girls."

Harvey emigrated from Liverpool to New York City in 1850 and began working in restaurants there and in New Orleans. He opened a restaurant in St. Louis, and when it failed he worked as a freight agent for a railroad and traveled throughout the Great Plains. Observing that the dining acommodations for railroad passengers in the American West were primitive and of extremely poor quality, Harvey in 1876 entered into an agreement with the Atchison, Topeka, and Santa Fe Railroad to operate a restaurant at that railroad's depot in Topeka, Kansas. Harvey's efforts to provide well-prepared meals in attractive settings proved immediately popular, and demand was such that within a few years he had opened several more restaurants at various Santa Fe Railroad depots. As his chain of Harvey House restaurants became famous for their appetizing cuisine, Harvey began establishing a series of clean, efficient hotels and then a string of railroad dining cars. By the time of his death, his enterprises included 47 restaurants, 30 dining cars, and 15 hotels. The hundreds (eventually thousands) of young women that Harvey brought out west to staff his restaurants eventually provided wives for many bachelors there. The humorist Will Rogers memorialized Harvey by saying that he "kept the West in food and wives."

Harvey, Gabriel (b. 1550?, Saffron Walden, Essex, Eng.—d. 1630), English writer and friend of the Elizabethan poet Edmund Spenser; the latter celebrated their friendship in *The Shepheardes Calender* (1579) through the characters of Hobbinol (Harvey) and Colin Clout (Spenser). Harvey was also noted for his tenacious participation in literary feuds.

The son of a ropemaker, Harvey matriculated at Christ College, Cambridge, in 1566, received his bachelor's degree in 1570, and became a fellow at Pembroke Hall (later Pembroke College) that same year. At Pembroke he became an intimate friend of Spenser. In 1578 Harvey became a fellow of Trinity Hall, Cambridge, and began to study civil law, but in 1585 he failed to be elected master of Trinity Hall and was not admitted to a doctor's degree there. He completed his doctorate in civil law at Oxford University. In 1592 he published *Foure Letters and Certaine Sonnets,* which contained a malicious account of the death of the writer Robert Greene and which further embroiled him in a long-running pamphlet war with the author Thomas Nashe. The

Gabriel Harvey, portrait by an unknown artist
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

ensuing literary combat with Nashe continued until 1599, when the archbishop of Canterbury ordered each man's satires to be burned. In 1598 Harvey petitioned for the mastership of Trinity Hall but again was not elected, and about this time he retired.

Though represented as an argumentative and malicious pedant by some of his contemporaries, Harvey was nonetheless a talented scholar and literary stylist. He entered into print only reluctantly; his few published writings include two lectures on rhetoric, elegies and other verses in Latin, and several elegantly styled letters between himself and Spenser. His chief, though unfulfilled, aim was the introduction of the classical hexameter into English poetry.

Harvey, Hayward A(ugustus) (b. Jan. 17, 1824, Jamestown, N.Y., U.S.—d. Aug. 28, 1893, Orange, N.J.), versatile American inventor who discovered the modern method of strengthening armour plating.

Harvey began his career as a draftsman in the New York Screw Company, of which his father was president. After a series of engineering jobs he founded (*c.* 1865) the Continental Screw Company, which he sold to the American Screw Company in 1887. In 1886 he established the Harvey Steel Company.

All during his career Harvey experimented with iron and steel, and he secured 125 patents. He invented a hay cutter, a railway chair, and an exceptionally useful industrial bolt (a peripheral grip bolt). He also developed a technique for manufacturing superior products from ordinary-grade materials; his companies made such items as steel razor blades, dies, and plates for reinforcing safes. One of his most important inventions was a method for rolling the threads onto screws that made them cheaper to manufacture and much stronger than screws with threads cut into them.

Harvey is best known for his method of strengthening steel armour plate for warships, a process utilized by most major naval powers of his time. Called carburizing, or cementing, the process involves keeping a steel plate heated at high temperature in contact with finely divided charcoal so that carbon penetrates the plate, toughening it. Although later manufacturers, including Krupp of Germany, improved on Harvey's process, his method remains the fundamental discovery in strengthening modern armour plating.

Harvey, Sir John Martin, also called SIR JOHN MARTIN-HARVEY (b. June 22, 1863,

Wivenhoe, Essex, Eng.—d. May 14, 1944, East Sheen, Surrey), English actor, producer, and theatre manager, best known for his outstanding performance as Sydney Carton in *The Only Way,* a sentimental adaptation of Dickens' *Tale of Two Cities.*

John Harvey, *c.* 1888

By courtesy of the Victoria and Albert Museum, London

The son of a yacht builder, he originally planned for a career in naval architecture but decided instead to study theatre with the actor John Ryder. He made his first public appearance in London in 1881. A year later he joined the Lyceum Theatre company of Sir Henry Irving, remaining there for 14 years and traveling four times to the United States.

In 1899 he achieved his greatest success in *The Only Way,* a play suggested, planned, and named by his wife, Angelita Helena de Silva, but written by two Irish clergymen, Freeman Wills and Frederick Langbridge. Harvey took the part of Sydney Carton, and his wife played Mimi. In subsequent years he produced *Hamlet* (1904), *Richard III* (1910), and *The Taming of the Shrew* (1913). His finest performance was in 1912 as the protagonist in Max Reinhardt's London production of *Oedipus Rex.* One of the early supporters of a scheme for establishment of a national theatre, he was knighted in 1921. His *Autobiography* appeared in 1933.

Harvey, (Robert) Neil (b. Oct. 8, 1928, Victoria, Australia), Australian cricketer who was noted as an outstanding left-handed batsman.

Harvey first gained recognition in 1948 as the youngest member of the Australian team against India at Melbourne. From 1948 until 1963 he played in more Test (international) matches (79) than any other Australian. He also scored more runs for Australia (6,149) than any other player except Donald (later Sir Donald) Bradman and was second only to Bradman in Test centuries (100 runs in a single innings).

Harvey, William (b. April 1, 1578, Folkestone, Kent, Eng.—d. June 3, 1657, London), English physician and discoverer of the true nature of the circulation of the blood and of the function of the heart as a pump.

A brief account of the life and works of William Harvey follows; for a full biography, *see* MACROPAEDIA: Harvey.

From 1588 to 1593 Harvey attended the King's School attached to the cathedral at Canterbury, and he entered Gonville and Caius College, Cambridge, in 1593, receiving his B.A. degree in 1597. He then undertook the study of medicine at the University of Padua (Italy), receiving the doctorate in medicine in April 1602. Having returned to London, Harvey was admitted in 1607 as a fellow of the Royal College of Physicians, and, in 1609, he became assistant physician and then physician at St. Bartholomew's Hospital, a position he continued to hold until 1643. He was one of the doctors in attendance at the death of King James I in 1625, having been appointed physician extraordinary to the king about 1618. King Charles I appointed Harvey his personal physician and contributed to Harvey's research by placing the deer in the royal parks at his disposal. The exacting methods developed by Harvey set the pattern for scientific research for generations.

Harvey's book on the circulation of the blood, *Exercitatio anatomica de Motu Cordis et Sanguinis in Animalibus* ("Anatomical Exercises Concerning the Motion of the Heart and Blood in Animals"), was published in 1628, and his *Exercitationes de Generatione Animalium* ("Exercises Concerning the Generation of Animals") followed in 1651. At his death he left his entire research library to the College of Physicians.

Harwich, town ("parish"), Tendring district, county of Essex, England. It occupies the tip of a small peninsula projecting into the estuary of the Rivers Stow and Orwell.

In AD 885 Alfred the Great defeated Danish ships in a battle that took place in the harbour. Harwich's seaborne trade developed steadily, notably in the 14th century, and shipbuiding was a significant industry in the 17th century.

The town's major development, however, awaited the coming of the railway, when Harwich became a terminus for passenger ferries across the North Sea as an outport of London. The port has been equipped to handle container traffic and has become a major port for trade with the European continent. Light engineering and fishing are the main industries today. The suburb of Dovercourt is a popular resort. Pop. (1981) 15,006.

Harwich, town ("township"), Barnstable county, southeastern Massachusetts, U.S. It lies on the southern coast of Cape Cod. Named for Harwich, Eng., it was settled about 1670 and incorporated in 1694. Once a whaling and shipbuilding centre, its economy is now based largely on cranberry cultivation and summer tourism. The town includes the villages of Harwich Port (which has a yacht basin), East Harwich, North Harwich, South Harwich, and West Harwich. The town's old powder house, built in 1770, was used during the Revolutionary War. A horse track at Harwich Port, once a centre of sporting activity on Cape Cod, was destroyed by a storm in 1884. Pleasant Lake, about 1.5 miles (2.4 km) long, is nearby. Pop. (1984 est.) 9,632.

Haryāna, constituent state of the Republic of India, located in the north of the country. It is bounded on the northwest by the Punjab, on the northeast by Himāchal Pradesh, on the east by Uttar Pradesh and the union territory of Delhi, and on the south by Rājasthān.

A brief treatment of Haryāna follows. For full treatment, *see* MACROPAEDIA: India.

The name Haryāna means "the abode of God" and probably derives from Hari—a name for the Hindu god Vishnu (Viṣṇu)—and *ayana* ("home"). The region was the birthplace of the Hindu religion and the Indus valley civilization, where the first hymns of the Aryans were sung and the most ancient manuscripts written. On the battlefield at Kurukṣetra, the Lord Krishna (Kṛṣṇa) is said to have delivered to the warrior Arjuna the teachings contained in the *Bhagavadgīta,* venerated by Hindus as the highest code of ethics.

Lying athwart the route of overland invasions into India, the area underwent successive waves of migration from the time of Alexander the Great (326 BC) and was the scene of many famous battles. Haryāna came under the control of the British East India Company in 1803 and became a part of Punjab in 1858. In 1966 it became a separate Indian state as a result of the partition of Punjab into Punjābī-speaking Punjab and Hindī-speaking Haryāna. Nearly 90 percent of the Haryāna people are Hindus. Chandīgarh is the joint capital of Haryāna and Punjab.

Most of Haryāna lies on the Indo-Gangetic Plain, with low hills covering the northeast. The state, as a whole, is flat, the average height ranging from 700 to 900 feet (210 to 270 m) above sea level. It is drained by one perennial river, the Yamuna (Jumna), which does not flow within the state but forms its eastern border with Uttar Pradesh. Rainfall is scanty in most areas, and there are periods of drought. The climate ranges from hot in summer to markedly cold in winter. The maximum summer (May–June) temperature reaches 114° F (46° C). The minimum temperature of 28° F (−2° C) occurs in January.

Haryāna's economy is mainly agricultural, and it has received substantial investment in irrigation and fertilization. As a consequence, production of food crops—especially wheat—has increased significantly and has led to a rise in per capita income. In addition to wheat, the principal winter crops are gram (chickpea), barley, and mustard. The chief summer crops are millet, rice, corn (maize), sugarcane, and cotton. The state also has large numbers of bullocks and dairy cattle.

Haryāna has no heavy industry or any sizable mineral resources for exploitation. The increase in agricultural output (especially in sugarcane and cotton), however, stimulated the development of agricultural processing industries, and by the early 1980s Haryāna boasted several cotton-textile and sugar mills. Other light industries include the manufacture of farm tools, machine tools, electrical and glass goods, cement, paper, and bicycles. The chief lines of communication are those leading to and from Delhi, particularly the historic Grand Trunk Road and the main line of the Northern Railway between Ambala and Delhi, which is the centre of the nation's rail, road, and air networks.

Haryāna is a land of legends, temples, historical places, and archeological sites. Its place in Indian history makes it an important region for pilgrims, and its people preserve Hindu religious and cultural traditions with annual fairs and festivals, such as the Janam Ashtami Fair (Krishna's birthday). The state has several teaching colleges and a university at Kurukṣetra, which also has a regional engineering college. Maharshī Dayānand University at Rohtak grants degrees through affiliated colleges, and Hissār is the seat of the Haryana Agricultural University. The Gurukal, an educational and archaeological institute, at Jhajjar has a rich collection of antiquities that throw light on the lives of people inhabiting the region at different periods. Area 17,070 square miles (44,222 square km). Pop. (1981) 12,922,618.

Harz, most northerly mountain range in Germany, between the Weser and Elbe rivers, occupying parts of the German *Länder* (states) of Lower Saxony and Saxony-Anhalt. At its greatest length it extends southeasterly and northwesterly for 60 miles (100 km), and its maximum breadth is about 20 miles (32 km). The Harz range consists of an irregular series of terraced plateaus (primarily of slates, sandstones, and limestones) that rise in places into rounded summits and are intersected by narrow, deep valleys. The Brocken (3,747 feet [1,142 m]) and Viktorshöhe (1,909 feet [582 m]) are of granite. The northwestern and higher third of the highland is known as the Oberharz; the southeastern and more extensive part is the Unterharz. The Brocken group, dividing the two, is generally considered a part of the Oberharz.

Oberharz forms a rolling plateau, 3,300 feet (1,000 m) high in the west and 1,600 feet (500 m) in the centre. Because it is the first range that the northerly winds strike after crossing the North German Plain, its climate is generally raw and damp, even in summer. Above this plateau rises the Brocken (*q.v.*), a mountain of granite made famous in folklore and literature. The highest summits of the Ober-

harz are bare, but the lower slopes are laced with rivers and punctuated by dense spruce forests and moors.

The Unterharz has a milder climate, which supports grain agriculture and cattle herding; its forests consist chiefly of beech, oak, and walnut. Of the wild-game animals, bear, lynx, and wolf have been hunted to extinction; but deer, fox, wildcat, and badger remain. The Harz have long been renowned for animal breeding, especially deer and canaries.

The Harz owes its early settlement and intensive development in the 10th–16th century to mining and metallurgy (silver, lead, iron, copper, and zinc), which was greatly aided by the availability of water and wood. The abundant mountain waters are controlled by dams that protect against flooding and summer shortages, as well as providing electric power and drinking water to towns as far as 125 miles (200 km) away. The most important local industry is tourism; the chief attractions are water for sports and health spas, the forest scenery, and the romantic associations of legends. Stone quarrying (granite, marble, and gypsum) and wood processing (paper, cardboard, and charcoal) are other sources of income.

The inhabitants are descended from Upper and Lower Saxons, Thuringians, and Franks, whose influence can be traced in the varieties of dialect. The boundary line between the High and Low German languages passes through the mountains. The legends and fanciful names connected with the mountains are a result of their having been the last stronghold of paganism in Germany.

Harzgerode, city, Saxony-Anhalt *Land* (state), central Germany. It lies on the well-forested highland of the Lower Harz Mountains, at an elevation of 1,250 feet (380 m) above sea level. Harzgerode is one of the oldest market centres in central Germany; the first recorded mention of it dates from 936, and it received city rights from the princes of Anhalt between 1323 and 1338. From 1635 to 1709 the castle (built 1549–52) was the residence of the Bernburg-Harz family, which from the 13th century to the beginning of the 19th century controlled the lead and silver mines that were the basis of the local economy. Lead and silver ore is found in the Silberhütte locality within the municipality, and there is iron ore at Mägdesprung. A spa founded at Alexisbad in 1810 was a fashionable resort during the first half of the 19th century, and the iron-rich mineral springs remain a tourist attraction. Harzgerode's industries include woodworking and ironworking. The Baroque parish church was built in 1699. Pop. (1973 est.) 5,658.

Hasa, al-, Arabic AL-AḤSĀ', oasis and region in eastern Saudi Arabia. Al-Hasa oasis, the largest oasis in Saudi Arabia, lies about 40 miles (65 km) west of the Persian Gulf. It has about 30,000 acres (12,000 hectares) of palm groves and other crops that are irrigated by the flow of 60 or more artesian springs. Many varieties of dates are grown on the more than 3,000,000 trees in the oasis. The oasis' population consists of almost equal proportions of Sunnite and Shī'ite Muslims.

The al-Hasa region derives its name from the oasis at its centre. The region is bounded on the north by Kuwait, on the east by the Persian Gulf, on the south by the desert Rub' al-Khali, or Empty Quarter, and on the west by the Dahnā sand belt. The region's low coastal strip is separated by a thick belt of large sand dunes from the steppe-desert of the interior. Most of the population is congregated in the three largest towns in the area, al-Hufūf, ad-Dammām, and al-Mubarraz. The rest of the population is scattered through more than 50 small villages or is nomadic.

Little is known of the early history of the region, but for many centuries it enjoyed a status of virtual independence until it was conquered by the Wahhābīyah, a Muslim puritanical group, in the late 18th century. After the Wahhābīyah's defeat in 1818 and until World War I, the region came under a loose

Al-Hasa oasis, Saudi Arabia
By courtesy of Aramco

Ottoman sovereignty that was interrupted by the periodic return of Wahhābī control. The Wahhābī leader Ibn Sa'ūd incorporated al-Hasa oasis into his expanding principality of Najd before World War I, and it subsequently became part of the kingdom of Saudi Arabia.

The al-Hasa region began to be transformed after the discovery of huge petroleum deposits near ad-Dammām in the 1930s. The oil fields were producing more than 1,000,000 barrels per day by the early 1960s, and the resulting oil wealth transformed Saudi Arabia out of all recognition. The terrain west and north of al-Hasa oasis continues to constitute the principal petroleum-producing area of the nation. Americans and Europeans employed in the petroleum industry make up a significant portion of the region's population. A railway and a paved highway link the principal towns in al-Hasa region with Riyadh.

Ḥasakah, al-, also spelled HASSAKA, or HASAKEH, town, northeastern Syria. The town lies on the banks of the Khābūr River (a tributary of the Euphrates) at its confluence with the Jaghjaghah. Under the Ottoman Empire it lost its importance, but it revived with the settlement there of Assyrian refugees from Iraq during the French mandate of Syria after 1932. Now an important road junction near the Turkish and Iraqi frontiers, al-Ḥasakah is the centre of an extensive irrigated-farming region.

The basin of the Khābūr River, in which al-Ḥasakah is situated, is the nation's main wheat- and rice-producing region and, with improved irrigation, an important cotton-growing area. The completion of the Ṭabaqah Dam in 1973 with its hydroelectric plant provided for the electrification of villages in the area as well as increased power for industry. In the 1950s petroleum was discovered in the area northeast of al-Ḥasakah. The oil is piped to Homs for refining and to the Mediterranean port of Ṭarṭūs for export. Pop. (1985 est.) town, 98,607.

Hasan (personal name): *see under* Hassan, except as below.

Ḥasan, in full HASAN IBN 'ALĪ IBN ABĪ ṬĀLIB (b. 624, Arabia—d. 680, Medina), a grandson of the Prophet Muḥammad (the founder of Islām), the elder son of Muḥammad's daughter Fāṭimah. He belongs to the group of the five most holy persons of Shī'ah, those over whom Muḥammad spread his cloak while calling them "The People of the House." After his father, 'Alī, he was considered by many of his contemporaries to be the rightful heir to Muḥammad's position of leadership.

As a child, Ḥasan lived with Muḥammad for seven years, and after the latter's death in 632 he was politically inactive until the end of the reign of the caliph 'Uthmān ibn 'Affān (the caliph was the titular leader of the Islāmic community). 'Uthmān was murdered in 656, an action in which Ḥasan took no part. 'Alī, Ḥasan's father, became the next caliph, and in the civil wars that soon broke out Ḥasan was sent to the important Iraqi city of Kūfah to secure acceptance of 'Alī's rule and, if possible, obtain military reinforcements. Later he fought in the Battle of Ṣiffīn, which, although not a defeat, did mark the beginning of a steady deterioration in 'Alī's position. After 'Alī was murdered in 661, never having chosen a successor, a large number of his followers pledged their loyalty to Ḥasan, and Ḥasan himself stressed his own close connections with the Prophet Muḥammad.

When Mu'āwiyah I, the governor of Syria and the man who had led the rebellion against 'Alī, refused to acknowledge Ḥasan as caliph and began to prepare for war, Ḥasan was able to offer considerable resistance: he dispatched a force to meet Mu'āwiyah and then himself headed a larger force. With little money left, Ḥasan, not a warlike person, was plagued by defections from his army. Although some of his followers resented it fiercely, he opened peace negotiations, and later in 661 abdicated the caliphate to Mu'āwiyah. Ḥasan ibn 'Alī obtained a generous pension and was allowed to live quietly the rest of his life in Medina.

Ḥasan, Sayyid Muḥammad ibn 'Abd Allāh (b. April 7, 1864, Dulbahante, British Somaliland [now Doli Bahanta, Somalia]—d. Dec. 21, 1920, Imi, Eth.), Muslim religious and nationalist Somali leader (called the "Mad Mullah" by the British) who for 20 years led armed resistance to the British, Italian, and Ethiopian colonial forces in Somaliland. Because of his active resistance to the British and his vision of a Somalia united in a religious brotherhood transcending clan divisions, Ḥasan is seen as a forerunner of modern Somali nationalism.

During a pilgrimage to Mecca in 1894, Ḥasan joined the Ṣalihīyah, a militant, reformist, and puritanical Ṣūfī order. Soon after his return to Somaliland, he began urging the expulsion of the English "infidels" and their missionaries. He believed that the colonists would destroy the Islāmic faith in Somaliland, and in 1899 he declared a holy war (jihad) on the colonial powers. Between 1900 and 1904, four major British, Ethiopian, and Italian expeditions were made against Ḥasan. By 1905 he was forced to conclude a truce, under which he and his Ṣūfī followers constructed a theocratic state in the Italian protectorate. In 1908 he began his holy war again, winning a major victory at Dulmadobe in 1913. Early in 1920, however, the Ṣūfis were finally routed by a British combined air, sea, and land attack.

Hasan Abdāl, also spelled HASSAN ABDĀL, formerly CAMPBELLPORE, town, northern Punjab province, northern Pakistan. The town is a textile and communications centre that is connected by the Grand Trunk Road and by rail with Peshāwar and Rāwalpindi. It has government colleges affiliated with the University of the Punjab. The Buddhist site of Hasan Abdāl, just east of the town, dates from the 2nd century BC and has given the town its modern name. Pop. (1981 prelim.) 23,000.

Ḥasan al-Bannā' (b. 1906, Egypt—d. February 1949, Cairo), Egyptian political and religious leader who established a new religious society, the Muslim Brotherhood, and played a central role in Egyptian political and social affairs.

At age 12 Ḥasan al-Bannā' joined the Society for Moral Behaviour, thus demonstrating at an early age the deep concern for religious affairs that characterized his entire life. In 1923

he enrolled at the Dār al-'Ulūm, a teacher training school in Cairo, which maintained a traditional religious and social outlook. In 1927 he was assigned to teach Arabic in a primary school in the city of Ismailia (al-Ismā'īlīyah), near the Suez Canal, a focal point for foreign economic and military occupation of Egypt. There he witnessed scenes that acutely distressed him and many other Muslims. In March 1928, with six workers from a British camp labour force, he created the Society of the Muslim Brothers (in Arabic al-Ikhwān al-Muslimūn), which aimed at a rejuvenation of Islām.

In the 1930s, at his own request, Ḥasan al-Bannā' was transferred to a teaching post in Cairo. By the advent of World War II the Muslim Brotherhood had grown enormously and had become a potent element on the Egyptian scene, attracting significant numbers of students, civil servants, urban labourers, and others, and representing almost every group in Egyptian society.

Many of the members came to view the Egyptian government as betraying the interests of Egyptian nationalism. For a while Ḥasan al-Bannā' tried to maintain a tactical alliance with the government, but he and his followers had become a threat to the central authorities. In the turmoil of the postwar years many elements of the society passed beyond his authority, and members were implicated in a number of assassinations, notably that of Prime Minister an-Nuqrāshī in December 1948. With the connivance of the government, Ḥasan al-Bannā' himself was assassinated the following year.

Ḥasan al-Baṣrī, al-, in full ABŪ SA'ĪD IBN ABĪ AL-ḤASAN YASĀR AL-BAṢRĪ (b. 642, Medina, Arabia—d. 728, Basra, Iraq), deeply religious and ascetic Muslim of the early Islāmic community, traditionally regarded as a founder of the two most important schools of early Sunnī (traditionalist) Islām, the Mu'tazilah (philosophical theologians) and the Ash'arī-yah (followers of the theologian al-Ash'arī).

Ḥasan was born nine years after the death of the Prophet Muḥammad. One year after the Battle of Ṣiffīn (657), which proved to be one of the most important events in the history of Islām, Ḥasan moved to Basra, a military camp town situated 50 miles (80 kilometres) northwest of the Persian Gulf. From this base, military expeditions to the east disembarked, and, as a young man (670–673), Ḥasan participated in some of the expeditions that led to the conquest of eastern Iran. In a short time, Basra came to be more than a military post; its cultural importance in the history of Islām is based on the fact that it became the home of intense religious and intellectual activity that had profound effects on the development of later Islāmic thought.

After his return to Basra, Ḥasan became a central figure in the religious, social, and political upheavals brought about by internal conflicts with the Muslim community. The years 684–704 marked the period of his great preaching activity. From the few remaining fragments of his sermons, which are among the best examples of early Arabic prose, there emerges the portrait of a deeply sensitive, religious Muslim. For Ḥasan, the true Muslim must not only refrain from committing sin but he must live in a state of lasting anxiety, brought about by the certainty of death and the uncertainty of his destiny in the hereafter. He said: "I never saw a certainty of which there is no doubt bear a greater resemblance to a doubtful thing of which there is no certainty, than death does." The world is treacherous, "for it is like to a snake, smooth to the touch, but its venom is deadly." The practice of religious self-examination (*muḥāsabah*), which led to the activity of avoiding evil and doing good, coupled with a wariness of the world, marked Ḥasan's piety and influenced later ascetic and mystical attitudes in Islām.

The enemy of Islām, for Ḥasan, was not the infidel but the hypocrite (*munāfiq*), who took his religion lightly and "is here with us in the rooms and streets and markets." In the important freedom–determinism debate, he took the position that man is totally responsible for his actions, and he systematically argued this position in an important letter written to the caliph 'Abd al-Malik. His letter, which is the earliest extant theological treatise in Islām, attacks the widely held view that God is the sole creator of man's actions. The document bears political overtones and shows that in early Islām theological disputes emerged from the politico-religious controversies of the day. He wrote: "Oh Commander of the Faithful . . . tyranny and injustice are not from God's decree, but His decree is His command concerning goodness, justice, kindness, and generosity regarding one's relatives." His political opinions, which were extensions of his religious views, often placed him in precarious situations. During the years 705–714, Ḥasan was forced into hiding because of the stance he took regarding the policies of the powerful governor of Iraq, al-Ḥajjāj. After the Governor's death, Ḥasan came out of hiding and continued to live in Basra until he died. It is said that the people of Basra were so involved with the observance of his funeral that no afternoon prayer was said in the mosque because no one was there to pray. (D.E.)

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Ḥasan 'Alī Shāh: *see* Aga Khan I.

Ḥasan-e Ṣabbāḥ (d. 1124, Daylam, Iran), leader of an Islāmic sect, the Nizārī Ismā'īlīs, and commonly believed to be the founder of the order known as the Assassins (*q.v.*).

He studied theology in the Persian city of Rayy and at about the age of 17 adopted the Ismā'īlī faith. He was an active believer and rose in the Ismā'īlī organization. In 1076 he went to Egypt, probably for further religious training, remaining there for about three years. When he returned to Iran he travelled widely in an effort to further Ismā'īlī interests. He made a number of converts, and, in 1090, with the aid of converts made within its garrison, was able to seize the great fortress of Alamūt in Daylam, a province of the Seljuq Empire. After further turmoil, Ḥasan settled down to the leadership of a territorially scattered, yet cohesive state. After the last major siege of Alamūt (1118), Ḥasan was able to live out the remainder of his life in peace. He led an ascetic existence and imposed a puritanical regime at Alamūt—when one of his sons was accused of murder and the other of drunkenness, he had them both executed. He wrote a number of cogent theological treatises, stressing in particular the need to accept absolute authority in matters of religious faith. His expression of this doctrine became widely accepted by contemporary Nizārīs.

Ḥasan ibn Muḥammad al-Wazzān al-Żayyāti, al-: *see* Leo Africanus.

Hasanlu, ancient Iranian site located in the Solduz Valley of Azerbaijan. Excavations there have been important for knowledge of the pre-

Unglazed pot from Hasanlu, 9th century BC; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, purchase, 1960, Rogers Fund

history of northwestern Iran, especially during the late 2nd and early 1st millennia BC.

The site was inhabited from *c.* 2100 to *c.* 825 BC, but the richest period yet excavated dates to the 10th and 9th centuries BC. That period, often called "Mannaean" after the name of the people who lived in the area, is characterized by a gray pottery accompanied by black and red varieties, the black ware being of much finer quality and probably made in imitation of metal vessels.

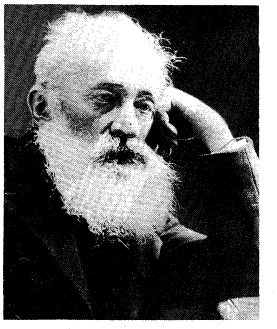
Hasanlu was crowned by a high citadel surrounded by a strong fortification wall. The outer town, which was unfortified, consisted primarily of ordinary dwellings and a cemetery. Among the most important objects uncovered at Hasanlu were an unusually decorated silver bowl, several iron garment pins headed by bronze lions, a solid gold bowl, a knife handle with gold cloisonné, and two hollow bronze horse heads that served to hold liquids. Parallels to the motifs on the Hasanlu objects have been found in Elam, Assyria, north Syria, and Urartu, indicating that Iran not only received considerable cultural and artistic stimuli from other areas but also in turn exerted influence on the Near East.

Ḥasdai: *see* Ḥisdai ibn Shaprut.

Ḥasdai IBN SHAPRUT: *see* Ḥisdai ibn Shaprut.

Ḥasdai ben Abraham Crescas: *see* Crescas, Ḥasdai.

Hasdeu, Bogdan Petriceicu (b. Feb. 16, 1836, Cristineşti, Rom.—d. Aug. 25, 1907, Cîmpina), scholar and archivist and a pioneer in Romanian language and historical studies. Settling as a high school teacher and librarian at Iaşi (1858), he collected and published a great number of ancient Slavic and Romanian documents for the first time in *Arhiva istorică a României,* 4 vol. (1865–67; "The



Hasdeu

By courtesy of the Enciclopedica Romana, Bucharest, Rumania

Historical Archive of Romania"). In 1870 he founded an important review of Romanian studies and in 1875 published a work that, though incomplete, marked the beginning of critical investigation of Romanian history. He became director of the state archives in 1876 and was appointed professor of philology at the University of Bucharest (1878). His *Cuvente den Bătrâni,* 2 vol. (1878–81), was the first history of apocryphal literature in Romania. In 1881 he edited a notable 16th-century Slavo-Romanian religious work, the Psalter of Coresi. He also began preparing an encyclopaedic dictionary of the Romanian language but did not get beyond the letter *B.*

Hasdrubal (d. 221 BC), Carthaginian general, the son-in-law of Hamilcar Barca. Hasdrubal is known for his political opposition to the Carthaginian aristocracy and for the unusually wide support that he enjoyed from the city's ordinary citizens. Hasdrubal assisted Hamilcar in successful campaigns of conquest against local tribes on the Iberian peninsula (modern Spain) from 237 BC until Hamilcar's death during the winter of 229–228 BC. When he succeeded to the governorship, he made immediate policy changes, emphasizing the use of diplomatic rather than military methods for expanding Carthaginian Spain and dealing with Rome. He founded New Carthage, a capital city which is today called Cartagena, and negotiated a treaty with the Romans that placed the northern limit of Carthaginian expansion at the Ebro River. Hasdrubal was murdered by a Celtic assassin.

Hasdrubal (d. 207 BC), Carthaginian general who unsuccessfully attempted to sustain military ascendancy on the Spanish peninsula in the face of Roman attacks.

Hasdrubal, the second son of Hamilcar Barca, was left in command of Spain when his brother Hannibal went to Italy (218 BC), and he fought for seven years against Publius Cornelius Scipio and his brother Gnaeus. The war began poorly for Hasdrubal. In a naval battle during the early summer of 217 BC on the Ebro River at Tarraco, Hasdrubal's fleet was largely destroyed by a daring surprise Roman attack.

In 215 BC Hasdrubal battled the Scipios at Dertosa, a city on the banks of the Ebro. The Carthaginian forces took very heavy losses in that battle when their centre broke. Four years later, Hasdrubal struck back, crushing the Roman armies, killing the Scipio brothers, and driving the Romans from most of Spain south of the Ebro.The younger Publius Cornelius Scipio, who was only 25, was then given command of the Roman armies in Spain. He arrived in 210 and in a daring attack seized the key Carthagenian base at Cartagena. In 208 Scipio defeated Hasdrubal at Baecula, but Hasdrubal escaped with most of his army and marched to Italy in an attempt to join Hannibal. He was ultimately defeated in 207 at the Metauras river, his head being thrown into Hannibal's camp by order of the Roman general Gaius Claudius Nero.

Hasdrubal (d. *c.* 202 BC), Carthaginian general customarily identified as the son of Gisco. Hasdrubal and two brothers of Hannibal named Mago and Hasdrubal commanded three separate Carthiginian armies in Spain during 211 BC. Considerably reinforced from Africa, they routed the Roman armies and killed their commanders, Publius Cornelius Scipio and his brother Gnaeus.

Late in 210 BC, Publius Cornelius Scipio, the younger (later called Scipio Africanus) the son of Publius Cornelius, arrived in Spain. He made many military gains, and Hasdrubal adopted a strategy of avoiding confrontations with him. In the early spring of 206 BC, Hasdrubal realized that he must stand and fight. The armies met at Ilipa (now called Alcalá del Río), where Hasdrubal was outgeneraled, defeated, and forced to retreat to the coast. He found his way to North Africa, where he gave Syphax, king of the Massaesyli, his daughter in marriage to formalize their military alliance. During the period from 205 to 203 BC Hasdrubal and Syphax fought Scipio on African soil but were consistently outmanoeuvred. Accused of treason after being defeated at Souk El Kremis, Hasdrubal committed suicide before the Battle of Zama.

Hasegawa Tatsunosuke: *see* Futabatei Shimei.

Hasegawa Tōhaku (b. 1539, Nanao, Japan—d. March 20, 1610, Edo [Tokyo]), Japanese painter of the Azuchi-Momoyama period (1573–1600) and the founder of the Hasegawa school of painting or painters.

Early in his career in Noto Province, Hasegawa painted Buddhist pictures including "Jūni-ten zu byōbu" ("Folding Screens with the Picture of Twelve Devas"; Ishikawa Shō-

"Monkeys," ink painting on paper by Hasegawa Tōhaku, *c.* 1595; in the Ryosen-an Temple, Kyōto

By courtesy of Ryosen-an Temple, Kyōto

kaku-in temple), "Takeda Shingen zō" ("Portrait of Takeda Shingen"; Seikei-in temple of Kōya-san), and "Nawa Nagatoshi zō" ("Portrait of Nawa Nagatoshi"). Around 1571 he moved to Kyōto and studied the painting of the Kanō school of painters. He was strongly influenced by Sesshū, a 15th-century master of *suiboku-ga* ("water-ink painting"), and even named himself Sesshū V; he also studied the painting of the Sung and Yüan dynasties of 10th–14th-century China, becoming a master of these styles. Around 1589 he painted a *suiboku sansui* ("landscape painting in water ink") on sliding doors in the Daikoku-ji and in 1591 he and his disciples painted the "Daikimbeki shōheki-ga" (a great wall painting with the emphasis on the colours of gold and blue) of the Shōun-ji, commissioned by chief Imperial minister Toyotomi Hideyoshi for his son, who had died prematurely.

Tōhaku's remaining works may be divided into two styles: one is that of a free-hearted spirit, expressing the masculine and candid atmosphere of the age, represented by the "Kaboku zu" ("Picture of Flowers and Trees"; Chishaku-in temple) and the "Ryūkyō zu" ("Picture of Willow Tree and Bridge"; collection of the Murakami family); the other style is that of *kotan* ("elegant simplicity") expressed in black-ink paintings such as the "Shōrinzu byōbu-e" ("Picture of Pine Forest: Painting on the Folding Screen"; Tokyo National Museum) and the "Chikurin enko zu byōbu" ("Picture of Monkey in the Bamboo Bush on the Folding Screen"; Shōkoku-ji). Having been a Nichiren sect Buddhist, he was associated with Nittsū, the holy priest of the Honpō-ji, who recorded Tōhaku's theory of painting in "Tōhaku ga-in" ("Studio of Tōhaku") in the 1590s. In 1603 Tōhaku was raised to the *hōkyō* ("divine bridge," one of the honourable ranks given to artists and doctors by the Imperial house). Toward the end of his life, he painted figure-paintings in the black-ink style, patterned after the *genpitsu-tai* (literally, "the style of fewest strokes") of Liang Chieh, though these works are coarse and rough.

Hašek, Jaroslav (b. April 30, 1883, Prague—d. Jan. 3, 1923, Lipuice, Czech.), Czech writer best known for *The Good Soldier Schweik,* considered one of the greatest masterpieces of satirical writing.

Hašek worked in Prague as a bank clerk, although at 17 he was already writing satirical articles for Czech newspapers. He soon abandoned business for a literary career, and before World War I he published a volume of poetry, *Májove výkřiky* (1903; "Shouts in May") and wrote 16 volumes of short stories, of which *Dobrý voják Švejk a jiné podivné historky* (1912; "Good Soldier Schweik and Other Strange Stories") is among the best known. From 1904–07 he was an editor of anarchist publications. Drafted into the Austro-Hungarian Army, Hašek was captured on the Russian front during World War I and was made a prisoner of war. While in Russia he became a member of the Czech liberation army but later joined the Bolsheviks, for whom he wrote Communist propaganda. Upon returning to Prague, the capital of the newly created country of Czechoslovakia, he devoted himself to writing *Osudy dobrého vojáka Švejka za světové války* (1920–23; *The Good Soldier Schweik,* 1930). It was intended to be a six-volume work, but only four were completed by the time of his death.

Haselrig, Sir Arthur: *see* Hesilrige, Sir Arthur.

Hasenclever, Walter (b. July 8, 1890, Aachen, Ger.—d. Aug. 15, 1940, Les Milles, Fr.), German Expressionist poet and dramatist whose work is a protest against bourgeois materialism and the war-making state. His first play, *Der Sohn* (1914; "The Son"), concerning a youth who becomes a political revolutionary and brings about his father's death, became

Hasenclever

Bavaria-Verlag

the manifesto for the German post-World War I generation. It was followed by two antiwar plays, *Der Retter* (1915; "The Saviour"), about a poet who tries to stop the war and is executed by a firing squad, and *Antigone* (1917), a pacifist-slanted interpretation of Sophocles' play. In his best known work, *Die Menschen* (1918; "Humanity"), Expressionist techniques are carried to an extreme form. The characters are symbolic types, speech is reduced to staccato monosyllables, and meaning is conveyed

by pantomime and stylized overacting. Later, Hasenclever abandoned the expressionist style and wrote conventional comedies.

After studying briefly at Oxford and Lausanne, Hasenclever in 1909 went to the University of Leipzig, where he turned to literature, philosophy, and history. While serving in the German army during World War I, he feigned mental illness and was discharged. After the war he became interested in mysticism, occultism, and Buddhism. He worked from 1924 to 1928 in Paris as correspondent for a Berlin newspaper, and from 1929 to 1932 he was a scriptwriter for Metro-Goldwyn-Mayer, living in Berlin but traveling frequently throughout Europe and North Africa. After fleeing Nazi Germany in 1933, he eventually went to southern France, where in 1940, confined in an internment camp, he committed suicide.

hasheesh (drug): *see* hashish.

Hashemite Kingdom of Jordan: *see* Jordan.

Hāshimite, also spelled HASHEMITE, any of the Arab descendants, either direct or collateral, of the prophet Muḥammad, from among whom came the family that created the 20th-century Hāshimite dynasty. Muḥammad himself was a member of the house of Hāshim (Hāshem), a subdivision of the Quraysh tribe. The most revered line of Hāshimites passed through Ḥasan, son of the Prophet's daughter Fāṭimah and her husband, ʿAlī, the fourth caliph. Ḥasan was the last of this line to hold disputed claim to the caliphate, but his progeny eventually established themselves as hereditary emirs of Mecca, the role continuing under Ottoman rule. Of such stock were Ḥusayn ibn ʿAlī, emir of Mecca and king of Ḥejaz from 1916 to 1924, and his sons Fayṣal and ʿAbd Allāh, who became kings of Iraq and Jordan, respectively, founding the modern Hāshimite dynasty.

Hāshimīyah, also called RAWANDIYAH, Islāmic religiopolitical sect of the 8th–9th century AD, instrumental in the ʿAbbāsid overthrow of the Umayyad caliphate. The movement appeared in the Mesopotamian city of Kūfah in the early 700s among supporters (called Shīʿites) of the fourth caliph ʿAlī, who believed that succession to ʿAlī's position of imam, or leader, of the Muslim community had devolved on Muḥammad ibn al-Ḥanafīyah (d. *c.* 700), one of his sons, and Abū Hāshim, a grandson. The Hāshimīyah thus did not recognize, for religious reasons, the legitimacy of Umayyad rule, and when Abū Hāshim died in 716, without heirs, a majority of the sect acknowledged Muḥammad ibn ʿAlī (died between 731 and 743) of the ʿAbbāsid family as imam.

In the hands of Muḥammad and his successor Ibrāhīm al-Imām (*c.* 701–749), the Hāshimīyah became a political instrument for stirring up anti-Umayyad sentiment among moderate Shīʿite and non-Arab, especially Iranian, converts to Islām. The missionary branch of the sect, developed by Abū Hāshim, was sent into the Iranian province of Khorāsān, where it met with tremendous success under the leadership of Abū Muslim from about 745 on. By 747 the Hāshimīyah had assumed a military character, and Abū Muslim and his general Qaḥṭabah were able to take the city of Merv, then all of Khorāsān, proceeding southwest to Rayy, Nahāvand, and finally Kūfah in 749. The armies of the Hāshimīyah installed Ibrāhīm's brother Abū al-ʿAbbās as-Saffāḥ (d. 754) as ʿAbbāsid caliph in Kūfah (749), and, with the defeat of the last Umayyad, Marwān II, at the Battle of the Great Zāb River in 750, ʿAbbāsid victory was complete.

During ʿAbbāsid rule, the original sense of the term Hāshimīyah was obscured, and it became confused with Hāshimīyūn, the descendants of Hāshim ibn ʿAbd Manāf, an ancestor shared by the Prophet Muḥammad, ʿAlī, and al-ʿAbbās, Muḥammad's uncle and eponym of the dynasty; the ʿAbbāsids thus appeared to be kinsmen of the Prophet, with legal right to the caliphate.

Hashimoto Gahō, original name HASHIMOTO SENTARŌ (b. Aug. 20, 1835, Edo [Tokyo], Japan—d. Jan. 13, 1908, Tokyo), Japanese painter who contributed greatly to the revival of Japanese-style painting in the Meiji era.

The son of Hashimoto Seien, a painter for the lord of Kawagoe, Hashimoto studied painting first with his father and later with Kanō Masanobu; he so excelled in his work that he became a studio director and at age 22 was placed in charge of his master's school. Because of the social upheaval of the Meiji Restoration, however, he experienced difficult times and even had to resort to painting decoration on paper fans for export to China.

During the 1880s, when there arose a revival of interest in Japanese arts, he became famous by twice winning a prize at government-sponsored picture exhibitions. Encouraged by the American Orientalist Ernest Fenollosa and by the Japanese art critic Okakura Kakuzō, he played a leading role in reviving Japanese-style painting. On the establishment of the Tokyo Fine Arts School in 1889, he became a professor, and among his students were such future great masters of Japanese painting as Yokoyama Taikan and Kawai Gyokudō. In 1890 he was appointed court artist, and in 1898, with Okakura, he founded the Japan Academy of Fine Arts.

Hashimoto reformed the old rules of Japanese painting by adopting the principles of perspective and shading from Western paintings. His representative works include "Dragon and Tiger" and "Deep Ravine."

Hashimoto's disease, also called STRUMA LYMPHOMATOSA, noninfectious form of inflammation of the thyroid gland (thyroiditis). Onset is insidious, with gradual enlargement of the gland and tenderness occurring only rarely. The four classic symptoms are: (1) a slight, symmetrical spongy or rubbery enlargement of the gland, (2) a mild undersecretion of thyroid hormones, (3) infiltration of the gland by a mixture of lymphoid and plasma cells, and (4) three antigen–antibody systems, all thyroid specific. The condition occurs more frequently in females than in males, usually between the ages of 20 and 40.

Along with myxedema and Graves' disease, Hashimoto's thyroiditis is considered an autoimmune disorder (*i.e.,* one in which the body reacts to its own tissues as though they were foreign proteins). Unlike the others, however, it has many variations from the classic pattern, most of which cause no symptoms. When symptoms are present, the principal one is thyroid enlargement, frequently with pressure on the esophagus or trachea. Sometimes there is spontaneous remission; if not, either the disease remains stable for years and can be treated with dessicated thyroid when hypothyroidism is present or else the gland can be surgically removed to relieve pressure in the throat or for cosmetic reasons.

hashish, also spelled HASHEESH, Arabic ḤASHĪSH ("dried herb"), Hindi CHARAS, a hallucinogenic drug preparation derived from the resin secreted by the flowering tops of cultivated female hemp plants (*Cannabis sativa*). More loosely, in Arabic-speaking countries, the term may denote a preparation made from any of various parts of the hemp plant—such as the leaves or dried flowering tops, used to prepare what is elsewhere more commonly called marijuana (*q.v.*).

The hashish made from resin is known by many names, including bhong and ganja, and is far more potent than marijuana. It may be either smoked or chewed or eaten for its intoxicating effects. The active ingredient is tetrahydrocannabinol (THC), which constitutes 10 to 15 percent of hashish but less than that in marijuana.

Most hashish comes from the Middle East, Nepal, and other Asian countries, as well as from Latin America.

Ḥasi, Tel, ancient archaeological site in southwestern Palestine, located southwest of Lachish (Tel Lakhish) in modern Israel. Excavation of the site, carried out in 1890 by Sir Flinders Petrie and in 1892–94 by F.J. Bliss, revealed that the first occupation began about 2600 BC. More important, however, Petrie's work there was the first stratigraphic excavation in Palestine. Recognizing that a Palestinian mound was the result of new towns having been built on the ruins of old ones, he began linking every stratum, or level, with the different types of pottery found in each. By examining the imported Egyptian objects contained in each level, Petrie was able to link Palestinian chronology with that of Egypt, thus establishing the general principle that the growth of the Middle Eastern sites can be interpreted in terms of the stratigraphic levels, which must ultimately be dated by relation to Egypt or some other country with an established chronology.

Hasidean, Hebrew ḤASID, or CHASID ("Pious One"), plural ḤASIDIM, or CHASIDIM, member of a pre-Christian Jewish sect of uncertain origin, noted for uncompromising observance of Judaic Law. The Hasideans joined the Maccabean revolt against the Hellenistic Seleucids (2nd century BC) to fight for religious freedom and stem the tide of paganism. They had no interest in politics as such, and they later withdrew from the Maccabean cause as soon as they had regained their religious freedom. Indeed, they fell into disfavour with the Hasmonean rulers.

Tradition pictures them as so devoted to Judaic Law that martyrdom and torture were willingly preferred to the slightest violation of the Sabbath (I Maccabees 2:42). No one can say for sure whether the Ḥasidim mentioned in the Talmud were Hasideans or not. A later sect or type, ardent in prayer and meticulous in the observance of the commandments and the Sabbath, may have been meant.

Historians tend to explain the disappearance of the Hasideans as a gradual merging with the Pharisees. The Hasideans may also have had a doctrinal influence on the Essenes, an early Jewish sect that flourished in Palestine.

Despite a similarity of names, the Hasideans played no part in the development of either the Ḥasidic mysticism of 12th-century Germany or of the later Ḥasidic movement that arose in 18th-century Poland (*see* Ḥasidism).

Ḥasidism, also spelled CHASIDISM (from Hebrew *ḥasid,* "pious one"), a 12th- and 13th-century Jewish religious movement in Germany that combined austerity with overtones of mysticism. It sought favour with the common people, who had grown dissatisfied with formalistic ritualism and had turned their attention to developing a personal spiritual life, as reflected in its great work, *Sefer Ḥasidim.* The leaders of the movement were Samuel ben Kalonymos, the Ḥasid; Judah ben Samuel, the Ḥasid of Regensburg (his son); and Eleazar ben Judah of Worms. All were members of the Kalonymos family that had migrated from Italy, imbued with knowledge of occultism and versed in Kabbalistic traditions connected with the mystical contemplation of "the throne of God" (*merkava,* literally "chariot"; Ezekiel 1). Efforts to experience the mystical presence of God, however, were based on humility and love of God rather than on *merkava*-like visions. Exces-

sive penitential practices gave the movement a sombreness that was entirely lacking in the far more significant Ḥasidic movement that arose in 18th-century Poland.

Ḥasidism, also spelled CHASIDISM (from Hebrew *ḥasid,* "pious one"), a pietistic movement within Judaism that began in the 18th century in Poland (Volhynia and Podolia), influenced millions of Jews, and persists today in small but vigorous groups, especially in the United States and Israel. The movement was an uprising by many who were disaffected by community control in the hands of the legally learned and by the economically advantaged and who rationalized their revolt by an appeal to emotionalism and anti-intellectualism.

In the 18th century a simple, devout, mystically inclined lime digger, Israel ben Eliezer, attracted crowds of simple people with comforting homilies and mystical expositions of the Scriptures. His reported cures of the sick and his unstinting devotion to the spiritual needs of the common people soon earned for him the reputation of a saint and miracle worker. The people called him the Ba'al Shem Ṭov (*q.v.*), the Master of the Good Name.

The Ba'al Shem Ṭov viewed true religion as being neither an ascetic withdrawal from the world nor a concentration on traditional rabbinic scholarship. He did not reject the Jewish faith or its customs and traditions but rather injected new elements—or at least new emphases—into Judaism by insisting that true religion was knowledge of the immanence of God in all creation. Awareness of this fact, he taught, leads to communion with God, mainly through prayer, although true worship relates to every activity of human life, including eating. Piety is superior to scholarship, and all men, however poor or ignorant, can commune with God if they have enthusiasm (*hitlahavut*) and a warm and trusting heart. If people serve God with a joyous heart in humility and meekness, the disunited world can be restored to unity, and saving grace will flow more freely. From God the people gained a sense of pride and dignity despite their lowly status.

The actual founder of the Ḥasidic community was Dov Baer (Great Preacher; *c.* 1710–12), whose reputation as a scholar made it possible for him to win important converts from among the learned rabbis. By investing Hasidic leaders (*tzaddiqim,* "righteous ones"; singular *tzaddiq*) with powers of intercession, he added an important element to Hasidic teachings. These *tzaddiqim* were said to have special sparks from heaven and to possess superhuman faculties unrelated to rabbinic learning.

This concept, coupled with the dissolution of the central Jewish authority in eastern Europe (Council of the Four Lands), prepared the way for countless small Ḥasidic communities in Poland, Russia, Lithuania, Hungary, and Palestine, each clustered around a *tzaddiq.*

As the movement spread, shouting, dancing, singing, wild movements of the body, and stimulating drink became part of communal services, all geared to produce sudden bursts of rapturous prayer and induce states of ecstasy.

Long-smoldering opposition from Orthodox rabbis (called Mitnaggedim, or Opponents) reached a climax in 1772 when Elijah ben Solomon, the *gaon* (spiritual leader) of Vilna, excommunicated the Ḥasidim for their practical repudiation of traditional Judaism, for pantheistic tendencies, for the adoption of esoteric Kabbalistic teachings, and for excessive veneration of the *tzaddiqim.* Elimelech of Lizhensk had, in fact, established Hasidic dynasties by claiming that charismatic qualities were transmitted by heredity from a father to his son. Despite such opposition, the movement continued unabated.

Numerous leaders gained great renown, among them Jacob Isaac (died 1815) of Lublin, Pol. popularly believed to be clairvoyant. He revived earlier stirrings of messianic hopes by declaring that the Napoleonic Wars were a prelude to messianic redemption that could be hastened by the use of magic. Shneur Zalman of Ladi (White Russia) attempted to combine mystical piety with rabbinic learning, but all to no avail. The opposition of the Mitnaggedim remained as firm as ever.

As the 19th century dawned, the pristine spirit of the Ḥasidim had greatly deteriorated. It began to take on an ultraconservative character and attacked any manifestation of modernity within the Jewish community. Hasidism suffered a staggering blow when huge numbers of Jews were put to death during World War II. The relatively few Ḥasidim who now survive have a vitality that belies their limited numbers. The philosopher Martin Buber, among others, did much in recent times to interpret Ḥasidism to the modern generation.

Haskala, also spelled HASKALAH (from Hebrew *sekhel,* "reason," or "intellect"), a late 18th- and 19th-century social and cultural movement among the Jews of central and eastern Europe. Though it owed much of its inspiration and values to the European Enlightenment, its roots, character, and development were distinctly Jewish. When the movement began, Jews were living mostly in pales of settlement and areas reserved especially for Jews, following a form of life that had evolved after centuries of segregation and discriminatory legislation. A move toward change was initiated by a relatively few "mobile Jews" (mainly merchants) and "court Jews" (agents of various rulers and princes), whose contact with European civilization had heightened their desire to become a part of society as a whole. One of the early centres of the movement was Berlin, whence it spread to eastern Europe.

Early proponents of Haskala were convinced that Jews could be brought into the mainstream of European culture through a reform of traditional Jewish education and a breakdown of ghetto life. This meant adding secular subjects to the school curriculum, adopting the local vernacular in place of Yiddish, abandoning traditional garb, reforming synagogue services, and taking up new occupations.

Moses Mendelssohn (1729–86) symbolized the exodus of Jews from ghetto life with his German translation of the Torah (first five books of the Bible), even though the book was printed in Hebrew letters. The revival of Hebrew writing was also given impetus with the publication in 1784 of the first modern Hebrew periodical, a significant attempt to recover a sense of "classical" Jewish civilization. Though basically rationalistic, Haskala also exhibited such romantic tendencies as a desire to return to nature, a high regard for manual work, and an aspiration to revive a glorious and better past. In this respect, Haskala created values and attitudes that later merged with those of the Jewish nationalist movement known as Zionism.

Orthodox Judaism opposed the Haskala movement from the start, because its repudiation of the traditional Jewish way of life threatened to destroy the tightly knit fabric of Judaism and to undermine religious observance. There was particular distrust of a rationalistic ideology that seemed to challenge rabbinic orthodoxy and the important role of Talmudic studies in Jewish education. Nonetheless, in due course, even Orthodoxy admitted a minimum of secular studies and the use of local vernaculars. But other fears were justified, for some aspects of the Haskala did in fact lead to assimilation and a weakening of Jewish identity and historical consciousness.

The development of the movement varied with the political, social, and cultural conditions of individual countries. In Germany, Hebrew was rapidly abandoned and assimilation was widespread, but interest in Jewish history revived and gave birth to *Wissenschaft des Judentums; i.e.,* modern critical historico-philological Jewish studies. In the Austrian Empire, government encouragement of educational reform met with little success in the great Jewish centres in Galicia, but a more specifically Hebrew Haskala subsequently developed that promoted Jewish scholarship and literature. Adherents of Haskala fought rabbinic orthodoxy and especially Hasidism, the mystical and pietistic tendencies of which were attacked bitterly. In Russia, some followers of Haskala hoped to achieve "improvement of the Jews" by collaborating with the government plan for educational reform, but the increasingly reactionary and anti-Semitic policies of the tsarist regime drove some Jews to support the revolutionary movement, others to support nascent nationalism.

Gradually, the impossibility of establishing an integral, worldwide Hebrew culture became evident, and rising anti-Semitism made many of the movement's expectations appear unrealistic. By the end of the 19th century, some ideals of Haskala had become permanent features of Jewish life, while others were abandoned. Modern Jewry is thus unthinkable without reference to Haskala, for it created a middle class that is loyal to historic Jewish traditions and yet part of modern Western civilization.

Haskins, Charles Homer (b. Dec. 21, 1870, Meadville, Pa., U.S.—d. May 14, 1937, Cambridge, Mass.), U.S. educator and a leading medievalist of his generation, who is known for his critical studies of Norman institutions and the transmission of Greco-Arabic learning to the West.

After receiving his Ph.D. from Johns Hopkins University, Baltimore, in 1890, Haskins taught at the University of Wisconsin, Madison, and in 1902 was appointed professor of history and dean of the Graduate School of Arts and Sciences at Harvard University. In that position he helped to establish the pattern of graduate training in history that is now generally accepted.

As a leading member of the Inquiry, a body set up by Pres. Woodrow Wilson during World War I to consider the settlement of territorial problems after the war, Haskins was subsequently attached to the American delegation at the Paris Peace Conference (1919), at which he advanced the solution that was accepted for the disposition of the Saarland.

Haskins' most important work, *Norman Institutions* (1918), was an epoch-making treatment of the 11th–12th-century institutions of Normandy and their contributions to medieval English government. It was preceded by his more popular treatment of the subject, *The Normans in European History* (1915). His writings on the transmission of Greek and Arabic learning to western Europe are outstanding critical evaluations of 12th–13th-century scholarship and are summarized in *Studies in the History of Mediaeval Science* (1924) and *Studies in Mediaeval Culture* (1929). These works appeared in popular form as *The Renaissance of the Twelfth Century* (1927).

Haskovo (Bulgaria): *see* Khaskovo.

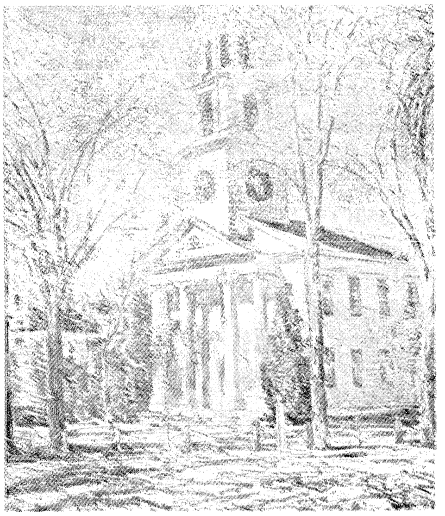
Haslemere, parish (town), Waverley district, county of Surrey, England. It is attractively situated between the sandy heights of Hindhead (895 ft [273 m]) and Blackdown (918 ft), both of which belong to the National Trust. The Dolmetsch family, internationally known as performers of early music on authentic instruments, settled there in 1916 and founded an annual summer festival there in 1925. Pop. (1981 prelim.) 13,900.

Hasmonean DYNASTY, also spelled HASMONAEAN, dynasty of ancient Judaea, descendants of the Maccabee (*q.v.*) family. The name derived (according to Josephus, in *The Antiquities of the Jews*) from the name of their ancestor Hasmoneus (Hasmon), or Asamonaios. In 143 (or 142) BC Simon Maccabeus, son of Mattathias (and brother of Judas Maccabeus), acceded to the high priesthood and in 141 (or 140) became independent of the Seleucid dynasty as high priest, ruler, and ethnarch of Judaea; the offices were hereditary, and Simon thus became the first of the Hasmonean dynasty. He was succeeded by his son John Hyrcanus I, Aristobulus I, Alexander Jannaeus and his widow Salome Alexandra, Aristobulus II, John Hyrcanus II, and the last Hasmonean, Antigonus, who was deposed and executed by the Romans under Mark Antony.

Hassam, (Frederick) Childe (b. Oct. 17, 1859, Boston—d. Aug. 27, 1935, East Hampton, N.Y., U.S.), painter and printmaker, one of the foremost exponents of French Impressionism in American art.

Hassam studied in Boston and Paris (1886–89), where he fell under the influence of the Impressionists and took to painting in brilliant colour with touches of pure pigment. On his return from Paris he settled in New York City, where he became a member of the group known as The Ten.

His works are distinctive for their freshness and clear luminous atmosphere. Scenes of



"Church at Old Lyme," oil painting by Childe Hassam, 1906; in the Parrish Art Museum, Southampton, N.Y.

By courtesy of the Parrish Art Museum, Southampton, N.Y.

New York life remained his favourite subject matter—*e.g.*, "Washington Arch, Spring" (1890; Phillips Collection, Washington, D.C.). He also painted landscapes of New England and rural New York that, with their intense blue skies, lush foliage, and shimmering white light, became especially popular.

Hassam produced about 300 black-and-white etchings and lithographs that are notable for their sense of light and atmosphere.

Hassan (personal name): *see under* Hasan, except as below.

Hassan I (b. 1857—d. June 9, 1894, Tadla, Mor.), sultan of Morocco (1873–94), whose policy of internal reforms brought his country a degree of stability previously unknown and who succeeded in preserving the independence of that North African nation.

Hassan's succession on Sept. 12, 1873, was peaceful, but throughout his reign he was faced with the problem of maintaining public security so that the European powers would have no excuse to annex Morocco. Although he was a conservative ruler, Hassan realized the need for modernization. He created a permanent standing army and employed European mercenaries as instructors. Moroccan students were sent to Europe to acquire technical skills. Most of his reign was spent in campaigns aimed at the pacification of rebellious tribes.

Hassan II, original name MAWLĀY HASSAN MUḤAMMAD IBN YŪSUF (b. July 9, 1929, Rabat, Mor.), king of Morocco from 1961.

Hassan, after taking a law degree at Bordeaux, Fr., was appointed commander of the Royal Armed Forces (1955) and deputy premier (1960) and succeeded to the throne on the death of his father, Muḥammad V (1961). As king, Hassan tried to democratize the Moroccan political system by introducing a new constitution (1962) that provided for a popularly elected legislature while maintaining a strong executive branch headed by the king. He exercised authoritarian rule from 1965 to 1970 in order to contain opposition to his regime. He restored limited parliamentary government under a new constitution in 1970, and he instituted some socioeconomic reforms following attempted coups in 1971, 1972, and 1973. Hassan was generally credited with maintaining the fragile unity of Morocco by means of his adroit rule. In foreign affairs he cultivated markedly closer relations with the United States and the West than his father had.

Hassan II

AP/Wide World Photos

In the struggle between Morocco and Algeria over Spanish (later Western) Sahara, Hassan strongly promoted Morocco's claim to the territory, and in November 1975 he called for a "Green March" of 100,000 unarmed Moroccans into the territory to demonstrate popular support for its annexation. Western Sahara was in fact divided between Morocco and Mauritania (1976), but this victory proved to be hollow, since guerrillas of the Polisario Front, agitating for Saharan independence, tied down Moroccan troops and prevented the exploitation of the phosphate deposits that had made the Sahara desirable to Morocco in the first place.

Hassan, town, south-central Karnātaka (formerly Mysore) state, southern India. Lying at an elevation of 3,084 feet (940 m), the town has a cool, humid climate. It dates from the 12th century and is now a trading centre served by a spur line of the railway from Arsikere to Mysore. The town's industries include several rice mills and engineering and cement works. Hassan has a government college and other colleges affiliated with the University of Mysore. Coffee, cardamom, millet, oilseeds, rice, sugar, and cotton are the chief crops grown in the surrounding area. Pop. (1981) town, 71,534.

Ḥassān ibn Thābit (b. *c.* 563, Medina, Arabia—d. *c.* 674?), Arabian poet, best-known for his poems in defense of the Prophet Muḥammad.

Ḥassān had won acclaim at the courts of the Christian Arab Ghassānid kings in Syria and the Lakhmid kings of al-Ḥīrah in Iraq, where he met the poets an-Nābighah and ʿAlqamah. He settled in Medina, where, after the advent of Muḥammad, he accepted Islām at about the age of 60. Ḥassān, who is said to have lived to be more than 110 years old, became Islām's earliest poetic defender. His poetry thrived under the traditional requirement that literary attacks be countered with satires on the offending poets. His writings in defense of Muḥammad contain references to contemporary events that have been useful in documenting the period. He was also Islām's first religious poet, using many phrases from the Qurʾān in his verse. Much of the work ascribed to him in his divan, or collection of poetry, appears to be spurious, however.

Hasse, Ernst (b. Feb. 14, 1846, Leulitz, Saxony [Germany]—d. Jan. 12, 1908, Leipzig), German nationalist and political leader who turned the General German League (Allgemeiner Deutscher Verband), founded in 1891, into the militantly nationalistic and anti-Semitic Pan-German League (Alldeutscher Verband) in 1894.

A professor of statistics at Leipzig, Hasse represented the National Liberal Party in the Reichstag from 1893 to 1903. He served as the league's president from 1893 to 1908 and wrote the three-volume study *Deutsche Politik* (1905–07; "German Politics") in which he made explicit the determination of the Pan-German movement: "We want territory, even if it be inhabited by foreign peoples, so that we may shape their future in accordance with our needs."

Hasse, Johann Adolph, byname IL SASSONE (b. March 25, 1699, Bergedorf, near Hamburg—d. Dec. 16, 1783, Venice), outstanding composer of operas in the Italian style that dominated late Baroque opera.

Hasse began his career as a singer and made his debut as a composer in 1721 with the opera *Antioco.* He went to Italy, where he studied with Nicola Porpora and with Alessandro Scarlatti and where his opera seria *Sesostrate* established his reputation; in Italy he became known as "il Sassone" ("the Saxon"). After spending several years in Venice, where he married the celebrated mezzo-soprano Faustina Bordoni (*c.* 1700–81), he became music director of the Dresden Opera (1731). He resided in Dresden from 1739 to 1763, when he retired and went to Vienna. His last work for the stage was *Ruggiero* (1771), written for the wedding of the archduke Ferdinand at Milan.

Johann Adolph Hasse, engraving by J.F. Kauxe after a portrait by P. Rotari

The Andre Meyer Collection—J.P. Ziolo

Hasse's compositions include 56 operas, as well as oratorios, masses, and instrumental works. His music was enormously popular during his lifetime; its chief characteristics were melodic beauty and formal balance. His operatic overtures had considerable influence

on the development of the symphony, especially in northern Germany.

Hassel, Odd (b. May 17, 1897, Kristiania, Nor.—d. May 11, 1981, Oslo), Norwegian physical chemist and corecipient, with Derek H.R. Barton of Great Britain, of the Nobel Prize for Chemistry in 1969. Hassel received the award for his work in establishing conformational analysis (the study of the three-dimensional geometric structure of molecules) as an important force in revolutionizing the modern concepts of molecular structure.

Hassel studied at the University of Oslo and received his doctorate at the University of Berlin in 1924. He joined the faculty of the University of Oslo in 1925 and from 1934 until 1964 was a professor of physical chemistry and director of the physical chemistry department. He began intensive research on the structure of cyclohexane (a 6-carbon hydrocarbon molecule) and its derivatives in 1930 and discovered the existence of two forms of cyclohexane. He also set forth the basic tenets of conformational analysis and wrote *Kristallchemie* (1934; *Crystal Chemistry*). After the German occupation of Norway in 1940, he continued to publish his research in Scandinavian journals, but his most important findings were obscured until after World War II. He was imprisoned (1943–45) with other members of the university community in a camp at nearby Grini. After the mid-1950s Hassel's research dealt mainly with the structure of organic halogen compounds.

Hasselt, capital of Limburg *province,* northeastern Belgium. It lies along the Demer River near the Albert Canal, northwest of Liège. For centuries it has been a centre of administration, a market town, and a home of distilleries (the gin called Hasselt Spirit is still produced there). Since coal mining began (1917) in the Kempenland (Campine) to the north, Hasselt has also developed industrially. The rich farmland of the fertile Hesbaye country to the south supports Hasselt's breweries, flour mills, tanneries, and fertilizer factories.

Principal buildings are the Church of St. Quentin (dating from the 14th century), the town hall (1675), and the 18th-century *béguinage* (retreat for secular nuns), now housing a museum. There is a monument to peasants whose uprising was crushed by French troops in 1798. In 1831 the Dutch won a major victory over the Belgian nationalists at Hasselt.

The Church of Our Lady (1726–31) contains the tomb of Anne-Catherine Lamboy, abbess of the nearby Cistercian nunnery of Herkenrode (1128). The nearby Bokrijk Nature Reserve (established 1958), consisting of more than 1,235 acres (500 hectares), includes an open-air museum of the old Kempen district. Pop. (1983 est.) mun., 65,437.

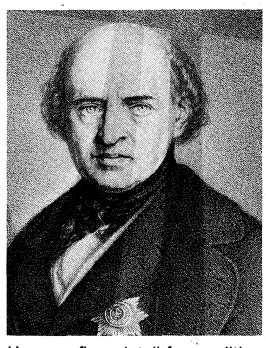
Hasselt, André (Henri Constant) Van (b. Jan. 5, 1806, Maastricht, Neth.—d. Dec. 1, 1874, Brussels), Romantic poet whose works represent one of the highest achievements of French-Belgian literature in the 19th century.

Van Hasselt obtained Belgian nationality in 1833, settling in Brussels, where he was employed at the Bourgogne Library before becoming an inspector of schools. He knew Victor Hugo, Alexandre Dumas, and other French Romantic writers but was also influenced by the German lyric poets. His first book of poems, *Primevères* (1834), was followed by the patriotic *La Belgique* (1842).

Van Hasselt's masterpiece is his epic *Les Quatre Incarnations du Christ* (first published 1863; expanded 1867), in which he presents great historical events as marking the progress of society under the influence of Christianity toward a final establishment of Christ's kingdom upon earth.

Hassenpflug, Hans Daniel (Ludwig Friedrich) (b. Feb. 26, 1794, Hanau, Hesse [Germany]—d. Oct. 10, 1862, Marburg, Hesse), pro-Austrian Hessian politician whose reactionary, anticonstitutional policies earned him the nickname "Hessenfluch" ("Curse of Hesse").

After studying law, Hassenpflug entered the Hesse-Kassel civil service. In 1832 he was named minister of the interior and of justice



Hassenpflug, detail from a lithograph by G. Koch

By courtesy of the Staatliche Kunstsammlung, Kassel, Ger.

in Hesse-Kassel and set to work to undermine the state's liberal 1831 constitution. Dismissed in 1837, he headed the administration of Hohenzollern-Sigmaringen (1838–39), served as civil governor of Luxembourg (1839–40), and became a Prussian civil servant (1841–50). Recalled to Hesse-Kassel by the elector Frederick William I in 1850, he resumed his struggle against the constitution and took the state out of the Prussian-sponsored Erfurt Union of North German states. His call on Austria for armed intervention against Hessian liberals almost led to war between Austria and Prussia, and he was finally dismissed from his high offices in 1855. By the time he died, the 1831 constitution had been largely restored.

Hassi Messaoud, major oilfield, east-central Algeria. The field lies in the Grand Erg (sand dunes) Oriental of the Sahara. The Hassi Messaoud oilfield, discovered in 1956, has a generally north–south axis, and the reservoirs are sandstones of the Paleozoic era. In 1979 Hassi Messaoud's oil refinery was expanded, increasing its production capacity to about 9,500,000 barrels annually. In the early 1980s the field produced about half of the total Algerian oil output. Pipelines carry its oil to refineries in Algiers, Arzew, Bejaïa, and Skikda. A petroleum museum is located on the site, and the oilfield has an airport.

Hassi R'Mel, town, containing one of the world's major natural-gas fields, (discovered in 1956), north-central Algeria. It lies 37 miles (60 km) northwest of Ghardaïa. It is also an intermediate stage on the natural-gas and oil pipelines running from Hassi Messaoud (160 miles [260 km] southeast) to the northern Algeria coastal cities of Arzew, Algiers, and Skikda.

Hassler, Hans Leo (b. Oct. 26, 1564, Nürnberg [Germany]—d. June 8, 1612, Frankfurt am Main [Germany]), outstanding German composer.

Hassler studied with his father, the organist Isaak Hassler (d. 1591). After mastering the imitative techniques of Orlando di Lasso and the fashionable polychoral style of the Venetians, he traveled to Venice in 1584 to study with Andrea Gabrieli. The light, elegant secular music of Orazio Vecchi, Baldassare Donato, and G.G. Gastoldi and the keyboard works of the Venetian school soon attracted him. In 1585 he returned to Germany as organist to the Fugger banking family of Augsburg. In 1600 he was appointed director of music for Augsburg city and in 1601 for Nürnberg. In 1608 he became organist to the elector of Saxony.

Hassler's style is a fusion of German counterpoint and Italian form. His *Madrigali* (1596), though avoiding the harmonic experiments of the 16th-century madrigalists such as Luca Marenzio, are considered to be among the finest of their time. His instrumental compositions and his church music—Protestant and Roman Catholic—were widely imitated. His German songs owe much to the homophonic dance rhythms of Gastoldi; the best-known collection was the *Lustgarten* (1601), which contains the charming "Mein Gemüt ist mir verwirret." This tune reappears in Bach's *St. Matthew Passion* under the title "O Haupt voll Blut und Wunden."

Hassuna, ancient Mesopotamian town located south of modern Mosul in northern Iraq. Excavated in 1943–44 by the Iraqi Directorate of Antiquities, Hassuna was found to represent a rather advanced village culture that apparently spread throughout northern Mesopotamia. At Hassuna itself, six layers of houses were uncovered, each progressively more substantial. Large clay vessels sunk into the ground were used for grain storage, and bread was baked in domed ovens. Characteristic of the so-called Hassuna period (*c.* 5750–*c.* 5350 BC) was a large, oval dish with a corrugated or pitted inner surface that was probably used as a husking tray. Husking-tray fragments have been found from Eridu in southern Iraq to Ras Shamra on the Syrian coast. In addition, the upper levels at Hassuna contained numerous examples of a ceramic pottery termed "Sāmarrā' ware," which seems to have been brought in or made by craftsmen who originally migrated from the area now known as Iran. These levels, occupied during the so-called Hassuna-Sāmarrā' period (*c.* 5350–*c.* 5050 BC), are identified with a culture that seems to have spread only within the area of the middle Tigris and Euphrates rivers. The Sāmarrā' pottery was remarkable not only for its new shapes but also for its bold and innovative use of elaborately painted motifs.

The Hassuna and the Hassuna-Sāmarrā' finds demonstrated that even as early as the 6th millennium BC extensive trade was carried on throughout a large part of the ancient Middle East.

Hastings, district (borough), county of East Sussex, England. It has an area of 12 square miles (30 square km). The old port of Hastings, premier among the medieval Cinque Ports (*q.v.*), has developed in modern times as a seaside resort. Prehistoric earthworks and the ruins of a medieval castle crown Castle Hill, which is situated on the sandstone cliffs overlooking the old fishing settlement and port at the mouth of a steep valley. The main shopping centre lies west of this old nucleus, which is notable for its numerous antique shops. The resort has developed along the seafront to the west, where, since 1872, the borough has also included St. Leonards, laid out in 1828. The seaside resort is also noteworthy for its winter chess congress. (*See also* Hastings, Battle of.) Pop. (1986 est.) 81,100.

Hastings, city, eastern North Island, New Zealand, on Heretaunga Plains, near Hawke Bay. The area's first European settlers arrived in 1864 to take up land leased from the local Maoris. The settlement was linked to the island's rail system by 1873 and was named after Warren Hastings (first governor-general of British India); it was declared a town in 1884 and a borough two years later. A disastrous earthquake struck the borough in 1931; but Hastings was rebuilt, grew, and was constituted a city in 1956. Serving an agricultural and pastoral region, it is a food-processing centre with canning, quick-freezing, dairy, and meatpacking plants, stockyards, and breweries;

it also produces fertilizer, tallow, and stock food. Highland Games are held at Hastings every year in the spring. Pop. (1983 est.) city, 37,100; urban area, 53,900.

Hastings, city, seat (1878) of Adams County, south central Nebraska, U.S., on the West Fork of the Big Blue River. Founded in 1872 at the eastern terminus of the St. Joseph and Denver City Railroad, it was named for Col. Thomas D. Hastings, a railroad contractor. A wholesale distributing centre for an agricultural (mainly wheat) area, it has dairy and food industries, grain processing and storage facilities, and a government beef-research station. Cooling, heating, and farm and irrigation equipment are manufactured. A U.S. naval munitions depot is 2 mi (3 km) east. Hastings College was founded in 1882 and Central Technical Community College in 1966; other institutions include Crosier Fathers Monastery and the Hastings Museum (pioneer and Indian artifacts) including the McDonald Planetarium. Inc. 1874. Pop. (1980) 23,045.

Hastings, Battle of (Oct. 14, 1066), battle that ended in the defeat of Harold II of England by William, duke of Normandy, and established the Normans as the rulers of England.

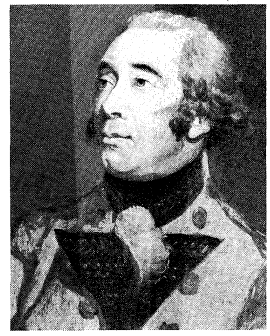
Norman attack during the Battle of Hastings, scene from the Bayeux Tapestry, 11th century; in the Museum of Queen Matilda, Bayeux, Fr.

By courtesy of Phaidon Press, publishers of *The Bayeux Tapestry*, edited by Sir Frank Stenton

Harold's predecessor, the childless Edward the Confessor, had at first probably designated William, a cousin, as his heir but on his deathbed (Jan. 5, 1066) granted the kingdom to Harold, earl of Wessex and the most powerful man in the kingdom; Harold was crowned king the next day.

On September 27 William crossed to England unopposed, with an army of 4,000 to 7,000 cavalry and infantry, disembarking at Pevensey in Sussex and moving eastward along the coast to Hastings. Harold, learning of his landing on about October 2, hurried southward and by October 13 was approaching Hastings with about 7,000 men, many of whom were half-armed, untrained peasants. At dawn on October 14 William moved toward Harold's army, which was occupying a ridge 10 miles northwest of Hastings. William disposed his army for attack, archers in front, infantrymen behind, and the knights in three groups to the rear. Harold's English army, lacking archers and cavalry, prepared for defense on the protected summit of the ridge. His men, too closely ranged, provided an excellent target for William's archers, who opened the Norman attack but suffered heavily from English slings and spears. William therefore threw in his cavalry, which was so badly mauled by the English infantry, wielding two-handed battle-axes, that it fled. William checked its flight and throughout the day launched on the English position a series of alternate cavalry charges and flights of arrows. By two feigned retreats he drew considerable numbers of Englishmen from their position and then turned and annihilated them. Gradually the English were worn down; two of Harold's brothers fell, and in the late afternoon he himself was killed. The leaderless English fought on until dusk, then broke; after a last rally they scattered, leaving William the winner of one of the most daring gambles in history. After the battle his army moved to isolate London, where William I was crowned king on December 25.

Hastings, Francis Rawdon-Hastings, 1st marquess of, 2ND EARL OF MOIRA (b. Dec. 9, 1754, County Down, Ire.—d. Nov. 28, 1826, off Naples), British soldier and colonial administrator; as governor general of Bengal he conquered the Marāthā states and greatly strengthened British rule in India.



1st Marquess Hastings, detail of a portrait by an unknown artist; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

He joined the army in 1771 as ensign in the 15th foot. He served in the American War of Independence (1775–81) and was rewarded with an English peerage in 1783; he succeeded his father as earl of Moira in 1793. When the Whigs came to power in 1806, Hastings was appointed master general of the ordnance, a post he resigned on the fall of his party in 1807. Taking an active part in the business of the House of Lords, he belonged to the circle of the prince of Wales (later George IV), through whose influence he was appointed governor general of Bengal and commander in chief of the forces in India. He landed at Calcutta and assumed office in October 1813. Facing an empty treasury, he raised a loan in Lucknow from the Nawob-Vizier and defeated the Gurkhas in 1816. They abandoned disputed districts, ceded some territory to the British, and agreed to receive a British resident. For this success, Lord Moira was made marquess of Hastings in 1817.

In dealing with a combination of Marāthā powers, Hastings offered them a choice of cooperation against the Pindaris (bands of horsemen attached to the Marāthā chiefs) or war. The Peshwa (titular ruler of the Marāthā confederacy), the raja of Nāgpur, and the army under Holkar II, ruler of Indore, chose war and were defeated. The Pindari bands were broken up, and, in a settlement, the Peshwa's territories were annexed and the Rājput princes accepted British supremacy. By 1818 these developments had established British sovereignty over the whole of India to the east of the Sutlej River and Sind. Hastings also suppressed pirate activities off the west coast of India and in the Persian Gulf and the Red Sea. In 1819 he obtained the cession by purchase of the strategic island of Singapore.

In internal affairs, Hastings began the repair of the Mughal canal system and brought the pure water of the Yamuna into Delhi, encouraged education in Bengal, began a process of Indianization by raising the status and powers of subordinate Indian judges, and took the first measures for the revenue settlement of the extensive "conquered and ceded" provinces of the northwest.

Hastings' competent administration, however, ended under a cloud because of his indulgence to a banking house. Though he was cleared of any corrupt motive, the home authorities censured him. He resigned and returned to England in 1823, receiving the comparatively minor post of governor of Malta in 1824. In 1828, two years after Hastings' death, members of the India House, to make some amends for their vote of censure, gave £20,000 to trustees for the benefit of Hastings' son.

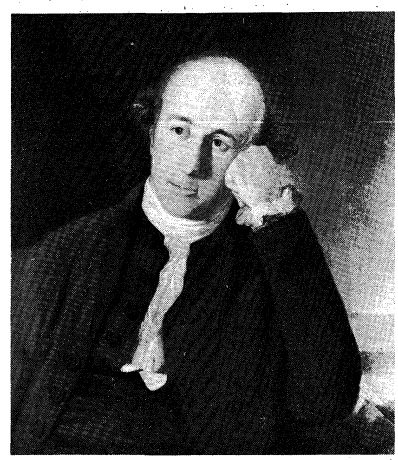
Hastings, Frank Abney (b. 1794—d. June 1, 1828, Zacynthus, Greece), British naval officer who fought in the War of Greek Independence and was the first commander to use a ship with auxiliary steam power in naval action.

The son of Lieut. Gen. Sir Charles Hastings, Frank Hastings was cashiered from the Royal Navy for a breach of discipline in 1820 and then joined the Greeks in their rebellion against Turkish rule.

To remedy the shortcomings of the outmoded Greek navy, he obtained the financial backing of Lord Byron and the London Greek Committee to buy six steam-powered warships in 1824; but only one was completed, the "Karteria," which was the fastest and most modern ship in the Mediterranean at the time, with an armament of four 68-pound guns featuring a method of heating and firing red-hot shells that Hastings himself had invented.

Hastings sank seven Turkish ships in the Bay of Salona, off the Gulf of Corinth, an act that forced the Egyptian naval commander to break through the allied naval blockade and suffer the defeat of Navarino on October 20, 1827, resulting in Egypt's withdrawal from the war. After Navarino, Hastings' operations in the islands and along the coastline of the Greek mainland enabled the Greeks to expand their territory and gain important strategic points. He died as a result of wounds suffered at Anatolikón in an attempt to capture Missolonghi.

Hastings, Warren (b. Dec. 17 [Dec. 6, old style], 1732, Churchill, near Daylesford, Oxfordshire, Eng.—d. Aug. 22, 1818, Daylesford), the first and most famous of the British governors general of India, who dominated Indian affairs from 1772 to 1785 and was impeached (though acquitted) on his return to England.



Warren Hastings, oil painting by Tilly Kettle; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Early life. The son of a clergyman of the Church of England, Hastings was abandoned by his father at an early age. He was brought up by an uncle, who gave him what was probably the best education then available for a boy of his inclinations, at Westminster School in London. Hastings showed great promise

as a schoolboy and seems at Westminster to have acquired the literary and scholarly tastes that were later to give him a serious interest in Indian culture and civilization. His school days were, however, cut short by his uncle's death in 1749. He was then taken away from school and granted a writership (as the junior appointments in the East India Company were called), and in 1750, at the age of 17, he sailed for Bengal.

In 1750 British contact with India was still the monopoly of the East India Company, which was engaged in buying and selling goods at small settlements in Indian ports. As one of the company's servants, for the early part of his career Hastings was employed in the company's commercial business. But after 1756 the outlook for both the company and its servants was radically altered. The company became involved in hostilities in India both with the French and with Indian rulers, and under Robert Clive its army was able to depose the nawab, or Indian governor, of Bengal at the Battle of Plassey in 1757. Although the company did not at this stage intend to set itself up as the actual ruler of the province, it was now so powerful that the new nawabs became its satellites. Thus, the servants, including Hastings, began to be drawn more and more into Indian politics. Hastings served as the company's representative at the court of the nawabs of Bengal from 1758 to 1761 and then on the company's Council, the controlling body for its affairs in Bengal, from 1761 to 1764. His career was cut short, however, by bitter disputes within the Council. Finding himself in a minority, Hastings resigned from the company's service and returned to England in 1765.

Governorship of Bengal. Short of money, Hastings sought service in India again. In 1769 he was appointed second in Council in Madras. Two years later he received his great opportunity when he was sent back to Bengal as governor in charge of the company's affairs there. Since he had last been in Bengal, the disintegration and demoralization of the normal Indian government of the province, begun after Plassey, had gathered speed; yet the company had been reluctant to create a new system in its place. In practical terms Bengal was in the power of the British, who were also virtually its legal rulers after being granted in 1765 the powers called the dewanee by the Mughal emperor. But the business of government was still conducted by Indian officials, with very limited European participation. Hastings recognized that this situation could not go on and that the British must accept full responsibility, make their power effective, and involve themselves more closely in the work of government, even if he shared his contemporaries' objections to excessive involvement. His view of the role of the British in India was later to be regarded as a very conservative one. He saw no "civilizing" or modernizing mission for them. Bengal was to be governed in strictly traditional ways, and the life of its people was not to be disturbed by innovation. To ensure good government, however, he felt that the British must actively intervene. In what was to be the most constructive period of his administration, from 1772 to 1774, Hastings detached the machinery of the central government from the nawab's court and brought it to the British settlement in Calcutta under direct British control, remodelled the administration of justice throughout Bengal, and began a series of experiments aimed at bringing the collection of taxation under effective supervision.

Political rivalries. Hastings' period of undisputed power in Bengal came to an end in 1774 with changes in the company's government. He acquired the new title of governor general and new responsibilities for supervising other British settlements in India, but these powers had now to be shared with a Supreme Council of four others, three of whom were new to India. The new councillors, who were led by an army officer, Sir John Clavering, and included the immensely able and ambitious Philip Francis, immediately quarrelled with Hastings. Hastings' admirers have had little patience with Clavering and Francis; but it is possible to see that Francis had a genuine point of view in his opposition to Hastings and that there was still much in Bengal, even after Hastings' reforms, to shock men fresh from Britain. (Bribery, extortion, and other abuses of power by Englishmen, which had been so common since Plassey, undoubtedly continued.) The quarrel between the new councillors and Hastings paralyzed the government of Bengal and produced a number of squalid episodes in which the newcomers, to discredit Hastings at home, encouraged Indians to bring accusations of malpractices against him, while his friends used various methods to deter such accusations. The most notorious of these episodes concerned one Maharaja Nandakumar, who made accusations against the governor general but was in his turn accused of forgery and hanged for it. Hastings was certainly not guilty of procuring a judicial murder, but recent research does suggest that he knew in advance of the counterplot against Nandakumar.

War in India. The death of Clavering in 1777 put Hastings once again in possession of full power, although Francis' opposition dragged on for another three years. It ended in a pistol duel between Hastings and Francis; the latter was wounded, and he returned to Europe. But by 1777 the energies of the Bengal government were becoming more and more absorbed in war. War against Indian states was always a likely consequence of the company's conquest of Bengal. As full participants in the unstable world created in India by the fall of the Mughal Empire, the company now found it difficult not to be drawn into the rivalries of the powers that had set themselves up in the ruins of the empire. Hastings' policy was to avoid further conquest and war but to maintain peaceful relations with neighbouring states by a series of alliances. He had, however, already taken part in one war in 1774, when he helped the company's ally on the northwestern boundary of Bengal, the Vizier of Oudh, to take over territory occupied by a people called the Rohillas; and in 1778 he became involved in war with the Marāthās, a loose federation of Hindu peoples in western and central India. Rightly or wrongly, Hastings came to believe that it was necessary for the safety of the British in India to ensure that the Marāthā leaders were friendly to the company and that he would be justified in applying military pressure to achieve this end. After the entry of France into the U.S. War of Independence in 1778, he was also confronted with French expeditionary forces in the Indian Ocean. Finally, in 1780, Hyder (Haidar) Ali, the ruler of the south Indian state of Mysore, attacked the British at Madras. War on several fronts brought out the best in Hastings, and his achievement in organizing the company's military and financial resources to counter every threat was a remarkable one. The Marāthās were brought to peace in 1782, as was Mysore in 1784, and the French were held in check until peace was made in Europe in 1783. But war stretched the company to the limit, disrupting its trade and thus antagonizing opinion at home. War also forced Hastings (or so he believed) into dubious acts to raise extra funds, two of which—the demand for a subsidy to the company from Chait Singh, the raja of Banaras, and the requisitioning of the treasures of the begums of Oudh (the mother and grandmother of the Vizier)—were to count heavily against him later.

Retirement and impeachment. It was, however, an India at peace and with British dominions fully intact that Hastings finally left in 1785. But even before his retirement the allegations of Francis and the reports of wars, whether justly or unjustly undertaken, had damaged his reputation; and the passionate moral concern about the standards of the British in India felt by Edmund Burke, the great Whig parliamentarian, had come to be focussed on Hastings. Most historians, while recognizing Burke's absolute sincerity, now feel that Burke was attempting to pin the evils of a situation on one individual and that he had chosen the wrong one. But Hastings was vulnerable on episodes such as the execution of Nandakumar and his treatment of the begums of Oudh and Chait Singh and even on some aspects of his personal finances, where he had acquired money in excess of his official allowances. In 1786, when Burke introduced an impeachment process against him (a prosecution by the House of Commons before the House of Lords), these blemishes were enough to persuade the House of Commons and in particular William Pitt the Younger, the prime minister, that Hastings ought to be sent to trial. The trial before the House of Lords lasted from 1788 to 1795, when he was acquitted. It is difficult not to regard this long-drawn-out ordeal as a serious injustice. At the most it made some contribution to the process by which standards were being laid down for the future conduct of British rule in India.

After his acquittal, Hastings lived to the age of 85 as a retired country gentleman—unassuming, mild-mannered, and of scholarly tastes, as he had been during his active career.

Assessment. As the first governor general of Bengal, Hastings was responsible for consolidating British control over the first major Indian province to be conquered. In his term of office he initiated solutions to such problems as how vast Indian populations were to be administered by a handful of foreigners and how the British, now themselves a major Indian power, were to fit into the state system of 18th-century India. These solutions were to have a profound influence on Britain's future role in India. Hastings' career is also of importance in raising for the British public at home other problems created by their new Indian empire—problems of the degree of control to be exercised over Englishmen in India and of the standards of integrity and fair dealing to be expected from them—and the solutions to these problems were also important for the future. (P.J.M.)

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Hastings, William Hastings, Baron (b. *c.* 1430—d. 1483), English soldier and diplomat, a supporter of King Edward IV and the Yorkists against the Lancastrians in the Wars of the Roses.

Son of Sir Leonard Hastings (d. 1455), he was master of the mint and chamberlain of the royal household under Edward IV and was created a baron in 1461. During the Earl of Warwick's rebellion (1469–71) Hastings won the powerful but vacillating duke of Clarence over to the side of his brother the King. After Edward's death (1483) he captured the affections of the royal mistress, Jane Shore. She encouraged him to oppose the succession of the Yorkist duke of Gloucester, afterward Richard III, who, following a confrontation in

the Tower of London (dramatized in Shakespeare's *Richard III*), had Hastings beheaded.

hat, any of various styles of head covering. Men wore hats in the form of caps or hoods in ancient times, but women favoured veils and wimples until the late Middle Ages. Hats have often served ceremonial functions, sometimes symbolizing the office or rank of the wearer.

Homemade hats of vegetable fibres are associated with the ancient rural traditions of Europe and Asia Minor. An early statue of Mercury shows his hat to be of finely plaited straw. Artisans of classical Athens and Rome usually wore conical caps with egg-shaped crowns made of felt. The material that protruded under the band evolved into a brim. In Rome this cap was a badge of the plebeian class; a slave being freed was presented with such a cap. Men of the upper classes usually went hatless except in bad weather or when hunting or travelling. The emperor Augustus, in his old age, set a new fashion by never going out without a hat.

In Egypt, caps and simple kerchiefs were worn over the head and brow, falling in a drape to the shoulders. Wigs of human hair or sheep's wool were also worn as protection from the sun. Helmet caps were ornamented with symbols of rank: the asp for kingly power, the feather for sovereignty.

In the early medieval era, city people wore hats usually made of cloth, such as the chaperon, a loose hood for both men and women. Throughout the Middle Ages, women of all classes wore head draperies hiding the hair and framing the face.

In the 14th century beaver hats became fashionable in Flanders and later spread to France, England, and elsewhere. Samuel Pepys paid £4 5*s*. for one in 1641. Women's hats showed increasing elaboration. The hennin, or steeple headdress, was fashionable in France and Flanders between 1460 and 1480. Women also wore the turban and the so-called butterfly headdress of transparent gauze raised above the head by means of long pins. During the 16th century the hood became popular for women. In the 17th century, Europeans wore hats indoors as well as out. European and American women in the 18th century sometimes wore the calash, a great bonnet that resembled the extension top of a *calèche,* or French carriage, atop pompadour-style hairdos. About 1760 the silk hat originated in Florence, appearing in England in 1810. The bowler, named for the London hatter who invented it and known as a derby in the United States, was introduced in 1850. During the last quarter of the century, the soft felt hat became popular in the United States. Styles originating in the 19th century became standardized for men in Western countries until the early 1960s, when fur and wool felts, cloth, and suede became popular in a variety of styles.

In the countries of the East, colourful turbans have been the traditional headgear. In the tropics, helmets of pith protect their wearers from the sun.

In eastern and southern Mediterranean countries, men wear the fez, a brimless, cone-shaped hat, usually of red felt with a flat crown and a long tassel. The fez was abolished as part of the Turkish national dress in 1925.

The people of Asia have devised head coverings as simple as the Chinese coolie hat, a one-piece flattened cone, to such an elaborate and decorative headdress as the Japanese cap-shaped *kammuri* of black lacquered silk decorated with an upright streamer and imperial chrysanthemum crest. In India the Gandhi cap, the fez, and variously styled turbans are in general use.

In Latin America and in the southwestern United States, the sombrero—a high-crowned hat of felt or straw with a wide brim rolled up at the edges—is popular. The cowboy adaptation, usually fashioned of beaver felt to repel rain, is known as a 10-gallon hat.

Hat Act (1732), in U.S. colonial history, British law restricting colonial manufacture and export of hats in direct competition with English hatmakers. Part of the mercantile system that subordinated the colonies economically, the Hat Act forbade exportation of hats from the colonies, limited apprenticeships, and, to preclude competition of cheap labour, forbade the use of Negroes in the trade. As a result of the act, London hatters were able to capture markets in other colonies and southern Europe formerly supplied by New England and New York manufacturers. The U.S. hat industry quickly revived after the War of Independence.

hat cheo, Vietnamese peasant theatre. It is generally (though not always) played out-of-doors in the forecourt of a village communal house. It is basically satirical in intent. Performances are given by amateur touring groups whose acting is realistic, rather than stylized. The popular theatre repertoire includes plays with historical and legendary themes, social satires, and farces.

Hat Yai, also spelled HAAD YAI, town, Songkhla *changwat* (province) in the Southern region of Thailand. It has become a modern, rapidly growing commercial city by virtue of its position on the major road south to Malaysia and on the junction of the eastern and western branches of the Bangkok–Singapore railroad. It also has an international airport. Hat Yai is a centre of the rubber industry and the site of the governmental Rubber Research Centre. Other major items of trade are tin and textiles: Thai silks and cottons and Malaysian batik. Pop. (1980) 93,519.

Hatano (Japan): *see* Hadano.

Hatano Seiichi (b. July 21, 1877, Matsumoto, Nagano Prefecture, Japan—d. Jan. 17, 1950, Tokyo), Japanese scholar and author of pioneering works on Christianity and Western philosophy widely studied in Japanese universities.

After graduating from Tokyo Imperial University in 1899, Hatano became the first professor to teach the history of Western philosophy at Tokyo Semmon Gakkō (now Waseda University). He studied in Germany from 1904 to 1907 and returned to become a lecturer in philosophy at Tokyo University and later at Kyōto University. Upon his retirement from Kyōto University in 1947, he served as president of Tamagawa Gakuen University until his death.

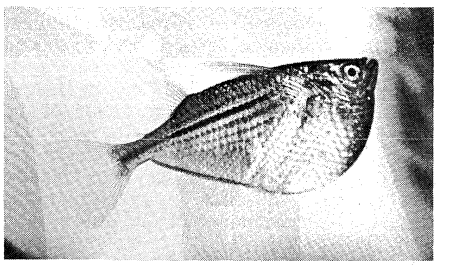
Hatano's *Seiyō tetsugakushi yō* ("Outline of the History of Western Philosophy"), written in 1907, was the first serious attempt in Japan to produce a survey of Western philosophy and soon became required reading for all university students. During the following years, Hatano did a series of studies on Christianity, which, in place of the usual polemics, attempted a serious philosophical approach. His major works on Christianity are: *Kirisutokyō no kigen* (1909; "Origin of Christianity"), *Seiyō shūkyō shioshi* (1921; "History of Western Religious Thought"), *Shūkyō tetsugaku* (1935; "Religious Philosophy"), and *Toki to ei'en* (1943; *Time and Eternity,* 1963).

Hatay, *il* (province) of Turkey, lying on the Mediterranean coast, bordered on the west by the Gulf of Iskenderun and on the south and east by Syria. With an area of 2,262 sq mi (5,859 sq km), it comprises a large plain watered by the Orontes River. Formerly the *sancak* (district) of Alexandretta (Turkish Iskenderun) under the Ottoman Empire, it came under French control after Ottoman defeat in World War I. France established a special administrative regime for Alexandretta district. By a Turko-French agreement and after a referendum had been held, the province was returned to Turkey in 1939. Under Turkish rule the capital was changed from Iskenderun (*q.v.*), the chief port of the *il,* to Antioch (*q.v.*; Turkish Antakya), which remains the provincial capital. The climate and agriculture are typically Mediterranean. Some iron is mined in the Nur Dağları (mountains) in the northwest. Main roads connect Hatay with major towns in Syria and the rest of Turkey, and the port of Iskenderun is linked to the Turkish railway system. Pop. (1983 est.) 923,100.

Hatch Act (Aug. 2, 1939; amended July 1940), measure enacted by the U.S. Congress, aimed at eliminating corrupt practices in national elections. It was sponsored by Sen. Carl Hatch of New Mexico following disclosures that Works Progress Administration officials were using their positions to win votes for the Democratic Party. The Hatch Act forbade intimidation or bribery of voters and restricted political-campaign activities by federal employees. As amended, it also severely limited contributions by individuals to political campaigns and spending by campaign committees.

hatchetfish, any member of two unrelated groups of hatchet-shaped fishes—deep-sea forms of the family Sternoptychidae or freshwater fishes of the family Gasteropelecidae.

Deep-sea hatchetfishes are small, shining silver fishes. They are abundant in warm and temperate regions throughout the world, usually at depths of about 200–1,000 metres (650–3,000 feet). Deep-bodied and flattened from side to side, they have slender tails and rows of light organs along the lower edge of each side of the body. The eyes are large and in the genus *Argyropelecus* are mounted on tubes pointed upward. Of about 15 species of sternoptychids, none exceeds the length of 10 centimetres (4 inches). The fishes are carnivorous.



Freshwater hatchetfish (*Gasteropelecus maculatus*)
Gene Wolfsheimer

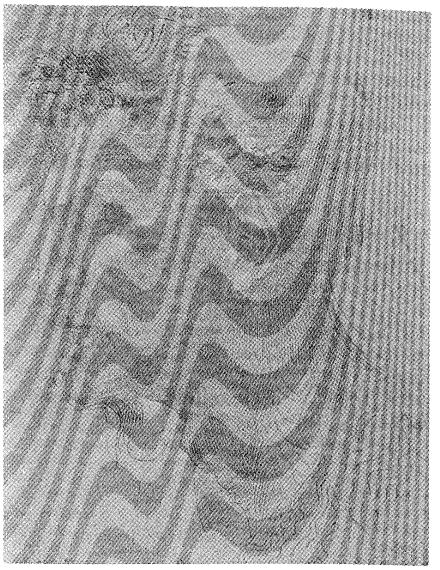
The freshwater, or flying, hatchetfishes constitute about nine species of South American fishes allied to characins in the order Cypriniformes. They are sometimes called flying characins and are included by some authorities in the characin family (Characidae). Flying hatchetfishes generally swim near the surface, where they can catch their insect prey. They can fly for short distances, and, unlike the flying fishes (*q.v.*), which glide, they achieve true flight by flapping their large pectoral fins. They vary from about 3 to 10 centimetres in length, depending on the species. Though fragile, they are sometimes kept in home aquariums. Among those known to aquarists are the marbled hatchetfish (*Carnegiella strigata*), and the silver hatchetfish (*Gasteropelecus sternicula*), which is olive above and silver below.

Hatchett, Charles (b. Jan. 2, 1765, London—d. March 10, 1847, London), English manufacturer, chemist, and discoverer in 1801 of niobium, which he called columbium.

Because of his expertise in analysis, Hatchett was frequently called on as a consultant. Mineral substances found in Australia (hatchettine or hatchettite) and North Carolina (hatchettolite) were named for him. Hatchett gave up

chemistry on his father's death and succeeded him as coachbuilder to the king.

hatching, also called CROSS-HATCHING, technique used by draftsmen, engravers, and other



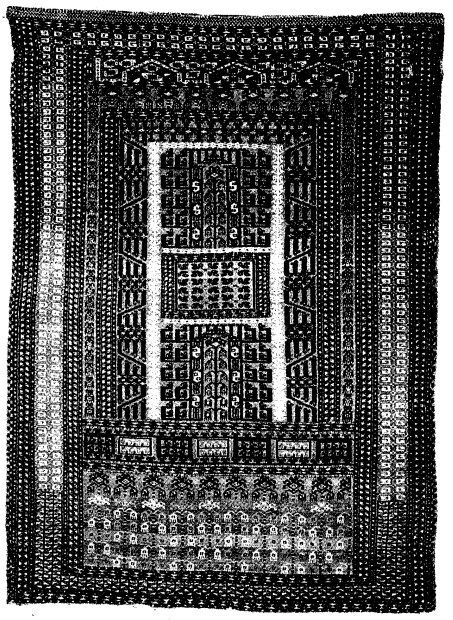
"Head of a Satyr," drawing with hatching by Michelangelo, pen and ink over chalk; in the Louvre

Alinari—Art Resource

artists who use mediums that do not allow blending (*e.g.,* pen and ink) to indicate shading, modelling, and light and shade. It consists of filling in the appropriate areas with a mass of parallel lines, of varying length, the intensity of effect being achieved by the number of lines used and their proximity to one another.

When these lines are crossed by others, the process is known as cross-hatching. Contrasting threads produce this effect in textiles.

Hatchlu rug, Hatchlu also spelled KATCHLI, also called ENGSI, 6-foot (1.8-metre) rug made



Hatchlu rug of the Kızıl Ayak Engsi type, from Russian Turkistan, 19th century; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, gift of J.F. Ballard; photograph, Otto E. Nelson—EB Inc.

by various Turkmens, used to close the entrance to a tent or as a prayer rug. The word Hatchlu (Turkish *Haçli*) refers to a prominent cross formation in the centre of an Engsi, or door flap, most obvious in Yomud weavings. Unlike the Yomud weavings, in which the cross formation normally has no arch (the purpose of which is to indicate the direction of Mecca, the Holy City), the Tekke Engsi type displays a small five-sided arch, like a miniature Caucasian prayer-rug arch, indicating its suitability for use as a devotional carpet.

The Afghan and Kızıl Ayak Engsi types may have one or two small, arched central panels, and the latter also has a row of small five-sided arches across the top of the rug. Of the major tribes, only the Ersari eschew the Engsi, or Hatchlu, form. Some Engsi rugs were once marketed as Princess Bokharas.

Hatchments in Stoke Poges church, Buckinghamshire

A.F. Kersting

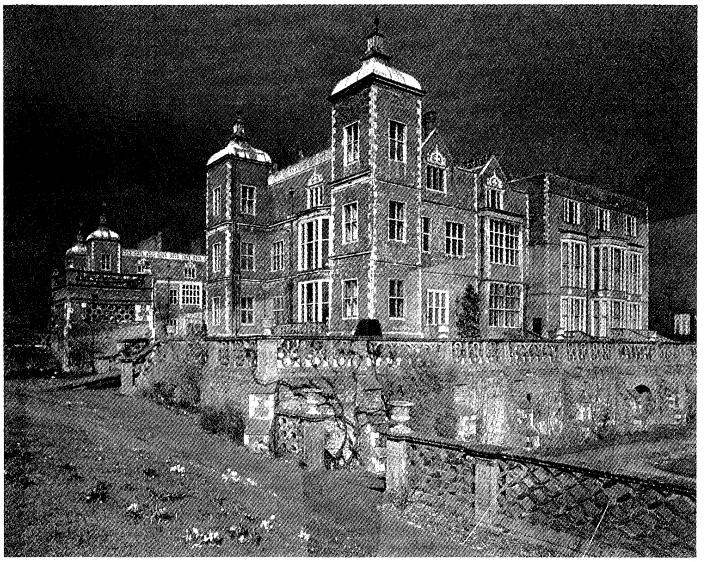
hatchment, heraldic memorial to a deceased person. This kind of memorial seems to be restricted mainly to the British Isles and The Netherlands. In England the hatchment, or funeral escutcheon, as it is sometimes called, is diamond-shaped and made of wood or canvas in a black-edged frame; on it are painted the arms of the deceased. The hatchment is placed first over the doorway of the house and then moved to the church of burial.

Hatchments developed in England particularly from the 17th century and declined in the 19th, though they by no means became obsolete. Many old English parish churches contain hatchments, as, for example, Stoke Poges church, Buckinghamshire.

The background of the device is painted black throughout for an unmarried man or woman and a widower or widow. For a married person with a surviving spouse the part beneath the survivor's arms is painted white. In the case of a bishop or other head of a public armigerous corporation, the sinister side, which bears his personal arms, is painted black under the arms, and the dexter side, under the official arms, remains white.

Frequently on Scottish hatchments, the arms of both parents and sometimes of the grandparents of the deceased appear. A parallel continental custom is to make circular plaques of the arms of the deceased as well as memorial slabs with the arms of the parents and grandparents engraved upon them. *See* heraldic memorials.

Hatfield, new town, Welwyn Hatfield district, county of Hertfordshire, England, on



Hatfield House, Hertfordshire

Picturepoint, London—Frederic Lewis

the northern periphery of London, on the old Great North Road. Hatfield House, the home of the Cecil family, stands on the site of Bishop John Morton of Ely's palace (completed 1497). A row of small Georgian dwellings remains in Fore Street in the old town. The Eight Bells Inn was reputedly the scene of one of highwayman Dick Turpin's escapades. The Church of St. Ethelreda contains the Salisbury Chapel (1618).

Hatfield new town, one of eight near London, was designated in 1948 by British planners to accommodate the overspill population. It lies between the Barnet bypass, Hatfield Park, and Welwyn Garden City. The site was already well endowed with industry, principally aircraft manufacture and general engineering and, more recently, electronics. The local technical college is now the Hatfield Polytechnic. Pop. (1981) 25,150.

Hatfield and McCoy FAMILIES, two American Appalachian mountaineer families who, with their kinfolk and neighbours, engaged in a legendary feud that attracted nationwide attention in the 1880s and '90s and prompted judicial and police actions, one of which drew an appeal up to the U.S. Supreme Court (1888).

The Hatfields were headed by William Anderson ("Devil Anse") Hatfield (1839–1921), and the McCoys by Randolph ("Rand'l") McCoy (1839?–1921). Each fathered 13 children (some sources claim 16 for McCoy), and each family had numerous kinfolk and allies in the respective counties in which they lived.

The origins of the feud are obscure. The families lived on opposite sides of a border stream, the Tug Fork—the McCoys in Pike County, Kentucky, and the Hatfields in Logan County (or Mingo County, formed from a portion of Logan County in 1895), West Virginia. In the American Civil War, the McCoys were Unionists and the Hatfields were Confederates. However, although animosities had built up and occasional fights had broken out, the first major bloodletting did not occur until 1882, when Ellison Hatfield, a son of Devil Anse, was mortally shot in a brawl with McCoys and, in revenge, the Hatfields kidnapped and executed three McCoy brothers—Tolbert, Phamer, and Randolph, Jr.

These murders sharpened the backwoods warfare, and thereafter Hatfields and McCoys repeatedly ambushed and killed each other. Hatfields arrested in their home county and McCoys arrested in their home county were invariably released or acquitted of their deeds because of their respective local support and influence. Fighting reached a climax in 1888. On New Year's Day a group of Hatfields led by Jim Vance (Devil Anse's brother) attacked the home of patriarch Rand'l McCoy, missing him but shooting dead a son and a daughter and burning his houses. In retaliation, a posse of McCoys and neighbours, headed by a Pike County deputy sheriff, made successive raids across the border into West Virginia, killing Jim Vance and at least three others, battling with a West Virginia posse, and eventually rounding up nine of the Hatfield clan for indictment and trial in Kentucky. West Virginia filed suit in federal court, charging kidnapping and lawlessness; Kentucky defended the abduction; and newspapers all over the country began carrying front-page stories of the feud and sending in reporters. Finally, in May 1888, a divided U.S. Supreme Court ruled (in *Plyant Mahon* v. *Abner Justice, jailer of Pike County, Ky.*) that Kentucky had the legal right to detain the accused for trial. The trials, later in the year, resulted in convictions and in one sentence of death by hanging and eight sentences of imprisonment.

Although there were flare-ups thereafter, notably in 1896–97, the feuding gradually abated and had ended by the second decade of the 20th century. The Hatfield–McCoy legend was embellished by a brief love affair about 1880 between Johnson ("Johnse") Hatfield and Rose Ann McCoy—an affair that was opposed and eventually broken up by the McCoys. Newspapers turned it into a Romeo-and-Juliet romance.

Haṭha Yoga (Sanskrit: "Union of Force"), a school of Indian philosophy that stresses mastery of the body as a means of attaining spiritual perfection. It is an outgrowth of the Yoga school of Indian philosophy. Haṭha Yoga traces its origins to Gorakhnāth, the legendary 12th-century founder of the Kānphaṭa Yogīs.

Haṭha Yoga places great importance on purificatory processes, regulation of breathing (*prāṇāyāma*), and the adoption of bodily postures called asanas. A common asana is the *padmāsana* ("lotus posture"), in which the crossed feet rest on the opposite thighs. This is the position in which many Hindu and Buddhist gods are often depicted.

Haṭha Yoga has grown in popularity in the West as a form of exercise and relaxation. Western physiologists and psychologists have also become interested in it and in related forms of Yoga that focus on the control of bodily processes. Adept Yoga practitioners have shown remarkable abilities to lower their own blood pressure and to regulate body temperature and respiration rate.

Hathaway, Anne, also called AGNES HATHWEY (b. *c.* 1556—d. Aug. 6, 1623, Stratford-upon-Avon, Warwickshire, Eng.), wife of William Shakespeare.

She was probably born at Shottery, near Stratford, the daughter of Richard Hathaway, a local landowner. She was married to Shakespeare in 1582, when he was 18 and when she, according to the sole evidence of an inscription on her gravestone, was 26. Their daughter Susanna was born the following May. After the birth (about 1585) of their twins, Hamnet and Judith, Shakespeare moved to London, probably leaving the family at Stratford. About 1596 Anne and the children were installed in New Place, Stratford, where Anne remained until her death in 1623. Shakespeare often visited his family there and lived there from his retirement in 1611 until his death.

Hathor, also called ATHYR, in ancient Egyptian religion, goddess of the sky. In the temples built by six kings of the 5th dynasty (*c.* 2465–*c.* 2325 BC) near Memphis, her worship was associated with that of the principal sun god, Re of Heliopolis. In the old centre of her cult, at Dandarah in Upper Egypt, however, she was the wife of Horus and was revered as the goddess of festivity, dance, and love.

From Dandarah her worship spread elsewhere, and she was consequently identified with a number of local goddesses, as at Dayr al-Baḥrī. There, however, owing to the proximity of the necropolis of Thebes, she became "Lady of the West" and patroness of the region of the dead, quite contrary to her earlier nature. The Greeks identified Hathor with their Aphrodite.

The goddess Hathor flanked by King Menkaure and the Hare Nome goddess, sculpture, 4th dynasty; in the Museum of Fine Arts, Boston

By courtesy of the Museum of Fine Arts, Boston, the Harvard-Boston Expedition

Hāthras, town, west-central Uttar Pradesh state, northern India. It lies south of Alīgarh town, with which it is connected by road and rail. It is a trade centre for agricultural products, and its industry includes cotton and oilseed milling and light manufacturing. Several colleges of Āgra University are located there. The ruins of a 19th-century fort lie to the southwest. Pop. (1981) 92,962.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Hātia Island, island situated in the Meghna Estuary of the Gangetic Delta, southeastern Bangladesh. A low-lying land mass 23 miles (37 km) long and 4–8 miles (6–13 km) wide, it is partially protected by embankments from sea incursions and is continually subject to cyclones and tidal waves. The island divides the Meghna River into two arms—the Shāhbāzpur River (west), separating Hātia from Dakhin Shāhbāzpur Island, and the Hātia River (east), separating it from Sandwīp Island. The large island to the northwest is also called Hātia; both are connected by ferry with the mainland. Below them lies South Hātia Island.

hātif, in Arab folklore, a mysterious nocturnal voice that is sometimes prophetic. A *hātif* is mentioned in the Bible (Ezekiel 21:2 and 7; Amos 7:16) as a prophet's voice, and it seems to have presaged Muḥammad's prophetic mission. It is said that the *hātif* can rise from within a calf sacrificed to an idol or from the idol itself. The Bedouin believe that it most often announces the death of some prominent figure, and it is said to have foretold the Prophet Muḥammad's death. According to tradition, Iblīs, the devil, disguised himself as a *hātif* and, after Muḥammad's death, attempted to prevent 'Alī, the Prophet's son-in-law, from ritually washing Muḥammad's dead body; a true *hātif* appeared, however, and saved 'Alī from grave sin. In modern Arabic the word *hātif* means "telephone."

Hatoyama Ichirō (b. Jan. 1, 1883, Tokyo—d. March 7, 1959, Tokyo), one of Japan's most important post-World War II prime ministers.

Hatoyama was born into a wealthy cosmopolitan family; his father was a graduate of Yale University, and his mother was a well-known writer and founder of a women's college. Entering politics, Hatoyama was first elected to the lower house of the Japanese Diet (parliament) in 1915 as a member of the dominant Seiyūkai Party. He soon became one of the leading party officials and in 1931 was named minister of education. His many Western habits, however, caused him to fall out of favour with the military, which began to dominate the Japanese government, and he was forced to resign from office. Although Hatoyama spent most of the war years between 1937 and 1945 in retirement at his country estate, he was one of the few politicians running for the Diet (parliament) in 1942 who opposed Prime Minister Tōjō Hideki.

Immediately following the end of the war, in September 1945, Hatoyama reorganized the Liberal Party as the successor to the Seiyūkai. But in May 1946, just as he was about to assume the prime ministership, Hatoyama was forbidden to hold any political office by the occupying American forces, who were suspicious of his association with the prewar Japanese government. It was not until April 1952, after the Japanese peace treaty with the Western nations went into effect, that Hatoyama was permitted to take his seat in the Diet.

He soon split with Prime Minister Yoshida Shigeru and in November 1954 organized a new dissident Democratic party. After forcing Yoshida to resign as prime minister in December 1954, Hatoyama succeeded him in office. Because he ruled without a clear majority in the Diet, Hatoyama helped merge the two conservative parties, the Liberals and the Democrats, into a new Liberal-Democratic Party, of which he was elected president in November 1955.

As prime minister, Hatoyama was the first Japanese politician to utilize radio and television media in campaigning. He succeeded in improving Japan's relations with other Asian countries and in reaching an agreement with the Soviet Union, under the terms of which the two countries resumed trade; Japan's efforts to reclaim the northern islands of Habomai, Shikotan, Kunashiri, and Etorofu remained a point of contention, however, and prevented the signing of a formal peace treaty.

hatpin, long, ornamental pin used for decoration and for fastening a woman's hat securely to her hair. In the late Victorian era and the beginning of the 20th century, the hatpin became a popular and important clothing accessory.

Hatpins were usually about 8 inches (20 cm) long and were often worn in pairs. They frequently had ornamented or jeweled heads.

Hatra, modern AL-ḤAḌR, ancient city between the Tigris and Euphrates rivers in present-day northern Iraq. It was founded as a military outpost by the Iranian Arsacids (Parthians) during the 1st century BC but was administered by native governors. It soon became autonomous and formed the centre of a small state known as Araba. Because of its strategic position along interriver trade routes, the town prospered and became an important religious centre. Temples were raised there to the Sumero-Akkadian god Nergal, to Hermes (Greek), to Atargatis (Aramean), to al-Lāt and Shamiya (Arabian), and to Shamash, a sun god common to most Semites. Hatra defied many Roman invasions. It also threw back an attack by the Sāsānian Ardashīr I but fell before his successor, Shāpūr I (reigned AD 241–272), when the city was ruined and abandoned. Recent excavations by the Iraqi government have uncovered a large number of Parthian artifacts.

Hatshepsut, also called HATSHOPSITU, queen of Egypt (reigned in her own right *c.* 1472–58 BC) who attained unprecedented power for a queen, adopting the full titles and regalia of a pharaoh.

Hatshepsut, the daughter of King Thutmose I and Queen Ahmose, was married to her half brother, Thutmose II. Since her two brothers, who normally would have succeeded to the throne, died prematurely, she and Thutmose II came to the throne after King Thutmose died in about 1512. Her husband probably reigned no more than three or four years, and Hatshepsut thereupon became regent for his son, Thutmose III, born of a minor woman of the harem. Heiress to a line of influential queens, Hatshepsut then took effective control of the government, while young Thutmose III served as a priest of the god Amon.

For a short time Hatshepsut presented herself as the young king's regent, but sometime in Thutmose III's first seven years she ordered herself crowned as pharaoh and adopted a Horus name (a royal name limited to kings) and the full pharaonic regalia, including a false beard, also traditionally worn only by the king. An essential element of Hatshepsut's success was a group of loyal and influential officials who controlled all the key positions in her government.

Hatshepsut, limestone sculpture, *c.* 1485 BC; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York, Rogers Fund and Contributions from Edward S. Harkness, 1929

Emphasizing administrative innovation and commercial expansion, Queen Hatshepsut dispatched a major seaborne expedition to Punt, the African coast at the southernmost end of the Red Sea. Gold, ebony, animal skins, baboons, processed myrrh, and living myrrh trees were brought back to Egypt, the trees to adorn the foreground of the Queen's famous Dayr al-Baḥrī temple in western Thebes. She also received large quantities of tribute from Asia, Nubia, and Libya.

The numerous products of trade and tribute were partially devoted to the state god Amon-Re, in whose honour Hatshepsut undertook an extensive building program. She claimed that she restored the damage wrought by the Hyksos (earlier Asian kings) during their rule in Egypt. In the temple at Karnak (Thebes), she renovated her father's hall, introduced four great obelisks nearly 100 feet (30 m) tall, and added a fine chapel. At Beni-Hasan, in Middle Egypt, she built a rock-cut temple known in Greek as Speos Artemidos. Her supreme achievement was the splendid temple at Dayr al-Baḥrī. Designed as a funerary monument for Hatshepsut and her father, it contains reliefs that record the major events of her reign. She also cut a large tomb for herself in the Valley of the Kings, another strictly pharaonic prerogative. Its burial chamber was intended to lie behind her funerary temple, and she also planned to move her father's mummy into her own tomb. Her attention to Thutmose I was intended to emphasize her legitimate succession directly from him through the agency of Amon-Re, whom she claimed as her actual father.

Hatshepsut's ambition, however, encountered that of the energetic Thutmose III, who had become head of the army. As she and her loyal officials aged, his party grew stronger. The early death of her daughter, whom she married to Thutmose III, may have contributed to her decline. Whether Hatshepsut died naturally or was deposed and slain is uncertain.

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Hatta, Mohammad (b. Aug. 12, 1902, Bukittinggi, Sumatra, Dutch East Indies [now Indonesia]—d. March 14, 1980, Jakarta, Indon.), a leader of the Indonesian independence movement who was prime minister (1948–50) and vice president (1950–56) of Indonesia.

While he studied in The Netherlands from 1922 to 1932, he was president of the Perhimpunan Indonesia (Indonesian Union), a progressive, nationalist political group founded by overseas Indonesian students. Returning to the Dutch East Indies in 1932, Hatta was arrested for his political activities by the Dutch in 1934 and sent to the infamous concentration camp of Boven Digul in West New Guinea. In 1935 he was exiled to the island of Bandanaira, where he remained until the eve of the Japanese invasion in World War II.

In contrast to the Dutch, the Japanese actively promoted Indonesian nationalism. Hatta and Sukarno, the future president of Indonesia, collaborated with them in establishing numerous Indonesian mass organizations; in 1943 they helped to organize the Japanese-sponsored home defense corps Sukarela Tentara Pembela Tanah Air (Peta), the first Indonesian armed force. When it became clear that the Japanese would lose the war, however, many nationalists urged an insurrection and immediate independence, but Hatta advised patience until they were sure that the Japanese would surrender. On Aug. 17, 1945, he and Sukarno were kidnapped by members of the students' union and persuaded to declare Indonesian independence. Hatta served as vice president in the subsequent revolutionary government. In 1948, when he was prime minister, he played an important part in the suppression of the communist revolt at Madiun in eastern Java, a measure that gained the struggling government many supporters in Western countries. He led the Indonesian delegation at the United Nations-sponsored Hague Conference (Aug. 23–Nov. 2, 1949) that culminated in the recognition by The Netherlands of Indonesia's complete independence. While serving as prime minister during the first seven months of 1950, he helped to guide the new country through a crucial period of transition from a federal to a unified state.

Hatta served as vice president until December 1956, when he resigned because of increasing disagreement with President Sukarno's policy of "guided democracy." Essentially a moderate, administratively oriented leader, Hatta felt that dealing with Indonesia's grave economic crises was of primary importance and feared that Sukarno's policies would bankrupt the country. He was also consistently critical of Sukarno's anti-Western and anti-Malaysian foreign policy. After Sukarno's downfall, Hatta came out of retirement to serve as special adviser to President Suharto on the problem of government corruption.

One of Indonesia's leading economists, Hatta is known as the "father of the Indonesian cooperative movement." His writings include *The Co-operative Movement in Indonesia* (1957), "Indonesia between the Power Blocs," *Foreign Affairs,* vol. 36 (1958), and *Past and Future* (1960).

Hatteras, Cape, long, narrow, curved sandbar forming a promontory on Hatteras Island, North Carolina, U.S. It extends 70 miles (113 km) along the Outer Banks between the At-

lantic Ocean, where treacherous shallows are a danger to navigation, and Pamlico Sound. Much of the area is included in Cape Hatteras National Seashore.

Hatteras Abyssal Plain, submarine plain forming the floor of the northwestern Atlantic Ocean. It lies east of the North American continental shelf between the southern United States and Bermuda, extending about 900 mi (1,450 km) from north to south, with an average width of 300 mi. The plain comprises the western part of the North American Basin and is separated from the Nares Abyssal Plain to the southwest by the Vema Abyssal Gap, located at 24° N and 68° W. The Blake–Bahama Outer Ridge, an extended sedimentary tongue of the North American Basin, also separates it from the narrow Blake–Bahama Basin.

Hattic language, also called KHATTIC, or KHATTISH, non-Indo-European language of Anatolia that was spoken before the period of the Hittite New Empire (*c.* 1400–1190 BC). Passages in the language occur in the Hittite cuneiform texts discovered in the ruins of the Hittite archives at Boğazköy (the ancient Hattusa, in modern Turkey) and are usually preceded by the designation *hattili.* This word is the source for the term Hittite, which was applied to the later Indo-European settlers in the region. The texts are primarily concerned with religion and include myths, litanies, and incantations. It is not known how long the Hattic speakers had lived in this region before the advent of the Indo-European Hittites.

A striking feature of the grammar of Hattic is its agglutination; it has both prefixes and suffixes. There are no formal marks to distinguish nouns from verbs.

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Hattiesburg, city, seat (1908) of Forrest County, southeastern Mississippi, U.S., on the Leaf and Bowie rivers, 70 mi (113 km) north of Gulfport. The site, in the longleaf yellow-pine area, was settled in 1881 by Capt. William Harris Hardy, Confederate soldier, statesman, and engineer, who named it for his wife (it was previously known as Twin Forks and Gordonville). The arrival of railroads in 1884 and 1897 stimulated the lumber industry. By the mid-20th century, with the depletion of timber sources, the city had broadened its economic base to embrace a variety of manufactured items including textiles, chemicals, and metal products. Hattiesburg is also a transportation centre for the surrounding agricultural area and is the seat of the University of Southern Mississippi (1910) and William Carey College (1906). Paul B. Johnson State Park and a section of the De Soto National Forest lie a few miles to the south. Inc. 1884. Pop. (1980) 40,829.

Ḥaṭṭīn, Battle of (July 4, 1187), battle in northern Palestine that marked the defeat and annihilation of the European Christian armies of Guy de Lusignan, king of Jerusalem (reigned 1186–92), by the Muslim forces of Saladin (reigned 1169–93). It paved the way for the Muslim reconquest of the city of Jerusalem (October 1187) and of the greater part of the three Latin States—Tripoli, Antioch, and Jerusalem—thus nullifying the achievements made in the Holy Land by the leaders of the first crusades and alerting Europe to the need for a third crusade.

In July 1187 the Christians were camped at Sepphoris, at the south end of the Sea of Galilee, when word reached them that Saladin had attacked the city of Tiberias to the north. The Christians abandoned their camp to go to the relief of the besieged city, but Saladin blocked the main road to Tiberias, forcing them onto an arid plain near the town of Ḥaṭṭīn. They camped on a plateau above Ḥaṭṭīn with their backs against hills ringing the city. Saladin moved his men up under cover of night, surrounded the Christians, cut them off from their source of water, and prepared to attack.

At dawn the thirsty Christians made a dash for a nearby lake but were driven back against the two largest hills, the Horns of Ḥaṭṭīn, by the Muslims. The Christian forces, numbering about 15,000 men, suffered a decisive defeat at the hands of the 18,000-man Muslim army. Most of them were slaughtered on the field, but Saladin spared the lives of King Guy and most of the Christian lords. On the day after the battle, Saladin launched his campaign to retake the city of Jerusalem.

Hattingen, city, North Rhine-Westphalia *Land* (state), northwestern Germany, on the Ruhr River, immediately south of Bochum. Chartered in 1396 and a member of the Hanseatic League, it declined during the Thirty Years' War and expanded again in the 19th century. Its St. George's Church (1450) is the centre of an attractively planned square, and the old town hall (1576) is now the local museum. There are steelworks and rolling mills, with coal mining in the vicinity. Pop. (1989 est.) 56,242.

Hatto I (b. *c.* 850, Swabia—d. May 15, 913), archbishop of Mainz and counsellor to the German king Arnulf of Bavaria, the last East Frankish Carolingian emperor; as regent for Arnulf's son Louis the Child (900–911), he governed the German kingdom for the last member of the East Frankish Carolingian dynasty.

Hatto was elected abbot of Reichenau (888) and Ellwangen (889) and archbishop of Mainz (891). A trusted adviser of King Arnulf, he presided at the Synod of Frankfurt (892) and the imperial Synod of Tribur (895) and accompanied Arnulf on the Frankish invasions of Italy (894 and 895–96).

Serving as tutor and, after Arnulf's death (899), as co-guardian (with Adelbero, bishop of Augsburg) for Louis, Hatto assumed the responsibilities of regent. Louis and Hatto aligned themselves with the Franconian family of Conradines in their feud with the Babenberg house. After the death of Louis (911), Hatto was influential in securing the election of Conrad, duke of Franconia, as the East Frankish king.

Hostile Saxon chroniclers variously reported either that Hatto died by being struck by lightning or that the devil threw him into the Mt. Etna volcano.

Hatton, Sir Christopher (b. 1540, Holdenby, Northamptonshire, Eng.—d. 1591, London), favourite of Queen Elizabeth I and lord chancellor of England from 1587 to 1591.

After spending several years in halfhearted study of the law, Hatton enrolled as one of the Queen's bodyguards in 1564. Handsome and accomplished, he impressed the Queen with his talent for dancing and quickly won her affection. There is no evidence that they were ever lovers, though Hatton was adept in the Renaissance conventions of courtly love. Hatton became captain of her bodyguards in 1572 and in 1577 vice chamberlain of her household, a privy councillor, and a knight. Regularly elected to Parliament from 1571, he became a leading spokesman for Elizabeth in the House of Commons. He accepted her Protestantism, but in foreign affairs he sided with the more vigorous anti-Spanish forces against the cautious policies of her principal secretary, William Cecil, Lord Burghley.

Hatton played a prominent role in the examinations of various Catholic plotters against the Queen, notably Anthony Babington in 1586. A commissioner for the trial of Elizabeth's prisoner Mary, Queen of Scots, in 1586, Hatton later prodded Elizabeth's secretary to dispatch the warrant for Mary's execution. The Queen had signed the warrant but had been reluctant to take full responsibility for putting it into effect. Hatton strongly supported the archbishop of Canterbury, John Whitgift, in his actions against the Puritans, and Elizabeth's desire to have these two men work together may well explain Hatton's appointment as lord chancellor in 1587. Despite his lack of extensive legal knowledge, he handled this office competently. In 1588 he was made a Knight of the Garter and chancellor of Oxford University. See Alice Vines, *Neither Fire Nor Steel: Sir Christopher Hatton* (1978).

Hattusa, also spelled HATTUSAS, HATTUSHA, or KHATTUSAS, ancient Hittite city on the site of modern Boğazköy (*q.v.*).

Hattusilis, also spelled KHATTUSHILISH, name of Hittite kings grouped below chronologically and indicated by the symbol •.

• Hattusilis I, also called LABARNAS II (reigned *c.* 1650–*c.* 1620 BC), early king of the Hittite Old Kingdom in Anatolia.

The son of the preceding king, Labarnas I, Hattusilis was also at first called Labarnas but apparently assumed his new name after he transferred his capital from Kussara to Hattusa.

Unlike Labarnas I, who concentrated on uniting the Hittite heartland, Hattusilis penetrated the Taurus range and invaded northern Syria, attacking the kingdom of Yamhad. His reign was troubled by domestic intrigue, leading him to disown three rebellious sons in the line of succession. In his "Farewell Address," intended for his kin and the *pankus* (a general assembly), Hattusilis reviewed past political conflicts, designated his grandson Mursilis I as his successor, and exhorted his family and people to observe virtue and moderation. This address is an important source for the political history of the Hittite Old Kingdom.

• Hattusilis III (fl. 13th century BC), Hittite king during the New Kingdom (reigned *c.* 1286–*c.* 1265 BC); he came to power by overthrowing his nephew Urhi-Teshub (Mursilis III).

The events of Hattusilis' accession are known from his autobiography, a remarkable document designed to justify the new king's actions. The change of rulers seems to have caused no serious upheavals in the political fabric of the empire, perhaps because Urhi-Teshub was both inexperienced and unpopular. Except for some military action in the Arzawa lands in southwestern Anatolia, the regime of Hattusilis and his influential wife, Puduhepa, was generally one of peace and prosperity. Together they reoccupied the old capital at Hattusa (now Boğazköy, Tur.) and instituted various constitutional reforms. Common danger resulting from the growing power of Assyria led to an increasingly close entente between the Hittite Empire and Egypt, formalized by the peace treaty of *c.* 1286 BC and sealed later with a dynastic marriage between Hattusilis' daughter and the Egyptian king Ramses II. Hattusilis was succeeded by his son Tudhaliyas IV.

Hatza, Ludwig: *see* Hetzer, Ludwig.

Hatzfeldt, Melchior, Graf von Gleichen und (count of Gleichen and) (b. Oct. 10, 1593, Krottorf, Sayn, Ger.—d. Jan. 9, 1658, Castle Powitzko, near Trachenberg, Silesia), a field marshal of the Holy Roman Empire during the Thirty Years' War (1618–48). Though active in every theatre of war, he proved no match for the leading Protestant generals.

From 1625 to 1632 Hatzfeldt campaigned

under the imperial generalissimo Albrecht von Wallenstein; he then took part in the conspiracy that toppled Wallenstein (1634), for which the emperor Ferdinand III rewarded him with lands and titles. From 1639 to 1643 he was successful in the secondary Rhenish-Westphalian theatre of war. Against the Swedes, however, he could do little. Johan Banér defeated him at Wittstock (1636), and Lennart Torstenson outfought and captured him at Jankov, Bohemia (1643).

Retiring in 1646, Hatzfeldt was recalled in 1657 to lead an imperial army to rescue Poland from Swedish attack. He captured Kraków but again retired because of ill health and died shortly thereafter. He was a remarkably honest and fair commander in an age of unscrupulous mercenary warfare.

Hatzidakis, George N. (b. Nov. 12, 1848, Mírthio, Crete—d. June 26, 1941, Athens, Greece), the first and most important linguist of modern Greece, noted for his studies of ancient, medieval, and modern Greek and for his initiation of the *Historical Lexicon of the Greek Language.*

Hatzidakis taught linguistics at the National Capodistrian University of Athens (1885–1923) and the Aristotelian University of Thessaloníki (1926–28). Between 1881 and 1935 he wrote 9 books and nearly 600 other works, mostly on medieval and modern Greek, especially on the origin of its dialects from Koine, or Hellenistic Greek, of about 335 BC to about AD 565. His works include *Einleitung in die neugriechische Grammatik* (1892; "Introduction to Modern Greek Grammar") and *Mesaionikón kaí neón Hellinikón* (1905–07; "Medieval and Modern Greek").

Hauch, Johannes Carsten (b. May 12, 1790, Fredrikshald, Nor.—d. March 4, 1872, Rome, Italy), Danish poet, dramatist, and novelist whose works expressed his high moral seriousness and tragic philosophy.

As a student, Hauch was strongly attracted by Romanticism; but, after early and unsuccessful literary attempts, he turned to natural sciences, particularly zoology. He took his doctorate in 1821 and then studied in Paris and Italy. In 1825 he had a foot amputated and shortly afterward attempted suicide. He emerged from the spiritual crisis with a renewed desire to write. On his return to Denmark, he was successively lecturer in natural sciences at Sorø, professor of Scandinavian literature at Kiel (1846–48), and professor of aesthetics at Copenhagen from 1851 until his death.

As a dramatist, Hauch wrote mostly historical tragedies about men of destiny—Bajazet, Tiberius, and Gregor den Syvende (Pope Gregory VII), all in 1828— and about great Danish figures such as Svend Grathe (1841) and Marsk Stig (1850). The gloom of his plays, which are filled with suffering, is relieved somewhat by his belief in universal justice. His historical novels include *Vilhelm Zabern* (1834), *Guldmageren* (1836; "The Alchemist"), *En polsk Familie* (1839; "A Polish Family"), and *Robert Fulton* (1853). But his greatest success was as a poet, particularly as a writer of odes. One of his most important poetic works was the ballad cycle *Valdemar Atterdag* (1861).

Haud Plateau: *see* Hawd Plateau.

Häufebecher (German: "stacking cup"), beaker, usually of silver, that is part of a set that can be stacked or piled up because each is constructed so that the base of one fits into the bowl of another. Each beaker has a deep, straight-sided bowl—often engraved with a hunting scene—a small foot, and a narrow raised band around the centre of the body. When beakers of this type were made in sets of a dozen, they were known as *Monatsbecher* ("month beaker")—one beaker for each month of the year. They were used almost

Silver *Häufebecher* made in Speyer, Ger., 1519; in the Staatliche Kunstsammlungen Kassel, Ger.
By courtesy of the Staatliche Kunstsammlungen Kassel, Ger.

exclusively in German-speaking countries—many being produced in Nürnberg—and were fashionable between the early 16th century and the middle of the 17th century.

Hauff, Wilhelm (b. Nov. 29, 1802, Stuttgart, Württemberg [Germany]—d. Nov. 18, 1827, Stuttgart), German poet and novelist best known for his fairy stories.

Hauff was educated at Tübingen University, worked as a tutor, and in January of 1827 became editor of J.F. Cotta's *Morgenblatt.* Although he died before he was 25, his collected works comprise 36 volumes.

Hauff had a narrative and inventive gift and sense of form; he wrote with ease, combining narrative themes of others with his own.

Hauff, engraving by Johann Wolfle
Bavaria-Verlag

His work shows a pleasant, often spirited, wit. There is a strong influence of E.T.A. Hoffmann in his fantasy *Mitteilungen aus den Memoiren des Satans* (1826–27; "Pronouncements from the Memoirs of Satan"). His short story "Die Bettlerin vom Pont des Arts" (1827; "The Beggar Woman from Pont des Arts") has affinities with Ludwig Tieck, the author of *Puss in Boots* and *Bluebeard. Lichtenstein* (1826), a historical romance of 16th-century Württemberg, was one of the first imitations of Sir Walter Scott. Some of Hauff's fairy stories published in his *Märchenalmanach auf das Jahr 1826* (followed by similar volumes in 1827 and 1828) had lasting popularity.

Haug, (Gustave-)Émile (b. June 19, 1861, Drusenheim, Fr.—d. Aug. 28, 1927, Niderbronn), French geologist and paleontologist known for his contributions to the theory of geosynclines (trenches that accumulate thousands of metres of sediment and later become crumpled and uplifted into mountain chains).

After receiving his Ph.D. from the University of Strasbourg (1884) and spending three years in postgraduate research, Haug moved to Paris, where he joined the geology faculty of the Sorbonne in 1897.

In his research, Haug surmised from the position of the Alps that geosynclines form between stable continental platforms. Through his analysis of sedimentary facies, he established that geosynclinal sediments accumulate in both deep and shallow troughs. He documented the existence of uplift during sediment accumulation and used the term geanticline for uplifted areas that form in the trough while much of the geosyncline is still under water. He also showed that geosynclinal subsidence accompanies marine regressions on the continental platform and that geosynclinal uplift accompanies marine transgressions on the continental platform. His *Traité de Geologie,* 2 vol. (1907–11; "Treatise of Geology"), contains his ideas about geosynclines.

Hauge, Alfred (b. Oct. 17, 1915, Sjernarøy, Nor.), Norwegian novelist and poet, best known for his trilogy describing the life of a Norwegian immigrant to the United States in the 1820s: *Hundevakt* (1961; "Midwatch"), *Landkjenning* (1964; "Land Sighting"), and *Ankerfeste* (1965; "Anchoring"), all translated into English and published under the title *Cleng Peerson,* 2 vol.

Many of Hauge's other books were concerned with religious and moral questions. *Septemberfrost* (1941; "September Frost"), his first novel, focused on the miserable conditions in Norway before it achieved its independence in 1814. *Ropet* (1946; "The Call") depicted the hostility of small-town pietism to art, a conflict that continued to inspire Hauge in several of his subsequent novels, all of which had small towns as their settings. Among them are *Året har ingen vår* (1948; "The Year Has No Spring"), *Fossen og bålet* (1949; "The Waterfall and the Bonfire"), and *Ingen kjenner dagen* (1955; "No One Knows the Day").

Kvinner på galgebakken (1958; "Women on Gallows Hill") is a psychological detective story in which questions of guilt and responsibility are paramount. Hauge's most important novel in this religious vein, however, is the visionary *Mysterium* (1967; "Mystery"). In it, a man suffering from amnesia finds his way to a cloister where he is guided by dreams and visions and eventually healed by a perception of religious truth. Hauge used the same cloister milieu in subsequent works composing the "Ulstein Monastery Cycle"; *Legenden om Svein og Maria* (1968; "The Legend of Svein and Maria"); the book of poems *Det evige sekund* (1970; "The Eternal Second"); *Perelmorstrand* (1974; "Mother of Pearl Beach"); and *Leviathan* (1979). Hauge also wrote travel books, stories for children, and several volumes of autobiography.

Haugesund, town, Rogaland *fylke* (county), southwestern Norway. A North Sea port, Haugesund is a shipbuilding and repair centre and has a 928-foot (283-metre) drydock that was the largest in Scandinavia at its completion in 1979. The town also engages in aluminum processing and textile weaving. It is the base for a large herring fleet and has fish canneries. It is served by the Bergen-Stavanger hydrofoil ferry. Just north of the town is Harald's Hill, where Harald I Fairhair, first king of all Norway, supposedly is buried. The site is commemorated by a monument, erected at the millenary celebration (1872) of Harald's final victory in the Battle of Hafrsfjord, near Stavanger. The Haugesund museum houses a collection of local antiquities. Pop. (1989 est.) mun., 27,243.

Haughey, Charles James (b. Sept. 16, 1925, Castlebar, County Mayo, Ire.), prime minister (Taoiseach) of Ireland from 1979 to

1981, from March to December of 1982, and from March 1987. He succeeded John Lynch as leader of the Fianna Fáil party.

The son of an officer in the original Irish Republican Army and in the succeeding Irish Free State's army, Haughey attended University College, Dublin, studying law and accounting. While making a fortune in real estate, he married (1951) the daughter of Prime Minister Sean Lemass and entered the Dáil (parliament) in 1957, becoming minister of justice in 1961. In subsequent years he held ministerial posts in agriculture and finance.

In 1970 he was twice tried for conspiracy to use government funds to smuggle arms into Ireland for the outlawed Irish Republican Army; the first trial was aborted, and he won acquittal in the second. Actually benefiting from the publicity of the trials, Haughey eventually regained his seat in the Dáil (1973), became the minister for health and social welfare in 1977, and was elected party leader and consequently became prime minister in 1979. In November 1981 his government fell, but he returned to power for eight months in 1982.

Haughey's first two terms in office were marked by deteriorating Anglo-Irish relations, a declining economy, and deep divisions within the Fianna Fáil party. Despite the controversies that plagued his government, the charismatic Haughey remained Fianna Fáil's leader after Garret Fitzgerald's coalition government came to power in late 1982, and he served as a formidable opposition leader in the Dáil. Haughey returned to the prime ministry in 1987 after general elections in February of that year. He became prime minister for a fourth time after indecisive elections in July 1989. During these latter terms, Haughey mounted a fiscal austerity program to cope with the government's continuing large budget deficits.

Haughton, Billy, byname of WILLIAM R. HAUGHTON (b. Nov. 23, 1923, Gloversville, N.Y., U.S.—d. July 15, 1986, Valhalla, N.Y.), American harness-racing driver and trainer. He was the foremost driver in annual winnings in 1952–59, 1963, 1965, and 1967–68.

Haughton came to harness racing from a farming background in upstate New York. By the time of his death Haughton had won more than 4,900 races and earned about $40,000,000 in purses. He was a leading trainer as well; his star Standardbred horses included Windshield Wiper, Rum Customer, Romulus Hanover, Laverne Hanover, Duke Rodney, Handle With Care, Christopher T., Rising Wind, Spartan Hanover, and Pammy Lobell. Haughton was inducted into the Harness Hall of Fame in 1968. Included among his awards was the special Grand Circuit Centennial Gold Medallion for his outstanding contributions to the sport of harness racing. He died from injuries sustained in an accident during a harness race.

Haughton, Percy Duncan (b. July 11, 1876, Staten Island, N.Y., U.S.—d. Oct. 27, 1924, New York, N.Y.), innovative American college football coach whose Harvard teams (1908–16) won 71 games, lost 7, and tied 5.

An 1899 graduate of Harvard, where he was an outstanding football and baseball player, Haughton coached teams that were strictly disciplined and whose play was precisely coordinated; they excelled in deceptive plays that threw the opposition off balance. Haughton introduced such novelties as the hidden ball, forward-pass combinations, and the lateral pass.

Haughton (of Haughton), Thomas Pelham-Holles, Viscount: *see* Newcastle (-under-Lyme), Thomas Pelham-Holles, 1st Duke of.

Haugwitz, Christian (August Heinrich Kurt), Graf von (count of) (b. June 11, 1752, Peuke-bei-Öls, Silesia [now in Poland]—d. Feb. 9, 1832, Venice, Austrian Empire [now in Italy]), Prussian minister and diplomat, the principal author of Prussian foreign policy from 1792 to 1806, who was held largely responsible for the catastrophic war against Napoleon (1806) that made Prussia a French satellite.

Haugwitz, drawing, before 1776; in the Lavater portrait collection
Archiv fur Kunst und Geschichte, Berlin

After studying at the universities of Halle and Göttingen, Haugwitz traveled to Switzerland, Germany, and Italy. He eventually joined the Rosicrucians, among whom he made the acquaintance of J.R. von Bischoffwerder, the influential adviser of Frederick William II of Prussia. Bischoffwerder soon opened a diplomatic career for Haugwitz, who was appointed Prussian minister to Vienna in 1791 and became a Prussian cabinet minister the next year. In 1793 he negotiated the Second Partition of Poland with Russia without Austria's knowledge. Opposing war against Revolutionary France, he concluded the separate Peace of Basel (1795), which extricated Prussia from the War of the First Coalition against France.

Haugwitz, who recognized the danger threatening from Napoleon, wanted to make Prussia participate in the War of the Second Coalition against France in 1799, but he could not overcome Frederick William III's pacific intentions. For a short time in 1804 he withdrew from office; but in the autumn of 1805, during the War of the Third Coalition, he undertook the delivery of a Prussian ultimatum to Napoleon. Inspired by the Russian emperor Alexander I, the ultimatum threatened a declaration of war against France if Napoleon should refuse Prussia's services as a mediator. In view of Napoleon's unfavourable military position in November 1805, this diplomatic move might have had far-reaching consequences, but Haugwitz, probably acting under verbal instructions from Frederick William III, delayed the delivery of the ultimatum until Napoleon had won a decisive victory over both Austria and Russia at the Battle of Austerlitz (Dec. 2, 1805). Napoleon then forced Haugwitz to sign the punitive treaties of Schönbrunn (Dec. 15, 1805) and Paris (Feb. 15, 1806), which reduced Prussia to virtually complete dependency on France.

Goaded by outraged patriotic public opinion at home, Haugwitz then steered his unprepared country into the War of the Fourth Coalition against France, in which Prussia suffered disastrous defeats in the battles of Jena and Auerstädt (Oct. 14, 1806). Soon afterward he retired at Karl August von Hardenberg's instigation and never reentered politics. He later retired to Italy, where he wrote *Fragment de mémoires inédits* ("Fragment of Unedited Memoires"), published posthumously in 1837.

Hauhau, member of PAI MARIRE (Maori: "Good and Peaceful Religion"), a religio-military cult among the Maori of New Zealand, arising during the Maori Wars of the 1860s. The movement was founded in 1864 by Te Ua, who claimed to have been visited by the angel Gabriel (in 1862) and to have been moved by the experience to kill his child in repentance for the straying of the Maori people.

Using a mixture of Jewish, Christian, and Maori religious tenets, the cult held that the Maori were a new chosen people. Their immediate task was to drive the Europeans from New Zealand and to recover their ancestral lands. The adherents of Pai Marire were assured by their leader that shouting the words "Pai Marire, hau! Hau!" in battle would protect them from European bullets. The cry provided the members with their popular name, and belief in the effectiveness of the cry accounted for the daring in battle that allowed the Hauhau warriors to raise the hopes of the Maori. In 1864–65, as the Hauhau took the field, most Maori forces were going down in defeat; immediate and large-scale European confiscation of Maori land, however, drove many Maori into the ranks of armed dissidents, and Hauhau remained a common label for these people. Fighting continued until 1872. By then Pai Marire itself had dwindled, but similar patterns of religious belief have continued strong among the Maori, Mormonism among them.

Hauksbee, Francis, THE ELDER, Hauksbee also spelled HAWKSBEE (d. *c.* 1713), self-educated English scientist and eclectic experimentalist whose discoveries came too early for contemporary appreciation of their significance.

Hauksbee determined with reasonable accuracy the relative weights of air and water. Investigating the forces of surface tension, he made the first accurate observations on the capillary action of tubes and glass plates. In 1706 he produced an electrostatic generator. His *Physico-Mechanical Experiments on Various Subjects* appeared in 1709. Elected a fellow of the Royal Society in 1705, he contributed numerous papers to the Society's *Philosophical Transactions,* including an account of a two-cylinder pump that served as a pattern for vacuum pumps and remained in use with minor modifications for some 200 years.

Hauksbee, Francis, THE YOUNGER (b. 1687—d. Jan. 11, 1763), English instrument maker, scientist, and lecturer. He may have been a son of Francis Hauksbee the Elder.

As early as about 1714 Hauksbee began giving lectures, with demonstrating experiments. By 1723 he had secured a sufficient reputation to be elected clerk and housekeeper to the Royal Society, Britain's major scientific society. Meanwhile he had established a manufactory in Fleet Street, where he made and sold air pumps, hydrostatic balances, and reflecting telescopes. Over the years he authored or coauthored a number of treatises dealing with such subjects as laboratory methods, chemistry, astronomical instruments, electricity, and pneumatics.

Haupt, Herman (b. March 26, 1817, Philadelphia, Pa., U.S.—d. Dec. 14, 1905, Jersey City, N.J.), American civil engineer and inventor, known especially for his work on the Hoosac Tunnel in Massachusetts.

Haupt graduated from the U.S. Military Academy, West Point, N.Y., in 1835 but resigned his army commission to enter the rapidly expanding field of railroad engineering, in which he soon won a leading place. In 1855 he was called on to assist in the ambitious project of constructing a railroad tunnel through the Hoosac Range at North Adams, Mass. Despite many obstacles, both technical and financial, he pushed the work a considerable distance before being called to Washington, D.C., in 1862 to take charge of military rail transportation in the American Civil War. The tunnel was completed in 1873.

Later he returned to railroad engineering as general manager of the Northern Pacific Railway Company during the line's completion to the West Coast. He also played a major role in introducing compressed air machinery into mining and tunneling. Among his many books, the most important were *General Theory of Bridge Construction* (1851), *Military Bridges* (1864), and *Tunneling by Machinery* (1876).

Hauptman, Herbert A(aron) (b. Feb. 14, 1917, New York, N.Y., U.S.), American mathematician and crystallographer who, along with Jerome Karle, received the Nobel Prize for Chemistry in 1985 for their development of mathematical methods for deducing the molecular structure of chemical compounds from the patterns formed when X rays are diffracted by their crystals.

Hauptman was a classmate with Karle at City College of New York, from which they both graduated in 1937. Hauptman went on to study mathematics further at Columbia University (M.A., 1939) and at the University of Maryland (Ph.D., 1955). After World War II, Hauptman was reunited with Karle at the Naval Research Laboratory (Washington, D.C.), where they began collaborating on the study of crystal structures. Hauptman became a professor of biophysics at the State University of New York at Buffalo in 1970, and from 1972 he was a vice president and the director of the Medical Foundation of Buffalo, a small private research institute.

Hauptman and Karle devised mathematical equations to describe the arrangements of numerous spots that appear on photographic film as a result of a crystal's diffraction of X rays. Their equations enabled the location of atoms within the crystal's molecules to be pinpointed based upon an analysis of the intensity of the spots. Their method was neglected for a number of years after its publication in about 1949, but gradually crystallographers began using it to determine the three-dimensional structure of thousands of small biological molecules, including those of many hormones, vitamins, and antibiotics. Before Hauptman and Karle developed their method, it took about two years to deduce the structure of a simple biological molecule; by the 1980s, using powerful computers to perform the complex calculations needed, one could do it in about two days.

Hauptmann, Bruno (Richard) (b. Nov. 26, 1899, Saxony, Ger.—d. April 3, 1936, Trenton, N.J., U.S.), German-born American carpenter and burglar who in 1935 was convicted of kidnapping and murdering the 21-month-old son of Charles and Anne Morrow Lindbergh.

Hauptmann attended an elementary school and a trade school, becoming a carpenter at age 14 in Kamenz, Ger. He served in the German army (1917–18) during World War I. After the war he apparently drifted into burglary, being convicted of breaking and entering in 1919 and being arrested for possession of stolen goods in 1922 (he escaped before trial). Twice in 1923 he was arrested for illegal entry into the United States.

At the Lindbergh home in Hopewell, N.J., on the night of March 1, 1932, the kidnapper of the Lindbergh baby climbed by ladder into the second-story nursery and left a ransom note demanding $50,000. After various efforts at communication through newspaper advertisements, a go-between—a retired New York teacher named John F. Condon—delivered the ransom on the night of April 8 at the Woodland Cemetery in the Bronx, New York City, on a promise of the return of the baby. The baby, however, had been killed shortly after the abduction; and its body was found on May 12 near the Lindbergh home.

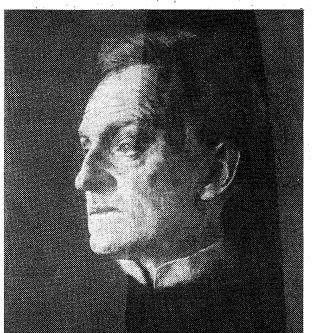
A manhunt ensued, and the serial numbers of the ransom bills (many in noticeable gold certificates) were publicized. More than two years later, on Sept. 15, 1934, Hauptmann passed one of the notes at a Bronx filling station. He was arrested, and a large stash of the ransom money (the amount is disputed but was more than $11,000) was found in his house.

At his trial at Flemington, N.J., from Jan. 2 through Feb. 13, 1935, the chief evidence against Hauptmann was (1) the recovered money, (2) the discovery of go-between Condon's telephone number on a closet wall in Hauptmann's home, (3) the identification of Hauptmann by witnesses who professed seeing him near the Lindbergh home or in the cemetery, and (4) the discovery that the ladder used in the kidnapping had been mended with a missing plank from Hauptmann's attic. Hauptmann countered that he had merely held the money for a friend, one Isidore Fisch, who had returned to Germany in 1933 and died there. Hauptmann was convicted and electrocuted in the New Jersey State Prison—to the end claiming his innocence.

Hauptmann, Gerhart (Johann Robert) (b. Nov. 15, 1862, Bad Salzbrunn, Silesia, Prussia [Germany]—d. June 6, 1946, Agnetendorf, Ger.), German playwright, poet, and novelist who was a recipient of the Nobel Prize for Literature in 1912.

Hauptmann was born in a then-fashionable Silesian resort town, where his father owned the main hotel. He studied sculpture from 1880 to 1882 at the Breslau Art Institute. He then studied science and philosophy at the university in Jena (1882–83), worked as a sculptor in Rome (1883–84), and studied further in Berlin (1884–85). It was at this time that he decided to make his career as a poet and dramatist. Having married the well-to-do Marie Thienemann in 1885, Hauptmann settled down in Erkner, a rural suburb of Berlin, dabbling in political, theological, and literary studies and associating with a group of scientists, philosophers, and avant-garde writers who were interested in naturalist and socialist ideas.

In October 1889 the performance of Hauptmann's social drama *Vor Sonnenaufgang* (*Before Dawn*) made him famous overnight, though it shocked the theatregoing public. This starkly realistic tragedy, dealing with contemporary social problems, signaled the end of the rhetorical and highly stylized German drama of the 19th century. Encouraged by the controversy, Hauptmann wrote in rapid succession a number of outstanding dramas on naturalistic themes (heredity, the plight of the poor, the clash of personal needs with societal restrictions) in which he artistically reproduced social reality and common speech. Most gripping and humane, as well as most objectionable to the political authorities, is *Die Weber* (1892; *The Weavers*), a compassionate dramatization of the Silesian weavers' revolt of 1844. *Das Friedensfest* (1890; "The Peace Festival") is an analysis of the troubled relations within a neurotic family, while *Einsame Menschen* (1891; *Lonely Lives*) describes the tragic end of an unhappy intellectual torn between his wife and a young woman with whom he can share his thoughts.



Gerhart Hauptmann, etching by Hermann Struck, 1904; in the Schiller-Nationalmuseum, Marbach, Ger.

By courtesy of the Schiller-Nationalmuseum, Marbach, Ger.

Hauptmann resumed his treatment of proletarian tragedy with *Fuhrmann Henschel* (1898; *Drayman Henschel*), a claustrophobic study of a workman's personal deterioration from the stresses of his domestic life. However, critics felt that the playwright had abandoned naturalistic tenets in *Hanneles Himmelfahrt* (1894; *The Assumption of Hannele*), a poetic evocation of the dreams an abused workhouse girl has shortly before she dies. *Der Biberpelz* (1893; *The Beaver Coat*) is a successful comedy, written in a rich Berlin dialect, that centres on a cunning female thief and her successful confrontation with pompous, stupid Prussian officials.

Hauptmann's longtime estrangement from his wife resulted in their divorce in 1904, and in the same year he married an actress and violinist, Margarete Marschalk, with whom he had moved in 1901 to a house in Agnetendorf in Silesia. Hauptmann spent the rest of his life there, though he traveled frequently.

Although Hauptmann helped to establish naturalism in Germany, he later abandoned naturalistic principles in his plays. In his later plays, fairytale and saga elements mingle with mystical religiosity and mythical symbolism. The portrayal of the primordial forces of the human personality in a historical setting (*Kaiser Karls Geisel,* 1908; *Charlemagne's Hostage*) stands beside naturalistic studies of the destinies of contemporary people (*Dorothea Angermann,* 1926). The culmination of the final phase in Hauptmann's dramatic work is the Atrides cycle, *Die Atriden-Tetralogie* (1941–48), which expresses through tragic Greek myths Hauptmann's horror of the cruelty of his own time and his disappointment with post-World War I European society.

Hauptmann's stories, novels, and epic poems are as varied as his dramatic works and are often thematically interwoven with them. The novel *Der Narr in Christo, Emanuel Quint* (1910; *The Fool in Christ, Emanuel Quint*) depicts, in a modern parallel to the life of Christ, the passion of a Silesian carpenter's son, possessed by pietistic ecstasy. A contrasted figure is the apostate priest in his most famous story, *Der Ketzer von Soana* (1918; *The Heretic of Soana*), who surrenders himself to a pagan cult of Eros.

In his early career Hauptmann found sustained effort difficult; later his literary production became more prolific, but it also became more uneven in quality. For example, the ambitious and visionary epic poems *Till Eulenspiegel* (1928) and *Der grosse Traum* (1942; "The Great Dream") successfully synthesize his scholarly pursuits with his philosophical and religious thinking, but are of uncertain literary value. The cosmological speculations of Hauptmann's later decades distracted him from his spontaneous talent for creating characters that come alive on the stage and in the imagination of the reader. Nevertheless, Hauptmann's literary reputation in Germany was unequaled until the ascendancy of Nazism, when he was barely tolerated by the regime and at the same time was denounced by émigrés for staying in Germany. Though privately out of tune with the Nazi ideology, he was politically naive and tended to be indecisive. He remained in Germany throughout World War II and died a year after his Silesian environs had been occupied by the Soviet Red Army.

Hauptmann was the most prominent German dramatist of the early 20th century. The unifying element of his vast and varied literary output is his sympathetic concern for human suffering, as expressed through characters who are generally passive victims of social and other elementary forces. His plays, the early naturalistic ones especially, are still frequently performed, though not so often as during his lifetime.

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Hauptmann, Moritz (b. Oct. 13, 1792, Dresden, Saxony [Germany]—d. Jan. 3, 1868, Leipzig), German violinist, composer, teacher, and writer on musical theory.

Hauptmann studied music under various masters of the time and afterward completed his education as a violinist and composer under Louis Spohr. Until 1820 he held various appointments in private courts and families, varying his musical occupations with mathematical and other studies bearing chiefly on acoustics and related subjects. For a time, also, Hauptmann was employed as an architect, but all other pursuits gave place to music.

In 1822 Hauptmann entered the orchestra of the city of Kassel, again under Spohr's direction, and taught composition and musical theory. His compositions at this time consisted chiefly of motets, masses, cantatas, and songs. His tragic grand opera *Mathilde* was produced in 1826.

In 1842 Hauptmann became cantor at the Thomas School (Thomasschule) of Leipzig, where one of his predecessors had been Johann Sebastian Bach, and the following year he became a professor at the newly founded Leipzig Conservatory. There his gift as a teacher developed and was acknowledged by a crowd of enthusiastic pupils, among whom were Joseph Joachim, Hans von Bülow, Arthur Sullivan, and Frederic Hymen Cowen. In 1850, with Otto Jahn and Robert Schumann, Hauptmann founded the Bach Gesellschaft; for the remainder of his life he served as the society's president and edited the first three volumes of the Bach-Gesellschaft (BG) edition of Bach's complete works. His most important publication in the area of theory was *Die Natur der Harmonik und Metrik* (1853; *The Nature of Harmony and Metric*).

Hauptschule (German: "head school"), in Germany, five-year upper elementary school preparing students for vocational school, apprenticeship in trade, or the lower levels of public service. First introduced in West Germany in 1950, and enrolling 65 to 70 percent of the student population, the *Hauptschule* was one of three basic kinds of West German secondary school, complementing the *Gymnasium* (a nine-year classical university preparatory school) and *Realschule* (a six-year preparatory school for higher business and technical schools or civil service). The *Hauptschule* and the *Grundschule* (the elementary school), usually in the same building, made up the *Volksschule* providing primary- and secondary-school preparation for vocational training. Sometimes a final year of vocational education was provided.

In Austria the *Hauptschule* consists of roughly the same grades (five through eight) as its German counterpart but is considered to be a lower-level secondary school.

Hauraki Gulf, large gulf of the South Pacific Ocean indenting eastern North Island, New Zealand. It is entered from the north by the Jellicoe and Cradock channels (west and east of Little Barrier Island) and from the northeast by Colville Channel (between Great Barrier Island and the Coromandel Peninsula). To the southeast, the 884-square-mile (2,290-square-kilometre) gulf extends into the Firth of Thames, part of a valley flooded by the sea. The Piako and Waihou rivers enter the firth from the Hauraki Lowlands. Waiheke Island, a resort, lies in the gulf, opposite Waitemata Harbour, the port of Auckland. The name Hauraki comes from the Maori for "north wind."

Haurān (Syria): *see* Ḥawrān.

Hauriou, Maurice-Jean-Claude-Eugène (b. Aug. 17, 1856, Ladiville, Fr.—d. March 12, 1929, Toulouse), French political scientist and educator whose theoretical work on public law contributed to the development of French administrative law.

Hauriou, a professor of law at Toulouse (1883–1929), proposed a theory of institutions that defined the state as a corporate institution meant to protect civil life and liberty. He defended the "individualistic order" of private enterprise and private property and helped create legal procedures to protect citizens from undue administrative actions.

His major works on administrative, public, and constitutional law include *Précis of Administrative Law and Public Law* (1891), *Principles of Public Law* (1910 and 1916), and *Précis of Constitutional Law* (1923).

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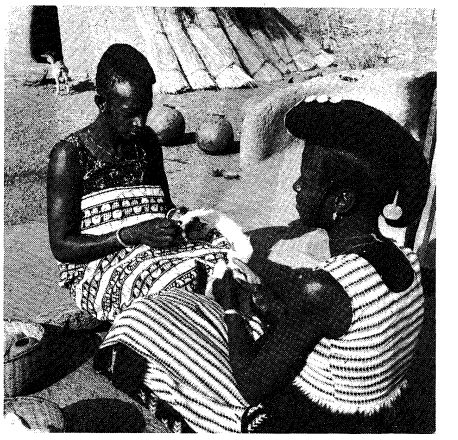
Haury, Emil W(alter) (b. May 2, 1904, Newton, Kan., U.S.), American anthropologist and archaeologist who investigated the ancient Indian civilizations of the southwestern United States and South America. His main concerns were the preceramic and ceramic archaeology of the southwestern United States and Mexico; the archaeology of the Hohokam, Mogollon, and Anasazi Indians of the southwestern United States; and the archaeology of the Chibcha Indians of the northern Andes.

Haury received his B.A. and M.A. from the University of Arizona and his Ph.D. from Harvard University (1934). He had been an instructor at the University of Arizona before going to Harvard, and afterward he returned to Arizona (1937) to become a professor of anthropology and eventually the head of the department (emeritus 1980). Haury was director of the Arizona State Museum from 1938 to 1964.

Some of Haury's works are *The Stratigraphy and Archaeology of Ventana Cave* (1950), *Prehistoric Settlement Patterns in the New World* (1956), and *The Hohokam, Desert Farmers and Craftsmen: Excavations at Snaketown, 1964–1965* (1976).

Hausa, people found chiefly in northwestern Nigeria and adjacent southern Niger. They constitute the largest ethnic group in the area, which also contains another large group, the Fulani, perhaps one-half of whom are settled among the Hausa as a ruling class, having adopted the Hausa language and culture. The language belongs to the Chadic group of the Hamito-Semitic family and is infused with many Arabic words as a result of Islāmic influence, which spread during the latter part of the 14th century from the kingdom of Mali, profoundly influencing Hausa belief and customs. A small minority of Hausa, known as Maguzawa, or Bunjawa, remained pagan.



Hausa women preparing cotton to be made into cloth
Almasy, Paris

Hausa society was, and to a large extent continues to be, politically organized on a feudal basis. The ruler (emir) of one of the several Hausa states is surrounded by a number of titled officeholders who hold villages as fiefs, from which their agents collect taxes. Administration is aided by an extensive bureaucracy, utilizing records written in Arabic.

The Hausa economy has rested on the intensive cultivation of sorghum, maize, millet, and numerous other crops grown on rotation principles and utilizing the manure of Fulani cattle. Agricultural activity has yielded considerably more than subsistence, permitting the Hausa to practice such craft specializations as thatching, leatherworking, weaving, and silversmithing. The range of craft products is large, and trading is extensive, particularly in regularly held markets in the larger towns.

The Hausa have settled in cities (of pre-European origin, such as Kano), towns, and hamlets; but the great majority of the population is rural. A typical farm household consists of two or more men and their families grouped in a mud- or stalk-walled enclosure of some 100 square feet (9 square m) containing small round or rectangular huts with thatched roofs and a larger rectangular hut in the centre for the headman of the compound.

Social structuring is markedly hierarchical; the ranking, both of offices and social classes, is expressed in an elaborate etiquette. Individuals may be ranked as commoners, administrators, or chiefs; and varying degrees of prestige attach to different professions and levels of prosperity. Slaves were formerly numerous, some of them holding important posts in the administration. Noble lineages dominated important official positions.

Descent is patrilineal; and close kin, especially cousins, are preferred marriage partners. Divorce, regulated by Muslim law, is frequent.

Hausa language, Hamito-Semitic language of the Chadic group. It is the official language of northern Nigeria and is used throughout much of western Africa as a second language. The two most important Hausa dialects are those of the Nigerian cities of Sokoto and

Kano. Standard literary Hausa, based on the dialect of Kano, was formerly written in an Arabic-based alphabet but has been written in an orthography based on the Roman (Latin) alphabet since the early decades of the 20th century. The language has borrowed many words from Arabic, especially religious and technological terms. Characteristic of Hausa grammar is the lack of declensional endings for the noun; the relation between a noun and the rest of the words in a sentence is shown by word order and the use of prepositions. *See also* Chadic languages.

Hausa states, group of neighbouring African states, occasionally interconnected from the mid-14th century by loose alliances. Their territory lay above the confluence of the Niger and Benue rivers (in present-day northern Nigeria), between the Songhai empire in the west and that of the Kanem-Bornu, or Bornu, in the east. The seven true Hausa states, or Hausa Bakwai (Biram, Daura, Gobir, Kano, Katsina, Rano, and Zaria [Zazzau]), and their seven outlying satellites, or Banza Bakwai (Zamfara, Kebbi, Yauri, Gwari, Nupe, Kororofa [Jukun], and Yoruba), had no central authority, were never combined in wars of conquest, and were therefore frequently subject to domination from outside. Isolated until the 14th century, they were then introduced to Islām by missionaries from Mali. Conquered early in the 19th century by Fulani, in whose jihad, or "holy war," many Hausa peasants had voluntarily combined, they were organized into emirates. At the beginning of the 20th century, the British took over the administration of the former emirates, to which they attached Bornu to form the northern provinces (subsequently the Northern Region) of the Protectorate of Nigeria.

Hausbuch, Master of the: *see* Housebook, Master of the.

hausen, also called BELUGA, large species of sturgeon (*q.v.*).

Hauser, Kaspar (b. April 30, 1812—d. Dec. 17, 1833, Ansbach, Bavaria [Germany]), German youth around whom gathered one of the 19th century's most celebrated mysteries.

On May 26, 1828, Hauser was brought before the authorities in Nürnberg, apparently bewildered and incoherent. With him he had a letter purporting to have been written by a labourer, into whose custody, it stated, the boy had been delivered on Oct. 7, 1812, with the proviso that he should be instructed in reading, writing, and the Christian religion but kept in close confinement. Enclosed with this letter was one purporting to have been written by the boy's mother, giving his name and his date of birth and stating that his father was a deceased cavalry officer. At first detained as a vagrant, the boy was later taken under the care of the educationist Georg Daumer. Next, the 4th Earl of Stanhope took the boy under his protection (1832) and sent him to Ansbach, where he became a clerk in the office of the president of the court of appeal, Anselm von Feuerbach. The youth died from a wound that was either self-inflicted or, as he claimed, dealt by a stranger.

It was early alleged that he was the hereditary prince of Baden (afterwards proved false), and other fanciful stories became associated with his origins. The case inspired a great output of imaginative literature, as in Paul Verlaine's poem in *Sagesse* (1881); the novels by Jacob Wassermann (1908), Sophie Hoechstetter (1925), and Otto Flake (1950); and the play by Erich Ebermayer (1928).

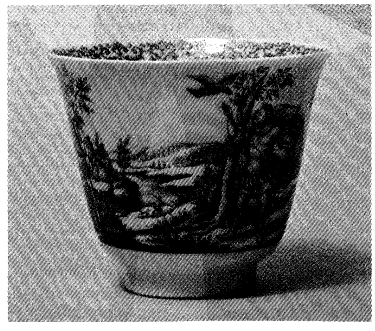
Haushofer, Karl (Ernst) (b. Aug. 27, 1869, Munich, Bavaria [Germany]—d. March 13, 1946, Pähl, W.Ger.), German army officer, political geographer, and leading proponent of geopolitics, an academic discipline prominent in the period between the two World Wars but later in disrepute because of its identification with Nazi doctrines of world domination.

Haushofer
Ullstein Bilderdienst

During his stay as an army officer in Japan (1908–10), Haushofer studied that nation's expansionist policies in Asia; several of his books, including his most ambitious study in political geography, *Geopolitik des Pazifischen Ozeans* (1924; "Geopolitics of the Pacific Ocean"), dealt with Japan's role in 20th-century politics. Retiring from the army in 1919 with the rank of major general, he dedicated himself to the regeneration of Germany. He founded (1924), and was editor of and principal contributor to, the *Zeitschrift für Geopolitik* ("Journal for Geopolitics") and directed the Institute of Geopolitics at the University of Munich. A mixture of sound observations and hazy theories, geopolitics was based on the works of the German geographer Friedrich Ratzel, who compared the state to a biological organism, and on the less-scientific theories of the Swedish political scientist Rudolf Kjellen, who took Ratzel's metaphor literally and viewed the state as an actual organism with a natural right to growth and to *Lebensraum* ("living space").

Haushofer's influence in military circles was considerable. As a disciple of the "heartland" theory of Sir Halford J. Mackinder, he stressed Germany's need to join forces with Russia until he was silenced by Germany's attack on the Soviet Union in 1941. Throughout World War II he attempted to justify Germany and Japan in their drives for world power, although his marriage to a woman of Jewish extraction probably made this task increasingly distasteful. In 1945 his son Albrecht, professor of geopolitics at the University of Berlin and active in the underground against Adolf Hitler, was executed by the Gestapo. After Germany's defeat, when Haushofer was investigated for alleged war crimes, he and his wife committed suicide.

Hausmalerei (German: "home painting"), white pottery wares obtained from a factory and painted at home by a *Hausmaler* (freelance home painter or decorator), most of whom were German or Bohemian. The practice began in the 17th century and was common in the 18th century. Competition with factory-painted wares became so intense that supplies of white porcelain were stopped, and decorators had to obtain it by devious means or remove factory decorations with acid to provide a suitable ground. Patrons of this work were usually private individuals who sought unusual pieces.



Black enamel (*Schwarzlot*) decorated porcelain bowl painted by *Hausmaler* Daniel Preussler of Wrocław, Pol., *c.* 1700; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London; photograph, EB Inc.

The earliest examples of Hausmalerei work occur on 17th-century German tin-glazed earthenware, or faience; it varies considerably in quality, but the best ranks with the most distinguished French faience and Italian maiolica painting. The finest Hausmalerei, however, were done on 18th-century Meissen and Vienna porcelain. The most gifted artists were Johann Aufenwerth, Bartholomäus Seuter, Franz Mayer, and Johann Metszch, who worked mainly on Meissen porcelain, and Ignaz Bottengruber and Daniel Preussler, who worked on both Meissen and Vienna porcelain.

hausmannite, a manganese oxide mineral (Mn_2O_4) that occurs as brownish black crystals or granular masses in high-temperature hydrothermal veins and in contact metamorphic zones. It is found associated with other oxide minerals of manganese and other metals at Ilmenau, Ger.; Långban, Swed.; and Batesville, Ark., U.S. For detailed physical properties, *see* oxide mineral (table).

Haussmann, Georges-Eugène, Baron (b. March 27, 1809, Paris, Fr.—d. Jan. 11, 1891, Paris), French administrator responsible for the transformation of Paris from its ancient

Haussmann
By courtesy of the Bibliotheque Nationale, Paris

character to the one that it still largely preserves. Though the aesthetic merits of his creations are open to dispute, there is no doubt that as a town planner he exerted great influence on cities all over the world.

Haussmann was the grandson, on his father's side, of a member of the Revolutionary Convention and, on his mother's, of a Napoleonic general. He studied law in Paris and entered the civil service in 1831 as the secretary-general of a prefecture, rising to be subprefect (1832–48), prefect in the provinces (1848–53), and finally prefect of the Seine *département* (1853–70).

In this last office he embarked on an enormous program of public works. He cut large straight avenues through the chaotic mass of small streets of which Paris was then composed and so made rapid and easy movement across it possible for the first time (the purpose was partly aesthetic and partly military, eliminating constricted streets where rebel barricades could be erected). He created new systems of water supply and of drainage and so removed the foul odours. He opened up parks on the English model both in the centre of Paris and

at Boulogne and Vincennes. He demolished most of the private buildings on the Île de la Cité and gave it its administrative and religious character. He built the Opéra and the central marketplace known as Les Halles (the latter surviving into the 1960s).

Many of the ideas for the changes came from Napoleon III, but it was owing to Haussmann's exceptional capacity for work that schemes that might have remained idle dreams were carried out so expeditiously. Haussmann's success was favoured also by the autocratic nature of the regime under which he served, for this allowed him to raise enormous long-term loans and to use them almost without parliamentary or other control. His handling of public money, however, roused increasing criticism among the liberal opposition, and the advent to power of Émile Ollivier's liberal government in 1870 resulted in his dismissal.

Haussmann was a Bonapartist member for Corsica in the National Assembly from 1877 to 1881 but took little active part in parliamentary work. He left an important autobiography, *Mémoires,* 3 vol. (1890–93).

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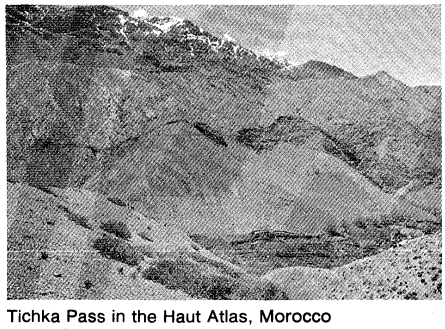
haustorium, highly modified stem or root of a parasitic plant, such as mistletoe or dodder, or a specialized branch or tube originating from a hairlike filament (hypha) of a fungus. The haustorium penetrates the tissues of a host and absorbs nutrients and water.

The word haustorium also is used to indicate certain cell types in plant embryology. The African Mutelidae family of freshwater mussels have a parasitic larval stage that is called a haustorium.

Haut Atlas, English HIGH ATLAS, or GREAT ATLAS, mountain range in central Morocco, northern Africa. It extends northeastward for 484 miles (779 km) from the Atlantic Coast to the Algerian border. Many peaks exceed 12,000 feet (3,658 m), including Mount Ayachi (12,260 feet), Mount M'Goun (13,356 feet), and Mount Toubkal (13,671 feet), the highest point in the Atlas Mountains. Well-known passes include Tichka (7,438 feet), Test (approximately 7,300 feet), and Talrhemt (approximately 7,250 feet). The northern sides and tops of the lower peaks are clothed with forests of cork, oak, pine, cedar, and other trees, including walnuts, which grow to the limit of irrigation. The lower slopes enclose well-watered valleys in which the Berber peoples cultivate tiny irrigated fields. The mountains' southern flanks, exposed to the hot, dry Saharan winds, are generally destitute of vegetation. Minerals extracted include copper, iron ore, lead, zinc, and manganese. Skiing is popular when snow covers the peaks, and many tourists visit Toubkal National Park.



Tichka Pass in the Haut Atlas, Morocco
Anne E. Hubbard—Photo Researchers/EB Inc.

Haut-Rhin, *département,* Alsace *région,* eastern France, bordering Switzerland and separated from Germany by the Rhine River. It was created in 1790 from the southern portion of Alsace and ceded to Prussia in 1871 after the Franco-Prussian War. Restored to France after World War I, it was again annexed by Germany during World War II and became French again in 1945. Its area is 1,361 square miles (3,525 square km). Following the construction of the Alsace Grand Canal through the *département,* the Rhine became accessible to barges of up to 1,350 tons from the sea to Basel, Switz. The Rhine-Rhône Canal also crosses the *département,* entering it in the southwest and passing through Mulhouse, the largest town. The Ill River, a tributary of the Rhine that flows south–north through Haut-Rhin, also passes through Mulhouse and Colmar, the departmental capital. The granite Vosges mountains, covered with forests and relieved by glacial valleys, occupy most of the western half of Haut-Rhin. They culminate in the Guebwiller Ballon (4,672 feet [1,424 m]), from the top of which in clear weather there is a magnificent panorama of the southern Vosges, the Black Forest in Germany, and the Jura and the Alps ranges. The Vosges fall abruptly to the fertile alluvial plain occupying most of the eastern half; between the two and intermediate in elevation are the sub-Vosgian hills, part of the wine country of Alsace, notable by virtue of the rainfall it receives at the foot of the Vosges escarpment. In the southeast a vast forest separates Mulhouse from the Rhine. Winters are cold, summers are hot, and the rainfall is low.

Mixed farming is carried out in the eastern half of the *département,* which produces well-known wines—Riquewihr, Riesling, Traminer, and Sylvaner—and is noted for its asparagus and foie gras (liver for pâté). Industry has been highly developed, particularly in the Mulhouse area, in which some of the biggest potash deposits in the world are located. The *département* is divided into six *arrondissements*—Colmar, Altkirch, Guebwiller, Mulhouse, Ribeauville, and Thann—and is in the educational division of Strasbourg. Pop. (1988 est.) 668,100.

Haute-Corse, *département,* northern Corsica, an island portion of metropolitan France in the Mediterranean Sea, created in 1976, with an area of 1,802 square miles (4,666 square km). Bastia is the capital. Cape Corse extends northeast and forms an anticlinal (structurally arched) peninsula dissected by rivulets and small torrents; slopes are terraced, producing grapes and other fruits. The rich farmland and olive groves of the Balagne region lie to the northwest and are bounded by the virtual deserts of Agriates to the southeast and Galeria to the south. Annual precipitation elsewhere is, however, generally high, frequently exceeding 60 inches (1,500 mm) in the mountains. Approximately two-fifths of the population live in Bastia, which has grown at the expense of the hinterland, though the Balagne (once called the Garden of Corsica) continues to be densely populated. Many householders in Bastia also own houses in the countryside. Services tend to be poorly developed outside the capital and the secondary centres of Calvi, L'Ile-Rousse, Ghisonaccia, Corte, and Porto-Vecchio.

Agriculture dominates the economy, producing olives, grapes, wheat, and timber. The traditional farmstead is the *maison haute,* whose thick stone walls insulate against winter cold. Stables occupy the ground floor, living quarters are on the second floor, and food and supplies are stored in the attic. Corsu, which is the insular language, shows strong Tuscan influences and continues to be spoken by more than four-fifths of the heads of household in Bastia. The Corsu of Haute-Corse is distinguishable from that of southern Corsica. Pop. (1988 est.) 135,200.

Haute-Garonne, *département,* Midi-Pyrénées *région,* southwestern France, created chiefly from a western part of the historic province of Languedoc and from northeastern Gascony. Occupying 2,436 square miles (6,309 square km), it embraces the entire basin of the upper Garonne River, which flows through the major towns—Saint-Gaudens, Muret, and Toulouse, its capital. Bagnères-de-Luchon, a mountain resort, lies in the Pyrenees on the Spanish frontier.

The climate is cold in winter and fresh in summer. The mountainous southern region, where the scenery is magnificent, has a well-developed tourist industry. Other activity in the area includes sheep raising, hydroelectric power generation, and chemical production. Elsewhere, agriculture (cereals, cattle, orchards, market gardening, vines) flourishes, and there are important industries (aircraft, leather, textiles, and food processing), particularly in the Toulouse region. The Concorde supersonic passenger airplane was constructed at local factories. Saint-Marcet is an important source of natural gas. The Midi Canal traverses the *département* for 32 miles (51 km), joining the lateral canal of the Garonne at Toulouse.

Among the places of historical and architectural interest, besides Toulouse, are Saint-Bertrand-de-Comminges, Valcabrère, and Montréjeau, near Bagnères-de-Luchon. Toulouse, Muret, and Saint-Gaudens give their names to the three *arrondissements* of the *département,* which is in the educational division of Toulouse. Pop. (1988 est.) 865,900.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Haute-Loire, *département,* Auvergne *région,* south-central France, created chiefly from the Velay district of the historic province of Languedoc and from a part of eastern Auvergne. With an area of 1,922 square miles (4,977 square km) and an average elevation of 3,000 feet (900 m), it occupies some of the wildest regions of the Massif Central and contains some of its highest mountains. The upper Loire River, flowing northeastward, waters the eastern half of the *département,* while the upper Allier River, flowing northwestward, waters its western section. They are divided in the south by the Devès chain and in the north by the Livradois Mountains. Le Puy, the departmental capital and former capital of Velay, lies at an elevation of more than 2,000 feet (600 m) at the centre of a small, very fertile basin.

Large areas of the Velay district are covered with lava and volcanic rocks. The Vivarais Mountains, culminating in Mount Mézenc, 5,755 feet (1,754 m), flank the eastern border of the *département;* and the Margeride Mountains follow the western border, running parallel to the Allier.

The climate is rigorous, with long winters and hot summers. The economy is rural: cereals, potatoes, fodder crops, and cattle. Lace making continues in many parts, especially around Le Puy, a place of pilgrimage and a centre for tourists who visit the *département* for its magnificent landscape, in which churches and castles crown volcanic peaks and hills. Among the features are the crater lake of Le Bouchet, the gorges of the Loire and the Allier, and the numerous medieval churches—made of the local volcanic lavas in different colours—which include Saint-Robert in La Chaise-Dieu, the Basilica of Saint-Julien in Brioude, and Saint-Laurent in Auzon and two Romanesque churches—Saint-Michel-d'Aiguilhe and Notre-Dame-du-Puy, with its celebrated "Black Virgin." The *département* has three *arrondissements*—Le Puy, Brioude, and Yssingeaux—and is in the educational division of Clermont-Ferrand. Pop. (1988 est.) 209,600.

Haute-Marne, *département,* Champagne-Ardenne region, northeastern France, created from part of historic Champagne (*q.v.*) province and a number of localities in Burgundy and Franche-Comté provinces. The Marne River flows south–north for more than 80 mi (130 km) through the 2,400-sq-mi (6,216-sq-km) area of the *département.* The Aube River and its tributary, the Aujon, as well as the Meuse River, fan out from their headwaters in the region of the Plateau de Langres.

The Marne, parallel to which runs the Canal de la Marne à la Saône, rises in the vicinity of the ancient cathedral city of Langres past Chaumont, the departmental capital, and Joinville. The river leaves the *département* after passing through Saint-Dizier, an industrial centre and Haute-Marne's largest city. The hilly region that it traverses is one of the most heavily forested of France.

The climate is severe, averaging 70 days of frost a year, with long, cold winters and short, hot summers. Outside the forested areas, in which lumbering is important, cattle are raised and cereals are grown. Around Langres and in the valleys, fruits are cultivated. The smelting of iron ore, which continued into the 20th century, was the basis of the iron, steel, and cutlery industries, particularly in the Saint-Dizier area and in Nogent. The *département* is divided into the *arrondissements* of Chaumont, Langres, and Saint-Dizier. It is in the educational division of Reims. Pop. (1982) 210,670.

Haute-Normandie, planning region (French *région de programme*), encompassing the northern French *départements* of Eure and Seine-Maritime and coextensive with northeastern Normandy (*q.v.*). The capital is Rouen. The region has an area of 4,733 sq mi (12,258 sq km) and is bounded by the *départements* of Calvados and Orne to the west, Eure-et-Loir to the south, and Yvelines, Val-d'Oise, Oise, and Somme to the east. The English Channel lies to the northwest. Haute-Normandie is mostly lowland belonging to the Paris Basin (*q.v.*) and is drained by the Seine River. A humid climate prevails.

Haute-Normandie is densely populated. The population declined slightly between 1851 and 1946, as in much of rural France during that period, but has subsequently increased at a rate well above the national average. Immigration and a relatively high birth rate have accounted for the postwar increase. Demographic recovery has favoured Seine-Maritime over Eure, which still has a large rural population. The population is heavily concentrated along the Seine River.

Animal husbandry dominates agriculture and the region is a leading producer of milk and beef. Grainfields around Saint-André-de-l'Eure and Neubourg in Eure have been converted to pasture. Artificial insemination is widely used to improve dairy herds. Dieppe is an important fishing port.

Manufacturing is highly developed. Eure has benefitted from its proximity to Paris, and its industries have expanded rapidly since 1950. Factories in Eure tend to be small and rarely employ more than 500 workers. The petroleum refineries of Gonfreville-l'Orcher, outside Le Havre, and Notre-Dame-de-Gravenchon and Port-Jérôme, which are located between Le Havre and Rouen, have established Seine-Maritime as a major petrochemical centre. Renault automobiles are manufactured in Cléon outside Elbeuf and near Le Havre in Sandouville. Many Parisians own houses in the countryside of Eure. Pop. (1982) 1,655,362.

Haute-Sangha, *préfecture,* southwestern Central African Republic, bordering Cameroon to the southwest and Congo to the southeast. The southern part of Haute-Sangha is a region of dense equatorial forest, inhabited by Babinga Pygmies as well as Bantu groups. The north, inhabited chiefly by Baya people, is a region of mixed grassland, woodland, gardens, and orchards.

Coffee plantations and diamond mines supply profitable exports; tobacco and cacao are additional cash crops. Some gold is mined, and a sawmill at Berbérati processes lumber from the forest to the south. Carving in wood and ivory remains a significant handicraft.

Berbérati, the prefectural seat, is one of the largest towns in the republic. Connected by road to Cameroon, it is a transport centre for overland exports. It also lies on the route of a proposed railway that would link Bangui with the Atlantic port of Douala, Cameroon. Both Berbérati and Carnot (further north) have regularly scheduled air service to Bangui. The southward-flowing Sangha River is intermittently navigable up to Nola, at the confluence of its headwaters, the Mambéré and Kadei rivers.

Haute-Sangha, with an area of 11,661 sq mi (30,203 sq km), is divided into three subprefectures, with seats at Berbérati, Carnot, and Nola. Pop. (1975) 194,169.

Haute-Saône, *département,* Franche-Comté region, eastern France, created from the northern part of the historic province of Franche-Comté (*q.v.*). Separated from Germany by the Belfort *territoire* and Haut-Rhin *département,* it has an area of 2,063 sq mi (5,343 sq km). The northern part lies on the southern slopes of the Vosges (*q.v.*) mountains. The Saône River (*q.v.*) flows north–southwest across plateaus and plains, meandering west of Vesoul (*q.v.*), Haute-Saône's capital, and through the town of Gray. The climate is continental, with sudden changes of temperature.

More than one-third of Haute-Saône is covered with forests and more than one-fourth with pasture land, while about one-fifth, notably the Saône Valley, is cultivated for cereals, fruit, and vegetables. Dairy farming is directed toward milk production for Gruyère cheese. Fougerolles in the northeast, near the spa of Luxeuil-les-Bains, has been noted for more than three centuries for its production of kirsch, a cherry liqueur. Industrial activity is small, devoted mainly to textiles and work in wood and metal, and Haute-Saône is slowly losing its rural population. The *département* is divided into two *arrondissements,* Vesoul and Lure, and is in the educational division of Besançon. Pop. (1982) 231,962.

Haute-Savoie, *département,* Rhône-Alpes region, southeastern France, formed from the the northern part of the duchy of Savoy (*q.v.*). The *département,* which has an area of 1,696 sq mi (4,391 sq km), is bounded in the north by the lake and Swiss canton of Geneva, in the east by the canton of Valais, Switzerland, and in the southeast by the Italian frontier along the Massif du Mont Blanc. The Rhône River leaves Lake Geneva and flows along the northwestern border. The southern boundary separating it from Savoie *département* runs along mountain peaks in Les Bauges range and the Chaîne des Aravis to the Aiguille des Glaciers of the Massif du Mont Blanc. The summit of Mont Blanc (*q.v.*), 15,771 ft (4,807 m), the highest peak in the Alps, is just within the *département.* To the northwest the Aiguilles Rouges and Mont Buet, 10,168 ft (3,094 m), are separated from the Massif du Mont Blanc by the Arve River, which flows through the mountain resort of Chamonix (*q.v.*) and across the *département* to the Rhône at Geneva. The mountains gradually lose height to the north and west, descending to less than 1,000 ft at Évian-les-Bains (*q.v.*) and Thonon-les-Bains on the shores of Lake Geneva. In the west Annecy (*q.v.*), the capital, and its lake are surrounded by the lower Pre-Alps mountains, clothed with forests and pastures. Rains are abundant in the *département;* winters are cold and the summer heat is close in some areas.

Agriculture—cereals, vines, fruit—prospers in the lower, sheltered areas. The cattle raising that once predominated in the mountains, founded on a system of transhumance, is in decline in the uplands; in the valleys, however, dairy cooperatives have kept milk and cheese production vigorous. Lumbering is extensive on the lower slopes. Industries include cement, engineering, watchmaking, and cheese processing. Annecy-le-Vieux has a famous bell foundry. Tourism and winter sports—at Chamonix, Megève, Morzine, La Cluzas—are well developed, and skiing and sightseeing on the Massif du Mont Blanc have been greatly facilitated by the construction of an aerial cablecar over the Aiguille du Midi. A road tunnel, 6.5 mi (11.6 km) long, under the massif links France and Italy. The *département* has four *arrondissements*—Annecy, Bonneville, Saint-Julien-en-Genevois, and Thonon-les-Bains—and is in the educational division of Grenoble. Pop. (1982) 494,505.

Haute-Vienne, *département,* Limousin region, west central France, on the northwestern slopes of the Massif Central. With an area of 2,128 sq mi (5,512 sq km), it was created mainly from the historic province of Marche, to which were added parts of the provinces of Limousin, Poitou, and Berry.

The *département* is bisected south-southeast to north-northwest by the Vienne River, which traverses rolling uplands and flows through Limoges (*q.v.*), the capital, after being joined from the east by the much-dammed Maulde and Taurion rivers. The north is watered by the Gartempe, a tributary of the Cher. In the south the mountains rise to 2,398 ft (731 m) at Mont Gargan. Between the Vienne and Gartempe valleys, the Monts de Blond in the west rise above the Limoges Plateau to more than 1,600 ft, whereas the Monts d'Ambazac in the east rise to more than 2,300 ft. Winters are cold, with heavy snowfall. Summers are usually fine and warm.

The *département* is largely agricultural. Fodder crops predominate. Potatoes and beets are also grown, and there is horse and cattle raising; but the chestnut, once a mainstay of the rural economy, has declined. There are important manufactures of porcelain, footwear, and, more recently, nonelectrical machinery at Limoges. Saint-Junien is a centre of leather industries.

Solignac has a fine Romanesque abbey church; and Saint-Junien is also notable for its church, begun in the 12th century. The 19th- and 20th-century Impressionist painter Pierre-Auguste Renoir was born at Limoges. The *département* has three *arrondissements*—Limoges, Bellac, and Rochechouart. It is in the educational division of Limoges. Pop. (1982) 355,737.

Haute-Volta, République de: *see* Burkina Faso.

Hauteclocque, Philippe-Marie, viscomte de (viscount of): *see* Leclerc, Jacques-Philippe.

Hautefeuille, Jean de (b. March 20, 1647, Orléans, Fr.—d. Oct. 18, 1724, Orléans), French physicist who built a primitive internal-combustion engine. He published works on acoustics, optics, tidal phenomena, and watch mechanisms. He also invented the micrometer microscope to measure the size of minute objects.

Hautefeuille's engine was intended to operate a pump. The piston was first actuated by the explosion of a small charge of gunpowder and then returned to its initial position when the hot gases of combustion cooled, leaving a partial vacuum.

Hauterive, town, seat of Côte-Nord (North Shore) region, east central Quebec province,

Canada, on the north shore of the St. Lawrence River, at the mouth of the Manicouagan River, west of Baie-Comeau. Founded in 1949, when Msgr. N.A. Labrie, first bishop of the Gulf of St. Lawrence, established the seat of his diocese there, the town has grown rapidly into an administrative and commercial centre. The harnessing of the Manicouagan and Outardes rivers for hydroelectric power has been responsible for Hauterive's prosperity. Pop. (1981) 13,995.

Hauterive, Borel d': *see* Borel, Petrus.

Hauterivian Stage, standard worldwide division of Lower Cretaceous rocks and time (the Cretaceous Period began about 136,000,000 years ago and lasted about 71,000,000 years). Rocks of the Hauterivian Stage overlie those of the Valanginian Stage and underlie rocks of the Barremian Stage. In Great Britain the Hauterivian is represented by the lower portions of the Wealdon Series, whereas in western Europe it consists of the lower portions of the thick Hils Clay. Limestones and some sandstones dominate the Hauterivian of North Africa and the Middle East, and sandstones dominate in India, Australia, Japan, Mongolia, and northern Siberia. The Hauterivian has been divided into four zones, smaller divisions of rocks and time, characterized by distinctive fossil ammonite cephalopods.

Hautes-Alpes, *département*, region of Provence-Alpes-Côte-d'Azur, southeast France. The *département* occupies the upper basin of the Durance River (*q.v.*) in the heart of the southern French Alps and is bounded on the east by Italy. Created from part of the historic province of Dauphiné (*q.v.*) and from a portion of Provence, it has an area of 2,142 square miles (5,549 square km). Consisting largely of mountains and high valleys, the *département* has only small towns and villages and is among the least populous in France. The mountains rise in magnificent, disordered massifs without regular chains. The Durance, which rises in the north of the *département*, flows southwest through Briançon past the ancient fortress town of Embrun and south of Gap (*q.v.*), the capital of the *département*.

Lac de Serre-Ponçon in the *département* of Hautes-Alpes, France

Hubertus Kanus—Shostal Associates

Winters in the *département* are long and cold, with perpetual snow on the higher mountains; but the sheltered valleys are remarkably dry and sunny, and vegetation limits are high, with patches of cultivation occurring above elevations of 6,000 feet (1,800 m). Irrigated meadows, cornfields, orchards, and vineyards occupy the valley floors and lower slopes. There is little forest of commercial value, and the bare mountain slopes have been extensively gullied by torrents. Sheep are the basis of the area's livestock farming, although dairy cattle are also reared. Stone buildings with tiled roofs are characteristic of the *département*. A dam at Serre-Ponçon, below which a hydroelectric plant has been built, has transformed the torrential Durance in the south of the *département* into a lake 16 miles (26 km) long and up to 2 miles wide. Hautes-Alpes is a popular tourist region, and winter sports are well developed in the Briançon area at Serre-Chevalier and Montgenève. The isolation of the high Alpine valleys has been reduced by the development of modern roads. Two important roads traverse the *département* from north to south: the Route Napoléon in the west through Gap, and the Route des Grandes Alpes nearer the Italian frontier, using high passes above 6,000 feet. The *département* is divided into two *arrondissements,* that of the ancient city of Gap, in which there is a little industry, and that of Briançon, a medieval fortress town with a new town below in which floss silk is made. It is in the educational division of Aix-en-Provence. Pop. (1985 est.) 107,000.

Hautes-Pyrénées, *département,* Midi-Pyrénées region, southwestern France. Most of the *département* lies in the central Pyrenees, north of the wall-like crest line that forms the Franco-Spanish frontier. It occupies an area of 1,724 square miles (4,464 square km). It was administratively created mainly from the district of Bigorre, with sections of other districts, all dependencies of the historic province of Gascony. The *département's* southern boundary runs along the highest peaks of the central Pyrenees, from Pic Balleïtouse, 10,315 feet (3,144 m) high, through Pic de Vignemale, 10,820 feet (3,298 m) high, along the ridge of the majestic Cirque de Gavarnie, a glacial amphitheatre, to peaks more than 10,000 feet (3,000 m) high on the border of the Haute-Garonne *département*. Narrow glacier-carved valleys cut deeply into the northern slopes of the Pyrenees, from which such torrential streams as the Gave de Pau, the Adour, the Neste, and the Pique rush northward. The mountain passes into Spain from Hautes-Pyrénées are high and difficult to use.

Summers are warm and sunny in Hautes-Pyrénées. In the mountains the winters are severe, but to the north they are mild with abundant rainfall. Sheep are sent up in spring to pasture in the higher valleys, where the possibilities for agriculture are severely limited and only small hay meadows and potato fields surround the permanent settlements. At lower elevations in the valleys and in the low-lying portions of the *département*, corn (maize) is the chief cereal and haricot beans and deciduous fruits are other important crops. Haute-Pyrénées's traditional craft industries are dying out, but they are being replaced by hydroelectric installations, winter sports, and, most importantly, tourism, which has invigorated the popular spas of Bagnères-de-Bigorre and Cauterets. The old fortress town of Lourdes (*q.v.*) has become the world's most visited pilgrimage centre. Marshal Foch (1851–1929) was born at Tarbes, the departmental capital. The *département* has three *arrondissements*—Bagnères-de-Bigorre, Argelès-Gazost, and Tarbes—and is in the educational division of Toulouse. Pop. (1985 est.) 228,000.

Hauteville, HOUSE OF, Italian ALTAVILLA, line of Norman lords and knights who were founders of fiefdoms and kingdoms in southern Italy and Sicily in the 11th and 12th centuries. The wars fought by members of the Hauteville family contributed to a steady reduction of Muslim and Byzantine power in the region. In their conquered territories the Hauteville descendants established strong states that were organized according to hierarchical feudal norms. Freedom of religious worship was widely permitted.

Three Hauteville brothers—William, Drogo, and Humphrey—were among the Norman knights who flocked to southern Italy in the early 11th century. The sons of a minor Norman lord, Tancred, the three settled in southern Italy and Sicily, which were at that time a patchwork of warring towns and principalities. Serving at first as mercenaries, the brothers soon began to seize lands for themselves. They also recruited more knights for their wars and campaigns of plunder. In 1041 a Norman–Lombard force defeated a Byzantine army near Melfi. In a still greater challenge, Pope Leo IX led a combined force of local levies, Germans (Lombards), and others against the Normans at Civitate in 1053. The Normans again scored an impressive victory. A Hauteville, Robert Guiscard (*c.* 1015–85), a younger half-brother of the earlier Hautevilles, distinguished himself and became a leader in the Norman conquests. Gradually but methodically, he drove the Byzantine forces from southern Italy. He made peace with Pope Nicholas II in 1059. Robert and his brother, Roger (1031–1101), then invaded Muslim-held Sicily. Roger became Roger I, ruler of Sicily. The Norman conquests continued until, with the fall of Bari in 1071, the last Byzantine forces had been driven from the Italian boot. Palermo in Sicily, with its great port, fell in 1072. At one time the Normans attacked the Byzantine Empire itself but had to withdraw because of revolts in Italy. Still allies of the papacy, the Norman knights became crusaders in the closing years of the 11th century. Tancred (*c.* 1075–1112), a Hauteville, joined the First Crusade in 1096 and gained fame as a military leader. By 1154 Roger II (1095–1154), the youngest living son of Roger I, had extended his kingdom throughout all of southern Italy and Sicily and into Greece, had taken control of part of North Africa, and had made his court at Palermo an important centre of learning and culture. Under later rulers, the Hauteville dynasty gradually faded. In 1194 King Henry VI of Germany invaded Sicily. Taking complete control of the Norman kingdom, Henry put German officials into key administrative posts.

Hauteville, Marc de: *see* Bohemond I.

Hauts-de-Seine, *département*, Île-de-France region, France. The *département* extends in the shape of a crescent around the western part of Paris. With an area of only about 68 square miles (176 square km), it was created from parts of the former *départements* of Seine and Seine-et-Oise, which were originally formed from a portion of the historical province of Île-de-France. It comprises the northwestern, western, and southwestern suburbs of Paris, including Colombes, Courbevoie, Nanterre, Levallois-Perret, Puteaux, Rueil-Malmaison, Saint-Cloud, Sèvres, and Meudon. It is bounded to the north by a loop of the Seine River above Gennevilliers. The river flows along the *département's* northwest border, leaving it at Bougival. The woods of Ville-d'Avray, Meudon, and Verrières spill over its southwest boundary, and the park of Sceaux lies inside its southern corner. The northern section is largely industrial. The central part embraces Neuilly—a fashionable residential district east of the Seine loop and north of the Bois (woods) de Boulogne, which is within the city limits of Paris. Avenue de Neuilly and avenue du Général-de-Gaulle, prolongations of the Champs-Élysées, end at the Rond-Point de la Défense (across the Seine northwest of Neuilly), which since the early 1970s was being developed as the central point of western Greater Paris. At the same time, highrise office and residential buildings were being constructed close to the

new Palace of Exhibitions. In the centre of the *département,* southwest of Neuilly, Mount Valérien, 528 feet (161 m), a place of worship since the time of the Gauls, is the site of a disused fort where the National Memorial of Fighting France commemorates the 4,500 hostages and members of the Resistance movement who were executed there by the Germans during World War II. The Autoroute de l'Ouest, one of the main motorways of France, begins in a tunnel under the park of Saint-Cloud; and the Autoroute du Sud, from Paris to the Mediterranean, skirts the eastern border. The regional express railway crosses the northern half of the *département,* running east–west through Nanterre, the capital. The *département* has two *arrondissements,* Nanterre to the north and Antony to the south. It is in the educational division of Paris. Pop. (1988 est.) 1,370,700.

Haüy, René-Just (b. Feb. 28, 1743, Saint-Just-en-Chaussée, Fr.—d. June 1, 1822, Paris), mineralogist and one of the founders of the science of crystallography.

After studying theology Haüy became an abbé and for 21 years served as professor at the Collège de Navarre. In 1802 he became professor of mineralogy at the Museum of Natural History in Paris, and in 1809 he was appointed to a similar post at the Sorbonne.

His interest in crystallography resulted, he later reported, from the accidental breaking of a piece of calcite. In examining the fragments he discovered that they cleaved along straight planes that met at constant angles. He broke more pieces of calcite and found that, regardless of the original shape, the broken fragments were consistently rhombohedral. From subsequent experiments he derived a thoroughgoing theory of crystal structure. Fundamental to his theory were the laws of decrement and of constancy of angles, whereby the cleavage forms of crystals were related geometrically to their primary forms or nuclei. Haüy subsequently applied his theory to the classification of minerals. He was also known for his studies of pyroelectricity and piezoelectricity in crystals. His publications include *Traité de minéralogie* (1801), *Traité de physique,* written at Napoleon's request (1803), and *Tableau comparatif,* his mineralogical classification (1809).

Haüy, Valentin (b. Nov. 13, 1745, Saint-Just-en-Chaussée, Fr.—d. March 18, 1822, Paris), French professor of calligraphy who became known as the "father and apostle of the blind." He was the brother of René-Just Haüy.

After seeing a group of blind men being cruelly exhibited in ridiculous garb in a Paris sideshow, Haüy decided to do something to make the life of the blind more tolerable and help them gain a sense of usefulness. He set out by hiring a blind beggar boy to submit to instruction. In 1784 he established the Institution des Jeunes Aveugles, Paris (afterward a state-supported school for blind children), where Louis Braille, inventor of the most widely used alphabet for the blind, was a student and later a teacher. Haüy foreshadowed Braille's work by discovering that sightless persons could decipher texts printed in embossed letters and by successfully teaching blind children to read.

Havana, Spanish LA HABANA, city, capital of Ciudad de la Habana *provincia,* with which it is coterminous, and of the Republic of Cuba. The city is located toward the western end of the long northern coast of the island of Cuba and rims one of the Caribbean's finest harbours. Havana is Cuba's economic, political, and cultural centre.

A brief treatment of Havana follows. For full treatment, *see* MACROPAEDIA: Havana.

Havana is situated on the western side of a bottleneck harbour, the narrow entrance of which leads to a broad interior bay consisting of three smaller bays. The city's boundaries were extended in an administrative reorganization in 1976. Contemporary Havana is an urban, political, and administrative unit composed of the old cities of Havana, Marianao, Regla, Guanabacoa, Santiago de las Vegas, and Santa María del Rosario.

Some of the city's food supply comes from the adjacent Havana Cordon, or Green Belt. Of major importance in this area are the growing of plantains, root crops, coffee, and fruits; dairying; and livestock production. Havana is Cuba's most important industrial, importing, and distributing centre. A considerable part of the country's manufacturing and processing industries are concentrated in Havana's environs. Dominant industries include food processing (largely sugar), shipbuilding, fishing, and automotive production. Beverage and cigar production, textile manufacture, and the pharmaceutical and chemical industries are also important. Much of Cuba's import and export trade passes through the port of Havana.

Vestiges of Havana's colonial past blend in with the modern cosmopolitan city. Old Havana, the original urban nucleus next to the port, is characterized by history-laden buildings in pure colonial style; the most outstanding of these is the Palace of the Captains General, completed in 1793. Some of the city's most imposing modern architecture is located around the Plaza de la Revolución. Havana's historic ruined walls are still visible, as are old military buildings such as Morro Castle. Fine colonial churches and public parks are numerous.

Havana is the seat of the government and of the Central Committee of the Communist Party of Cuba. The outstanding centre of instruction is the University of Havana, which was founded in 1728 (reorganized 1976). The city is the home of an outstanding national library. Havana has almost 1,000 separate facilities for holding sporting events.

Inner-city transportation consists primarily of buses traveling Havana's broad avenues. Railways and bus lines link Havana with the provincial capitals and other cities. The José Martí International Airport is located 8 miles (13 km) south of the harbour. Area 281 square miles (727 square km). Pop. (1988 est.) 2,059,223.

Havant, district (borough), county of Hampshire, England, adjoining Portsmouth. It has an area of 22 square miles (56 square km). The small medieval town, apart from its 12th-century church, was destroyed by fire in 1760. A township called Waterlooville grew on the London road nearby after troops returning from the Battle of Waterloo in 1815 passed through the neighbourhood. Growing subsequently with the dormitory suburbs of Portsmouth, the area has accommodated further overspill of homes and factories from the congested island site that is the nucleus of that city. A variety of light-engineering and plastics industries are carried on there, and yachting is important. Pop. (1986 est.) 118,900.

Havdala (Hebrew: "Separation"), also spelled HABDALAH, or HAVDALAH, a ceremony in Jewish homes and in synagogues concluding the Sabbath and religious festivals. The ceremony consists of benedictions that are recited over a cup of wine (and, on the night of the Sabbath, over spices and a braided candle) to praise God, who deigned to sanctify these days and thus "separate" them from routine weekdays. The prayer distinguishes holy from secular, light from darkness, and Israelites from Gentiles. If a festival begins at the closing of the Sabbath, no spices are used, the candle lit for the festival replaces the Sabbath candle, and a special form of the Havdala (indicating the greater holiness of the Sabbath) is combined with the special benediction (Qiddush) that ushers in the festival.

Havel, Václav (b. Oct. 5, 1936, Prague, Czech.), prominent Czechoslovak playwright, poet, and political dissident who in 1989 became the first noncommunist president of his country in 41 years.

Havel was the son of a wealthy restaurateur whose property was confiscated by the communist government of Czechoslovakia in 1948. As the son of bourgeois parents, Havel was denied easy access to education but managed to finish high school and study on the university level. He found work as a stagehand in a Prague theatrical company in 1959 and had progressed to the position of resident playwright of the Theatre of the Balustrade company by 1968. Havel was a prominent participant in the liberal reforms of 1968 (known as the Prague Spring), and, after the Soviet clampdown on Czechoslovakia that year, his plays were banned and his passport was confiscated. During the 1970s and '80s he was repeatedly arrested and served four years in prison (1979–83) for his dissident activities on behalf of human rights in Czechoslovakia. After his release from prison he remained in his homeland.

Havel's first solo play, *Zahradní slavnost* (1963; *The Garden Party*), typified his work in its absurdist, satirical examination of bureaucratic routines and their dehumanizing effects on people. In his best-known play, *Vyrozumění* (1965; *The Memorandum*), an incomprehensible artificial language is imposed on a large bureaucratic enterprise, causing the complete breakdown of human relationships and their replacement by unscrupulous struggles for power. In these and subsequent works Havel explored the self-deluding rationalizations and moral compromises people make in living under a totalitarian political system. Among his later plays were *Ztížená možnost soustředění* (1968; *The Increased Difficulty of Concentration*); the three one-act plays *Audience* (1975), *Vernisáž* (1975; *Private View*), and *Protest* (1978); and *Largo Desolato* (1985).

When massive antigovernment demonstrations erupted in Prague in November 1989, Havel became the leading figure in the Civic Forum, which was a new coalition of noncommunist opposition groups pressing for democratic reforms. In early December the Communist Party capitulated and formed a coalition government with the Civic Forum. As a result of an agreement between the partners in this coalition, Havel was elected to the (largely ceremonial) post of president of Czechoslovakia on Dec. 29, 1989.

Havel River, tributary of the Elbe River in Germany. It rises on the Mecklenburg Plateau 7 miles (11 km) northwest of Neustrelitz and flows through the Mecklenburg lakes before heading south as far as Spandau (in Berlin), where it is joined by the Spree River. Curving southwest past Potsdam and Brandenburg, the Havel traverses another chain of lakes and heads northwest to join the Elbe 6 miles (10 km) northwest of Havelberg after a course of 212 miles (341 km). The river drains an area of 9,276 square miles (24,025 square km). It has a total fall of only 158 feet (43 m) and is navigable downstream from the Mecklenburg lakes. Over much of its course the Havel River forms part of a canal system that links the Elbe River, to the west, with the Oder River, to the east.

Havell, Robert, Jr. (b. Nov. 25, 1793, Reading, Berkshire, Eng.—d. Nov. 11, 1878, Tarrytown, N.Y., U.S.), American landscape painter and printmaker who engraved the plates for John James Audubon's *Birds of America.*

Havell's life to age 46 was spent in Great Britain, where his engraver father oversaw his development as an aquatint artist and urged

him to enter a more erudite profession. He responded by leaving home. Two years later (1827) his father accepted the job of printing *Birds of America*, and his search for a graphic artist of the highest calibre led him back to his son, whom he found working for a publishing firm. He engaged him to make the plates. The younger Robert also did most of the watercolouring of the prints. The edition was successful, and Havell's work, notable for its preservation of Audubon's scientific as well as artistic detail, was praised.

During the years that were taken up with the work (1827–38), Havell became a close friend and associate of Audubon. In 1839 he went to America, where he lived with Audubon for a while, then resided successively in Brooklyn, Ossining, and Tarrytown, N.Y. Although he continued aquatint and engraving (primarily panoramic city views), he devoted most of his attention to painting the countryside of the Hudson River Valley. The subject of his American works and his devotion to his adopted landscape have placed him with the group of American painters known as the Hudson River school.

Havelock, town on the northwest border of Swaziland, southern Africa. Located in the Highveld, it is the site of one of the world's largest asbestos mines. Operations began in the 1930s, and asbestos was Swaziland's economic mainstay until the 1950s, when agricultural products began to play an equally important role. The town and mine are dominated by Emlembe, Swaziland's highest peak (6,109 ft [1,862 m]). Pop. (1976) 4,838.

Havelock, Sir Henry (b. April 5, 1795, near Sunderland, Durham, Eng.—d. Nov. 24, 1857, Lucknow, India), British soldier in India who distinguished himself during the Indian Mutiny in 1857.

Raised in a religious environment, Havelock obtained a commission in the army at age 20, but he spent eight restless years at home

Havelock, detail of an engraving
BBC Hulton Picture Library

while studying military strategy. To join two brothers in India, he changed his regiment and obtained a lieutenancy in the 13th Light Infantry. He served with distinction in the First Anglo-Burmese War (1824–26) but in 1838 was still only a captain and had seen commissions purchased over him by five others. He again distinguished himself in the First Afghan War (1839–42) and was made a Companion of the Bath, but only later did he receive a promotion, when serving as interpreter to Sir Hugh Gough in the 1843 Gwalior campaign.

Burdened by ill health and the debts of his eldest son, Havelock took two years home leave beginning in 1849. After returning to India, he was promoted and shared in Sir James Outram's Persian expedition of 1857. Returning in the midst of the Indian Mutiny, he was too late and too weakened by casualties to save Kānpur or Lucknow, but his series of victories in July and August brought him acclaim; in September he broke through on his fourth try to relieve the residency at Lucknow. He was rewarded with knighthood (Order of the Bath) and promotion to major general.

Haverford College, private coeducational institution of higher learning in Haverford, Pa., near Philadelphia. Founded by Quakers in 1833 as a men's college, it was the first to be established by them. As early as 1847 non-Quakers were admitted, and the school no longer has formal connections with the Religious Society of Friends. Haverford maintained close relations with nearby Bryn Mawr, a women's college, also founded by Quakers. In 1980 Haverford began admitting women as first-year students, and students may now major and live at either college. Cooperative programs are maintained with Swarthmore College and the University of Pennsylvania. Studies are primarily academic, with required courses in natural science, history, social science, literature, and aesthetics. A substantial percentage of graduates go on to postgraduate study.

Haverfordwest, Welsh HWLFFORDD, market town and seat of Preseli district, Dyfed county, Wales. The town grew up as a walled borough at the head of navigation on an inlet of the Irish Sea, with a castle (*c.* 1120) that protected a route to Ireland and the local colony of English and Flemish settlers. The English king Henry I granted the town its first charter (early 12th century), and *c.* 1200 an Augustinian priory was founded. Three present churches date from the 13th to the 15th century. Haverfordwest became an important town; but its castle was partly dismantled in 1644–45, during the English Civil War, and subsequently the town lost its former maritime prosperity, mainly to Milford Haven with its deepwater harbour. Pop. (1981 prelim.) 9,936.

Haverhill, city, Essex County, northeastern Massachusetts, U.S., on the Merrimack River. Founded by the Rev. John Ward in 1640, it was named for Haverhill in England. Early agricultural efforts gave way to shipbuilding and leather industries during the early 19th century. By 1836 it was a major centre of shoe, comb, and hat manufacturing, reaching its industrial peak in the 1920s. A decline in industrial activity resulted in some economic diversification, which now includes the production of electrical items, machinery, and paper box board. The Haverhill Historical Society House, "Buttonwoods" (*c.* 1800), contains relics of Hannah Dustin, who was kidnapped by Indians in 1697 and supposedly escaped after scalping 10 of her captors. A boulder on the green of the First Church of Christ (organized 1682) claims the birthplace there in 1810 of the foreign missionary movement in the United States. The birthplace of John Greenleaf Whittier (described in his poem "Snowbound"), 3 mi west, is preserved. The city is the site of Northern Essex Community College (1961). Inc. town, 1645; city, 1869. Pop. (1980) city, 46,865; metropolitan area (SMSA), 281,981.

Haverhill fever: *see* streptobacillary fever.

Havering, outer borough of Greater London, forming part of its northeastern perimeter. It includes the former borough of Romford and has developed especially since the extension of electrified suburban railways and building of municipal housing estates to relieve overcrowding in inner London. Many of its workers commute to central London, but there are important engineering and other manufacturing industries in the borough. The Royal Air Force (RAF) station at Hornchurch was a major fighter base during World Wars I and II. The borough has an area of 46 sq mi (120 sq km). Pop. (1982 est.) 242,400.

haversian system (bone): *see* osteon.

Haviland Crater, small, shallow meteorite crater in farmland near Haviland, Kansas, U.S. The depression is oval in shape, measuring 57 ft (17 m) by 37 ft. The first meteoritic fragment was found at the site in 1885, but the shallow crater was not found until 1925. A typical impact structure, it is actually thought to be two craters partially superimposed. Meteoritic fragments up to several hundred kg (one kg equals 2.2 lb) in weight are spread over an area of several square miles. This is thought to indicate that several small meteorites fell in the area.

Havířov, town, Severomoravský *kraj* (Northern Moravia region), Czechoslovakia, on the Lučina River (a tributary of the Ostravice), just southeast of Ostrava. It is a planned new town in the Czech part of the Upper Silesian coalfield, associated with the Ostrava industrial region. Chartered in 1955, it quickly grew to become one of Czechoslovakia's larger cities. Pop. (1983 est.) 90,801.

Havlicek, John, byname HONDO (b. April 8, 1940, Martins Ferry, Ohio, U.S.), U.S. collegiate and professional basketball player who led the National Basketball Association (NBA) Boston Celtics' fast break offense and set a league record for the most 1,000-point seasons (16, 1963–78). In 1980 he was named to the NBA all-time team.

At Ohio State University (Columbus) Havlicek led his team to the National Collegiate Athletic Association championship in 1960, making nearly 60 percent of his shots. After graduation he signed with the professional National Football League Cleveland Browns but joined the Celtics in 1962. At 6 ft 5 in., he played both forward and guard on the Celtics team that won eight NBA championships (1963–66, 1968–69, 1974, 1976). He was noted for his endurance and for steals and scoring in crucial games. When he retired in 1978 he held the NBA record for most games played (1,270).

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Havlíček Borovský, Karel, pseudonym HAVEL BOROVSKÝ (b. Oct. 31, 1821, Borová, Bohemia, Austrian Empire—d. July 29, 1856, Prague), Czech author and political journalist, a master prose stylist who reacted against Romanticism and through his writings gave the Czech language a more modern character.

A student at Prague, Havlíček first became a tutor in Russia, but in the 1840s he became active as a Czech politician and journalist. He wrote numerous articles advocating constitutional reform and national rights, and in 1851 he was arrested, tried, and banished to Brixen until 1855. He also wrote a book of brilliant satirical poems, *Křest Svatého Vladima* (1876; *The Conversion of St. Vladimir*, 1930).

Havre, city, seat (1911) of Hill County, northern Montana, U.S., on the Milk River, near the Fresno Dam and Reservoir (west) and Rocky Boy Indian Reservation (south). It was named for Le Havre, Fr., the birthplace of the original homesteaders. The townsite was first located (1879) 5 mi (8 km) southwest, near Ft. Assiniboine (now an agricultural experiment station). After the Great Northern Railway was extended, Havre was relocated (1887) at the mouth of Bull Hook Creek and developed as a railroad division point and as a market for livestock and crops, notably wheat. Havre is the site of Northern Montana College (1929). Inc. town, 1892; city, 1903. Pop. (1980) 10,891.

Havre, Le, seaport and town, Seine-Maritime *département*, Haute-Normandie region,

northern France. It is on the English Channel coast and on the right bank of the Seine estuary, 134 miles (216 km) west-northwest of Paris and 53 miles (85 km) west of Rouen by road.

Le Havre was only a fishing village until 1517, when Francis I had a harbour built there named Havre-de-Grâce ("Haven of Grace"). Enlarged and fortified under the Cardinal de Richelieu and Louis XIV in the 17th century, it was adapted to accommodate bigger vessels under Louis XVI in the late 18th century and was further improved under Napoleon III in the mid-19th century. During World War II the Belgian government was transferred there for a short time after the fall of Antwerp and Ostend to the Germans.

Almost three quarters of Le Havre's buildings were destroyed during World War II but were subsequently rebuilt. The Place de l'Hôtel de Ville in the centre is one of the most spacious public squares in Europe. The 16th–17th-century Church of Notre-Dame is one of the few surviving old buildings; although damaged during World War II, it was restored in the 1970s. The Church of Saint-Joseph is an unusual reinforced-concrete edifice. The new museum, built in 1961, houses a collection saved from the old museum, which was destroyed in 1944. Paintings by the 19th-century painter Eugène Boudin and the 20th-century artist Raoul Dufy are housed there.

The harbour, rebuilt after World War II, was expanded in the early 1970s. Le Havre is the second port of France after Marseille and acts as an outport (seaward terminal for deep-draft vessels) of Paris. Before World War II it was one of the principal centres of passenger traffic with North America. This role has virtually ceased, however, because of air travel. Regular car-ferry services run to England and Ireland. Le Havre's main imports are fuel oil and tropical goods (cotton, coffee). Pipelines connect the port to refineries east of the town and carry the refined product to the Paris region. Petroleum-storage facilities exist at nearby Antifer. Elsewhere, major industrialization efforts have been made. Le Havre's industries now include the manufacture of machinery and automobiles, as well as the older, traditional manufacture of rope and the handling of timber. Pop. (1982) 198,700.

Havre-Saint-Pierre, village, Côte-Nord (North Shore) region, eastern Quebec province, Canada. It lies along the north shore of the Gulf of St. Lawrence, north of Anticosti Island. Settled in 1857 as an Acadian fishing community, it was known as Saint-Pierre-de-la-Pointe-aux-Esquimaux until the present name was adopted in 1930. Historically a fishing and lumbering centre, the village now serves as a titanium-ore transshipment port; the ore is transported from the mines at Lac Allard and loaded aboard ships bound for Sorel. Pop. (1981) 3,200.

haw (tree): *see* hawthorn.

Haw-Haw, Lord: *see* Joyce, William.

Hawaii, constituent state of the United States of America, occupying a group of volcanic islands in the central Pacific Ocean 2,397 miles (3,857 km) west of San Francisco. The capital is Honolulu.

A brief treatment of Hawaii follows. For full treatment, *see* MACROPAEDIA: United States of America: *Hawaii.*

The original Hawaiians were of Polynesian origin and came from the Marquesas Islands. They may have reached the Hawaiian Islands as early as AD 400 and were followed approximately 400 to 500 years later by a second wave of immigration from Tahiti. Captain James Cook is credited with the European discovery (1778) of the group, which he named the Sandwich Islands. In 1796 Kamehameha I emerged as monarch over the entire island group, which during most of the 19th century was known both as the Sandwich Islands and as the Hawaii Islands after Hawaii, the largest of the group. In 1820 the first missionaries from New England arrived, and Western influences began to change the islands. A constitution modeled after various American and British documents was adopted in 1840, and recognition of the kingdom's independence was granted by the United States, France, and Great Britain. Britain and France continued to intrigue for dominance over the islands, and in 1851 Kamehameha III placed Hawaii under U.S. protection. In 1887 the United States obtained the rights for a naval base at Pearl Harbor. Many Hawaiian and U.S. interests favoured annexation, but this was resisted by President Grover Cleveland and others. A coup fomented by U.S. sugar interests resulted in the overthrow of the monarchy and the establishment of a Republic of Hawaii in 1893. In 1898 the new republic and the United States agreed on annexation, and in 1900 Hawaii became a territory of the United States. Hawaii became an important base for the U.S. Navy's Pacific fleet, and the Japanese attack on the naval installation at Pearl Harbor in 1941 brought the United States into World War II. Hawaii became the 50th state of the U.S. in 1959.

The Hawaiian Islands are the tops of a chain of emerged volcanic mountains that form the eight major islands and 124 islets. The terrain is comparatively domelike in the geologically young areas; in the older areas there are abrupt, sharply grooved cliffs pocked with caves, deep valleys, and coastal plains. Because the topography is generally steep, there are few basins or lakes.

Hawaii's mild tropical climate is often described as ideal. Average temperatures in downtown Honolulu range from 72° to 78° F (22° to 26° C). Mountainous regions are considerably cooler, especially during winter. Variations in rainfall are dramatic. Mount Waialeale is often called the wettest spot in the world, with an annual rainfall of 444 inches (1,280 mm). Kawaihae, on the other hand, has an annual rainfall of less than 9 inches (230 mm).

The original Hawaiian population may have numbered 300,000 in 1778; by 1853, it had dropped to 70,000. People of at least part-Hawaiian descent comprise only one-eighth of Hawaii's total population, while those of Japanese ancestry are the single largest ethnic group, with one-fourth of the total. The majority of the state's residents live on Oahu Island, with almost 60 percent in the Honolulu urban area and another 20 percent in outlying districts. Hawaii's growth rate between 1970 and 1980 was more than twice the national average.

Agriculture remains of prime importance in the Hawaiian economy. Hawaii is one of the largest producers of sugarcane in the United States. Pineapple is also an important cash crop; sorghum and corn (maize) are widely cultivated. There are no important mineral resources.

Heavy industries include an oil refinery, a steel mill, several cement plants, a concrete-pipe plant, and an aluminum-extrusion plant. Canning of Hawaiian-grown foodstuffs is also important. Hawaii's largest industry, however, is tourism. The federal government is the second largest source of income; much of its spending is on defense-related items.

Ocean surface shipping is Hawaii's lifeline; Honolulu Harbor is the main port. There are three major civilian airports and a well-developed road network. There is no significant rail mileage.

Honolulu is noted for its Bernice P. Bishop Museum of the Pacific and its peoples, and the Honolulu Academy of Arts, known for its collection of late 19th- and early 20th-century art. The Neal Blaisdell Center is a municipal theatre-concert hall-arena complex. A unique educational institution is the Center for Cultural and Technical Interchange between East and West, sponsored by the federal government. Hawaii has daily newspapers in Japanese and Chinese as well as in English. Total area 6,471 square miles (16,759 square km). Pop. (1990 est.) 1,141,000.

Hawaii, volcanic island, Hawaii, U.S. It lies south of Maui Island and constitutes Hawaii county. Known as the Big Island, it is the largest (area 4,021 square miles [10,414 square km]) and southeasternmost of the Hawaiian Island group. It is the youngest geologically and was formed by five volcanoes connected by lava saddles (ridges). Kilauea is the world's largest active volcano. The island is roughly triangular in shape, with topographic features that include the often snowcapped peak of Mauna Kea, misty plateaus, craggy ocean cliffs, tropical coastal areas, lava deserts, and fern and bamboo forests. Hilo, the county seat, is on the east-central coast. Other important villages are Kailua-Kona, Honaunau, and Waimea. Sugar, tourism, cattle, orchid, and coffee industries are the chief economic factors. Pop. (1986 est.) 111,800.

Hawaii Volcanoes National Park, volcanic area along the southeast shore of Hawaii Island, U.S., southwest of Hilo. Established in 1961 and formerly a part of Hawaii National Park, it occupies an area of 229,177 acres (92,744 hectares) and includes two active volcanoes—Mauna Loa and Kilauea, 25 miles (40 km) apart. Other highlights are Kau Desert, a region of strange lava formations near Kilauea; Mauna Loa Trail, which wends its way to that volcano's summit; tree-fern forest, a dense tropical area watered by nearly 100 inches (2,500 mm) of rainfall annually; and the museum at the park headquarters. The area abounds with mongooses, wild goats and pigs, tropical birds, and pheasant and quail.

Hawaiian, any of the aboriginal people of Hawaii, descendants of Polynesians who migrated to Hawaii in two waves: the first from the Marquesas Islands, probably about AD 400; the second from Tahiti in the 9th or 10th century. Numbering about 300,000 at the time of Captain James Cook's discovery of the islands in 1778, full-blooded Hawaiians numbered fewer than 10,000 in the late 20th century (though there are large numbers of part-Hawaiians).

The Hawaiians were a brown-skinned people with straight or wavy black hair. They were large and of fine physique, like the New Zealand Maori, whose language resembled theirs. The ruling classes tended to inbreed. Polygyny and polyandry were practiced, especially among the chiefs. Rank descended mainly through the mother.

Hawaiian society's basic unit of land, the *ahupuaa,* usually extended from the shore to the mountaintop, with rights in the adjoining sea waters, so that the occupants had the means of supplying all their wants—the sea for fish; the littoral for coconuts; the valley for taro, their principal food; the lower slopes for sweet potatoes, yams, and bananas; and the mountain for wood. The next subdivision was called the *ili;* it was either subservient to the *ahupuaa* or independent. Within the *ili* were small areas, *kuleanas,* occupied by the common people, who also had certain rights of fishery, water, and mountain products. Besides open-sea fisheries, there were stone-walled fish ponds, some now 1,000 years old, built semicircularly from the shore. Taro was raised in terraces flooded by conduits from streams. Elaborate systems of water rights were evolved. A conqueror or a successor king often redistributed the lands.

Without metals, pottery, or beasts of bur-

den, the people made implements, weapons, and utensils of stone, wood, shell, teeth, and bone, and great skill was displayed in arts and industries. Their featherwork (capes, robes, helmets, leis, kahilis) has not been excelled. Houses were of wood frames and thatched, with stone floors covered with mats. Food was cooked in holes in the ground, called *imus,* by means of hot stones; but many foods, including fish, were often eaten raw. Many of the best foods were taboo to women. Men usually wore only a *malo,* or girdle, and women a skirt of *tapa,* or paper cloth, or leaves or fibre, though both sometimes wore mantles thrown over the shoulders. Canoes were outrigger or double, sometimes 100 feet (30 m) long. The men were excellent sailors, fishermen, and swimmers. Their year began on November 20 and consisted of 12 lunar months, with occasionally an intercalary month.

The Hawaiians excelled in athletics. Frequent contests were held, even between champions of different islands, in surfboarding on the crests of waves, swimming, wrestling, boxing, spear throwing (at each other), coasting while standing on narrow sleds, bowling, and running. They often gambled, and they made narcotic and fermented drinks of the *awa* (kava) or ti roots, but not distilled liquors. They were fond of music, both vocal and instrumental, and had percussion, string, and wind instruments, including a nose flute, but no mouth flute. Their dances were largely the hula of many varieties. They loved flowers, which they wore in leis around their necks and hats. The Hawaiians were also fond of oratory, poetry, history, storytelling, chants, riddles, conundrums, and proverbs. Without writing, knowledge of all sorts was preserved and taught to successive generations by persons specially trained for the purpose.

The Hawaiians held a vague belief in a future existence. They had four principal gods—Kane, Kanaloa, Ku, and Lono—and innumerable lesser gods and tutelary deities. Animals, plants, places, professions, families, and all other objects and forces had their gods or spirits. Temples of stone and idols of wood abounded, and hardly anything was undertaken without religious ceremonies. Priests and sorcerers were potent. On important occasions there were human sacrifices. There were places of refuge to which one might flee and be safe.

The Hawaiian political and religious systems were closely interwoven. During the last period before their discovery by Europeans, the nobility and priesthood tended to become more and more tyrannical, the common people more and more oppressed. The laws, chief among which were the intricate and oppressive taboos, bore heavily upon the masses, especially women, and their administration became largely a matter of arbitrariness and favouritism.

After the arrival of Christian missionaries beginning in 1820, there was a certain liberalization in government, including the abolition of the more repressive laws and taboos. However, the native population was weakened and decimated by Western diseases, and the native royal house came increasingly under the influence of American missionaries and foreign businessmen and planters. The first indentured Chinese field hands arrived in 1851, and the first Japanese in 1868; these and other foreigners eventually overwhelmed the native Hawaiians.

Hawaiian goose: *see* nene.

ḥawāmīm (Islām): *see* fawātiḥ.

Hawash River (Ethiopia): *see* Awash River.

Hawd Plateau, Hawd also spelled HAUD, plateau sloping southeastward and spanning the northern Ethiopian-Somali border, southeast of the northern Somalian highlands. It covers an area of about 25,000 square miles (64,750 square km) and slopes from about 4,000 feet (1,220 m) in the northwest to about 1,500 feet (450 m) in the southeast. It is a vast savanna of varying fertility and is a major wet-season grazing area for herds of camels, goats, and sheep kept by the Somali pastoralists. The Hawd Plateau has few permanent wells (except for areas in the west) and is thus mostly uninhabited during the dry season (January to April). Some natural depressions, filled during the rainy season from April to June, provide fresh pasturage for as long as five to six months.

Under the Anglo-Ethiopian treaty of 1897, Great Britain ceded the northeastern part of the Hawd Plateau, a traditional Somali grazing area, to Ethiopia. In 1960 the newly independent Somali government refused to acknowledge this transfer, and a major dispute erupted in 1964. Later, Ethiopia decided to continue to allow Somali pastoralists to cross the boundary and use the Hawd Plateau as they had been doing for centuries. In the late 20th century the boundary dispute between Ethiopia and Somalia had not been settled, and Somali nomads continued to move back and forth with the seasons throughout the plateau in their search of forage for their animals.

Hawea Lake, lake in west-central South Island, New Zealand, occupying 54 square miles (141 square km) of a valley dammed by a terminal moraine (glacial debris). The lake, 1,142 feet (348 m) above sea level, is 19 miles (31 km) long, 5 miles (8 km) wide, and 1,286 feet (392 m) deep. It drains an area of 536 square miles (1,388 square km). Its main affluent, the Hunter River, flows into the lake from east of the Southern Alps. The lake empties into the Hawea River, a tributary of the Clutha. A dam at the lake's outlet supplies electricity in connection with the Roxburgh hydroelectric project on the Clutha. Hawea, named for a local Maori tribe, was first seen by a European, Nathanial Chalmers, in 1853. The lake lies at the heart of a resort area 182 miles (293 km) northwest of Dunedin by road.

Hawera, town ("district"), western North Island, New Zealand. The original settlement, situated on the east Waimate Plain, 2 miles (3 km) from the coast of South Taranaki Bight, on the Tasman Sea, grew around a blockhouse built in 1870 for protection from hostile Maoris. The settlement became a borough in 1882, and in the late 1970s the borough was amalgamated with the surrounding county to form a district. The name, a Maori word meaning "burnt place," refers to a tale of intertribal warfare. Hawera has fat-lamb freezing works, and dairy, confectionery, soap, furniture, stock foods, engineering, clothing, coal gas, farm equipment, and motor body plants. It is on the Wellington-New Plymouth highway and rail line. Pop. (1988 est.) 11,350.

Hawes, Josiah Johnson: *see* Southworth, Albert Sands; and Hawes, Josiah Johnson.

Hawes, Stephen (fl. 1502–21), poet and courtier who served Henry VII of England and was a follower of the devotional poet John Lydgate, whom he called his master.

Hawes's main work is a long allegorical poem, *The Passetyme of Pleasure,* the chief theme of which is the education and pilgrimage through life of the knight Graunde Amoure. Completed in 1506, it was printed by Wynkyn de Worde in 1509. Another allegory by Hawes, *The Example of Vertu,* is simpler and shorter. Though he shows at times a finer quality of mind than Lydgate, Hawes is not even Lydgate's equal in technical accomplishment, and little of his prolix, repetitious verse is memorable.

Little is known of Hawes's life beyond the facts that he was educated at the University of Oxford, traveled in England, Scotland, and France, and in 1502 was groom of the chamber to Henry VII. He was alive in 1521, but his date of death is unknown.

hawk, any of many small to medium-sized diurnal birds of prey, particularly those in the genus *Accipiter,* known as the true hawks, and including the goshawks and sparrowhawks. The term hawk is often applied to other birds in the family Accipitridae (such as the kites, buzzards, and harriers) and sometimes is extended to include certain members of the family Falconidae (falcons and caracaras).

The great majority of hawks are more useful to humans than they are harmful, but there is still widespread prejudice against them. Occasionally they destroy poultry and smaller birds, but usually they eat small mammals, reptiles, and insects. Hawks have many foraging techniques, but the most typical in their pursuit of prey is raking, or swiftly following the animal's efforts to escape. Once the hawk has secured the prey with its powerful talons, the bird dismembers it with its sharply pointed, strong beak.

Hawks occur on the six major continental areas. Most species nest in trees, but some, like the marsh hawk, nest on the ground in grassy places, and others nest on cliffs. They lay from three to six brown-spotted eggs.

The so-called true hawks—members of the genus *Accipiter* (sometimes also called accipiters)—are exemplified by the sharp-shinned hawk (*A. striatus*), a bird with a 30-centimetre (12-inch) body length, gray above with fine rusty barring below, found through much of the New World, and by Cooper's hawk (*A. cooperii*), a North American species similar in appearance but larger—to 50 cm long. A long tail and short, rounded wings give these fast, low-flying birds great maneuverability. They feed on birds and small mammals; of all the New World raptors, Cooper's hawk is most suspect when poultry yards are raided. The goshawk and the sparrowhawk are also members of this group.

The buteos, also called buzzard hawks, are broad-winged, wide-tailed, soaring raptors found in the New World, Eurasia, and Africa. The red-tailed hawk (*Buteo jamaicensis*), the most common North American species, is about 60 cm long, varying in colour but generally brownish above and somewhat lighter below with a rufous-coloured tail. This beneficial hunter preys mainly on rodents, but it also catches other small mammals as well as various birds, reptiles (including rattlesnakes and copperheads), amphibians, and even insects. The red-shouldered hawk (*B. lineatus*), common in eastern and Pacific North America, is a reddish brown bird about 50 cm long, with closely barred underparts.

The black hawks are two species of short-tailed and exceptionally wide-winged black buteos. The great black hawk, or Brazilian eagle (*Buteogallus urubitinga*), about 60 cm long, ranges from Mexico to Argentina; the smaller common, or Mexican, black hawk (*B. anthracinus*) has some white markings and ranges from northern South America into the southwestern United States. Both species feed on frogs, fish, crabs, and other aquatic creatures.

Some other buteos are the following. Harris's, or the bay-winged, hawk (*Parabuteo unicinctus*), a large black bird with inconspicuous brown shoulders and flashing white rump, is found in South America and northward into the southwestern United States. The broad-winged hawk (*B. platypterus*), a crow-sized hawk, gray-brown with a black-and-white-banded tail, is found in eastern North America, where it migrates in large flocks. Swainson's hawk (*B. swainsoni*) is a bird of western North America that migrates to Argentina. Two notable rough-legged hawks are the fer-

ruginous hawk (*B. regalis*)—the largest North American buzzard (up to 63 cm long)—and the rough-legged hawk (*B. lagopus*) of both the Old and New Worlds.

The African harrier hawk (*Polyboroides typicus*) and the crane hawk (*Geranospiza nigra*) of tropical America are medium-sized gray birds resembling the harriers but having short broad wings.

The relationship of the Accipitridae and the Falconidae creates some confusion regarding classification and naming of species, and some names seem—to the layperson, at least—to be used interchangeably. For example, in the harrier group, a genus (*Circus*) of hawks, only one species, the marsh hawk of the United States, is commonly called a hawk; the same bird is known in Britain as the hen harrier. Many falcons are known locally as hawks but have other, more widespread common names—*e.g.*, the sparrow hawk, or kestrel; the duck hawk, or peregrine falcon; and the pigeon hawk, or merlin. Another related species, the fish hawk, is better known by the name osprey.

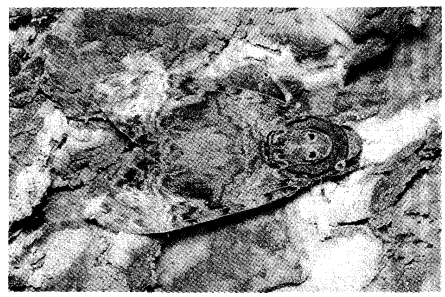
Red-tailed hawk (*Buteo jamaicensis*)
Alan Carey

Some unrelated birds are also called hawks, such as the hawk owl, a bird of prey of the family Strigidae (order Strigiformes).

hawk moth, also called SPHINX MOTH, or HUMMINGBIRD MOTH, any member of the cosmopolitan insect family Sphingidae (order Lepidoptera), named for its hovering, swift flight patterns. These stout-bodied moths have long, narrow forewings and shorter hindwings, with wingspans ranging from 5 to 20 cm (2 to 8 inches). Many species pollinate flowers such as orchids and petunias while sucking nectar; the proboscis (feeding organ) of some species measures up to 32.5 cm. Some hawk moths migrate.

The common name for *Acherontia atropos,* death's head moth, derives from the fancied facsimile of a human skull on the upper surface of the body. Common in Europe and Africa, these moths have a short proboscis and often feed on honey from beehives. They produce loud chirping or squeaking sounds by forcing air out through the tongue. In the larval stage the sounds are distinct, cracking noises.

The leaf-feeding larva generally has a smooth body with a characteristic dorsal caudal horn: hence the common name hornworm. Two economically destructive North American species—the tobacco, or southern, hornworm (*Protoparce sexta*) and the tomato, or northern, hornworm (*P. quinquemaculata*)—attack tomato, tobacco, and potato crops. These leaf-feeding pests are green and can be 10 cm (4 inches) long. Control includes the use of a natural enemy, the braconid wasp (*Apanteles congregatus*), which parasitizes the larvae.



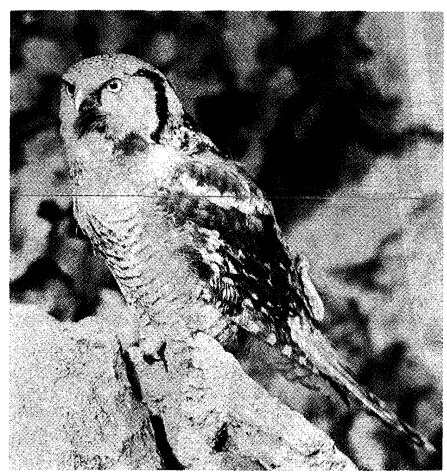
Death's head moth (*Acherontia atropos*)
E.S. Ross

Pupation occurs in an earthen cell or loose cocoon at surface level.

hawk owl, any of numerous birds of prey of the family Strigidae (order Strigiformes).

The northern hawk owl (*Surnia ulula*) is approximately 40 cm (about 16 inches) long. Its tail is long, and its wings are short and pointed like those of a hawk. The facial disk of the northern hawk owl does not extend above the eyes, and it has no ear tufts. It feeds on small mammals, birds, and insects, hunting during the day rather than at night as do other owls. The range of the northern hawk owl is over northern Europe, northern Asia, and Canada.

Other owls called hawk owls are the New Guinea hawk owl (*Uroglaux dimorpha*) and about 18 species of *Ninox*. They are not strictly diurnal but nocturnal as well.



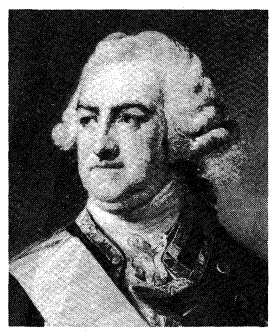
Northern hawk owl (*Surnia ulula*)
I. Moretti

The Oriental hawk owl (*Ninox scutulata*), about 20 cm long, ranges from Indonesia to Sri Lanka, the Himalayas, Japan, and eastern Siberia. It eats insects, small mammals, and birds. The great hawk owl (*N. strenua*) of southeastern Australia is much larger, about 50 cm long. It eats magpies, rabbits, rats, and possums.

Hawke (of Towton), Edward Hawke, 1st Baron (b. Feb. 21, 1710, London, Eng.—d. Oct. 17, 1781, Sunbury, Middlesex), British admiral whose naval victory in 1759 put an end to French plans to invade Great Britain during the Seven Years' War (1756–63).

Hawke joined the navy in February 1720 and was promoted to rear admiral for his distinguished service against the French in the War of the Austrian Succession (1740–48). In October 1747 he captured six French warships in a brilliant action off the coast of Brittany.

As commander of the fleet blockading the French naval station of Brest in 1759, Hawke played a vital role in the conquest of Canada by the British when he prevented reinforcements from reaching the French army in Canada. The French decided, as a counteroffensive, to invade Great Britain; the French fleet at Brest was crucial to this plan. On Nov. 14, 1759, the French admiral Hubert de Brienne, Count de Conflans, taking advantage of an opening in Hawke's blockade, headed southeast from Brest along the French coast to pick up troops for the invasion. Six days later Hawke's fleet of some 23 ships caught up with Conflans' 21-vessel squadron and drove it into Quiberon Bay. During a three-hour battle and its aftermath, nine French ships were destroyed, and the French unit was rendered incapable of further aggressive action. Hawke then retired from sea duty. He served as first lord of the Admiralty from 1766 to 1771 and was made a baron in 1776.



1st Baron Hawke, detail of an oil painting by F. Cotes; in the National Maritime Museum, Greenwich, Eng.
By courtesy of the National Maritime Museum, Greenwich, Eng.

BIBLIOGRAPHY. Hawke's career is recounted in Ruddock F. Mackay, *Admiral Hawke* (1965).

Hawke, Robert (James Lee), byname BOB HAWKE (b. Dec. 9, 1929, Bordertown, S.Aus., Australia), Australian labour leader and prime minister of Australia from 1983.

After graduating from the University of Western Australia with a degree in law, Hawke spent three years at the University of Oxford as a Rhodes Scholar. He was briefly an economics researcher at the Australian National University in Canberra and in 1958 joined the Australian Council of Trade Unions (ACTU), the umbrella organization of the country's tightly organized labour movement. As president of the ACTU from 1970 to 1980, Hawke proved to be a brilliant trade-union official, getting favourable settlements for the unions before Australia's arbitration commissions. Hawke had also joined the Australian Labor Party (ALP) as a student, and he rose through the ranks to serve as the party's national president from 1973 to 1978. By the time he successfully ran for Parliament in 1980 as a Labor candidate, Hawke already enjoyed immense national popularity. In February 1983 Hawke was elected leader of the ALP, and in the elections held the following month he led his party to a landslide victory over the Liberal Party, becoming prime minister of Australia.

As prime minister, Hawke achieved greater industrial harmony by instituting a unified wage accord among Australia's fractious labour unions. He also was able to lower the rate of inflation, and he continued to maintain close relations with the United States. Hawke was reelected prime minister in the elections he had called for December 1984. His popularity remained high among the public, who liked his frank and genial personal demeanour. The Labor Party maintained its electoral majority in the 1987 elections, but because of a worsening economy his parliamentary majority was considerably reduced in the 1990 election.

Hawke's Bay, local government region, eastern North Island, New Zealand. It consists mostly of the hill country fronting Hawke Bay to the east, stretches from the Mahia

Peninsula in the northeast to the vicinity of Cape Turnagain in the southeast, and is noted for its rolling sheep lands. The region covers an area of 4,786 square miles (12,396 square km) and extends westward to the Huiarau, Maungaharuru, Kaweka, and Ruahine mountain ranges; the only large patch of low-lying land is the Heretaunga Plain near the city of Hastings. Hastings is a food-processing centre for the surrounding orchards, market gardens, and vineyards. The city of Napier on Hawke Bay, rebuilt after a major earthquake in 1931, is New Zealand's largest wool wholesale centre and is also a major resort area. Pop. (1988 est.) 141,200.

Hawkesbury, Robert Banks Jenkinson, 2nd Baron: *see* Liverpool, Robert Banks Jenkinson, 2nd Earl of.

Hawkesbury River, river rising in the Great Dividing Range north of Lake George, New South Wales, Australia, and flowing 293 miles (472 km) north and east to the Tasman Sea at Broken Bay. It drains an area of about 8,390 square miles (21,730 square km). Known as the Wollondilly in its rugged upper course and as the Warragamba after receiving the Nattai and, later, the Nepean rivers, it becomes the Hawkesbury after its junction with the Grose. It then continues on a meandering course for 100 miles (160 km), becoming a salt tidal stream after receiving the Colo River. Riparian towns include Camden, Penrith, and Windsor, and there are many scenic valley resorts. The river's fertile alluvial flats are subject to floods. Explored in 1789 by Captain Arthur Phillip, first governor of the Australian colony, it was named for Lord Hawkesbury.

Hawkesworth, John (b. 1715?—d. Nov. 16, 1773, London, Eng.), English writer, Samuel Johnson's successor as compiler of parliamentary debates for the *Gentleman's Magazine.*

Hawkesworth, engraving by James Watson, after a portrait by Sir Joshua Reynolds

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Hawkesworth collaborated with Johnson (whose prose style he closely imitated) in founding a periodical, *The Adventurer.* He wrote poems and articles for both these publications, adapted plays for the actor-manager David Garrick, and wrote miscellaneous original dramatic works. His cocksure attitudes alienated many friends, including Dr. Johnson. He was commissioned by the British Admiralty to compile *An Account of the Voyages Undertaken in the Southern Hemisphere* (1773), dealing chiefly with the voyages of exploration of Captain James Cook; but the work was severely criticized for inaccuracy and for failing to attribute escapes at sea to the workings of divine providence.

hawking: *see* falconry.

Hawking, Stephen W(illiam) (b. Jan. 8, 1942, Oxford, Oxfordshire, Eng.), British theoretical physicist whose theory of exploding black holes drew upon both relativity theory and quantum mechanics. He also worked with space-time singularities.

After graduating from St. Alban's school, Hawking studied mathematics and physics at University College, Oxford (B.A., 1962), and Trinity Hall, Cambridge (Ph.D., 1966). He was elected a Research Fellow at Gonville and Caius College at Oxford. In the early 1960s Hawking contracted amyotrophic lateral sclerosis, an incurable degenerative neuromuscular disease. He continued to work despite the disease's progressively disabling effects.

Hawking worked primarily in the field of general relativity and particularly on the physics of black holes. In 1971 he suggested the formation, following the big bang, of numerous objects containing as much as 1,000,000,000 tons of mass but occupying only the space of a proton. These objects, called mini black holes, are unique in that their immense mass and gravity require that they be ruled by the laws of relativity, while their minute size requires that the laws of quantum mechanics apply to them also. In 1974 Hawking proposed that, in accordance with the predictions of quantum theory, black holes emit subatomic particles until they exhaust their energy and finally explode. Hawking's work greatly spurred efforts to theoretically delineate the properties of black holes, objects about which it was previously thought that nothing could be known. His work was also important because it showed these properties' relationship to the laws of classical thermodynamics and quantum mechanics.

Hawking's contributions to physics earned him many exceptional honours. In 1974 the Royal Society elected him one of its youngest fellows. He became professor of gravitational physics at Cambridge in 1977, and in 1979 he was appointed to Cambridge's Lucasian professorship of mathematics, a post once held by Isaac Newton.

His publications include *The Large Scale Structure of Space-Time* (1973; coauthored with G.F.R. Ellis), *Superspace and Supergravity* (1981), *The Very Early Universe* (1983), and the best-seller *A Brief History of Time: From the Big Bang to Black Holes* (1988).

Hawkins, Coleman (b. Nov. 21, 1904, St. Joseph, Mo., U.S.—d. May 19, 1969, New York, N.Y.), American jazz musician whose improvisational mastery of tenor saxophone, which had previously been viewed as little more than a novelty, helped establish it as one of the most popular instruments in jazz.

At age four Hawkins began to study the piano, at seven the cello, and at nine the saxophone. He became a professional musician in his teens, and some of his greatest work was done with the Fletcher Henderson big band between 1923 and 1934. He left that band to tour Europe (1934–39) and on his return was one of the few established musicians to encourage the unorthodoxies of the modernists.

Coleman Hawkins, *c.* 1943

By courtesy of *down beat* magazine

Hawkins was one of the first jazz horn players with a full understanding of intricate chord progressions, and he influenced many of the great saxophonists of the swing era (Ben Webster and Chu Berry) as well as leading figures in modern jazz (Sonny Rollins and John Coltrane). Hawkins' deep, full-bodied tone and quick vibrato was the expected style on jazz tenor until the advent of Lester Young, and even after Young's appearance many players continued to absorb Hawkins' approach. He was one of the strongest improvisers in jazz history, delivering harmonically complex lines with an urgency and authority that demanded the listener's attention. He played with inspiration for decades, managing to convey fire in his work long after his youth. His most acclaimed recording was a combo version of "Body and Soul" made in 1939.

Hawkins, Sir John, Hawkins also spelled HAWKYNS (b. 1532, Plymouth, Devon, Eng.—d. Nov. 12, 1595, at sea off Puerto Rico), English naval administrator and commander,

Sir John Hawkins, detail of a portrait by an unknown artist, 1591; in the City Art Gallery, Plymouth, Eng.

By courtesy of the City Art Gallery, Plymouth, Eng.

one of the foremost seamen of 16th-century England and the chief architect of the Elizabethan navy.

A kinsman of Sir Francis Drake, Hawkins began his career as a merchant in the African trade and soon became the first English slave trader. By carrying slaves from Guinea, in West Africa, to the Spanish West Indies, he provoked conflict with the Spaniards, who did not allow unauthorized foreigners to trade with their colonies. Hawkins' first slave-trading voyage, in 1562–63, on behalf of a syndicate of London merchants, was so profitable that a more prestigious group, including Queen Elizabeth I, provided the money for a second expedition (1564–65). His third voyage, with Drake in 1567–69, however, ended in disaster. After selling the slaves in the Caribbean, Hawkins was forced by needed repairs and lack of water to take refuge at San Juan de Ulua, near Veracruz, Mex. A Spanish fleet attacked him in the harbour, and, of the six ships, only the two commanded by Hawkins and Drake were able to escape. This episode marked the beginning of the long quarrel between England and Spain that eventually led to open war in 1585.

Hawkins soon avenged himself; by gaining the confidence of Spain's ambassador to England, he learned the details of a conspiracy (the so-called Ridolfi plot of 1571) in which

English Roman Catholics, with Spanish assistance, were to depose Queen Elizabeth and install Mary Stuart, Queen of Scots, on the English throne. Hawkins notified his government, and the English plotters involved were arrested.

In 1577 Hawkins succeeded his father-in-law, Benjamin Gonson, as treasurer of the navy; later (1589) he was to assume the additional duties of controller. His high naval post enabled him to direct the rebuilding of the older galleons and to contribute to the design of faster, more heavily armed ships. It was this new, swift-sailing navy that withstood the Spanish Armada in 1588. Hawkins was third in command during the Armada crisis (during which he was knighted), and afterward he devised the strategy—quite original for that period—of setting up a naval blockade at the Azores to intercept Spanish treasure ships returning from the New World.

In 1595 Hawkins and Drake sailed with 27 ships to raid the Spanish West Indies. Hawkins died the night before an unsuccessful attack on Puerto Rico. His life is the subject of J.A. Williamson's *Sir John Hawkins* (1927) and *Hawkins of Plymouth* (1949; 2nd ed., 1969).

Hawkins, Sir John (b. March 30, 1719, London—d. May 21, 1789, London), English magistrate, writer, and author of the first history of music in English.

Hawkins was apprenticed as a clerk and became a solicitor. In 1759 a legacy enabled him to sell his practice. A Middlesex magistrate from 1761, Hawkins was elected chairman of the quarter sessions in 1765. He was knighted in 1772.

Hawkins wrote, among other works, an annotated edition of Izaak Walton's *Compleat Angler* (1760) and legal articles. His biography of Samuel Johnson, published with his 1787 edition of Johnson's works, was superseded only by Boswell's. Hawkins was among Johnson's closest friends and was an executor of Johnson's will.

Hawkins' *General History of the Science and Practice of Music* occupied him for 16 years. It was published in five volumes in 1776, a few weeks before Charles Burney's celebrated *General History of Music.* Hawkin's book continues to be invaluable as a mine of detailed information, some of it unavailable elsewhere, but it was eclipsed by Burney's.

Hawkins, Sir Richard, Hawkins also spelled HAWKYNS (b. *c.* 1560—d. April 18, 1622, London), English seaman and adventurer whose *Observations in His Voyage Into the South Sea* (1622) gives the best extant idea of Elizabethan life at sea and was used by Charles Kingsley for *Westward Ho!.*

The only son of the famed seaman Sir John Hawkins by his first marriage, Richard Hawkins in 1582 sailed with his uncle William to the West Indies; in 1585 he commanded a ship on Sir Francis Drake's raid on the Spanish Main and was a ship captain during the Armada campaign (1588).

In June 1593 he sailed from Plymouth in the "Dainty" with two smaller vessels, which parted company before reaching the Pacific. In February 1594 he sighted what he called Hawkins Maidenland, probably the Falkland Islands, which had been discovered two years previously by John Davis. After burning four ships at Valparaíso, Hawkins continued up the coast until he met six Spanish warships off Callao. He overcame them; but on June 22, when north of Paita, he was wounded and forced to surrender after a fight lasting three days with two more Spanish ships. He was imprisoned at Lima and then from 1597 till 1602 in Spain, at which date his ransom of £3,000 was paid. On his return he was knighted and elected mayor and MP for Plymouth. In 1608, after five years as vice-admiral of Devon, he was arrested and fined for condoning piracy. In 1620 he sailed as second in command of an ineffective expedition against the Algerine corsairs.

His *Observations in His Voyage Into the South Sea* was printed in 1622, having been composed about 1603.

Hawks, Howard (Winchester) (b. May 30, 1896, Goshen, Ind., U.S.—d. Dec. 26, 1977, Palm Springs, Calif.), U.S. motion-picture director who maintained a consistent personal style within the framework of the traditional film genres. His pictures, which starred Hollywood's most noted actors, were marked by the effective establishment and sustenance of mood and by an intimacy created by filming from the eye level of a spectator.

Hawks was a professional race-car driver before going to Hollywood in 1922 as a director. *A Girl in Every Port* (1928), his first important picture, was followed by internationally popular features that included the adventure films *The Dawn Patrol* (1930), *Only Angels Have Wings* (1939), and *Hatari!* (1962); the crime films *Scarface* (1932), *To Have and Have Not* (1944), and *The Big Sleep* (1946); and the westerns *Red River* (1948), *Rio Bravo* (1959), and *El Dorado* (1967).

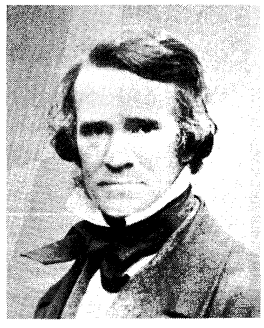
Hawks's heroes in his adventure, crime, and western films are essentially professionals, men who quietly accept the often dangerous responsibilities of their careers. In comedies such as *Twentieth Century* (1934), *Bringing Up Baby* (1938), and *His Girl Friday* (1940) the treatment of the hero is reversed; his self-respect is diminished, often by a woman.

hawk's-eye, variety of the semiprecious quartz tiger's-eye (*q.v.*).

Hawksbee, Francis: *see* Hauksbee, Francis.

Hawkshaw, Sir John (b. 1811, Yorkshire, Eng.—d. June 2, 1891, London), British civil engineer noted for his work on the Charing Cross and Cannon Street railways, with their bridges over the Thames River, and the East London Railway, which utilized Sir Marc Isambard Brunel's Thames tunnel.

In 1845 Hawkshaw became chief engineer of the Manchester and Leeds Railway, introducing steeper gradients than any previously built. As a consulting engineer in London

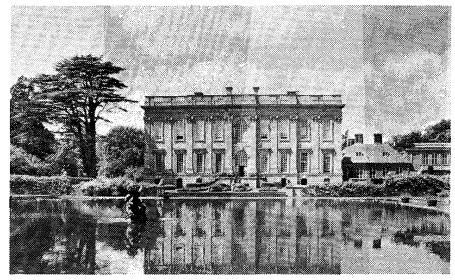


Hawkshaw
By courtesy of the Science Museum, London

(1850), he worked, with Sir John Wolfe-Barry, on the underground District Railway. He designed the nearly mile-long bridge over the Narmada River in India and in 1862 became the engineer for the Amsterdam ship canal. The following year he visited Egypt, where he reported in favour of Ferdinand de Lesseps' proposed site for the Suez Canal; Hawkshaw's report was decisive in allowing the work to continue. He was elected a fellow of the Royal Society in 1855 and knighted in 1873.

Hawksmoor, Nicholas (b. *c.* 1661, probably at East Drayton, Nottinghamshire, Eng.—d. March 24/25, 1736, London), English architect whose association with Sir Christopher Wren and Sir John Vanbrugh long diverted critical attention from the remarkable originality of his own Baroque designs for churches and other institutional buildings.

First employed by Wren about 1679, Hawksmoor owed his professional advancement in part to the political influence of the elder architect. He aided Wren in building St.

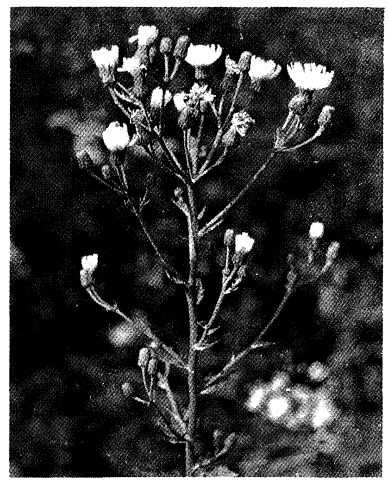


East front of Easton Neston, Northamptonshire, England, designed by Nicholas Hawksmoor, 1700–02
A.F. Kersting

Paul's Cathedral, London (completed 1711), and Vanbrugh in constructing Castle Howard, Yorkshire (1699–1726), and Blenheim Palace, Oxfordshire (1705–16). On the death of Wren (1723), Hawksmoor became surveyor general (chief architect) of Westminster Abbey, the west towers of which were built (1734–45) to his design. Earlier (from 1692), he was responsible for various university buildings at Oxford.

In October 1711 Hawksmoor was appointed one of two surveyors (architects) to the Commission for Fifty New Churches (to be built in the cities of London and Westminster and their immediate environs). In this capacity he designed, among other churches, the four on which his reputation as a Baroque genius mainly rests: St. Anne, Limehouse (1714–30), St. George-in-the-East (1714–29), Christ Church, Spitalfields (1714–29), and St. Mary Woolnoth (1716–24).

hawkweed, any of the weedy plants of the genus *Hieracium* of the family Asteraceae, containing more than 200 species native to temperate regions of the world. Mouse-ear hawkweed (*H. pilosella*), orange hawkweed



Panicled hawkweed (*Hieracium paniculatum*)
Peter L. Ames—EB Inc.

(*H. aurantiacum*), and common hawkweed (*H. vulgatum*) are widely distributed weeds.

Some species are cultivated as garden ornamentals for their attractive flower clusters. They are variously known as devil's paintbrush, golden lungwort, mouse-ear, rattlesnake weed, and shaggy, orange, or narrow-leaved hawkweed.

Hawkwood, Sir John, Italian byname GIOVANNI ACUTO (b. *c.* 1320, Sible Hedingham,

Essex, Eng.—d. March 16/17, 1394, Florence), Mercenary captain who for 30 years played a role in the wars of 14th-century Italy.

The son of a tanner, Hawkwood chose a soldier's career, serving in the French wars of Edward III, who probably bestowed a knighthood on him. After the Treaty of Brétigny temporarily ended Anglo-French hostilities (1360), Hawkwood became the leader of a free company, going to Italy three years later to join the English band known as the White Company in the service of Pisa. He was elected captain general in January 1364. Using the English longbow and tactics developed by the English in France, he became famous for the rapidity of his movements, made possible by lighter armour and equipment, for his handling of infantry, and for the discipline of his troops.

Between 1372 and 1378 he alternately served the Pope and the Duke of Milan, whose illegitimate daughter he married in 1377. The following year he became captain general of Florence, fighting for other clients when his services were not needed by the Florentine republic.

In 1382 he sold lands given him by the Pope in the Romagna (near Ravenna) and bought estates near Florence; nine years later he became an honorary Florentine citizen. In 1394, preparing to return to England to spend his last years, he sold his Italian properties but died before his plan could be carried out.

Hawkyns, Sir John: *see* Hawkins, Sir John.

Hawkyns, Sir Richard: *see* Hawkins, Sir Richard.

Haworth, locality, Bradford district, metropolitan county of West Yorkshire, England, overlooking the River Worth and adjoining the town of Keighley. In 1820 the Rev. Patrick Brontë brought his wife and six children—including Charlotte, Emily, and Anne, later of international literary fame—to Haworth. The Church of St. Michael contains their family memorials, while the adjacent parsonage (1779) has, since 1928, housed the museum of the Brontë Society (founded 1893). Pop. (latest census) 3,923.

Consult the INDEX *first*

Haworth, Sir (Walter) Norman (b. March 19, 1883, Chorley, Lancashire, Eng.—d. March 19, 1950, Birmingham), British chemist, winner, with the Swiss chemist Paul Karrer, of the 1937 Nobel Prize for Chemistry for his work in determining the chemical structures of carbohydrates and vitamin C.

Haworth joined the faculty of St. Andrews University in 1912. While in Fife, he worked with the British chemists Sir James Irvine and Thomas Purdie in the study of carbohydrates, including sugars, starch, and cellulose. They found that sugars have a ringlike, rather than a straight-line, arrangement of their carbon atoms; these ringlike representations of sugar molecules have come to be known as Haworth formulas.

In 1925 he became director of the chemistry department at the University of Birmingham, where he turned to the study of vitamin C, which is structurally similar to simple sugars. In 1934, with the British chemist Sir Edmund Hirst, he succeeded in synthesizing the vitamin, the first to be artificially produced. This accomplishment not only constituted a valuable addition to knowledge of organic chemistry but also made possible the cheap production of vitamin C (or ascorbic acid, as Haworth called it) for medical purposes. Haworth was knighted in 1947.

ḥawrā', plural ḤŪR, English HOURI, in Islām, a beautiful maiden who awaits the devout Muslim in paradise. The word *ḥawrā'* signifies the contrast of the clear white of the eye to the blackness of the iris. There are numerous references to the *ḥūr* in the Qur'ān (Islāmic sacred scriptures) during the Meccan period, describing them as "purified wives" and "spotless virgins." Tradition elaborated on the sensual image of the houri and defined some of her functions; on entering paradise, for example, the believer is presented with a large number of houris, with each of whom he may cohabit once for each day he has fasted in Ramaḍān and once for each good work he has performed.

Some theologians, such as al-Bayḍāwī, preferred to give the houri a metaphorical interpretation. It has also been suggested that Muḥammad reinterpreted angels he saw in pictures of Christian paradise as houris.

Ḥawrān, also spelled HAURĀN, region of southwestern Syria extending southeastward from Mt. Hermon to the Jordanian frontier. Although rock-strewn and almost completely devoid of trees, the plain has very fertile soil and sufficient rainfall to make it a productive wheat-growing region. Other crops include barley, beans, and beets. Divided between the Nabataeans and the Romans until AD 106, the Ḥawrān was then united under Roman rule as the province of Auranitis and enjoyed its greatest prosperity and growth. Christianity was introduced as early as the 2nd–3rd century and flourished until the spread of Islām in the early 7th century. Today the Ḥawrān is populated largely by the Druze, a fiercely independent Islāmic sect; they migrated there from Lebanon in 1711 and again in 1860. Its area is primarily within the *muḥāfaẓah* (governorate) of Dar'ā. Principal towns include Dar'ā, Izra', and Buṣrā ash-Shām—all Hellenistic settlements.

Hawrani, Akram al- (b. 1910, Ḥamāh, Syria), radical politician and leader of the peasants, who had a determining influence on the course of Syrian politics in the two decades after World War II (1939–45).

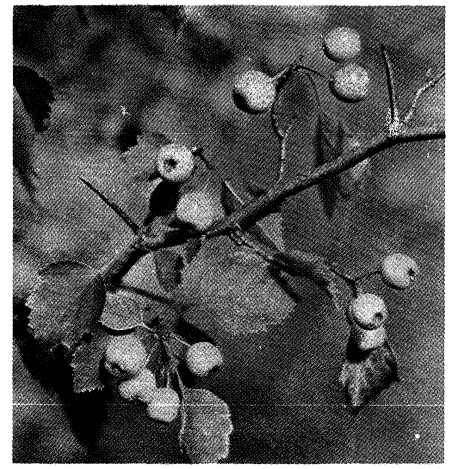
Hawrani's radical orientation had its roots in direct personal experience rather than in intellectual reflection. He resented the large landlords' exploitation of the Syrian peasantry and strove to rouse the latter to a militant defense of their interests. After Adib ash-Shishakli seized power with a military coup in December 1949, Hawrani gave expression to the ideological impulses of the regime by leading agitation on behalf of the peasantry. Shishakli banned political parties in 1951, however, and Hawrani became estranged from the regime.

Late in 1952 Hawrani fled to Lebanon with Michel 'Aflaq, leader of the Ba'th Party, which espoused Arab unity and Socialism. Hawrani and 'Aflaq decided to combine their efforts. Although their role in the overthrow of Shishakli (February 1954) was not critical, the Ba'th under their influence became a dynamic element in Syrian and inter-Arab affairs. They were instrumental in the events that led to formation of the United Arab Republic (U.A.R.; a union of Syria and Egypt) in 1958.

Hawrani became a vice president of the U.A.R. and chairman of the executive council for the Syrian province. But despite the expectation of the Ba'th leaders to exert a large measure of influence over Syrian affairs, the party's power was sharply reduced. Hawrani and the other Ba'thists in important offices resigned en bloc from the U.A.R. government in December 1959. In 1961 Syria seceded from the U.A.R., and Hawrani became a deputy in the newly formed Syrian Parliament.

Hawrani denounced the Egyptian president Gamal Abdel Nasser's dictatorial policies and eventually broke with 'Aflaq, who still saw Nasser as the only person around whom an effective Arab union could be built. Hawrani formed a new party, and 'Aflaq declared him to have been expelled from the Ba'th. The secessionist regime was overthrown by a military coup in March 1963, and Hawrani was jailed. Though subsequently released, he ceased to play a vital role in Syrian affairs.

hawthorn, also called HAW, or THORNAPPLE, any of a number of thorny shrubs or small trees of the genus *Crataegus*, in the rose family (Rosaceae), native to the North Temperate Zone. Many species and cultivated varieties are grown as ornamentals for their white masses of spring flowers and red fruits. Some species are characterized by horizontal branching, a growth habit considered to enhance their ornamental value.



Hawthorn (*Crataegus*)
Walter Chandoha

Two haws that make ideal hedges because of their denseness and thorny branches are the English midland hawthorn (*C. oxyacantha*, or *C. laevigata*) and the quick thorn (*C. monogyna*), both growing to 9 metres (30 feet) in height. *C. laevigata* has given rise to several cultivated varieties with showier flower clusters, in pink and red; unfortunately the species and its varieties often suffer from leaf spot, fire blight, and cedar-hawthorn rusts, which cause early defoliation and decline.

A most strikingly thorned American species is the cockspur hawthorn (*C. crus-galli*), with curved thorns up to 8 centimetres (3 inches) long; a thornless variety is also available. Washington hawthorn (*C. phaenopyrum*, or *C. cordata*) is famous for its red autumn colour and its abundant clusters of orange-red fruits that persist on the twigs well into winter; it is somewhat susceptible to rust but is otherwise a durable and much used ornamental. Downy, or red, haw (*C. mollis*) has whitish hairs on young twigs and downy leaves. Lavalle hawthorn (*C.* × *lavallei*) is a compact vase-shaped tree with dense glossy foliage.

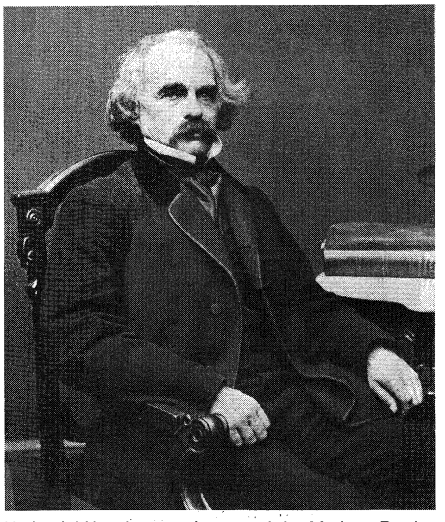
Numerous wild species provide thickets in the eastern half of the United States, including green (*C. viridis*), May (*C. opaca*), Allegheny (*C. intricata*), dotted (*C. punctata*), and fleshy (*C. succulenta*) hawthorns.

Hawthorn, John Michael, byname MIKE HAWTHORN (b. April 10, 1929, Mexborough, Yorkshire, Eng.—d. Jan. 22, 1959, near Onslow, Surrey), automobile racer, first British world champion driver (1958).

Hawthorn won his first motorcycle race at 18, turned to sports cars at 21, and two years later, driving a Cooper–Bristol, defeated Juan Manuel Fangio at Goodwood. In 1953, driving for Ferrari, he won the French Grand Prix from Fangio; in 1955 he won the tragic Le

Mans race, during which 83 spectators were killed. He raced for Ferrari in 1957 and 1958. Hawthorn was killed in a road accident about six weeks after announcing his retirement from racing.

Hawthorne, Nathaniel (b. July 4, 1804, Salem, Mass., U.S.—d. May 19, 1864, Plymouth, N.H.), American novelist and short-story writer who was a master of the allegorical and symbolic tale. One of the greatest fiction writers in American literature, he is best-known for *The Scarlet Letter* (1850) and *The House of the Seven Gables* (1851).



Nathaniel Hawthorne, photograph by Mathew Brady
The Granger Collection, New York City

Early years. Hawthorne's ancestors had lived in Salem since the 17th century. His earliest American ancestor, William Hathorne (Nathaniel added the *w* to the name when he began to write), was a magistrate who had sentenced a Quaker woman to public whipping. He had acted as a staunch defender of Puritan orthodoxy, with its zealous advocacy of a "pure," unaffected form of religious worship, its rigid adherence to a simple, almost severe, mode of life, and its conviction of the "natural depravity" of "fallen" man. Hawthorne was later to wonder whether the decline of his family's prosperity and prominence during the 18th century, while other Salem families were growing wealthy from the lucrative shipping trade, might not be a retribution for this act and for the role of William's son John as one of three judges in the Salem witchcraft trials of 1692. When Nathaniel's father—a ship's captain—died during one of his voyages, he left his young widow without means to care for her two girls and young Nathaniel, aged four. She moved in with her affluent brothers, the Mannings. Hawthorne grew up in their house in Salem and, for extensive periods during his teens, in Raymond, Maine, on the shores of Sebago Lake. He returned to Salem in 1825 after four years at Bowdoin College, in Brunswick, Maine. Hawthorne did not distinguish himself as a young man. Instead, he spent nearly a dozen years reading and trying to master the art of writing fiction.

First works. In college Hawthorne had excelled only in composition and had determined to become a writer. Upon graduation, he had written an amateurish novel, *Fanshawe,* which he published at his own expense—only to decide that it was unworthy of him and to try to destroy all copies. Hawthorne, however, soon found his own voice, style, and subjects, and within five years of his graduation he had published such impressive and distinctive stories as "The Hollow of the Three Hills" and "An Old Woman's Tale." By 1832, "My Kinsman, Major Molineux" and "Roger Malvin's Burial," two of his greatest tales—and among the finest in the language—had appeared. "Young Goodman Brown," perhaps the greatest tale of witchcraft ever written, appeared in 1835.

His increasing success in placing his stories brought him a little fame. Unwilling to depend any longer on his uncles' generosity, he turned to a job in the Boston Custom House (1939–40) and for six months in 1841 was a resident at the agricultural cooperative Brook Farm, in West Roxbury, Mass. Even when his first signed book, *Twice-Told Tales,* was published in 1837, the work had brought gratifying recognition but no dependable income. By 1842, however, Hawthorne's writing had brought him a sufficient income to allow him to marry Sophia Peabody; the couple rented the Old Manse in Concord and began a happy three-year period that Hawthorne would later record in his essay "The Old Manse."

The presence of some of the leading social thinkers and philosophers of his day, such as Ralph Waldo Emerson, Henry Thoreau, and Bronson Alcott, in Concord made the village the centre of the philosophy of Transcendentalism, which encouraged man to transcend the materialistic world of experience and facts and become conscious of the pervading spirit of the universe and the potentialities for human freedom. Hawthorne welcomed the companionship of his Transcendentalist neighbours, but he had little to say to them. Artists and intellectuals never inspired his full confidence, but he thoroughly enjoyed the visit of his old college friend and classmate Franklin Pierce, later to become president of the United States. At the Old Manse, Hawthorne continued to write stories, with the same result as before: literary success, monetary failure. His new short-story collection, *Mosses from an Old Manse,* appeared in 1846.

Mature novels. A growing family and mounting debts compelled the Hawthornes' return in 1845 to Salem, where Nathaniel was appointed surveyor of the Custom House by the Polk administration (Hawthorne had always been a loyal Democrat and pulled all the political strings he could to get this appointment). Three years later the presidential election brought the Whigs into power under Zachary Taylor, and Hawthorne lost his job; but in a few months of concentrated effort, he produced his masterpiece, *The Scarlet Letter.* The bitterness he felt over his dismissal is apparent in "The Custom House" essay prefixed to the novel. This novel tells the story of two lovers kept apart by the ironies of fate, their own mingled strengths and weaknesses, and the Puritan community's interpretation of moral law, until at last death unites them under a single headstone. The book made him famous and was eventually recognized as one of the greatest of American novels.

Determined to leave Salem forever, Hawthorne moved to Lenox, located in the mountain scenery of the Berkshires in western Massachusetts. There he began work on *The House of the Seven Gables* (1851), the story of the Pyncheon family, who for generations had lived under a curse until it was removed at last by love.

At Lenox he enjoyed the stimulating friendship of Herman Melville, who lived in nearby Pittsfield. This friendship, although important for the younger writer and his work, was much less so for Hawthorne. Melville praised Hawthorne extravagantly in a review of his *Mosses from an Old Manse,* and he also dedicated *Moby Dick* to Hawthorne. But eventually Melville came to feel that the friendship he so ardently pursued was one-sided. Later he was to picture the relationship with disillusion in his introductory sketch to *The Piazza Tales* and depicted Hawthorne himself unflatteringly as "Vine" in his long poem *Clarel.*

In the autumn of 1851 Hawthorne moved his family to another temporary residence, this time in West Newton, near Boston. There he quickly wrote *The Blithedale Romance,* which was based on his disenchantment with Brook Farm. Then he purchased and redecorated Bronson Alcott's house in Concord, the Wayside. *Blithedale* was disappointingly received and did not produce the income Hawthorne had expected. He was hoping for a lucrative political appointment that would bolster his finances; in the meantime, he wrote a campaign biography of his old friend Franklin Pierce. When Pierce won the presidency, Hawthorne was in 1853 rewarded with the consulship in Liverpool, Lancashire, a position he hoped would enable him in a few years to leave his family financially secure.

Last years. The remaining 11 years of Hawthorne's life were, from a creative point of view, largely anticlimactic. He performed his consular duties faithfully and effectively until his position was terminated in 1857, and then he spent a year and a half sight-seeing in Italy. Determined to produce yet another romance, he finally retreated to a seaside town in England and quickly produced *The Marble Faun.* In writing it, he drew heavily upon the experiences and impressions he had recorded in a notebook kept during his Italian tour to give substance to an allegory of the Fall of man, a theme that had usually been assumed in his earlier works but that now received direct and philosophic treatment.

Back in the Wayside once more in 1860, Hawthorne devoted himself entirely to his writing but was unable to make any progress with his plans for a new novel. The drafts of unfinished works he left are mostly incoherent and show many signs of a psychic regression, already foreshadowed by his increasing restlessness and discontent of the preceding half dozen years. Some two years before his death he began to age very suddenly. His hair turned white, his handwriting changed, he suffered frequent nosebleeds, and he took to writing the figure "64" compulsively on scraps of paper. He died in his sleep on a trip in search of health with his friend Pierce.

Works. The main character of *The Scarlet Letter* is Hester Prynne, a young married woman who has borne an illegitimate child while living away from her husband in a village in Puritan New England. The husband, Roger Chillingworth, arrives in New England to find his wife pilloried and made to wear the letter A (meaning adulteress) in scarlet on her dress as a punishment for her illicit affair and for her refusal to reveal the name of the child's father. Chillingworth becomes obsessed with finding the identity of his wife's former lover. He learns that Hester's paramour is a saintly young minister, Arthur Dimmesdale, and Chillingworth then proceeds to revenge himself by mentally tormenting the guilt-stricken young man. Hester herself is revealed to be a compassionate and splendidly self-reliant heroine who is never truly repentant for the act of adultery committed with the minister; she feels that their act was consecrated by their deep love for each other. In the end Chillingworth is morally degraded by his monomaniac pursuit of revenge, and Dimmesdale is broken by his own sense of guilt and publicly confesses his adultery before dying in Hester's arms. Only Hester can face the future optimistically, as she plans to ensure the future of her beloved little girl by taking her to Europe.

The House of the Seven Gables is a sombre study in hereditary sin based on the legend of a curse pronounced on Hawthorne's own family by a woman condemned to death during the witchcraft trials. The greed and arrogant pride of the novel's Pyncheon family down the generations is mirrored in the gloomy decay of their seven-gabled mansion, in which the family's enfeebled and impoverished poor

relations live. At the book's end the descendant of a family long ago defrauded by the Pyncheons lifts his ancestors' curse on the mansion and marries a young niece of the family.

In *The Marble Faun* a trio of expatriate American art students in Italy become peripherally involved to varying degrees in the murder of an unknown man; their contact with sin transforms two of them from innocents into adults now possessed of a mature and critical awareness of life's complexity and possibilities.

Hawthorne's high rank among American fiction writers is the result of at least three considerations. First, he was a skillful craftsman with an impressive arthitectonic sense of form. The structure of *The Scarlet Letter,* for example, is so tightly integrated that no chapter, no paragraph, even, could be omitted without doing violence to the whole. The book's four characters are inextricably bound together in the tangled web of a life situation that seems to have no solution, and the tightly woven plot has a unity of action that rises slowly but inexorably to the climactic scene of Dimmesdale's public confession. The same tight construction is found in Hawthorne's other writings also, especially in the shorter pieces, or "tales." Hawthorne was also the master of a classic literary style that is remarkable for its directness, its clarity, its firmness, and its sureness of idiom.

A second reason for Hawthorne's greatness is his moral insight. He inherited the Puritan tradition of moral earnestness, and he was deeply concerned with the concepts of original sin and guilt and the claims of law and conscience. Hawthorne rejected what he saw as the Transcendentalists' transparent optimism about the potentialities of human nature. Instead he looked more deeply and perhaps more honestly into life, finding in it much suffering and conflict but also finding the redeeming power of love. There is no Romantic escape in his works, but rather a firm and resolute scrutiny of the psychological and moral facts of the human condition.

A third reason for Hawthorne's eminence is his mastery of allegory and symbolism. His fictional characters' actions and dilemmas fairly obviously express larger generalizations about the problems of human existence. But with Hawthorne this leads not to unconvincing pasteboard figures with explanatory labels attached but to a sombre, concentrated emotional involvement with his characters that has the power, the gravity, and the inevitability of true tragedy. His use of symbolism in *The Scarlet Letter* is particularly effective, and the scarlet letter itself takes on a wider significance and application that is out of all proportion to its literal character as a scrap of cloth.

Works. Hawthorne's work initiated the most durable tradition in American fiction, that of the symbolic romance that assumes the universality of guilt and explores the complexities and ambiguities of man's choices. His greatest short stories and *The Scarlet Letter* are marked by a depth of psychological and moral insight seldom equaled and never surpassed by any American writer.

MAJOR WORKS. *Novels. Fanshawe, a Tale* (1828); *The Scarlet Letter* (1850); *The House of the Seven Gables* (1851); *The Blithedale Romance* (1852); *The Marble Faun: Or, the Romance of Monte Beni* (British title, *Transformation,* 1860). (Unfinished novels): *Septimius Felton* (1872); *The Dolliver Romance, and Other Pieces* (1876); *Doctor Grimshawe's Secret* (1883); *The Ancestral Footstep* (1883).

Stories. Twice-Told Tales, including "The Gray Champion," "The Gentle Boy," "A Rill from the Town Pump," "The Great Carbuncle," "Sights from a Steeple," and "Dr. Heidegger's Experiment" (1837); 2nd enl. ed., including also "The Celestial Railroad" (1842); *Mosses from an Old Manse* (1846); *The Snow-Image, and Other Tales* (1851; also published as *The Snow-Image, and Other Twice-Told Tales,* 1852). (Stories for Children): *Grandfather's Chair* (1841); *Famous Old People* (1841); *Liberty Tree* (1841); *Biographical Stories for Children* (1842); *A Wonder Book for Girls and Boys* (1851); *Tanglewood Tales for Girls and Boys* (1853).

Biography. Life of Franklin Pierce (1852).

Autobiographical. Our Old Home: A Series of English Sketches (1863); *Passages from the American Note-Books of Nathaniel Hawthorne* (1868); *Passages from the English Note-Books of Nathaniel Hawthorne* (1870); *Passages from the French and Italian Note-Books of Nathaniel Hawthorne* (1871).

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Hawthorne, Rose: *see* Lathrop, Mother Alphonsa.

Hawthorne research, socioeconomic experiments conducted in 1927 among workers of the Hawthorne Works factory of the Western Electric Company in Cicero, Ill. Principally, a group of female workers over a period of almost a year were subjected to measured changes in their hours, wages, rest periods, organization, and degree of supervision and consultation in order to determine the effects of the several factors on their performance or work output. The major deduction was that social and psychological influences gave more marked results than changes in wages and hours, which had long been the chief concern of most managers and economists who had assumed that labour was simply a commodity to be bought and sold.

Hawtrey, Sir Ralph (George) (b. Nov. 22, 1879, Slough, Buckinghamshire, Eng.—d. March 21, 1975, London), British economist who developed a concept that later became known as the multiplier.

Hawtrey was educated at Eton and the University of Cambridge, graduating with first-class honours in mathematics in 1901. He spent his working life as a civil servant and played a key role in the Genoa Conference of 1922, which attempted to devise arrangements for a stable return to the gold standard. Hawtrey studied economics after leaving Cambridge. He held few academic positions; he taught at Harvard (1928–29) and was Price Professor of International Economics at the Royal Institute of International Affairs (1947–52). He was knighted in 1956.

Hawtrey advocated a purely monetary theory of economic fluctuations in which changes in money supply produce changes in expectations and adjustments in stocks. Stocks of goods in the hands of retailers and wholesalers are given a key role in Hawtrey's theory; they are extremely sensitive to interest charges, and it is through their agency that the bank rate of interest is able to affect the level of activity.

Hawtrey deserves credit for a number of significant developments to which his analysis led him. These include an original form of the cash balance approach to the quantity theory of money, to which he grafted an income approach, foreshadowing later treatment by British economist J.M. Keynes. He also advanced, as early as 1931, the concept that later became known as the multiplier, a coefficient showing the effect of a change in total national investment on the amount of total national income. This concept was given a central role by Keynes, and, indeed, Hawtrey played a significant role in the development of Keynes's thought in the years between the latter's *Treatise* and his *General Theory.*

Hay, town, south-central New South Wales, Australia, on the Murrumbidgee River. The settlement originated in 1840 as a coach station known as Lang's Crossing Place. Surveyed in 1858, it became a town the following year and was named after John Hay, a district parliamentary representative. Developed as a river port, it was proclaimed a municipality in 1872 and a shire in 1965. Situated at the junction of the Sturt, Cobb, and Mid Western highways and forming the terminus of a rail line from Sydney (368 miles [592 km] northeast), Hay now serves a wide area (of the far-western Riverina) of semiarid grazing and irrigated-fruit and dairy farming. Pop. (1981) 2,958.

hay, in agriculture, dried grasses and other foliage used as animal feed. Usually the material is cut in the field while still green and then either dried in the field or mechanically dried by forced hot air. Typical hay crops are timothy, alfalfa, and clover. The protein content of grasses and legumes decreases and fibre and lignified tissue increases as growing plants advance in maturity. For good hay, the crop must thus be cut at the proper stage, handled so as to retain the leaves, and cured to prevent spoilage or discoloration. Hay is usually dried in small piles or stacks in the field, but a rainy climate may dictate forced-air curing in the barn. Properly cured hay with 20 percent or less moisture may be stored for months without danger of spoilage.

Until the middle of the 19th century, hay was cut by hand with sickles and scythes. In the 1860s early cutting devices were developed that resembled those on reapers and binders; from these came the modern array of fully mechanical mowers, crushers, windrowers, field choppers, balers, and machines for pelletizing or wafering in the field.

Mowers consist of a long, flat steel cutter bar, with fingers pointing forward, and a thin steel reciprocating knife section with triangular steel blades riveted on. The cutter bar combs through the grass close to the ground, while the reciprocating blades cut it off.

The hay mower-conditioner, introduced in the 1960s, has either steel or rubber rolls to split the stems or meshing fluted rolls to crimp the stems, allowing moisture to escape quickly so that leaves and stems dry at nearly the same rate, reducing overall drying time.

Balers compress hay or straw into tightly packed rectangular or cylindrical bales weighing 50 to 100 pounds (22.5 to 45 kg) and tied with wire or twine. Pickup balers have a rotary toothed pickup mechanism to lift the windrows and deliver the hay to a feeding device that places it in the baling chamber on each stroke of the compressing plunger. Two twines or wires are automatically tied around a length of hay compressed into a bale chamber to form a bale, the density and length of which can be adjusted.

Hay cubers, developed in the mid-1960s, pick up the cut hay from windrows and compress it into cubes that are easily shoveled; they are practical in regions in which the climate permits cut forage to dry to the desired moisture content.

Hay, Francis: *see* Erroll, Francis Hay, 9th earl of.

Hay, Sir Gilbert, also called SIR GILBERT OF THE HAYE (fl. 1456), Scottish translator of works from the French, whose prose translations are the earliest extant examples of literary Scots prose.

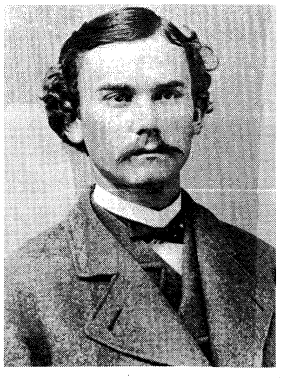
Hay may have been the Gylbertus Hay named in the registers of St. Andrews University in 1418 and 1419. That he received a degree as a master of arts, that he became a knight, and that he was at some time chamberlain to the king of France (Charles VII) are facts known from his own description of himself at the beginning of the manuscript of his prose translations: he is known to have been in France by 1432. By 1456 he had returned to Scotland and had entered the service of the Earl of Orkney and Caithness, at whose request he began in that year the translation of three of the most popular works of the Middle Ages: Honoré Bonet's *L'Arbre des batailles* (as *The Buke of the Law of Armys,* or *Buke of Bataillis*); *Le Livre de l'ordre de chevalerie,* a French version of Ramon Llull's *Libre de cavayleria* (as *The Buke of the Order of Knyghthood*); and *Le Gouvernement des princes,* a French version of the pseudo-Aristotelian *Secreta secretorum* (as *The Buke of the Governaunce of Princes*). These remained in manuscript until found in Sir Walter Scott's library at Abbotsford and edited by D. Laing in 1847.

By 1456 Hay must have become a priest, for the earl's father-in-law, in a will dated then, left him instructions to say 10 psalters for his soul.

His only extant poetical work, *The Buik of Alexander the Conqueror,* is a translation of the French *Roman d'Alexandre.*

Hay, John (Milton) (b. Oct. 8, 1838, Salem, Ind., U.S.—d. July 1, 1905, Newbury, N.H.), U.S. secretary of state (1898–1905) who skillfully guided the diplomacy of his country during the critical period of its emergence as a great power; he is particularly associated with the Open Door policy toward China.

Hay studied law in Springfield, Ill., where he met the future president Abraham Lincoln. He served as President Lincoln's private secretary from 1861 to 1865, and under succeeding Republican administrations he held various diplomatic posts in Europe. Following a five-year stint as editorial writer for the *New York Tribune,* Hay returned to government service and was assistant secretary of state from 1879 to 1881.



John Hay

By courtesy of the U.S. Signal Corps

Hay became nationally prominent with the election of President William McKinley, under whom he served as ambassador to Great Britain (1897–98) and then secretary of state. He took part in the Paris peace negotiations to end the Spanish–American War (1898) and was particularly active in promoting the momentous decision to retain the entire Philippine archipelago as one of the spoils of war, thus marking the United States as a major imperialist power.

Hay is probably best remembered as the promoter of the Open Door policy, which was designed to counter the trend toward divisive spheres of influence in the Orient. In 1899 he sent diplomatic notes to six interested nations proposing equal trading rights in China for all nations. This move was followed by a second Hay Open Door circular in the midst of the Boxer Rebellion in China (1900), proposing that all nations cooperate in preserving that country's territorial and administrative integrity.

In 1901 Hay negotiated with Great Britain the second Hay–Pauncefote Treaty, giving the United States exclusive rights to build a canal across the Isthmus of Panama. Two years later he assisted President Theodore Roosevelt in the diplomatic maneuvers leading to Panama's independence and the beginning of canal construction.

Throughout his life Hay found time to exercise his considerable literary talent, and his *Pike County Ballads and Other Pieces* (1871) and his novel *The Bread-Winners* (1883) were well received. In collaboration with John G. Nicolay, he was also responsible for two historical works that remained standard for many years: *Abraham Lincoln: A History* (1890) and Lincoln's *Complete Works* (1894). The standard biography of Hay is Tyler Dennett, *John Hay: From Poetry to Politics* (1933).

Hay, Lucy: *see* Carlisle, Lucy Hay, countess of.

Hay, Oliver Perry (b. May 22, 1846, Saluda, Ind., U.S.—d. Nov. 2, 1930, Washington, D.C.), American paleontologist who did much to unify existing knowledge of North American fossil vertebrates by constructing catalogs that have become standard references.

While serving as professor of biology and geology at Butler University, Indianapolis, Ind. (1879–92), he helped organize the Indiana Academy of Science (1890) and embarked on his first paleontological expedition (1889), studying fossils in western Kansas. When he was associate curator of the American Museum of Natural History, New York City (1901–07), Hay published *Bibliography and Catalogue of the Fossil Vertebrata of North America* (1902). This authoritative work and the *Second Bibliography,* 2 vol. (1929), are the achievements for which he is most noted. At the Carnegie Institution, Washington, D.C. (1912–26), he conducted research into the history of North American vertebrates of the Pleistocene epoch (1.6 million to 10,000 years ago), providing the basis for his *Pleistocene of North America and Its Vertebrated Animals* . . . (1923) and two subsequent volumes (1924; 1927).

Hay–Bunau-Varilla Treaty (Nov. 18, 1903), agreement between the United States and Panama granting exclusive canal rights to the United States across the Isthmus of Panama in exchange for financial reimbursement and guarantees of protection to the newly established republic. The United States had offered similar terms to Colombia, which then controlled Panama, in the Hay–Herrán Treaty (Jan. 22, 1903), but they were rejected by the Colombian government as an infringement on its national sovereignty and because it considered the compensation inadequate.

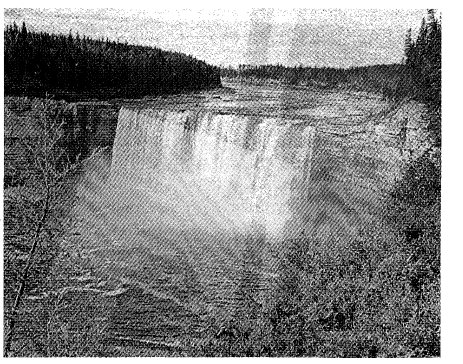
With the tacit approval of the U.S. government and the benevolent presence of the U.S. Navy in nearby waters, Panama declared its independence of Colombia on November 3, followed by de facto U.S. recognition three days later. On the 18th, Philippe Bunau-Varilla, representing Panama, met with Secretary of State John M. Hay in Washington, D.C., to negotiate the treaty that gave the United States in perpetuity a strip 10 miles (16 km) wide across the isthmus for canal construction. The United States was allowed to govern and fortify this Canal Zone. In return Panama was guaranteed its independence and received $10,000,000 outright plus an annuity of $250,000 beginning nine years later. The treaty was ratified by both countries in 1904, and the Panama Canal was completed in 1914.

From its inception, there were intermittent disputes over interpretation of the treaty and charges of U.S. discrimination against Panamanians in the zone. In 1978 two new treaties were concluded detailing the steps by which the United States would transfer to Panama full control over the zone and the canal in the year 2000.

hay fever, also called ROSE FEVER, or ALLERGIC RHINITIS, seasonally recurrent bouts of sneezing, nasal congestion, and tearing and itching of the eyes caused by allergy to the pollen of certain plants, chiefly those depending upon the wind for cross-fertilization, such as ragweed in North America and timothy grass in Great Britain. In allergic persons, contact with pollen releases histamine from the tissues, which irritates the small blood vessels and mucus-secreting glands; symptoms may be aggravated by emotional factors. Antihistamine drugs may provide temporary relief, but the most effective long-range treatment is desensitization by injections of an extract of the causative pollen. Hay fever, like other allergic diseases, shows a familial tendency and may be associated with other allergic disorders, such as eczema or asthma; unless properly treated, about one-third of patients with hay fever develop asthma.

Hay–Pauncefote Treaty (1900–01), either of two agreements between Britain and the United States, the second of which freed the United States from a previous commitment to accept international control of the Panama Canal. After negotiations between U.S. Secretary of State John Milton Hay and British ambassador Lord Pauncefote on revision of the Clayton–Bulwer Treaty of 1850 (by which the two nations would jointly control a projected Central American canal), the first Hay–Pauncefote Treaty was concluded on Feb. 5, 1900. The U.S. Senate declined to ratify it because it still restricted U.S. rights over the proposed canal. The second treaty (Nov. 18, 1901), ratified by both governments, definitely abrogated the agreement of 1850 and gave the United States a free hand.

Hay River, town, southern Fort Smith region, Northwest Territories, Canada, on the southwestern shore of Great Slave Lake. The settlement, at the mouth of the Hay River, was established in 1868 as a Hudson's Bay Company trading post. With the arrival of the Mackenzie Highway in 1949 and the Great



Alexandra Falls on the Hay River, Northwest Territories

By courtesy of the Canadian Government Travel Bureau, Ottawa; photograph, H. Rowed

Slave Lake Railway in 1964, Hay River (82 mi [132 km] north of the Alberta border) became a busy commercial fishing and transshipment centre. Lead and zinc are mined 35 mi east at Pine Point, which can be reached by road, rail, and air.

The 103-ft (32-m) Alexandra Falls on the Hay River are 34 mi south. Pop. (1981 est.) 2,863.

Haya, also called WAHAYA, ZIBA, or WAZIBA, East African people who speak a Bantu language (also called Hays) and inhabit the northwestern corner of Tanzania between the Kagera River and Lake Victoria.

Two main ethnic elements exist in the population: the pastoral Hima, who are probably descendants of wandering Nilotes; and the more agricultural Iru, descendants of the original Bantu. The Haya are organized in a series of 130 or so patrilineal clans, each having its own totem. They were traditionally divided among eight small states (Kiamtuara, Ibangiro, Kianja, Karagwe, Maruku, Bugabo, Kiziba, Missenyi), each under a despotic ruler called the *mukama.* Traditionally, rulers appointed subordinate chiefs and officials from both royal and commoner clans. The numerous and specific resemblances of Haya political institutions to those of the Cushites of the Sidāmo province in Ethiopia suggest a historical connection.

The Iru are agriculturalists, while the Hima subsist almost entirely on the products of their herds. The production of coffee, an indigenous crop, was expanded under German and British administration to make it the major cash crop; the staple food is plantain. The Haya fish extensively.

The Haya live in a dwelling, peculiar to this region, of beehive shape without walls, thatched from the point of the roof to the ground.

Haya de la Torre, Víctor Raúl (b. Feb. 22, 1895, Trujillo, Peru—d. Aug. 2, 1979, Lima), Peruvian political theorist and activist who founded and led the Aprista Party, the vehicle for radical dissent in Peru since 1924.

Haya, the son of wealthy parents, was at the age of 24 elected president of the San Marcos Federation of Students and led the students in establishing night schools for workers (known as popular universities). Despite his left-wing lecturing and writing, he avoided trouble with the dictatorial regime of Augusto Leguía until, after leading a mass demonstration (May 23, 1923) protesting the dedication of Peru to the Sacred Heart of Jesus, he was deported (Oct. 9, 1923).

In exile in Mexico City, Haya founded (May 7, 1924) the Alianza Popular Revolucionaria Americana (APRA), known as the Aprista movement. After the Leguía regime fell, Haya returned to Peru (1931) to run as the Aprista candidate for president. Peru's oligarchy threw its support behind Col. Luis M. Sánchez Cerro. After a hotly disputed election Sánchez Cerro was inaugurated, and Haya was jailed until Sánchez Cerro was assassinated in 1933.

From 1934 to 1945 Haya lived in hiding in Peru but became widely known through his underground activities and writings. In 1945 the Aprista Party took the name Partido del Pueblo (People's Party) and threw its support behind José Luis Bustamante y Rivero, who won the presidential election. Haya, nonetheless, then 50, really controlled the government. His supporters in the Congress, however, were unable to pass their measures for social and political reform over the conservative opposition. In 1947 Bustamante outlawed the People's Party, and after Gen. Manuel Odría overthrew Bustamante (1948), Haya took asylum in the Colombian embassy in Lima from 1949 until 1954, when he was allowed to go to Mexico. He remained there until 1957, when constitutional government in Peru was restored after the deposition of Odría.

In the 1962 presidential election Haya was the Aprista Party's candidate. Odría and Fernando Belaúnde Terry were his principal opponents. After a bitter and violent campaign, Haya missed by a hair winning one-third of the total votes necessary for the election. The contest was thrown to the Congress, in which the Apristas were the leading—but not majority—party. The army, however, was determined to prevent Haya's victory, and on July 18, 1962, it took over the government, annulled the June election, and promised new elections in mid-1963. In June the promised elections were held; the results, however, gave Belaúnde the presidency.

Hayagrīva (Sanskrit: Horse Neck), in northern Buddhism, one of the eight fierce protective deities. *See* dharmapāla.

Hayakawa, S(amuel) I(chiyé) (b. July 18, 1906, Vancouver, B.C., Can.), scholar, university president, and U.S. senator from California (1977–83). He is best known for his popular writings on semantics and for his career as president of San Francisco State College (now San Francisco State University).

Hayakawa was educated at the University of Manitoba, McGill University, and the University of Wisconsin. He taught English and language arts at the University of Wisconsin, the Illinois Institute of Technology, the University of Chicago, and San Francisco State College. His first book, *Language in Action* (1941), was a popular treatment of the semantic theories of Alfred Korzybski and was followed by years of teaching, writing, and lecturing in that field.

Hayakawa
AP/Wide World Photos

In 1968, after a period of student rioting at San Francisco State College, Hayakawa was appointed acting president and immediately took a firm stand against what he regarded as the excesses of student protesters. He acquired a national reputation as a foe of student leftism and a symbol of the conservative in action. In 1969 he was given permanent status as president. He retired in 1973, saying that he had accomplished his mission of restoring order. Three years later he was elected, as a Republican, to the U.S. Senate, where he served for one term.

Hayam Wuruk, also called (after 1350) RAJASANAGARA (b. 1334, Java—d. 1389, Java), ruler of the Javan Hindu state of Majapahit at the time of its greatest power.

Hayam Wuruk inherited the throne in 1350 at the age of 16, when the great *patih* ("prime minister") Gajah Mada was at the height of his career. Under the two leaders, Majapahit extended its power throughout the Indonesian archipelago. Its core area was directly administered by Hayam Wuruk, and the vast outlying territory acknowledged his supremacy, but he exerted little direct control over it. Javanese sea power was supreme, and Hayam Wuruk enjoyed an effective monopoly of trade in the region.

Hayam Wuruk had no heir by his official queen, so he arranged to divide his kingdom between a nephew married to his daughter by the queen and his son by a lesser wife. In so doing he broke the unity of the state and allowed local potentates to seize control of portions of Majapahit's territory. After his death Majapahit rapidly declined and, along with it, the last great manifestation of Hindu civilization in Java.

hayashi, in Japanese music, generic term for combinations of flute and percussion instruments. In Nō and Kabuki drama, the *hayashi* normally consists of a flute plus the hourglass-shaped hand drum (*ko-tsuzumi*) held on the right shoulder, the larger *o-tsuzumi* held on the left hip, and the *taiko* stick-struck barrel drum set on a stand on the floor. Folk *hayashi* often combine a bamboo flute (*shinobue,* or *take-bue*) with stick-beaten drums and a small hand gong (*kane* or *atari-gane*), struck inside its rim with a bone hammer. The variety of combinations is great.

Hayashi Fumiko, original name MIYATA FUMIKO (b. Dec. 31, 1904, Shimonoseki, Japan—d. June 28, 1951, Tokyo), Japanese novelist whose realistic stories deal with urban working-class life.

The illegitimate daughter of a geisha, Hayashi lived an unsettled life until she went to Onomichi in 1916, where she stayed until graduation from high school in 1922. In her lonely childhood she developed an attachment to literature, and when she went out to work she started writing poetry and children's stories in her spare time. Her own experiences of hunger and humiliation appear in her first work, *Hōrōkiizen* (1930; "Journal of a Vagabond"), and *Seihin no sho* (1931; "A Life of Poverty"). Hayashi's stories of degradation and instability, depicting women who remained yet undaunted, commanded a strong following. Often near sentimentality, they are saved by a realistic and direct style. She reached the peak of her popularity after World War II, when such stories as *Daun taun* (1948; *Downtown,* 1962) and *Ukigumo* (1949; *The Drifting Clouds,* 1957) mirrored the harsh postwar scene. Hayashi died suddenly of heart strain brought on by overwork.

Hayashi Razan, original name HAYASHI NOBUKATSU, Buddhist name DŌSHUN (b. August 1583, Kyōto—d. Feb. 4, 1657, Edo, Japan), Japanese scholar who, together with his

Hayashi Razan, colour on silk by Tan-an Moritoki; in a private collection
By courtesy of the International Society for Educational Information, Tokyo

son and grandson, established the thought of the great Chinese Neo-Confucian philosopher Chu Hsi as the official doctrine of the Tokugawa shogunate (the office through which the Tokugawa family ruled Japan from 1603 to 1867). Hayashi also reinterpreted Shintō, the Japanese national religion, from the point of view of Chu Hsi's philosophy, laying the foundation for the Confucianized Shintō that developed in later centuries.

Hayashi began as a student of Buddhism but became a devoted adherent of Neo-Confucianism and a bitter opponent of Buddhism. In 1604 he became a pupil of the Confucian scholar Fujiwara Seika and on the recommendation of his master was employed by the shogunate, beginning in 1607. He served the first four Tokugawa shoguns, tutoring them in Neo-Confucianism and history. At the same time, he was engaged in scholarly activities and in the drafting of diplomatic documents. The first Tokugawa shogun, Ieyasu, may simply have wanted to make use of Hayashi's vast knowledge for the purpose of practical politics and conduct of international affairs. But Hayashi's philosophy, with its emphasis on loyalty, on a hierarchical social and political order, and on a static conservative point of view, proved to be a powerful support for the newly established government, giving the Tokugawa the ideology needed to rule the restless feudal lords under their control. In 1630 the third shogun gave Hayashi an estate in the capital city of Edo, where he founded his private academy, a library, and a shrine to Confucius. These later came under the direct control and support of the government.

Gahō, Hayashi's third son (also called Harukatsu), became his father's successor as chief official scholar; and Dokkōsai, Hayashi's fourth son (also called Morikatsu), was also employed by the shogunate. During their father's lifetime, they collaborated with him in compiling histories; and after his death, they assembled the *Hayashi Razan bunshū* ("Collected Works of Hayashi Razan") and the *Razan Sensei shishū* ("Master Razan's Poems"), republished in two volumes in 1918 and 1921, respectively. His grandson (Gahō's son Hōkō) was given the title *daigaku-nokami* ("head of the state university"), which was then handed down to the subsequent heads of the Hayashi family until the late 19th century.

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Hayashi Senjūrō (b. Feb. 23, 1876, Kanazawa, Japan—d. Feb. 4, 1943, Tokyo), army officer and later prime minister of Japan.

In 1931, as commander of Japanese troops in Korea, Hayashi ordered his forces to march into Manchuria, beginning the Japanese encroachment upon China that culminated in World War II in the Pacific. The action was undertaken without permission of the government in Tokyo. Hayashi was promoted to full general in 1932. In 1934 he succeeded Gen. Araki Sadao as minister of war, and, attempting to purge the army of Araki's supporters, who had strong fascist leanings, he succeeded in removing an estimated 5,000 officers from important posts. After his resignation in 1935 he took a position on the Supreme War Council, from which he resigned the following year.

Hayashi Senjūrō
Kyodo Photo Service, Tokyo

Hayashi became prime minister in February 1937 and tried to create a cabinet that was above the factional strife of the political parties. To this end he demanded that members of his Cabinet renounce their party ties. Finally, after only a few months in office, he threw government support behind the Shōwakai, a promilitarist party. He dissolved the Diet (parliament) and called a general election, hoping to establish a one-party country. The general election revealed that he had few supporters, and he was forced to resign.

Hayashi Shihei (b. June 1738, Edo, Japan—d. July 28, 1793, Sendai), Japanese scholar, a specialist in military affairs, who first drew attention to Japan's inadequate military and maritime defenses.

Hayashi was the son of an official of the shogunate, the country's hereditary military dictatorship. After entering the service of the Sendai clan in Mutsu at the age of 15, Hayashi, influenced by the national concern about the intentions of the Western powers, began to study the problems of national defense. Eventually he proposed reforms of the country's political and economic policies and in lectures also stressed the need to stabilize the domestic situation.

In 1777, on a visit to Nagasaki, then the only port open to foreign commerce, Hayashi learned from the head of the resident Dutch commercial community of Russian intentions to advance southward from Siberia. With his concern over the adequacy of Japan's defenses heightened by this information, he journeyed to Hokkaido to study the situation in that northernmost of the Japanese isles. Continuing to campaign against what he regarded as dangerous ignorance of the outside world in feudal Japan, he emphasized the need to populate and develop Hokkaido.

In Hayashi's *Kaikoku heidan*, 16 vol. (1787); "A Discussion of the Military Problems of a Maritime Country"), he recommended stronger military forces and a maritime defense capability. To dramatize Japan's vulnerability from the sea, he wrote: "... the waters flowing under Nihombashi in Edo and the waters in the rivers of China and Holland are one stream without any barrier." *Kaikoku heidan* described the weaponry of the Western powers and criticized the shogunate for its ignorance of the world and reliance upon a "closed-door" policy while neglecting maritime defenses. It aroused great interest and was banned in May 1792 on the grounds that national defense matters had been publicly discussed without official sanction. Hayashi was placed under house arrest.

In September 1792 a Russian mission arrived in Hokkaido to press for the opening of the country to foreign trade. This development and subsequent visits by Russian and European fleets later caused Hayashi's views to receive serious attention, but he was still under house arrest when he died.

Hayashi Tadasu, HAKUSHAKU (Count) (b. Feb. 22, 1850, Chiba Prefecture, Japan—d. July 10, 1913, Tokyo), Japanese diplomat who negotiated the Anglo-Japanese Alliance of 1902.

Hayashi studied in England but returned home to fight against the Imperial government at the time of the Meiji Restoration—*i.e.*, the restoration of power to the emperor in 1868, after 264 years of rule by the Tokugawa family. Later he served the Imperial government, joined the diplomatic service, and held several important positions. In 1899 he was appointed ambassador to England. Alarmed by the expansion of Russian power in the Far East, he was instrumental in concluding the Anglo-Japanese Alliance—a pillar of Japanese foreign policy for the next 20 years. From 1906 to 1908 he was minister for foreign affairs.

Hayashi Tadasu
BBC Hulton Picture Library

Ḥaydar, Shaykh, alsp spelled SHEYKH ḤEYDAR (d. July 9, 1488, near Darband, on the foothills of the Elburz Mountains), one of the founders of the Ṣafavid state (1501–1736).

Ḥaydar obtained his early religious instruction in the city of Amid from his late father's lieutenants (the *khulafā'* of the order). When the Kara Koyunlu empire disintegrated in 1467, Ḥaydar moved to Ardabīl (now in northwest Iran), where he formally became the head of the Ṣafavid order and was placed under the care of Shaykh Ja'far, his paternal uncle. Thus a schism that had rent the Ṣafavid order was healed. When Ḥaydar married 'Alamshāh Begum, the daughter of the ruler Uzun Ḥasan, he further strengthened the bonds that existed between the Ak Koyunlu dynasty and the Ṣafavid order.

On reaching maturity Ḥaydar continued the policy of his father—a combination of extreme Shī'ī (one of the two main branches of Islām, distinguished from the majority Sunnī) ideology with military activity—by conducting raids (*ghazah*) against the Christian Circassians of the north in 1483, 1487, and 1488. The first two were successful and increased the fame and material fortunes of the Ṣafavid order. But his actions soon brought him into conflict with Ya'qūb (died 1490), the Ak Koyunlu ruler who was also Ḥaydar's brother-in-law, with the result that the alliance between the order and that dynasty was weakened. Ḥaydar was killed in battle by Ak Koyunlu troops while he was leading an expedition to Circassian territory. Ḥaydar's major achievement was the reliable military organization that he bequeathed to his sons.

Ḥaydarābād (Pakistan): *see* Hyderābād.

Hayden, Ferdinand Vandiveer (b. Sept. 7, 1829, Westfield, Mass., U.S.—d. Dec. 22, 1887, Philadelphia), U.S. geologist whose explorations and geological studies of the Western United States, particularly the Great Plains and Rocky Mountains, helped lay the foundation of the U.S. Geological Survey and led to the creation of the Yellowstone National Park.

In 1853, accompanied by the U.S. paleontologist Fielding B. Meek, he made a trip to the Dakota Badlands to collect fossils. The following year he trekked north along the Missouri River and by 1856 reached Fort Benton, Mont. He then joined a military expedition exploring the Yellowstone and Missouri rivers and the Black Hills of Dakota. In 1858 Meek and Hayden undertook explorations of the Territory of Kansas, and the following year Hayden again joined a military expedition to

the headwaters of the Yellowstone, Gallatin, and Madison rivers in Montana.

During the Civil War he served as a surgeon in the Federal Army and was brevetted a lieutenant colonel for meritorious service. In 1865 he was appointed professor of geology at the University of Pennsylvania, a post he held until 1872. He resumed his explorations in 1866, and the following year, under the auspices of the General Land Office, he organized a geological survey of the Territory of Nebraska. His survey later extended westward into the Territory of Wyoming, and in 1869 he was placed in charge of the newly established U.S. Geological and Geographical Survey of the Territories, which continued for 12 years and won worldwide acclaim.

When the territorial surveys were consolidated in 1879, Hayden became a geologist with the U.S. Geological Survey and continued his studies in Montana. Poor health forced him to retire in 1886.

Haydn, (Franz) Joseph (b. March 31, 1732, Rohrau, Austria—d. May 31, 1809, Vienna), Austrian composer who was one of the most important figures in the development of the Classical style in music during the 18th century. He helped establish the forms for the string quartet and the symphony.

Early years. Haydn was the second son of humble parents. His father was a wheelwright, his mother, before her marriage, a cook for the lords of the village. Haydn revealed unusual musical gifts, and his parents' problem of how to provide the proper type of education for him was solved by a cousin, a school principal and choirmaster in the nearby city of Hainburg, who offered to take the boy into his home and train him. Haydn, not yet six years old, left home, never to return to the parental cottage except for rare, brief visits.

Haydn, detail of a portrait by Thomas Hardy, 1791; in the collection of the Royal College of Music, London

By courtesy of the Royal College of Music, London

The boy sang in the church choir, learned to play various instruments, and obtained a good basic knowledge of music. But otherwise, life at Hainburg was less satisfactory. The cousin was poor and his modest salary hardly sufficed to support a growing family. Joseph was not given the love and care a child needs; as he later reported, he received "more floggings than food." But he was able to take such disadvantages in his stride; he had a wiry resilience and a contented disposition.

Haydn's life changed decisively when he was eight years old. The musical director of St. Stephen's Cathedral in Vienna had observed the boy on a visit to Hainburg and invited him to serve as chorister at the Austrian capital's most important church. Haydn's parents accepted the offer, for it secured for their son a thorough musical training and relieved them of all financial cares while he boarded at the choir school. Thus, in 1740 Hayden moved to Vienna full of expectation. He stayed at the school for nine years, acquiring an enormous practical knowledge of music by constant performances but, to his disappointment, receiving little instruction in music theory. The pattern of life in Hainburg seemed to repeat itself. Again he had to work hard to fulfill all his obligations as a chorister; again he was badly fed. Gradually his voice deteriorated; when it broke, the cathedral choir had no use for him. Seizing on the pretext of punishing a practical joke the director had him expelled from the choir school.

With no money and three ragged shirts and an old coat as his only possessions, Haydn at 17 was left to his own devices. He found a refuge for a while in the garret of a fellow musician and supported himself "miserably" with odd musical jobs, performing at dances and serenades, playing the organ at Sunday services, and teaching at very modest fees. Hand in hand with these activities went an arduous course of self-instruction through the study of musical works—notably those of Carl Philipp Emanuel Bach—and of leading manuals of musical theory. A fortunate chance brought him to the attention of the successful Italian composer and singing teacher Niccolò Porpora, who accepted him as accompanist for voice lessons and, in return for this as well as for his services as a valet, corrected Haydn's compositions.

With persistence and energy, Haydn made progress. He was eventually engaged to teach some aristocratic pupils and introduced by them to the music-loving Austrian nobleman Karl Joseph von Fürnberg, in whose home he played chamber music. For the instrumentalists there he wrote his first string quartets, a form that he cultivated throughout his professional career, composing some 80 such works.

Through the recommendation of Fürnberg, in 1758 Haydn received his first regular appointment. He was engaged as musical director and chamber composer for the Bohemian count Ferdinand Maximilian von Morzin, who lived mostly in his country estate of Lukaveč in western Bohemia. Haydn had an orchestra of about 16 musicians, and for this ensemble he wrote his first symphony. These first attempts were still conventional in character, yet a certain freshness of melodic invention and sparkle marked them as the work of a future master.

Esterházy patronage. Haydn stayed only briefly with von Morzin, as financial difficulties forced his patron to dismiss the orchestra. Soon Haydn was invited to enter the service of Prince Pál Antal Esterházy, who had heard his works at von Morzin's castle. The Esterházys were one of the wealthiest and most influential families of the Austrian empire and boasted a distinguished record of supporting music and art. Prince Pál Antal had a well-appointed orchestra performing regularly in his castle at Eisenstadt, a small town some 30 miles from Vienna. Because his aged music director was ailing, the Prince appointed the relatively unknown Haydn assistant conductor. The contract concluded on May 1, 1761, details the new appointee's duties. While the music director oversaw church music, Haydn conducted the orchestra and coached the singers in almost daily rehearsals; composed most of the music required; and served as music librarian, supervisor of instruments, and chief of the musical personnel. Haydn carried out his duties extremely well and even found time to supervise the work of the copyists of music and to tune his own keyboard instruments. His service as chief of personnel revealed tact, good nature, and skill in dealing with people. He exerted himself to support his subordinates against other officials on the Prince's staff, and, thanks to his friendliness and his sense of humour, he managed to maintain good relations with staff and employers. The musicians loved and respected their Papa, as they nicknamed him.

In 1766 Haydn became musical director at the Esterházy court. He raised the quality and increased the size of the Prince's musical ensembles by appointing many choice instrumentalists and singers. His ambitious plans were supported by Prince Miklós, who, on the death of his brother in 1762, had become head of the family. A passionate and discriminating music lover himself, he was able to appreciate Haydn's contributions and created an atmosphere conducive to the development and maturing of Haydn's art.

Haydn seems to have enjoyed his busy life and served Prince Miklós for nearly 30 years. He loved hunting, fishing, and other outdoor activities. Nor did he feel cut off from the cultural world, for travelling dramatic troupes often brought works by eminent writers to the Prince's castle of Esterháza, and he frequently visited Vienna in the Prince's retinue.

On these visits a close friendship developed with Mozart. The fact that Mozart was 24 years younger than Haydn did not matter. They felt inspired by each other's work. Mozart declared that he had learned from Haydn how to write quartets and dedicated a superb set of six such works to his "beloved friend." Haydn's music, too, shows the impact of his young friend. The mature composer was by no means set in his ways; he was flexible and receptive to new ideas.

Unlike Mozart, Haydn became internationally famous in his own lifetime. His works were performed throughout Europe and were published in Austria, Germany, Holland, France, and England. He received official commissions from many European music lovers. The city of Cádiz in Spain, for example, commissioned *The Seven Last Words* for a Good Friday service in 1796; the King of Naples requested compositions for the lira organizzata, a hurdy-gurdy (wheel fiddle) with a built-in tiny pipe organ; and the *Paris Symphonies* (numbers 82–87) were commissioned and composed in 1785 and 1786.

Haydn's professional success was not matched in his personal life. A girl he loved entered a convent, and her parents induced Haydn, who had just obtained his position with Count von Morzin, to wed the elder sister. The marriage produced neither a pleasant, peaceful home, nor any children. Haydn's wife, two years his senior, was quarrelsome and bigoted. She did not understand music and showed no interest in her husband's work. Her disdain went to the extremes of using his manuscripts for pastry pan linings or curl papers. Haydn was not insensitive to the attractions of other women, and for years he carried on a love affair with Luigia Polzelli, a young Italian mezzo-soprano in the Prince's service.

English period. In 1790, when Prince Miklós died, his son, Prince Antal, who did not care for music and dismissed most of the court musicians, succeeded him. Haydn was retained, however, and continued to receive his salary. No duties were required of him, enabling Haydn to do whatever he pleased. After such a long time at the Esterházy court, however, the composer was eager to try a different way of life. He, therefore, considered seriously two tempting offers that were made as soon as his availability was generally known. First, the King of Naples urged him to visit his court; second, a violinist and concert manager, Johann Peter Salomon, arrived from England and commissioned, at excellent financial terms, six new symphonies and 20 smaller compositions to be conducted by the composer himself in a series of orchestral concerts in London sponsored by Salomon. Haydn, moreover, was to compose a new Italian opera for the King's Theatre in London, for a fee of £300. Haydn felt far more attracted by the English offer than the Italian.

He felt it would be a great experience to work with a large, excellently trained orchestra and to live in one of the great musical centres of the 18th century. Furthermore, he would be independent.

Undeterred by the dire warnings of his friends, including Mozart, he left for London. He had never before travelled outside Austria. On New Year's Day, 1791, he arrived in England, and the following 18 months proved rewarding and stimulating. The many novel impressions, the meeting with eminent musicians, and the admiration bestowed on him had a powerful impact on his creative work. The symphonies written for the first and second visit to London represent the climax in his orchestral output. Their virtuosity of instrumentation, masterly treatment of musical forms, freely flowing melodic inspiration, and sense of humour endeared the works much to the British audiences. Their popularity is reflected in the various nicknames bestowed on them (*Surprise, The Clock, Military, Drum Roll*). As Haydn conducted the works himself, he exercised, in the words of the great British musical historian Charles Burney, "an electrical effect on all present and such a degree of enthusiasm as almost amounted to frenzy." The opera he composed for the King's Theatre was refused the license to be performed. Haydn, however, suffered no financial loss and seems not to have been greatly disturbed.

In England Haydn was feted by famous men as well as by royalty. In July 1791 Oxford University awarded him the honorary degree of Doctor of Music. He performed for the Prince of Wales and the Duke of York. His diary describes visits at which he was "gloriously entertained," and references to beautiful women he met at such occasions are frequent. Sixty years old, his face pitted by smallpox, with a large aquiline nose, and too-short legs, he was nonetheless attractive to women admirers.

In June 1792 Haydn left London for Germany, for Prince Esterházy wanted the famous composer in his retinue at the coronation of the emperor Francis II in Frankfurt am Main. On his journey he stopped at Bonn, where the 22-year-old Beethoven was introduced to him, and it was arranged that the young composer should move to Vienna to receive Haydn's instruction. On July 29 Haydn arrived in Vienna where he was able, thanks to his considerable earnings in England, to buy a pleasant house still standing today and the site of a Haydn museum in the suburb of Gumpendorf.

Haydn stayed in Vienna only briefly. His English admirers urged him to visit London once more, and in January 1794 he returned to England, staying until Aug. 15, 1795. Again he won great acclaim. Various members of the royal family made efforts to keep him in England, but Haydn declined, because a change had occurred in the leadership of the Esterházy family. Miklós II, the new head of the princely house, was eager to restore the former orchestra under Haydn's direction, and the composer felt compelled to accept the assignment. The duties he now undertook would, of course, not be as burdensome as before. Moreover, the Prince's intention to spend the winter months in Vienna provided a strong incentive. Although Haydn had to leave his many friends in London, he could look back on his stay there as a profitable one. His trunks bulged with no fewer than 768 pages of music he had written, and the musical stimulus and the financial rewards for his labour had been gratifying.

The late Esterházy and Viennese period. In 1791 when Haydn had attended the Handel Commemoration at Westminster Abbey in London, he had been deeply moved by Handel's masterly oratorios and by the veneration with which they were received by the English audience. Deciding to compose in this genre, he obtained a suitable libretto, allegedly prepared for Handel himself. After settling in Vienna and resuming his duties for Prince Esterházy, Haydn started work on the oratorio *The Creation,* the text of which had been translated into German by Baron Gottfried van Swieten. The libretto was based on the epic poem *Paradise Lost* by John Milton and on the Genesis chapter of the Bible. Composing the oratorio proved a truly congenial task. Haydn was deeply religious and throughout his career had contributed Latin masses of great beauty for the Roman Catholic Church. In the oratorio he could express his gratitude to God in a work with German text and at the same time depict in music the beauties of nature that so greatly delighted him. The years devoted to this task were among the happiest in Haydn's life. He felt uplifted and in communion with the divine spirit. In April 1798 the oratorio had its first performance in a princely palace and produced a profound effect. Before long a public performance took place with equal results, and, henceforth, *The Creation* was again and again performed with great success, the proceeds going, at the composer's request, to charitable institutions.

This success encouraged Haydn to produce another oratorio, which absorbed him until 1801. A poem, *The Seasons,* by James Thomson (1700–48), was chosen for the libretto and translated by van Swieten. The libretto allowed Haydn to compose delightful musical genre pictures of events in nature, and the oratorio was also triumphantly successful, both at court, where the Austrian empress sang the soprano solos, and in public performances.

Haydn's late creative activity also produced the six masses written for his patron Esterházy, among the most significant masses of the 18th century. He also continued to compose magnificent string quartets and, in 1797, he gave to the Austrian nation the stirring song "Gott erhalte Franz den Kaiser" ("God Save Emperor Francis"). It was used for more than a century as the national anthem of the Austrian monarchy and as the patriotic song "Deutschland, Deutschland über alles" ("Germany, Germany above all else") in Germany. The music is heard today under many titles as a Protestant hymn in English-speaking countries. The song was so beloved that Haydn decided to use it as a theme for variations in one of his finest string quartets, the *Emperor Quartet,* Opus 76, No. 3.

Not surprisingly, honours from various parts of Europe gladdened the composer in his last years. Stockholm, Amsterdam, St. Petersburg, and Paris made him an honorary member of their music associations, and the French capital, after the premiere of *The Creation,* had a gold medal engraved in Haydn's honour. Nor did Austria lag behind. In the village of Rohrau, Haydn's birthplace, a monument was erected to its famous son, and Haydn had the gratification of seeing it. The city of Vienna conferred on him the great golden Salvator Medal and named him an honorary citizen. Particularly notable was the Vienna concert of 1808 in celebration of Haydn's 76th birthday. *The Creation* was performed by eminent musicians in the presence of the ailing composer, carried in on an armchair and seated amid jubilant exclamations among members of the high nobility. Poems were read in his honour, applause shook the hall, and on Haydn's departure Beethoven knelt down and kissed the hands of his former teacher. This was Haydn's last public appearance. Henceforth, conditions in Vienna prevented such outings and undermined the little strength still left to the aged artist. Austria and Vienna faced the Napoleonic armies in 1809—devastating battles were fought and Vienna was bombarded, a cannon ball falling near Haydn's residence. Napoleon, however, eventually placed a guard of honour outside Haydn's house. A moment of joyful respite was granted to the invalid when a French officer called and, professing admiration of Haydn's music, gave a rendering of an aria from *The Creation,* which allegedly made the composer shed happy tears. Soon afterward the singer fell in battle. Haydn survived him by only a few days. At the official obsequies, members of the French army joined forces with the municipal militia to form a line before the catafalque. Vienna's cultural elite and high-ranking French officers paid solemn tribute to the genius who had given so much to the musical world.

(K.G./Ed.)

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Haydon, Benjamin Robert (b. Jan. 25, 1786, Plymouth, Devon, Eng.—d. June 22, 1846, London), English historical painter and writer, whose superb *Autobiography* (1847), with accounts of eminent persons in the arts and politics, is perhaps as important as his painting.

In 1807 he first exhibited at the Royal Academy, but because of subsequent quarrels most of his later paintings were shown at private exhibitions. Haydon's stormy career, down to 1821, is recorded in his *Autobiography.* His acquaintance among literary people was extensive. Intimate glimpses of celebrated individuals enliven his writings, for he had a keen eye for character and a striking gift of phrase.

Haydon's fantastic incompetence in financial matters and the disappointment of his hopes resulted in his ruin. Four times he was confined in King's Bench prison for debt, and he eventually killed himself.

His influence upon art was not great. The day of the Raphaelesque "high art" which he upheld had passed; and his attempts to "improve the public taste" were a failure. His technical abilities as a painter were only mediocre. As a lecturer and writer, however, he advocated social concepts of art which anticipated those of Ruskin and Morris. Haydon is also remembered for his courageous defense of the Elgin marbles (sculptures from the Parthenon), and he was largely responsible for their acquisition in 1816. Haydon wrote the article on painting for the seventh edition of *Encyclopædia Britannica.*

Haye, La (The Netherlands): *see* Hague, The.

Hayek, Friedrich A(ugust von) (b. May 8, 1899, Vienna), Austrian-born British economist noted for his conservative views and criticisms of the Keynesian welfare state. In 1974 he shared the Nobel Prize for Economics with the Swedish economic liberal Gunnar Myrdal.

Hayek was the son of August von Hayek, professor of botany at the University of Vienna. The young Hayek studied law and psychology, then economics, at the University of Vienna, receiving a doctorate in 1923. After studying at New York University (1923–24), he became director of the Austrian Institute of Economic Science and then in 1931 moved to London, where he held positions at the University of London and the London School of Economics and Political Science. In 1938 he became a naturalized British citizen. From 1950 to 1962 he was professor of social and

moral science at the University of Chicago; upon reaching retirement age, he accepted a lifetime chair at the University of Freiburg in Germany and also taught at the University of Salzburg.

Hayek's conservative thesis has been that governmental control of or intervention in a free market only forestalls such economic ailments as inflation, unemployment, recession, or depression. In 1944 he suggested in *The Road to Serfdom* that mild piecemeal reforms and governmental manipulations inevitably lead to the kind of ultimate domestic disaster that paves the way for totalitarian takeover by a Hitler. Hayek's other works include *Prices and Production* (1931), *The Pure Theory of Capital* (1944), *The Constitution of Liberty* (1960), *Law, Legislation, and Liberty* (1978), and *Unemployment and Monetary Policy: Government as Generator of the Business Cycle* (1979).

Hayes, Bob, byname of ROBERT LEE HAYES (b. Dec. 20, 1942, Jacksonville, Fla., U.S.), U.S. sprinter who, with nine other runners, tied (1960–68) for a world record in the 100-metre dash with a time of 10 sec.

Hayes began road-running as a boy with his brother Ernest, who was training to be a boxer. At Matthew W. Gilbert High School (Jacksonville), Hayes played running back on the football team and sprinted, as he also did at Florida Agricultural and Mechanical University (Tallahassee) in 1960–64. He led the football team in rushing and pass-receiving yardage and in scoring. He set a world record for the 100-yard dash in 1963, tied by five others by 1973. In the 1964 Olympic Games at Tokyo, he won the gold medal for the 100-metre dash and tied the world record. After retiring from sprinting, Hayes played professional football as wide receiver for the Dallas Cowboys for 10 seasons, beginning in 1965. At his retirement from football he had set team records for pass receptions and kick returns. In 1979 he was sentenced to five years in a Texas prison for selling narcotics but was paroled in 1980.

Hayes, Helen, original name HELEN HAYES BROWN (b. Oct. 10, 1900, Washington, D.C.), one of the most popular U.S. stage actresses of the 20th century. She was also acclaimed for her roles on radio and television and in motion pictures.

Her stage career began at the age of five; she made her first appearances in such roles as Peaseblossom in Shakespeare's *Midsummer Night's Dream,* then met with juvenile and ingenue success in a variety of parts. Her adult appearances on the stage included George Bernard Shaw's *Caesar and Cleopatra* (1925); Frank Craven's *Animal Kingdom* (1932); Laurence Housman's *Victoria Regina* (1935); Anita Loos' *Happy Birthday* (1946); Mary Ellen Chase's *Mrs. McThing* (1952); Thornton Wilder's *The Skin of Our Teeth* (1955); Tennessee Williams' *The Glass Menagerie* (1956); Jean Anouilh's *Time Remembered* (1957); and Eugene O'Neill's *A Touch of the Poet* (1958) and *Long Day's Journey into Night* (1971). In 1955 New York City's Fulton Theater was renamed the Helen Hayes Theater, and then in 1983, a year after that building was razed, Broadway's Little Theater was renamed in her honour.

Helen Hayes as Queen Victoria

EB Inc.

From 1930 she was heard in radio drama and received the Best Radio Actress Award in 1940. She performed on television from its earliest days, receiving an Emmy award in 1952. She also appeared in numerous motion pictures including *Arrowsmith* (1931); *A Farewell to Arms* (1932); *The Sin of Madelon Claudet,* for which she received an Academy Award in 1932; and *Airport* (1969), for which she received another Academy Award. She married the playwright Charles MacArthur in 1926 (d. 1956). Her son, James MacArthur (b. 1937), became a stage, film, and television actor. Autobiographical writings include *A Gift of Joy* (1965), *On Reflection,* (1968), and (with Anita Loos) *Twice Over Lightly* (1971).

Where the same name may denote a person, place, or thing, the articles will be found in that order

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Hayes, Isaac Israel (b. March 5, 1832, Chester County, Pa., U.S.—d. Dec. 17, 1881, New York City), U.S. physician and Arctic explorer who sought to prove the existence of open seas around the North Pole.

After receiving his M.D. from the University of Pennsylvania (1853), Hayes volunteered to serve as surgeon with Elisha Kent Kane's Arctic expedition, which planned to search for Sir John Franklin, the English explorer whose ships were lost in the Canadian Arctic in 1845. On May 31, 1853, Kane's expedition sailed from New York City on the "Advance." It spent the following winter icebound in Kane Basin off northwestern Greenland. During this time Hayes made several expeditions to nearby Ellesmere Island, now in Canada's Northwest Territories, where in May 1854 he explored the region known as Grinnell Land. His attempt to reach the west coast of Greenland at Upernavik (August 1854) became the subject of his book, *An Arctic Boat Journey* (1860).

Isaac Hayes

By courtesy of the Library of Congress, Washington, D.C.

Commanding the schooner "United States," Hayes sailed again for the Arctic in July 1860. He wintered somewhat south of the point where the "Advance" had been icebound and in the spring of 1861 began to sledge northward. It is almost certain that he reached only slightly beyond 80° N, and the "open polar sea" that he believed he observed was, in actuality, Kennedy Channel, which separates Greenland from Ellesmere Island. He made a third voyage to the Arctic in 1869. His observations from that venture were detailed in *The Land of Desolation* (1871 and 1872).

Hayes, Patrick Joseph (b. Nov. 20, 1867, New York City—d. Sept. 4, 1938, Monticello, N.Y., U.S.), archbishop of New York and cardinal who unified Catholic welfare activities under a central agency, Catholic Charities.

After graduate study at the Catholic University of America, Washington, D.C., he went to New York City as curate at St. Gabriel's parish, becoming successively secretary (1895) to Bishop John Farley, chancellor of the archdiocese (1903), first president (1903) of Cathedral College, the archdiocesan preparatory seminary, New York City, and bishop auxiliary to the then Cardinal Farley (1914). During World War I, he was first bishop of the armed forces (1917), in charge of all Catholic chaplains in the army and navy. On March 10, 1919, he became the fifth archbishop of New York, and he created Catholic Charities (1920), an organization that became a model for other U.S. dioceses. Pope Pius XI named him cardinal in 1924.

Hayes, Rutherford B(irchard) (b. Oct. 4, 1822, Delaware, Ohio, U.S.—d. Jan. 17, 1893, Fremont, Ohio), 19th president of the United States (1877–81), who brought post-Civil War Reconstruction to an end in the South and who tried to establish new standards of official integrity after eight years of corruption in Washington, D.C. He was the only president to hold office by decision of an extraordinary commission of congressmen and Supreme Court justices appointed to rule on contested electoral ballots.

Rutherford B. Hayes, 1877

By courtesy of the Library of Congress, Washington, D.C.

A successful Cincinnati lawyer during the decade preceding the Civil War (1861–65), Hayes represented defendants in several fugitive slave cases and became associated with the newly formed Republican Party. After combat service with the Union Army he was elected to Congress (1865–67) and to the Ohio governorship (1868–76).

In 1875, during his third gubernatorial campaign, Hayes attracted national attention by his uncompromising advocacy of a sound currency backed by gold. The following year he became his state's favourite son at the national Republican nominating convention, where a shrewdly managed campaign won him the presidential nomination. Hayes's unblemished public record and high moral tone offered a striking contrast to widely publicized accusations of corruption in the administration of Pres. Ulysses S. Grant (1869–77). An economic depression, however, and Northern disenchantment with Radical Reconstruction in the South combined to give Hayes's Democratic opponent, Samuel J. Tilden, a popular majority. Early returns indicated a Democratic victory in the electoral college as well, but Hayes's campaign management chal-

lenged the validity of returns from South Carolina, Florida, and Louisiana, and as a result, two sets of ballots were submitted from the three states. The ensuing electoral dispute became known as the Hayes–Tilden affair. The eventual solution, which was not approved by Hayes, was the creation of a special 15-man Electoral Commission (*q.v.*), of whom 8 were Republicans. In a vote along strict party lines, the commission awarded all the contested votes to Hayes, who was thus elected with 185 electoral votes to Tilden's 184.

Honouring secret assurances made to moderate Southerners during the compromise negotiations, Hayes withdrew federal troops from those areas of the South still occupied, thus ending the era of Reconstruction (1865–77). In addition, he promised not to interfere with elections in the former Confederacy, thus ensuring a return there of traditional white Democratic supremacy. He appointed Southerners to federal positions, and he made financial appropriations for Southern improvements. These policies aroused the animosity of a conservative Republican faction called Stalwarts, who were further antagonized by the president's efforts to reform the civil service by substituting nonpartisan examinations for political patronage. As a result, a bitter struggle erupted between Hayes and New York senator Roscoe Conkling when two Republicans were removed from top positions in the New York customhouse.

In the great railroad strikes of 1877, Hayes, at the request of state governors, used federal troops against the strikers. His administration was under continual pressure from the South and West to resume silver coinage, outlawed in 1873. Many considered this proposal inflationary, and Hayes sided with the Eastern, hard-money (gold) interests. Congress, however, overrode his veto of the Bland–Allison Act (1878), which provided for government purchase of silver bullion and restoration of the silver dollar as legal tender.

Hayes refused renomination by the Republican Party in 1880, contenting himself with one term as president. In retirement he devoted himself to humanitarian causes, notably prison reform and educational opportunities for Southern black youth. Biographies include Harry Barnard, *Rutherford B. Hayes and His America* (1954).

Hayes, Woody, byname of WAYNE WOODROW HAYES (b. Feb. 14, 1913, Clifton, Ohio, U.S.—d. March 12, 1987, Upper Arlington, Ohio), American collegiate football coach whose career coaching record was 238 games won, 72 lost, and 10 tied. He developed 58 All-American players, and his Ohio State University teams (1951–78) won 13 Big Ten championships and played in eight Rose Bowl games (winning four).

Hayes graduated in 1935 from Denison (Ohio) University and then taught and coached football in Ohio high schools (1936–40). In World War II he served in the U.S. Navy (1941–46). After the war, he coached at Denison (1946–48) and at Miami University (Oxford, Ohio; 1949–50).

In 1951 he became coach at Ohio State. There he became known as a conservative coach and a stern taskmaster with his players; during games he was aggressive and defiant, berating officials and destroying sideline yard markers in his wrath. He was discharged as coach after a nationally televised game during which he struck a Clemson University player who had intercepted an Ohio State pass. He was elected to the football Hall of Fame in 1983.

Hayes River, river in northeastern Manitoba, Canada, rising from several lakes in the central part of the province and flowing northeastward for 300 miles (500 km) across the Canadian Shield (a region of rocky, ice-smoothed hills dotted with lakes) to enter Hudson Bay at York Factory. The river, named for Sir James Hayes of the Hudson's Bay Company, was, together with the Nelson River, an important route from the company's port of York Factory to Lake Winnipeg and the interior.

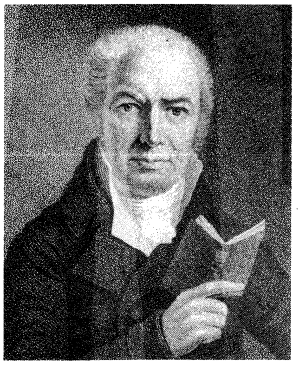
Hayford, John Fillmore (b. May 19, 1868, Rouses Point, N.Y., U.S.—d. March 10, 1925, Evanston, Ill.), American civil engineer and early geodesist who established the theory of isostasy.

Hayford's theory assumes that there must be a compensatory distribution of rock materials of varying density so that the Earth's crust exerts an essentially consistent pressure that is brought to bear evenly at a certain layer in the Earth's interior. From studies of isostasy and gravity anomalies, Hayford estimated the depth of isostatic compensation to vary from 60 to 122 km (37 to 76 miles) and from that deduced the figure of the Earth, which was adopted in 1924 as the International Ellipsoid by the International Geodetic and Geophysical Union. Hayford wrote *Geodetic Astronomy* (1898). He served as a member of the U.S. Coast and Geodetic Survey periodically from 1889 until 1909, when he became director of the College of Engineering at Northwestern University, Evanston, Ill.

Hayley, William (b. Oct. 29, 1745, Chichester, Sussex, Eng.—d. Nov. 12, 1820, Felpham, near Chichester), English poet, biographer, and patron of the arts.

Hayley is best remembered for his friendships with William Blake, the great pre-Romantic poet, painter, and designer, and with the 18th-century poet William Cowper. Hayley is also recalled for his well-meant but destructive patronage of George Romney, a painter whom he persuaded to continue the "drudgery of face-painting" when Romney would have preferred to paint ideal subjects.

Of independent means and good intentions, Hayley in 1800 invited Blake and his wife to live in a cottage on his Felpham estate and engrave and print illustrations for his books. His failure to understand Blake's visionary genius caused Blake, despite his joy in the Sussex scenery and his gratitude for Hayley's generosity, to see in him "an enemy of my Spiritual Life while (pretending) to be



Hayley, engraving by H.R. Cook, 19th century, after a portrait by William Haines

The Mansell Collection

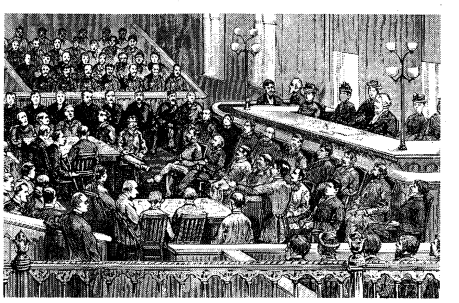
the Friend of my Corporeal"; and in 1803, realizing that Hayley's wish to turn him into a tame poet, engraver, and miniature painter would eventually destroy his artistic integrity, he returned to London, immortalizing Hayley in the epigram:

> Thy friendship oft has made my heart to ache:
> Do be my Enemy for Friendship's sake.

Hayley's verse, as in the didactic *The Triumphs of Temper* (1781), belongs to the 18th century. His *Life . . . of William Cowper,* 3 vol. (1803–04), foreshadows the methods of modern biography, but he retains his place in literary history as *Blake's Hayley* (title of a study by Morchard Bishop, 1951).

Hayman Island, northernmost of the Cumberland Islands, at the northern entrance to Whitsunday Passage (Coral Sea), off northeastern Queensland, Australia. An inshore coral-fringed continental island, it measures 2 miles (3 km) by 1½ miles (2.5 km) and has an area of 960 acres (390 hectares). From red granite coastal cliffs, 200 feet (60 m) high, it rises to more than 840 feet (255 m) in forested hills. It is one of the best-known resorts of the Great Barrier Reef. It was designated a national park in 1941 and is a bird sanctuary.

Haymarket Riot (May 4, 1886), violent confrontation between police and labour protesters in Chicago that dramatized the labour movement's struggle for recognition in the United States. On May 3, one person had been killed and several injured as police intervened to protect strikebreakers from strikers during a strike at the McCormick Harvesting



"The Trial of the Anarchists in Chicago," from a sketch by Louis Gasselin in *Harper's Weekly,* 1886

By courtesy of the Library of Congress, Washington, D.C.

Machine Company. (The strike itself was part of a campaign by militant labour unionists in Chicago and elsewhere to secure an eight-hour workday.) In response to this violence, a mass meeting to protest police brutality was called by radicals to take place on May 4 in Haymarket Square. The meeting remained peaceful until a police contingent attempted to disperse it. At this point a dynamite bomb, thrown by a person never positively identified, killed 7 policemen and injured about 60 others. The rest of the police then traded pistol fire with workers in the crowd. Amid the ensuing public hysteria, August Spies and seven other alleged anarchist labour leaders were convicted of murder on the grounds that they had conspired with or aided an unknown murderer, with whom their connection was not demonstrated. Spies and three others were hanged on Nov. 11, 1887; another committed suicide; and the surviving three were pardoned in 1893 by the Illinois governor John Peter Altgeld—an action widely condemned by conservatives but applauded by organized labour.

Haynau, Julius (Jacob), Freiherr von (baron of) (b. Oct. 14, 1786, Kassel, Hesse-Kassel [Germany]—d. March 14, 1853, Vienna, Austrian Empire), Austrian general whose military successes were overshadowed by his notorious brutality.

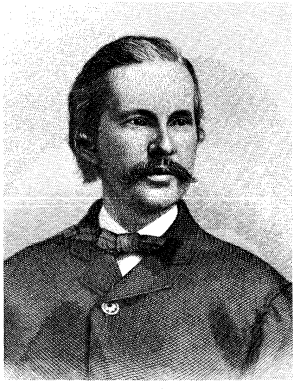
Entering the Austrian Army in 1801, Haynau saw action throughout the Napoleonic Wars and remained in service after the Congress of Vienna (1814–15). During the revolutions of 1848–49, he campaigned in Italy, where he marred his undoubted military abilities by the inordinately severe repression of a rising in Brescia. Moving to Hungary in command of an army corps in 1849, Haynau again, though successful in the field, used what many thought was undue harshness. He retired in

1850 and toured Europe, but his reputation was such that he was exposed to mob violence during his visits to London in 1850 and Brussels in 1852.

Haynau, detail from an engraving by Fritz Kriehuber
By courtesy of the Heeresgeschichtliches Museum, Vienna

Hayne, Paul Hamilton (b. Jan. 1, 1830, Charleston, S.C., U.S.—d. July 6, 1886, Grovetown, Ga.), American poet and literary leader, one of the best-known poets of the Confederate cause.

After growing up in the home of his uncle, Robert Young Hayne, and practicing law for a short time, Hayne wrote for the *Charleston Evening News* and the Richmond *Southern Literary Messenger* and was associate editor of the weekly *Southern Literary Gazette*. His first collected poems were published at his own expense in 1855. He was coeditor of the influential *Russell's Magazine*, launched under the leadership of William Gilmore Simms, during its three years of publication (1857–60). During the Civil War he contributed verse supporting the Southern cause—notably "The Battle of Charleston Harbor"—to the *Southern Illustrated News* of Richmond. After the war, his home having burned and with his fortune lost, Hayne and his family moved to a shanty at Copse Hill near Augusta, Ga., where he earned his living writing prose and wrote some poetry. Hayne's published works include: *Sonnets and Other Poems* (1857), *Legends and Lyrics* (1872), *The Mountain of the Lovers* (1875), and *The Broken Battalions* (1885).



Paul Hayne, engraving by J.J. Cade
By courtesy of the Library of Congress, Washington, D.C.

Hayne, Robert Young (b. Nov. 10, 1791, Colleton District, S.C., U.S.—d. Sept. 24, 1839, Asheville, N.C.), American lawyer, political leader, and spokesman for the South, best-remembered for his debate with Daniel Webster (1830), in which he set forth a doctrine of nullification.

Hayne entered the U.S. Senate in 1823 and soon became prominent as a spokesman for the South and for the doctrine of states' rights. In his debate with Webster, Hayne argued that the federal Constitution was a compact among the states, and that any state might nullify a federal law that it considered in violation of the constitutional compact. In 1832, as a member of the South Carolina nullification convention, he helped pass an ordinance declaring federal tariff laws null and void in the state. Hayne resigned from the Senate in 1832, and after serving as governor of South Carolina (1832–34) and mayor of Charleston (1834–37), he became president of the abortive Louisville, Cincinnati, and Charleston Railroad (1837–39).

Haynes, Elwood (b. Oct. 14, 1857, Portland, Ind., U.S.—d. April 13, 1925, Kokomo, Ind.), American automobile pioneer who built one of the first automobiles.

He successfully tested his one-horsepower, one-cylinder vehicle at 6 or 7 miles (10 or 11 km) per hour on July 4, 1894, at Kokomo, Ind. Haynes claimed that he received the first U.S. traffic ticket when in 1895 a policeman on a bicycle ordered him and his automobile off the streets of Chicago. Now on exhibition at the Smithsonian Institution, Washington, D.C., Haynes's vehicle is the oldest American-made automobile in existence.

In partnership with Edgar and Elmer Apperson, Haynes formed the Haynes–Apperson Company, Kokomo, and began producing automobiles in 1898. Haynes and the Appersons split up in 1902, and three years later the company name was changed to Haynes Automobile Company. It ceased operations in 1925.

A trained engineer and chemist, Haynes discovered a number of alloys, including tungsten chrome steel (1881), a chromium and nickel alloy (1897), and a chromium and cobalt alloy (1900). He discovered a stainless steel in 1911 and patented it in 1919. He was the first to use aluminum in an automobile engine.

Hays, city, seat of Ellis county, central Kansas, U.S., on Big Creek. It was founded in 1867 after the establishment of Fort Hays (a frontier post built as Fort Fletcher in 1865). The fort was abandoned in 1889; its blockhouse and guardhouse are preserved in the Frontier Historical Park. Oil fields in the vicinity began to be developed in 1936. The city is a trading centre and shipping point for an extensive wheat-growing and oil-producing area and is the seat of Fort Hays State University (1902) and a large dryland agricultural experiment station. The Cathedral of the Plains (1909–11) is at nearby Victoria. Inc. 1885. Pop. (1986 est.) 18,257.

Hays, Arthur Garfield (b. Dec. 12, 1881, Rochester, N.Y., U.S.—d. Dec. 14, 1954, New York City), American lawyer who defended, usually without charge, persons accused in many prominent civil-liberties cases in the 1920s.

Educated at Columbia University (B.A., 1902; M.A. and LL.B., 1905), Hays was admitted to the New York bar. In 1914–15 he practiced international law in London. Among the proceedings in which he appeared as a defense attorney were the Scopes trial, Dayton, Tenn., 1925; the Sweet segregation–violence case, Detroit, 1925 (both the above with Clarence S. Darrow); the *American Mercury* censorship case, Boston, 1926; the Sacco–Vanzetti case, Boston, 1921–27; and the Scottsboro case, Alabama, from 1931. In 1933 he went to Germany to defend the alleged burners of the Reichstag. From 1912 he was general counsel of the American Civil Liberties Union; in 1924 he was New York state chairman of the Progressive Party.

Hays, Will H., byname of WILLIAM HARRISON HAYS (b. Nov. 5, 1879, Sullivan, Ind., U.S.—d. March 7, 1954, Sullivan), prominent American political figure who was president of the Motion Picture Producers and Distributors of America (MPPDA, later called the Motion Picture Association of America) from 1922 to 1945. Because of his pervasive influence on the censorship office of the association, it was known as the Hays Office.

Hays, a politically active lawyer, became the chairman of the Republican National Committee in 1918. He spearheaded Warren G. Harding's successful front-porch campaign for the presidency of the United States in 1920 and the following year was appointed postmaster general (1921–22). In 1922, after the occurrence of a number of scandals involving Hollywood personalities, the leaders of the motion-picture industry formed the self-regulating MPPDA to counteract the threat of government censorship of films and to create favourable publicity for the industry. Hays was offered a position as president. As a respected national politician and dignified elder in the Presbyterian Church, Hays brought prestige to the organization. He initiated a moral blacklist in Hollywood, inserted morals clauses in actors' contracts, and in 1930 was one of the authors of the Production Code, a detailed enumeration of what was morally acceptable on the screen, which was not supplanted until 1966.

Will H. Hays
Brown Brothers

haystack hill: *see* pepino hill.

Hayter, Stanley William (b. Dec. 27, 1901, London—d. May 4, 1988, Paris), English printmaker and painter who founded Atelier 17, the most influential print workshop of the 20th century.

Hayter was trained in geology at King's College, London University, and initially regarded art as an avocation. While he was working in the Middle East as a research chemist from 1922 to 1925, he painted in his spare time. In Paris in 1926 he met the painter and printmaker Jacques Villon, who introduced him to engraving, and was associated briefly with the Académie Julian before opening his own atelier the following year.

During the 1930s Hayter operated a printmaking studio at 17 Rue Campagne-Première in Paris. This studio gave its name—Atelier Dix-Sept—to a group of artists that at various times included Marc Chagall, Max Ernst, Joan Miró, and Pablo Picasso. Hayter relocated the studio to New York City for a time in the 1940s, but in 1950 he reestablished Atelier 17 in Paris. Many American artists, including Jackson Pollock, were also influenced by Hayter, particularly by his emphasis on automatism and reliance on the unconscious. He taught printmaking techniques at several U.S. colleges as well as at Atelier 17 itself.

Hayter's writings include *New Ways of Gravure* (1949, revised 1966), *About Prints* (1962), and *The Nature and Art of Motion* (1964). He was made Officer (1959) and Commander (1967), Order of the British Empire, and an Honorary Royal Academician (1982).

Hayton, also spelled HAITHON, or HETHUM (d. 1271), king of Little Armenia, now in

Turkey, from 1224 to 1269; the account of his travels in western and central Asia, written by Kirakos Gandzaketsi, a member of his suite, gives one of the earliest and most comprehensive accounts of Mongolian geography and ethnology.

Throughout his reign Hayton followed a policy of friendship and alliance with the powerful Mongols and in 1251 was summoned to the court of Möngke, the new khan at Karakorum, Mongolia. Disguised so as to pass safely through the Turkish states of the interior of eastern Asia Minor, where he was hated as an ally of the Mongols against Islām, he made his way to the Mongol camp at Kars, Greater Armenia, now in Turkey. After he passed through the Iron Gates of Derbent around the western shore of the Caspian Sea, comparatively little is known of the long journey to Karakorum, which he reached about Sept. 14, 1254. He left on November 1, with documents, seals, and letters of enfranchisement filled with promises for the betterment of the Armenian state, church, and people. His return journey by way of Samarkand and northern Persia brought him to Greater Armenia in just eight months. The narrative of his travels concludes with some observations of Buddhist tenets, Chinese habits, and some notes, compounded of truth and legend, on the wild tribes and animals of the Gobi (desert) and adjoining regions.

Hayward, city, Alameda County, California, U.S., at the eastern terminus of the San Mateo Toll Bridge across San Francisco Bay. Named for William Hayward, a disappointed gold seeker who arrived in 1851 and opened a hotel, it was originally an Indian campsite on grazing lands of Mission San José (established 1797) and later part of the Guillermo Castro Rancho. Promoted by San Francisco businessmen, it became a livestock and agricultural centre and later turned to manufacturing. California State University at Hayward was established in 1957 and Chabot (junior) College in 1961. Inc. 1876. Pop. (1985 est.) 102,351.

Haywood, Eliza, *née* FOWLER (b. 1693?—d. Feb. 25, 1756, London), prolific English writer of sensational romantic novels that mirrored contemporary 18th-century scandals.

Eliza Haywood, engraving by G. Vertue after a portrait by James Parmentier

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

She left her husband, a middle-aged clergyman, for the stage, supporting herself also by writing and adapting works for the theatre. She then turned to the extravagantly passionate fiction for which there was then a vogue, adopting the technique of writing novels based on scandals involving leaders of society, whom she denoted by initials. (The British Museum in London has a key giving their full names.) Among such works are *Memoirs of a Certain Island Adjacent to the Kingdom of Utopia* (1725) and *The Secret History of the Present Intrigues of the Court of Caramania* (1727).

Alexander Pope attacked her with coarse brutality in his satirical poem *The Dunciad,* and Jonathan Swift called her a "stupid, infamous woman." Pope's attack, which she attempted to counter with *The Female Dunciad* (1729), caused her to cease writing for almost 16 years. Later, she achieved some success with *The Female Spectator* (1744–46), the first periodical to be written by a woman, and with her realistic novel *The History of Jemmy and Jenny Jessamy* (1753).

Haywood, William D(udley), byname BIG BILL HAYWOOD (b. Feb. 4, 1869, Salt Lake City, Utah, U.S.—d. May 18, 1928, Moscow), American radical who led the Industrial Workers of the World (IWW, or "Wobblies") in the early decades of the 20th century.

A miner at the age of 15, Haywood became active in the Western Federation of Miners and was elected its secretary treasurer. At the founding convention of the IWW in 1905, Haywood chaired the proceedings and subsequently led the initial IWW organizing efforts. His arrest and acquittal on a labour-related murder charge in 1906–07 propelled him into the national limelight, and he spent much of the next five years on a national speaking tour for the Socialist Party. Haywood and other IWW organizers lent their support to a number of strikes in the period from 1909 to 1913.

In 1917, shortly after the United States entered World War I, Haywood was arrested in Chicago, along with scores of other IWW members, and convicted the following year on charges amounting to treason and sabotage. Released on bail during appeal procedures, Haywood in 1921 decided to jump bail and go to Russia. He was given an administrative post by the Russian revolutionary government, but his health steadily declined and he died in 1928. *Bill Haywood's Book: The Autobiography of William D. Haywood* was published in 1929.

Hayworth, Rita, original name MARGARITA CARMEN CANSINO (b. Oct. 17, 1918, Brooklyn, New York City—d. May 14, 1987, New York City), American motion-picture actress who rose to glamorous stardom in the 1940s and '50s. She was called "The Great American Love Goddess."

The daughter of Spanish-born dancer Eduardo Cansino and his partner Volga Haworth, Hayworth became a professional dancer with her father's nightclub act at the age of 12 and appeared as Spanish dancer Rita Cansino in several films beginning in 1935. Then, on the advice of her first husband, Edward Judson (who became her manager), she changed her name and dyed her hair auburn, cultivating a sophisticated glamour that first registered in *Only Angels Have Wings* (1939), *Strawberry Blonde* (1941), and *Blood and Sand* (1941). The musicals *You'll Never Get Rich* (1941) and *You Were Never Lovelier* (1942), both with Fred Astaire, and *Cover Girl* (1944), with Gene Kelly, made her a star and a favourite pinup girl of American servicemen.

Rita Hayworth in *Gilda,* 1946

NYT Pictures

The worldly eroticism of Hayworth's performance rose to its peak in *Gilda* (1946), which had some censorship problems because of the so-called striptease in which she was seen singing "Put the Blame on Mame" (the dubbed voice was actually that of Anita Ellis). Her later films included *The Lady from Shanghai* (1948), directed by her second husband, Orson Welles, as well as *Affair in Trinidad* (1952), *Salome* (1953), *Miss Sadie Thompson* (1953), *Pal Joey* (1957), *Separate Tables* (1958), *The Money Trap* (1966), and *The Wrath of God* (1972).

For some 15 years before her death, Hayworth suffered from Alzheimer's disease.

Hazael (fl. 9th century BC), king of Damascus, whose history is given at length in the Bible, II Kings 8–13.

Hazael became king after the death of Ben-hadad I, under whom he was probably a court official. Ben-hadad, who was ill, sent Hazael to the prophet Elisha to inquire concerning his chances of recovery. Elisha prophesied that Ben-hadad would die and that Hazael would succeed him. Hazael, on his return, smothered Ben-hadad and became king. He ruled for many years, during which time he fought the kings of Judah and Israel with some success, capturing all Israel's possessions east of the Jordan. He was eventually conquered by Shalmaneser III (859–824 BC), king of Assyria, who defeated Hazael's forces in battle, the first time taking an enormous toll in lives and equipment and driving Hazael into Damascus and the second time capturing a number of Syrian cities. Damascus itself, though besieged and its oasis devastated, was not conquered.

ḥazan (liturgical singer): *see* cantor.

Ḥazāra, people of Mongol descent dwelling in the mountains of central Afghanistan. They number about 1,650,000, of whom about 1,500,000 live in Afghanistan, and the remainder in Iran. One group, the Eastern Ḥazāra, inhabit the area known as the Hazārajāt. There are important communities of them also in Iran and Baluchistan (Pakistan). The Western Ḥazāra include those dwelling in the northern foothills of the Safīd Kūh Selseleh-ye (Paropamisus Mountains); and a group on the border of Iran known as Ḥazāra in Iran and as Taimuri, or Timuri, in Afghanistan.

The Western Ḥazāra are Sunnite Muslims and speak dialects of Persian. Many of them were still nomadic or seminomadic in the late 20th century. Some spend their summers in felt-covered conical tents.

The Eastern Ḥazāra speak a peculiar kind of Persian with many Mongol and Turkic words. Most of them are Shī'ite Muslims of the Twelver faith. They live in fortified villages of flat-roofed houses of stone or mud built wall-to-wall around a central courtyard, overlooking the narrow valleys in which they cultivate rotating crops of barley, wheat, and legumes, as well as various fruits and cucumbers. The vast, treeless mountains that dominate the landscape are used chiefly for pasturing sheep.

Hazard, city, seat of Perry County, southeastern Kentucky, U.S., on the North Fork of the

Kentucky River in the Cumberland foothills just east of Daniel Boone National Forest (Redbird Purchase Unit), 90 miles (145 km) southeast of Lexington. Founded in 1821, it was named to honour the American naval hero Commodore Oliver Hazard Perry. Growth was retarded by the long blood feud between the French and Eversole families; the worst gun battle occurred in Hazard (1888) when 12 men were killed. The arrival of the Louisville and Nashville Railroad in 1912 boosted development of local resources (coal, oil, gas, timber). Hazard annexed the adjacent community of Lothair in 1965. Hazard Community College opened in 1968. Inc. town, 1832; city, 1884. Pop. (1986 est.) 5,580.

hazard, dice game dating back at least to the 14th century and once popular and played for high stakes in English gambling rooms. The name of the popular American dice game of craps derives from the nickname crabs for the cast 1–1 in hazard. The modern rules of craps also grew out of the old English game.

In hazard the banker, or setter, sets a stake. The player, or caster, calls a main (a number from 5 to 9, inclusive) and then throws two dice. If he throws in, or nicks, he wins the stake. Five is nicked by 5; 6 by 6 or 12; 7 by 7 or 11; 8 by 8 or 12; 9 by 9. The caster throws out, losing the stake, when throwing aces or deuce–ace (crabs, or craps) or when throwing 11 or 12 to a main of 5 or 9, 11 to 6 or 8, and 12 to 7. Any other throw is his chance; he keeps throwing until the chance comes up, when he wins, or until the main comes up, when he loses. When a chance is thrown, the setter pays more than the original stake, according to specified odds. In French hazard the player throws against the house. In English, or chicken, hazard the player throws against an opponent.

Chuck-a-Luck (*q.v.*), a game played with three dice, is sometimes called hazard.

Hazard, Paul(-Gustave-Marie-Camille) (b. Aug. 30, 1878, Nordpeene, Fr.—d. April 13, 1944, Paris), French educator, historian of ideas, and scholar of comparative literature.

Hazard studied at the École Normale Supérieure in Paris and took a doctorate at the Sorbonne in 1910. He taught comparative literature at the University of Lyon until 1919, when he moved to the Sorbonne. In 1925 he went to the Collège de France in Paris.

Hazard's major work on intellectual history was *La Crise de la conscience européenne, 1680–1715,* 3 vol. (1935; "The Crisis of the European Conscience, 1680–1715"; Eng. trans. *The European Mind, 1680–1715*). It examines the conflict between 17th-century Neoclassicism and its ideals of order and perfection and ideas of the Enlightenment. He also wrote on Italian history and literature. He was the first to point out, in *Les Livres, les enfants et les hommes* (1937; *Books, Children and Men*), that northern Europe surpassed the south in literature for children. He often lectured at Columbia University and other American schools in the 1920s and '30s.

Hazāribāgh, town, south-central Bihār state, northeastern India, on the Hazāribāgh plateau. The town is a major road junction and agricultural trade centre. It houses the offices of the Dāmodar Valley Corporation, a hospital, and several colleges affiliated with Rānchi University. Hazāribāgh was constituted a municipality in 1869. Pop. (1981) 80,155.

Hazāribāgh National Park, national park in south-central Bihār state, northeastern India, lying on the main Patna–Rānchi road, 11 miles (18 km) from Hazāribāgh town. Established in 1955, it extends over an area of 71 square miles (184 square km). The park consists of hills covered by a dense forest of sal (*Shorea*) and inhabited by tiger, leopard, sloth bear, black bear, deer, wild pig, hyena, peafowl, red jungle fowl, and green pigeon. The park can be viewed from observation towers connected by all-weather roads; several salt licks have also been constructed.

hazel (tree or nut): *see* filbert.

Hazeltine, (Louis) Alan (b. Aug. 7, 1886, Morristown, N.J., U.S.—d. May 24, 1964, Maplewood, N.J.), American electrical engineer and physicist who invented the neutrodyne circuit, which made radio commercially possible.

Hazeltine attended Stevens Institute of Technology, Hoboken, N.J., and, after working a year (1906–07) in the laboratory of the General Electric Company in Schenectady, N.Y., he returned to Stevens to begin a long career in teaching. He became a full professor and head of the department of electrical engineering in 1917.

Experimental work in radio telegraphy and telephony, including a period as consultant to the U.S. Navy during World War I, led Hazeltine to invent the neutrodyne circuit, which neutralized the noise that plagued all radio receivers of the time. In 1924 the Hazeltine Corporation was formed, to which he sold the neutrodyne patent for stock and cash; by 1927 it was estimated that 10,000,000 radio receivers employing the new device were in operation.

For the next several years Hazeltine served as adviser to the government on regulation of radio broadcasting and continued his development work in radio for the Hazeltine Corporation; he returned to the Stevens faculty in 1933 as professor of physical mathematics. In World War II he was again in government service, as a member of the National Defense Research Committee.

Hazleton, city, Luzerne county, east-central Pennsylvania, U.S. It is sited on Spring Mountain of the Buck Mountain Plateau, at an elevation of 1,624 feet (495 m), 24 miles (39 km) south of Wilkes-Barre. Originally a lumbering settlement, it became a prosperous mining town after the discovery (1818) of nearby anthracite coal deposits and was laid out in 1836 by the Hazleton Coal Company. Its name is derived from hazel bushes found in the area, then known as the "Great Swamp." With the decline of coal mining after World War II, diversified manufactures (textiles, steel products, and aerospace components) became the economic mainstay. The city has a branch campus of the Pennsylvania State University (opened 1934) and the Pennsylvania Anthracite Museum displaying early mining equipment.

Suburbs include the boroughs of West Hazleton (inc. 1889), Conyngham, Freeland, McAdoo, Weatherly, and White Haven. Inc. borough, 1856; city, 1892. Pop. (1986 est.) 25,270.

Hazlitt, William (b. April 10, 1778, Maidstone, Kent, Eng.—d. Sept. 18, 1830, Soho, London), English writer remembered above all for his essays, which are of permanent value for their humanity. His writing is ordinary in the best sense, without conscious artistry or literary pretension, and it can be read for sheer enjoyment of the brilliant intellect that informs it.

Hazlitt, chalk drawing by W. Bewick; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Hazlitt's childhood was spent in Ireland and North America, where his father, a Unitarian preacher, supported the American rebels. The family returned to England when William was nine, settling in Shropshire. At puberty the child, until then described as happy, became somewhat sullen and unapproachable, tendencies that persisted throughout his life. He read intensively, however, laying the foundation of his learning. Having some difficulty in expressing himself either in conversation or in writing, he turned to painting and in 1802 traveled to Paris to work in the Louvre, though war between England and France compelled his return the following year. His friends, who already included Charles Lamb, William Wordsworth, and Samuel Taylor Coleridge, encouraged his ambitions as a painter; yet in 1805 he gave his mind to metaphysics and the study of philosophy that had attracted him earlier, publishing his first book, *On the Principles of Human Action.* In 1808 he married Sarah Stoddart, and the couple went to live at Winterslow on Salisbury Plain, which was to become Hazlitt's favourite retreat for thinking and writing.

Although he successfully completed several literary projects, by the end of 1811 Hazlitt was penniless. He then gave a course of lectures in philosophy in London and began reporting for the *Morning Chronicle,* quickly establishing himself as critic, journalist, and essayist. His collected dramatic criticism appeared as *A View of the English Stage* in 1818. He also contributed to a number of journals, among them Leigh Hunt's *Examiner;* this association led to the publication of *The Round Table,* 2 vol. (1817), 52 essays of which 40 were by Hazlitt. Also in 1817 Hazlitt published his *Characters of Shakespeare's Plays,* which met with immediate approval in most quarters. He had, however, become involved in a number of quarrels, often with his friends, resulting from the forcible expression of his views in the journals. At the same time, he made new friends and admirers (among them Percy Bysshe Shelley and John Keats) and consolidated his reputation as a lecturer, delivering courses *On the English Poets* (published 1818) and *On the English Comic Writers* (published 1819), as well as publishing a collection of political essays. *Lectures on the Dramatic Literature of the Age of Elizabeth* were prepared during 1819, but thereafter he devoted himself to essays for various journals, notably John Scott's *London Magazine.*

Hazlitt lived apart from his wife after the end of 1819, and they were divorced in 1822. He fell in love with the daughter of his London landlord, but the affair ended disastrously, and Hazlitt described his suffering in the strange *Liber Amoris; or, The New Pygmalion* (1823). Even so, many of his best essays were written during this difficult period and were collected in his two most famous books: *Table Talk* (1821) and *The Plain Speaker* (1826). Others were afterward edited by his son, William, as *Sketches and Essays* (1829), *Literary Remains* (1836), and *Winterslow* (1850), and by his biographer, P.P. Howe, as *New Writings* (1925–27). Hazlitt's other works during this period of prolific output included *Sketches of the Principal Picture Galleries in England* (1824), with its celebrated essay on the Dulwich gallery.

In April 1824 Hazlitt married a widow named Bridgwater. But the new wife was resented by his son, whom Hazlitt adored, and the couple separated after three years. Part of this second marriage was spent abroad, an experience recorded in *Notes of a Journey in France and Italy* (1826). In France he began an ambitious but not very successful *Life of Napoleon,* 4 vol. (1828–30), and in 1825 he published some of

his most effective writing in *The Spirit of the Age.* His last book, *Conversations of James Northcote* (1830), recorded his long friendship with that eccentric painter.

Hazlitt's *Complete Works,* in 13 volumes, appeared in 1902–06, to be reissued, edited by P.P. Howe, in 21 volumes in 1930–34. Biographies of Hazlitt include W.C. Hazlitt's *Four Generations of a Literary Family,* 2 vol. (1897), and P.P. Howe's *Life of Hazlitt* (1922, 1928). *The Letters of William Hazlitt,* edited by Herschell Moreland Sikes, Willard Hallam Bonner, and Gerald Lahey, and John Kinnaird's *William Hazlitt; Critic of Power,* a history of Hazlitt's intellectual career, were published in 1980.

hazzan (Judaism): *see* cantor.

H.D.: *see* Doolittle, Hilda.

HD, abbreviation of *Henry Draper Catalogue* (*q.v.*), a listing of stars.

he (Chinese vessel): *see* ho.

He Xiangu (in Chinese mythology): *see* Ho Hsien-ku.

He Yan (Chinese philosopher): *see* Ho Yen.

Head, Bessie Emery (b. July 6, 1937, Pietermaritzburg, S.Af.—d. April 17, 1986, Serowe, Botswana), African writer who described the contradictions and shortcomings of pre- and post-colonial African society in morally didactic novels and stories.

Head was born of an illegal union between her white mother (who was placed in a mental asylum during her pregnancy) and black father (who then mysteriously disappeared). She suffered rejection and alienation at an early age. After moving from foster parents to an orphanage school to an early marriage, she abandoned her homeland, her teaching job, and her husband and took her small son to Botswana, seeking personal asylum and tranquility in simple village life.

Her novels evolved from an objective, affirmative narrative of an exile finding new meaning in his adopted village in *When Rain Clouds Gather* (1969) to a more introspective account of the acceptance won by a light-coloured Bushman woman in a black-dominated African society in *Maru* (1971). *A Question of Power* (1973) is a frankly autobiographical account of disorientation and paranoia in which the heroine survives by sheer force of will. *The Collector of Treasures* (1977), a volume of short fiction, includes brief vignettes of traditional Botswanan village life, macabre tales of witchcraft, and passionate attacks on African male chauvinism.

Head said that literature must be a reflection of daily encounters with undistinguished people. Her works reveal empathy with children, with women treated as "dead things" in South Africa, and with idealistic planners who meet indifference and greed at the marketplace.

Head, Edith (b. Oct. 28, 1898, San Bernardino, Calif., U.S.—d. Oct. 24, 1981, Hollywood), American motion-picture costume designer.

Head was educated at the University of California and at Stanford University and for a time taught French, Spanish, and art. She joined Paramount Studios in 1923 as a sketch artist, and her first solo credit as a costume designer was for *She Done Him Wrong* (1933). From then on, as chief designer at Paramount and later at Universal, she became America's best known and most successful Hollywood designer. She was noted for the range of her costume designs, from elegant simplicity to intricate flamboyance, and she also gained a reputation for being able to placate temperamental actresses and directors.

Head was nominated by the Academy of Motion Picture Arts and Sciences for an unprecedented 34 Oscars, winning a record eight of them for her work in *The Heiress* (1949), *All About Eve* (1950), *Samson and Delilah* (1950), *A Place in the Sun* (1951), *Roman Holiday* (1953), *Sabrina* (1954), *The Facts of Life* (1960), and *The Sting* (1973). She was the author of an autobiography, *The Dress Doctor* (1959), and a self-help book, *How to Dress for Success* (1967). She appeared as herself on screen in *The Oscar* (1966).

head flattening, intentional or unintentional artificial deformation of the skull. Some Indians of the Pacific Northwest Coast of North America produced head flattening by binding an infant's head to a cradleboard; only the heads of free men, not slaves, were deformed. Indians of southeastern North America deformed infants' heads by specially constructed cradleboards and the pressure of a wooden block or a bag of sand against the forehead. *See also* deformation, ritual.

headache, pain inside the head; headache in one form or another probably is humanity's most frequently troublesome symptom, affecting nearly everyone at some time and inflicting recurrent discomfort on perhaps one person out of 10. Headaches vary widely in their intensity and in the seriousness of the underlying conditions that cause them, and there is no necessary correlation between the severity of the pain and its cause. Pain is an individual matter—a biological danger signal initiated by tissue injury, carried along fairly specific nervous system pathways, but ultimately experienced according to the psychological endowment and past experience of the sufferer. The understanding of headache, therefore, requires an awareness of the mechanisms that cause head pain and of the fact that different genetic and emotional backgrounds produce very different individual responses to tissue injury of similar intensity.

Mechanism of headache. Most headaches occur because specific pain-sensitive structures in or around the head are overstimulated or damaged. Some of these are inside the skull, or intracranial; the remainder are in the tissues surrounding or covering the skull, or extracranial. Extracranial structures are by far the more common sources of recurrent headache.

Intracranial headache results when the arterial blood vessels at the base of the brain become excessively distended (as during fever, "hangover," or a severe and sudden attack of high blood pressure) or when an inflammation or hemorrhage surrounds these same arteries and their adjacent meningeal tissues (as during an attack of meningitis or a cerebral hemorrhage). Intracranial headache also can occur if a tumour or some other space-taking mass displaces certain of the large veins or other tissues inside the skull (the brain itself is not sensitive to pain). Intracranial headaches often begin abruptly; only rarely do they last throughout the waking hours, and they usually change in character with a change in posture. Most headaches from brain tumour are felt in a particular part of the head, especially when they first begin. Intracranial causes of headache almost always produce associated abnormalities that the physician can detect by physical examination or laboratory tests.

Extracranial headaches have six major sources:

1. Dilatation and distension of the extracranial arteries that supply the surface tissues of the head. This category includes migraine and many "tension" headaches.
2. Sustained contraction of skeletal muscles about the face, scalp, and neck. This includes most psychologically associated "tension" headaches as well as those associated with excess fatigue, orthopedic difficulties of the neck, and simple eyestrain.
3. Distension, inflammation, or destruction of pain-sensitive tissues in the nose, paranasal sinuses, eyes, ears, and teeth. Headache from these sources is accompanied by objective signs of active disease.
4. Specific neuritis or neuralgias, such as trigeminal neuralgia, all of which have very specific and predictable pain patterns.
5. Direct injuries, infections, or growths involving the extracranial tissues. Head pain following trauma is often a complex matter, since it can herald troubles as serious as a blood clot on the brain or as medically trivial as a desire for greater financial compensation after injury.
6. Rare inflammatory diseases of the cranial arteries.

More than 90 percent of all headaches result from distension of extracranial arteries or from sustained contraction of face and neck muscles. Such headaches accompany frustration, resentment, anxiety, fatigue, or depression. Thus the individual's life situation and emotions are particularly important in the genesis of headache, both because disturbed feeling states initiate changes in arteries and muscles that cause pain, and because the presence of pain is often particularly threatening to emotionally troubled persons. Psychological factors actually induce hurtful tissue changes; only rarely does headache develop for which no responsible tissue abnormality exists.

Migraine is an extremely painful disorder in which vascular headache is combined with several other bodily disturbances, including periodic changes in water balance and in autonomic nervous system function. Migraine attacks may occur daily or as infrequently as once a year. Characteristically, patients with migraine experience initial symptoms that precede headache by as much as an hour and are believed to be due to the constriction of certain intracranial arteries: there may be illusions of flashing lights, loss of vision, or transient defects in speech or body movement. As a rule, the early symptoms subside in 10 to 30 minutes and are followed by severe, throbbing headache located over one or the other temple or occipital region. Less commonly the headache is bilateral or generalized. During the attack, bright lights hurt the eyes and many patients have nausea and vomiting. Dilation of one or more extracranial arteries causes this early painful stage. If the headache persists for more than a few hours, secondary painful contraction sets in in scalp and neck muscles. In typical cases, the migraine attack lasts for 12 to 24 hours or more unless relieved by vasoconstrictor and analgesic drugs early in its course.

The underlying cause of migraine is unknown. The illness occurs in families with an incidence suggesting an autosomal dominant inheritance (*i.e.,* the defect is transmitted by a nonsex chromosome; only one of the two genes involved in the trait need be transmitted). At one time or another, various investigators have attempted to link migraine to allergy, epilepsy, or other conditions, but the evidence has been unconvincing. Several studies have suggested an abnormality in the regulation of serotonin, a chemical involved in transmitting impulses in the brain. The observed chemical changes in patients with migraine, however, have not always been consistent, and the evidence has not yet led to any change in treatment, which consists of using vasoconstrictor and analgesic drugs during the attacks and psychological guidance for the patients between attacks. Persons with migraine are characteristically perfectionistic, self-demanding, hard-working, and inflexible. They commonly set impossibly high standards for themselves and, less often, for others. When affected persons come to understand these feelings and realize the fatigue and resentment they engender in themselves, they are often able to establish more realistic ways of approaching life. Headaches tend to decline in frequency at the same time.

Closely related to the migraine is the cluster headache. Men are more often afflicted than women with this disorder, usually at an age span around the third to sixth decade. Attacks are sudden with intense throbbing pain between the eyes and in the forehead; the nose and eyes generally water. The pain usually does not persist more than two hours for each episode; there may be several attacks, however, daily, weekly, or monthly. For no apparent reason the pain arises and subsides with equal abruptness. The affected person may remain symptom-free for months or years before another patterned cluster of headaches arises. Alcohol ingestion can precipitate a headache during the cluster period, but not between attacks.

Medical significance of headache. The medical significance of headache varies widely, as the causes themselves range from relatively minor emotional difficulties to illnesses as serious as brain tumour. Any headache that is recent in onset, different from previous patterns, or altered in quality requires close and careful medical evaluation.

header, machine for harvesting grain, developed in the United States, Canada, and Australia; along with the binder, it was standard equipment for harvesting wheat in the United States and Canada until early in the 20th century, when the grain combine was widely adopted. The header clipped the heads of grain from the stalks and elevated them into a header barge, a wagon with one low side over which the cut material could be pitched out with forks onto a stack. Later in the autumn, the grain was threshed by a threshing machine.

headfish: *see* mola.

headhunting, practice of removing and preserving human heads. Headhunting arises in some cultures from a belief in the existence of a more or less material soul matter on which all life depends. In the case of human beings, this soul matter is believed to be particularly located in the head, and removal of the head is believed to capture the soul matter within and add it to the general stock of soul matter belonging to the community, wherein it contributes to the fertility of the human population, livestock, and crops. Headhunting has thus been associated with ideas regarding the head as the seat of the soul; with some forms of cannibalism in which the body or part of the body is consumed in order to transfer to the eater the soul matter of the victim; and with phallic cults and fertility rites intended to imbue the soil with productivity. It may thus develop into human sacrifice, a practice that has been generally associated with agricultural societies.

Headhunting has been practiced worldwide and may go back to Paleolithic times. In deposits of the Late Paleolithic Azilian culture found at Ofnet in Bavaria, carefully decapitated heads were buried separately from the bodies, indicating beliefs in the special sanctity or importance of the head.

In Europe the practice survived until the early 20th century in the Balkan Peninsula, where the taking of the head implied the transfer of the soul matter of the decapitated to the decapitator. The complete head was taken by Montenegrins as late as 1912, being carried by a lock of hair worn allegedly for that purpose. In the Balkan War of 1912–13, nose taking was substituted, and it was the practice to cut off the nose and upper lip with the moustache (by which it was carried). In the British Isles the practice continued approximately to the end of the Middle Ages in Ireland and the Scottish marches.

Herodotus mentions Asian headhunters, and on a bas-relief from Nineveh in the British Museum, Assyrians are depicted as cutting off and carrying away the heads of the slain during a battle.

In Africa headhunting was known in Nigeria, where, as in Indonesia, it was associated with the fertility of the crops, with marriage, and with the victim's obligation as a servant in the next world.

In Káfiristán (now Nūrestān) in eastern Afghanistan, headhunting was practiced until about the end of the 19th century, with women showering wheat upon men returning with heads from a successful raid. In the northeast of India, Assam was famous for headhunting, and indeed all the peoples living south of the Brahmaputra River—Garos, Khasis, Nagas, and Kukis—formerly were headhunters. Headhunting in Assam was normally carried on by parties of raiders who depended on surprise tactics to achieve their ends.

In Burma several groups followed customs similar to those of the headhunting tribes of India. The Wa people observed a definite headhunting season, when the fertilizing soul matter was required for the growing crop, and wayfarers moved about at their peril. In Borneo, most of Indonesia, the Philippines, and Taiwan, similar methods of headhunting were practiced. The practice was reported in the Philippines by Martín de Rada in 1577 and was abandoned formally by the Igorot and Kalinga of Luzon only at the beginning of the 20th century. In Indonesia it extended through Ceram, where the Alfurs were headhunters, and to New Guinea, where headhunting was practiced by the Motu. In several areas of Indonesia, as in the Batak country and in the Tanimbar Islands, it seems to have been replaced by cannibalism.

Throughout Oceania headhunting tended to be obscured by cannibalism, but in many islands the importance attached to the head was unmistakable. In parts of Micronesia the head of the slain enemy was paraded about with dancing, which served as an excuse for raising a fee for the chief to defray public expenditure; later the head would be lent to another chief for the same purpose. In Melanesia the head was often mummified and preserved and sometimes worn as a mask in order that the wearer might acquire the soul of the dead man. Similarly, it was reported that Aboriginal Australians believed that the spirit of a slain enemy entered the slayer. In New Zealand the heads of enemies were dried and preserved so that tattoo marks and the facial features were recognizable; this practice led to a development of headhunting when tattooed heads became desirable curios and the demand in Europe for Maori trophies caused "pickled heads" to become a regular article of ships' manifests.

In South America the heads were often preserved, as by the Jívaro, by removing the skull and packing the skin with hot sand, thus shrinking it to the size of the head of a small monkey but preserving the features intact. There, again, headhunting was probably associated with cannibalism in a ceremonial form.

Despite the prohibition of headhunting activities, scattered reports of such practices continued well into the mid-20th century.

headphone, small loudspeaker (earphone) held over the ear by a band worn on the head. Headphones are commonly employed in situations in which levels of surrounding noise are high, as in an airplane cockpit, or where a user such as a switchboard operator needs to keep the hands free, or where the listener is moving about or wants to listen without disturbing other people. A headphone may be equipped with one earphone or two and may include a miniature microphone, in which case it is called a headset. For listening to stereophonically reproduced sound, stereo headphones may be used, with separate channels of sound being fed to the two earphones.

headstander, any of several fishes of the families Chilodontidae and Anostomidae (order Cypriniformes). All species are small, reaching a maximum length of 20 cm (8 inches), and are confined to freshwater habitats in South America. The name headstander comes from their habit of swimming upright, with the head pointed down, as they feed off the bottom. The striped headstander (*Anostomus anostomus*) has two yellowish-orange stripes on each side alternating with black ones. The tail and all fins are bright orange.

heald loom (weaving): *see* heddle loom.

Healesville, town, Victoria, Australia, in the Dandenong Ranges and on the Maroondah Highway northeast of Melbourne. Founded (1860) on the fertile flats of the Acheron River, a tributary of the Yarra, it was named after Sir Richard Heales, then premier of Victoria. A rail terminus, it is the centre of a district of fruit cultivation, poultry raising, and dairying that also has some of the state's finest stands of timber. Both a summer and winter resort, Healesville has easy access to ski slopes on Mount Donna Buang. The Sir Colin MacKenzie Wildlife Sanctuary (with its platypus research station) and the Maroondah Reservoir are nearby. Pop. (1981) 4,526.

Healey, Denis Winston (b. Aug. 30, 1917, Mottingham, Kent, Eng.), British economist and statesman, writer, and chancellor of the Exchequer from 1974 to 1979.

Healey grew up in Bradford, Yorkshire, and had a brilliant academic career at the University of Oxford. Immediately after World War II he moved into Labour Party politics with a job in the party secretariat. He was head of its international department for seven years before becoming a member of Parliament in 1952. The Foreign Office seemed his natural destination, but instead he was minister of defense for six years (1964–70), then chancellor of the Exchequer when Labour returned to power in 1974. He remained at the Treasury after James Callaghan succeeded Harold Wilson as prime minister in April 1976.

Healey pushed through tough, even harsh, measures in successive budgets during a period of worldwide economic distress; his attempts to persuade the powerful trade unions to accept limits on wage increases were only partly successful, and union strikes in 1978–79 were largely responsible for the defeat of the Labourites in 1979 and the victory of the Conservative Party under Margaret Thatcher.

From 1980 to 1983 he was deputy leader of the Labour Party and engaged in numerous battles with the party's left wing. His opposition to the party's endorsement of unilateral British nuclear disarmament cost him considerable support in the party, and he lost his deputy leadership post after the Tory victory in the 1983 election. In the fall of 1983 he became Labour's shadow foreign minister. He retired from the party leadership in 1987.

His books include *The Curtain Falls* (1951), *New Fabian Essays* (1952), *Neutralism* (1955), *A Neutral Belt in Europe* (1958), *NATO and American Security* (1959), *The Race Against The H Bomb* (1960), and *Healey's Eye* (1980).

healing cult, religious group or movement that places major, or even exclusive, emphasis on the treatment or prevention by nonmedical means of physical or spiritual ailments, which are often seen as manifestations of evil. Such cults generally fall into one of three types: those centred on certain shrines or holy places, those centred on certain organizations, and those centred on particular persons.

Pilgrimage to a sacred place and devotion before a sacred object is a major means of religious healing. From earliest times, healing and healing cults have been associated with

springs and other sources of water. Water—as the source of life in many myths, as that which is an absolute necessity for existence, and as that which cleanses—is the most all-encompassing means of restoring health. As in the spa-therapy (bathing in mineral waters) of contemporary health resorts, so thermal and mineral springs were conceived to be curative in ancient times. There is evidence of Neolithic and Bronze Age devotion at the sites of a variety of such springs in western Europe (*e.g.,* Grisy and Saint-Sauveur in France; Forlì, Italy; Sankt Moritz, Switz.). Every country in which they occur has healing traditions associated with such springs. In ancient Greece the most famous shrines were at Thermopylae and near Aedepses. In ancient Rome, the springs at Tibus and the hot sulfur wells of Aquae Abulae were well known. In the Middle East, Callirrhoe, where Herod attempted to find relief from his fatal illness, was perhaps the best known; in ancient Egypt many of the temples dedicated to Asclepius (the Greek god of medicine) are adjacent to mineral springs.

Elaborate cultic practices surround those sources of water that have been the scenes of epiphanies (manifestations of deities or sacred beings), or in which divinities are believed to dwell. The most famous Western example of this type of shrine is that at Lourdes in France where the Virgin Mary is believed to have appeared to one Bernadette Soubirous in a series of visions in 1858 and to have indicated a miraculously flowing stream that would heal the ill. A number of other European water shrines are associated with epiphanies of Mary (*e.g.,* the Shrine of the Madonna of the Baths at Scafati, Italy). Because of his association with water, many streams and wells are believed to have healing powers on the feast of the Conception of St. John the Baptist. More frequently, however, it is minor local water spirits (nymphs, water serpents, etc.) or wells and streams blessed by saints or other holy men to which devotion is made and from which healing is expected after immersion.

Certain great landmark rivers, the scene of both civic cults and private devotions, are believed to have general therapeutic and apotropaic powers. By immersion in the Euphrates (Iraq), the Abana, the Pharpar (in Damascus, Syria), the Jordan (Israel), the Tiber (Italy), the Nile (Egypt), or the Ganges, Jumna or Saravatī (all in India), one might be cured of disease, purified from transgression, or protected against future disorders.

These same basic features—unusual natural characteristics, scenes of epiphanies, locations associated with the life or the burial place of holy men, or great national landmarks—are present in other varieties of healing shrines (*e.g.,* those associated with sacred trees, stones, or mountain peaks).

As in the case of various monastic orders throughout Europe that have as their primary function the care of the sick (*e.g.,* the Knights Hospitallers, the Augustinian Nuns, the Order of the Holy Ghost, and the Sororites Order), healing has frequently been delegated to certain groups. Among these are special classes of priests (*e.g.,* the Akkadian Āshipu or Kalū priests, the Greek Asclepiads); religious castes (*e.g.,* various Brahmin groups in India, the Vaidya caste in Bengal); secret societies (*e.g.,* the Midē'wiwim type groups among the American Indians—such groups can be highly specialized, for example, among the Sia Indians there are eight societies: one specializes in treating burns, one in ant bites, etc.); or dynasties of healers who trace their knowledge back to the gods (*e.g.,* the Physicians of Myddvai in Wales, who have been active herbalists for more than five centuries). The formation of such groups is connected with the priests' services at shrines and their possession and manipulation of certain sacred objects and relics that are the sources of the priestly charisma (supernatural power) of office. Most prominent are those priests who serve in the cults of healing deities (*e.g.,* Asclepius, Hygieia in Greek religion) or at shrines devoted to healing saints (*e.g.,* St. Cosmas and St. Damian in Christianity). The tendency to concentrate healing activities in specialized sacred organizations also arises from the length of training required to master the arts of healing, the need for special equipment and libraries, and the expense of maintaining such facilities—all of which may be readily borne by settled religious communities. Thus, many important religious leaders have also been physicians (*e.g.,* Mani, Moses Maimonides), and the origin of hospitals in both East and West is linked to religious orders.

Healing may be accomplished by those who derive powers from their office, such as priests and kings. More frequently, however, individuals are believed to cure by means of a special gift or sacred commission. They are holy men, and one means by which their sacrality is manifested is their power to heal. This power may be revealed in a vision; it may be sought after; or it may be accidentally discovered that an individual possesses such abilities.

Almost every religious founder, saint, and prophet has been credited with the ability to heal—either as a demonstration of or as a consequence of his holiness. In every culture there are also specialists who have gone through extraordinary initiations that confer curative powers upon them. These individuals (*e.g.,* shamans, "medicine men," "folk doctors") may fill a cultural niche alongside certain religious groups, fulfilling their functions when circumstances so require. Some work within an established religious tradition but concentrate their energies primarily upon healing (*e.g.,* well-known Christian faith healers of the 19th and 20th centuries, such as John of Kronstadt; Chlodwig Karl Viktor, Fürst zu Hohenlohe-Schillingsfürst; Leslie Weatherhead; Edgar Cayce; and Oral Roberts). Others have founded their own religious communities that maintain a focus on healing (*e.g.,* Phineas P. Quimby and the New Thought movement; Mary Baker Eddy and Christian Science; the various independent churches of Africa; the Spiritist and Hallelujah movements among the Carib peoples in Brazil).

health, in human beings, the extent of an individual's continuing physical, emotional, mental, and social ability to cope with his environment.

Such a definition, just one of many that are possible, has its drawbacks. The rather fragile individual who stays "well" within the ordinary environment of his or her existence may succumb to a heart attack from heavy shovelling after a snowstorm; or a sea-level dweller may move to a new home in the mountains, where the atmosphere has a lower content of oxygen, and suffer from shortness of breath and anemia until his red blood cell count adjusts itself to the altitude. Thus, even by this definition, the conception of good health must involve some allowance for change in the environment.

Bad health can be defined as the presence of disease, good health as its absence—particularly the absence of continuing disease, because the person afflicted with a sudden attack of seasickness, for example, may not be thought of as having lost his good health as a result of such a mishap. The same might apply to a pregnant woman, perfectly healthy in the afternoons and evenings but suffering from morning sickness a few hours each day.

Actually, there is a wide variable area between health and disease. Only a few examples are necessary to illustrate the point: (1) It is physiologically normal for an individual, 15 to 20 minutes after eating a meal, to have a high blood sugar content. If, however, the sugar content remains elevated two hours later, this condition is abnormal and may be indicative of disease. (2) A "healthy" individual may have developed an allergy, perhaps during early childhood, to a single specific substance. If he never again comes in contact with the antigen that causes the allergy, all other factors remaining normal, he will remain in that state of health. Should he, however, come in contact with that allergen, even 20 or 30 years later, he may suffer anything from a mild allergic reaction—a simple rash—to severe anaphylactic shock, coma, or even death, depending upon the circumstances. (3) An apparently healthy individual may imbibe a relatively large amount of alcoholic beverage. After the alcohol reaches certain levels in his bloodstream he exhibits certain behavioral changes, and his condition is referred to as intoxication. During this period, and usually the morning after, he cannot be considered as being in good health. He may regain his normal health in a few days or less; but frequent repetition of this performance, or daily ingestion of large amounts of alcohol, even when no apparent behavioral or hangover effects are noted, insidiously converts a condition of good health to bad health—sometimes irreversibly. Thus it can be seen that, unlike disease, which is frequently recognizable, tangible, and rather easily defined, health is a somewhat nebulous condition, and somewhat difficult to define.

Moreover, physical condition and health are not synonymous terms. A seven-foot-tall basketball player may be in excellent physical condition (although outside the range of normality for height) but may or may not be in good health—depending, for example, on whether or not he has fallen victim to an attack of influenza. The one-armed gymnast, the colour-blind skater, or the pianist born blind—all may be in good health; but are they in good physical condition? Again, this depends upon definitions, and definitions vary.

There are further problems in settling upon a definition of human health. A person may be physically strong, resistant to infection, able to cope with physical hardship and other features of his physical environment, and may still be considered unhealthy if his mental state, as measured by his behaviour, is deemed unsound. What is mental health? Some say that a person is mentally healthy if he is able to function reasonably well. Others hold that a person is healthy mentally if his behaviour is like that of a majority of his fellows. A third group makes comparisons with an ideal; according to these physicians mental healthfulness may be approached but not attained. Still another concept stresses the changes in a person's behaviour that take place with the passage of time as criteria of his mental health.

In the face of this confusion, it is most useful, perhaps, to define health, good or bad, in terms that can be measured, can be interpreted with respect to the ability of the individual at the time of measurement to function in a normal manner and with respect to the likelihood of imminent disease. These measurements can be found in tables of "normal values" printed in textbooks of clinical medicine, diagnosis, and other references of this type. When an individual is given a health examination, the examination is likely to include a series of tests. Some of these tests are more descriptive than quantitative and can indicate the presence of disease in a seemingly healthy person. Such tests include the electrocardiogram to detect some kinds of heart disease; electromyogram for primary muscle disorders; liver and gall bladder function tests; and many types of X-ray techniques for determining disease or malfunction of internal organs.

Other tests give numerical results (or results that can be assigned numerical values—such as photometric colour determinations) that

can be interpreted by the examiner. These are physical and chemical tests, including blood, urine, and cerebral spinal fluid analyses. The results of the tests are compared with the normal values; and the physician receives clues as to the health of his patient and, if the values are abnormal, for the methods of improving his health.

A major difficulty in the interpretation of test results is that of biological variability. Almost without exception these normal values for variables are means or adjusted means of large group measurements. To give these values significance—hence the frequent use of the word standard rather than normal in describing them—they must be considered as lying somewhere near the centre point of a 95 percent range—*i.e.,* the so-called ordinary range or, with reservations, the range from normal to the upper and lower borderline limits. Thus, the 2.5 percent below the lower limit and the 2.5 percent above the upper limit of the 95 percent range are considered areas of abnormality or, perhaps, illness. Some areas have wide 95 percent ranges—blood pressure, for example, may vary considerably throughout the day (*e.g.,* during exercise, fright, or anger) and remain within its range of normality. Other values have ranges so narrow that they are termed physiological constants. An individual's body temperature, for example, rarely varies (when taken at the same anatomical site) by more than a degree (from time of rising until bedtime) without being indicative of infection or other illness.

health insurance, private or public system of protection against the losses due to medical expenses, based to some degree on the pooling of risk and the relation of benefits to past contributions. The distinction between public and private programs is not always clear because some governments subsidize private insurance programs. Health insurance may apply to a limited or comprehensive range of medical services and may provide for full or partial payment of the costs of specific services. Benefits may consist of the right to certain medical services or reimbursement of the insured for specified medical costs and may sometimes include income benefits for working time lost owing to sickness or maternity leave.

Social medical insurance plans date from 1883, when the government of Germany initiated a plan based on contributions by employers and employees in particular industries. Social health insurance programs may operate as independent programs (in which case they seldom provide comprehensive medical care to whole populations) or may be one component in financing more extensive medical care (the major component being general tax revenue).

Social health insurance plans are usually financed by contributions from both employers and employees, with the money going into a special fund. In most countries with this form of health insurance, there is a government contribution as well.

Private health insurance is usually financed on a group insurance basis, but most plans also provide for individual policies. Insurance of hospital costs is the most prevalent form of voluntary health insurance coverage; another type is major medical expense protection, which provides protection against large medical costs but avoids the financial and administrative burdens involved in insuring small costs.

health maintenance organization (HMO), organization, either public or private, that provides comprehensive medical care to a group of voluntary subscribers, on the basis of a prepaid contract. HMOs bring together in a single organization a broad range of health services and deliver those services for a fixed, prenegotiated fee.

There are two main types of HMOs, the prepaid group practice model and the medical care foundation (MCF), also called Individual Practice Association. The prepaid group practice type of health care plan was pioneered by Ross-Loos Medical Group in California, U.S., in 1929. In this model, physicians are organized into a group practice, and there is one insuring agency. The Kaiser Foundation Health Plan in California, the Health Insurance Plan of Greater New York, and the Group Health Cooperative of Puget Sound are generally regarded as innovators of this type of HMO. The MCF usually involves a number of insurance companies. The organization is a loose network of individual physicians, practicing individually, and paid on a fee-for-service basis. The medical-care foundation reimburses the physicians from the prepaid fees of subscribers. Examples of this type of HMO are the San Joaquin Foundation in California and the Physician Association of Clackamas County in Oregon.

The U.S. government, which began to promote the HMO concept in the 1970s, viewed HMOs as a means of controlling health care costs (by discouraging physicians from performing unnecessary, costly procedures), meeting the increased popular demand for health services, and providing health care where it had previously been inadequate or, in some cases, absent.

Advocates of prepaid medical plans feel that the HMO, by the nature of its contract, guarantees the availability of quality health care to those enrolled. They also believe that HMOs foster preventive medicine, encouraging the patient-subscriber to seek treatment early, rather than postponing it out of financial considerations. Thus a potentially serious condition may be diagnosed and treated at an earlier stage and usually at lower overall cost. Opponents of HMOs question this reasoning, arguing that prepayment encourages unnecessary visits to doctors and could, by virtue of the expenses involved, render physicians unable to perform the most complete and thorough testing procedures.

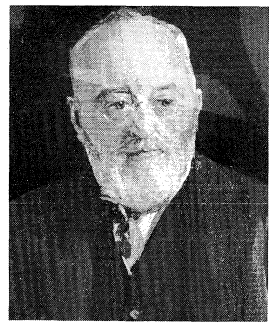
health screening, multiphasic: *see* multiphasic health screening.

Healy, George (Peter Alexander) (b. July 15, 1813, Boston, Mass., U.S.—d. June 24, 1894, Chicago, Ill.), American academic painter of highly realistic portraits, especially known for his likenesses of the founders of Chicago society.

In 1834 he went to study in Paris, where his facile style soon secured for him a large clientele. In his studios in Paris (1834–55 and 1872–92), Chicago (1855–67 and 1892–94), and Rome (1867–72), he often painted as many as 50 portraits in a year. Among his subjects were King Louis-Philippe of France, Pope Pius IX, the Princess of Romania, John C. Calhoun, Henry Clay, Henry Wadsworth Longfellow, and a series of U.S. presidents from John Quincy Adams to Ulysses S. Grant. He also painted historical scenes—*e.g.,* "Daniel Webster Replying to Hayne," a monumental portrayal with scores of individuals delineated. His autobiography, *Reminiscences of a Portrait Painter,* was published in 1894.

Healy, T(imothy) M(ichael), byname TIM HEALY (b. May 17, 1855, Bantry, County Cork, Ire.—d. March 26, 1931, Dublin), leader in the campaigns for Irish Home Rule and for agrarian reform, the first governor-general of the Irish Free State.

Working in England first as a railway clerk and then from 1878 in London as parliamentary correspondent of the *Nation,* he took part in Irish politics and was associated with Charles Stewart Parnell, the chief Irish nationalist. Arrested for intimidation in connection



T.M. Healy, detail of an oil painting by Sir John Lavery; in the Municipal Gallery of Modern Art, Dublin

By courtesy of the Municipal Gallery of Modern Art, Dublin

with the Land League, he was promptly returned as member of Parliament for Wexford (1880).

He became an authority on the land question, and the "Healy Clause" of the Land Act of 1881, which protected tenants' agrarian improvements from rent increases, not only made him popular throughout southern Ireland but also won him seats in Protestant Ulster. Breaking with Parnell in 1886, he supported Prime Minister William Gladstone's Home Rule policy. Meanwhile, he had been called to the Irish bar in 1884 and became a king's counsel in 1910.

Set against the Liberals and the official leadership of the Irish Nationalist Party after the Easter Rising in 1916, he supported the Sinn Féin ("We Ourselves") Party after 1917. Regarded as an elder statesman by the British and Irish ministries, Healy was proposed by both sides in 1922 as governor-general of the new Irish Free State, a post that he held until his resignation and retirement in 1928.

Heaney, Seamus Justin (b. April 13, 1939, Castledawson, Londonderry, N.Ire.), Irish poet whose poems are rooted in rural life in Northern Ireland.

Heaney was educated at Queen's University, Belfast (B.A., 1961). In Belfast he taught secondary school (1962–63) and lectured at St. Joseph's College of Education (1963–66) and Queen's University (1966–72). From 1975 to 1980 he was on the faculty of Carysfort College in Dublin, and thereafter he taught at Harvard University.

His first major collection of poems, *Death of a Naturalist* (1966), won several prizes. Other collections include *Door into the Dark* (1969), *Wintering Out* (1972), *North* (1975), and *Field Work* (1979). His poems evoke historical awareness back to the Viking raiders and draw on myth and unique aspects of the Irish experience. Many focus on everyday life in the countryside; some are concerned with language and the difficulty of creating poetry. Simplicity and clarity distinguish his style.

In essays published as *Preoccupations: Selected Prose, 1968–1978* (1980), Heaney dealt with poets close to him, including William Wordsworth, Gerard Manley Hopkins, and Robert Lowell, and he provided autobiographical insights into his own work.

Heard and McDonald Islands, sub-Antarctic island groups together forming an external territory of Australia, in the southern Indian Ocean, 2,500 miles (4,000 km) southwest of Perth. Volcanic in origin, Heard Island is 27 miles (43 km) long by 13 miles (21 km) wide and rises to 9,005 feet (2,745 m) at Mount Mawson on Big Ben Mountain. Much of its surface is covered with snow and ice. It was discovered in 1833 by a British sealing vessel and later named for a U.S. mariner, Captain John J. Heard. Colonies of elephant seals and penguins on Heard Island were exploited by hunters in the second half of the 19th century. Transferred from British to Australian control

in 1947, it is inhabited intermittently by scientific-research parties. The McDonalds are a group of uninhabited rocky islets 25 miles (40 km) west of Heard Island.

hearing, in biology, physiological process of perceiving sound. *See* ear; mechanoreception; perception; sound reception.

hearing, in law, a trial; more specifically, the formal examination of a cause, civil or criminal, before a judge according to the laws of the land. Frequently, in popular usage, it refers to any formal proceeding before a magistrate subsequent to inception of the case and without a jury—especially a preliminary hearing, in which a magistrate or judge, in the presence of the accused, determines whether or not there is sufficient evidence to justify proceeding with the case.

hearing aid, device that increases the loudness of sounds in the ear of the wearer. The earliest aid was the ear trumpet, characterized by a large mouth at one end for collecting the sound energy from a large area and a gradually tapering tube to a narrow orifice for insertion in the ear.

Modern hearing aids are electronic. Principal components are a microphone that converts sound into a varying electrical current, an amplifier that amplifies this current, and an earphone that converts the amplified current into a sound of greater intensity than the original. Early models were quite large, but when transistors replaced amplifier tubes and smaller magnetic microphones became available in the 1950s, it became possible to build very small hearing aids, some of which were constructed to fit within the frames of eyeglasses and, later, behind the earlobe or within the external ear.

Hearing aids have widely differing characteristics; requirements for suitable aids have been extensively investigated. The two characteristics of a hearing aid that most influence the understanding of speech are the amplification of the various components of speech sounds and the loudness with which the sounds are heard by the wearer. As regards the first characteristic, speech sounds contain many components of different frequencies, which are variously amplified by a hearing aid. The variation of amplification with frequency is called the frequency response of the aid. An aid need amplify sounds only within the range of 400 to 4,000 hertz, although the components of speech cover a much wider range. With regard to the second characteristic—the loudness with which sounds are heard—too loud a sound can be as difficult to understand as one that is too faint. The loudness range over which speech is understood best is wide for some users and narrow for others. Hearing aids with automatic volume control vary the amplification of the aid automatically with variations of the input.

A binaural hearing aid consists of two separate aids, one for each ear. Such an arrangement can benefit certain users.

Hearn, (Patricio) Lafcadio (Tessima Carlos), also called (from 1895) KOIZUMI YAKUMO (b. June 27, 1850, Levkás, Ionian Islands, Greece—d. Sept. 26, 1904, Ōkubo, Japan), writer, translator, and teacher who introduced the culture and literature of Japan to the West.

Hearn grew up in Dublin. After a brief and spasmodic education in England and France, he immigrated to the United States at 19. He settled in Cincinnati, Ohio, working at various menial jobs and then on the *Trade List,* a business weekly. Eventually he became a reporter for *The Cincinnati Enquirer* and later for *The Cincinnati Commercial,* where he contributed prose poems and scholarly essays on themes unusual for that time, such as life among urban blacks. While in Cincinnati he translated stories from the French writer Théophile Gautier under the title *One of Cleopatra's Nights* (1882) and Gustave Flaubert's *Temptation of St. Anthony* (published posthumously). In 1877 Hearn went to New Orleans to write a series of articles on Louisiana politics for the *Commercial* and remained there, writing for the *Item* (later the *Times-Democrat*), contributing translations of French authors, original stories and sketches, and adaptations from foreign literature. The latter made up two of his earliest works—*Stray Leaves from Strange Literature* (1884) and *Some Chinese Ghosts* (1887). The scope of his articles varied widely; he wrote on Buddhism and Islām and on French and Russian literature. His editorials ranged from scientific topics to articles on anti-Semitism in Russia and France. *Chita* (1889), an adventure novel about the only survivor of a tidal wave, dates from this time.

From 1887 to 1889, Hearn was in the West Indies on assignment for *Harper's Magazine,* which resulted in *Two Years in the French West Indies* (1890) and his novel *Youma* (1890), a highly original story of a slave insurrection.

In 1890 Hearn traveled to Japan for *Harper's.* He soon broke with the magazine and worked as a schoolteacher in Izumo in northern Japan. There he met Setsuko Koizumi, a Japanese lady of high Samurai rank, whom he married in 1891. Hearn's articles on Japan soon began appearing in *The Atlantic Monthly* and were syndicated in several newspapers in the United States. These essays and others, reflecting Hearn's initial captivation with the Japanese, were subsequently collected and published in two volumes as *Glimpses of Unfamiliar Japan* (1894).

In 1891 Hearn transferred to the Government College at Kumamoto, where he remained for three years. In 1895 he became a Japanese subject, taking the name Koizumi Yakumo, Koizumi being his wife's family name.

Hearn's most brilliant and prolific period was from 1896 to 1903, as professor of English literature at the Imperial University of Tokyo. In four books written during this time—*Exotics and Retrospective* (1898), *In Ghostly Japan* (1899), *Shadowings* (1900), and *A Japanese Miscellany* (1901)—he is informative about the customs, religion, and literature of Japan. *Kwaidan* (1904) is a collection of stories of the supernatural and translations of haiku poetry. Three of the ghost stories formed the basis of a critically praised Japanese film, *Kwaidan,* in 1965. *Japan, an Attempt at an Interpretation* (1904) is a collection of lectures prepared for delivery at Cornell University, Ithaca, N.Y. Hearn died, however, before he could return to the United States. This last and perhaps best-known work is a departure from his earlier, idealized view of Japan.

Consult the INDEX *first*

Hearne, Samuel (b. 1745, London, Eng.—d. November 1792, England), English seaman, fur trader, and explorer, the first European to make an overland trip to the Arctic Ocean. He was the first to show the trend of the Arctic shore.

At the age of 11, Hearne became a midshipman in the British Royal Navy. Later he worked for the British-based Hudson's Bay Company (HBC) as mate on company vessels, one of which took him in 1769 to Fort Prince of Wales at the mouth of the Churchill River in present Manitoba.

Between the fort and the Arctic Ocean lay an immense region known only as the Barren Grounds, rumoured to be filled with riches, including copper. It was speculated that the mysterious tundra even offered a route to the Orient. Twice frustrated in attempts to explore the territory for the Hudson's Bay Company, Hearne left the Churchill River in December 1770, accompanied only by an Indian guide and the guide's eight wives. The following July he found the mouth of the river that he is said to have named the Coppermine (in present Northwest Territories). When he returned to the fort in June 1772, he had walked some 5,000 miles and explored more than 250,000 square miles.

In 1774 Hearne built for the Hudson's Bay Company its first interior trading post, Cumberland House, on the Saskatchewan River, the first permanent settlement in present Saskatchewan. He was serving the Hudson's Bay Company as governor in 1782 when the French plundered and destroyed the post and took Hearne prisoner.

To the credit of the French navy, Hearne was treated with dignity. The Count de La Perouse, himself an explorer, encouraged Hearne not only to preserve his papers but also to publish an account of his fabulous journey to the Arctic. Released by the French, Hearne spent four relatively uneventful years in Canada (1783–87) before he returned to England to write *A Journey from Prince of Wales' Fort . . . to the Northern Ocean* (published posthumously, 1795; new eds., 1911 and 1958).

Hearne, Thomas (b. July 1678, Littlefield Green, White Waltham, Berkshire, Eng.—d. June 10, 1735, Oxford, Oxfordshire), English historian and antiquarian whose editions of English medieval chronicles were important sources for subsequent historians.

Educated at St. Edmund Hall, Oxford, Hearne acted as assistant librarian of Oxford's Bodleian Library between 1699 and 1715 and did much to index and catalog its acquisitions. He lost his position there in 1716 because of his opposition to the Hanoverian regime of King George I, and he retired to St. Edmund Hall, where he continued writing until his death. Hearne's manuscripts are numerous and include, in addition to the editions of the chronicles, such various topics as a biography of Sir Thomas Bodley; the *Ductor Historicus* (1698), a system of universal history and chronology from the creation to 1714; an introduction to ancient and English historians; and histories of ancient monarchies, emperors, and cities.

hearsay, in Anglo-American law, testimony that consists of what the witness has heard others say. United States and English courts may refuse to admit testimony that depends for its value upon the truthfulness and accuracy of one who is neither under oath nor available for cross-examination. The rule is subject, however, to many exceptions. In continental European law, where there is no jury to be protected from misleading testimony, judges may consider any evidence that they consider pertinent to reaching a decision. *See also* circumstantial evidence.

Hearst, Patricia (Campbell), byname PATTY HEARST, married name SHAW (b. Feb. 20, 1954, Los Angeles, Calif., U.S.), an heiress of the William Randolph Hearst newspaper empire who was kidnapped in 1974 by leftist radicals called the Symbionese Liberation Army, whom under duress she joined in robbery and extortion.

The third of five daughters of Randolph A. Hearst, she attended private schools in Los Angeles, San Mateo, Crystal Springs, and Monterey, Calif., and took courses at Menlo College and the University of California at Berkeley. On the night of Feb. 4, 1974, she and her fiancé, Steven Weed, were at her Berkeley flat when three members of the Symbionese Liberation Army broke in, beat up Weed, and abducted Hearst. She was allegedly coerced and brainwashed under humiliating conditions of confinement in the closet of an apartment hideaway and thereafter began making

public statements, through tape recordings, condemning the capitalistic "crimes" of her parents. The Symbionese Liberation Army extorted from her father $2,000,000 in a food giveaway to the poor and allegedly forced her to join in at least two robberies, of a San Francisco bank and a Los Angeles store.

The Symbionese Liberation Army probably never had more than 11 or 12 members, six of whom—including the leader, Donald DeFreeze—were killed in a police shootout and house fire in Los Angeles on May 17, 1974. Hearst remained at large with her captors or confederates (notably William and Emily Harris), crisscrossing the country as far as New York City and Pennsylvania. On Sept. 18, 1975, back in San Francisco, she and another confederate, Wendy Yoshimura, as well as the Harrises, were captured by the FBI.

Hearst was tried and convicted in March 1976 for bank robbery and felonious use of firearms. Sentenced to seven years, she spent the next three years partly in prison, partly at liberty (during appeals), was released in February 1979, and, shortly after, married her former bodyguard Bernard Shaw. She wrote (with Alvin Moscow) an account of her ordeal from 1974 to 1979: *Every Secret Thing* (1982).

Hearst, William Randolph (b. April 29, 1863, San Francisco, Calif., U.S.—d. Aug. 14, 1951, Beverly Hills, Calif.), American newspaper publisher who built up the nation's largest newspaper chain and whose methods profoundly influenced American journalism for a time.

Hearst was the only son of George Hearst, a gold-mine owner and U.S. senator from California (1886–91). The young Hearst attended Harvard College for two years before

William Randolph Hearst, 1906

By courtesy of the Library of Congress, Washington, D.C.

being expelled. In 1887 he took control of the struggling *San Francisco Examiner,* which the elder Hearst had bought in 1880 for political reasons. He remade the paper into a blend of reformist investigative reporting and lurid sensationalism, and within two years it showed a profit. He then entered the New York City newspaper market in 1895 by purchasing the unsuccessful *New York Morning Journal.* He hired such able writers as Stephen Crane and Julian Hawthorne and raided the *New York World* for some of Joseph Pulitzer's best men, notably Richard F. Outcault, the inventor of colour comics. The *New York Journal* (afterward *New York Journal-American*) soon attained an unprecedented circulation by its reduced price of one cent; by the use of many illustrations, colour magazine sections, and glaring headlines; by sensational articles on crime and pseudoscientific topics; and by bellicosity in foreign affairs. Hearst's *Journal* and Pulitzer's *World* became involved in a series of fierce circulation wars, and these newspapers' use of sensationalistic reporting and frenzied promotional schemes soon gave rise to the term "yellow journalism" in describing such tactics.

The *Journal* excoriated Great Britain in the Venezuela-British Guiana border dispute (from 1895) and then demanded (1897–98) war between the United States and Spain. Through dishonest and exaggerated reportage, Hearst's newspapers whipped up public sentiment against Spain such that they actually helped cause the Spanish-American War of 1898. Hearst supported William Jennings Bryan in the presidential campaign of 1896 and again in 1900, when he assailed President William McKinley as a tool of the trusts.

While serving rather inactively in the U.S. House of Representatives (1903–07), Hearst received considerable support for the Democratic presidential nomination in 1904 and, running on an anti-Tammany Hall ticket, came within 3,000 votes of winning the 1905 election for mayor of New York City. In 1906, despite (or because of) his having turned to Tammany for support, he lost to Charles Evans Hughes for governor of New York, and in 1909 he suffered a heavier defeat for mayor of New York City. Rebuffed in his political ambitions, Hearst continued to vilify the British Empire, opposed the United States' entry into World War I, and maligned the League of Nations and the World Court.

By 1925 Hearst had established or acquired newspapers in every section of the United States, as well as several magazines. He also published books of fiction and produced motion pictures featuring the actress Marion Davies, his mistress for more than 30 years. In the 1920s he built a grandiose castle on a 240,000-acre (97,000-hectare) ranch at San Simeon, Calif., and he furnished this residential complex with a vast collection of antiques and art objects that he had bought in Europe. At the peak of his fortune in 1935 he owned 28 major newspapers and 18 magazines, along with several radio stations, movie companies, and news services. But his vast personal extravagances and the Great Depression of the 1930s soon seriously weakened his financial position, and he had to sell faltering newspapers or consolidate them with stronger units. In 1937 he was forced to begin selling off some of his art collection, and by 1940 he had lost personal control of the vast communications empire that he had built. He lived the last years of his life in virtual seclusion.

BIBLIOGRAPHY. W.A. Swanberg, *Citizen Hearst* (1961, reprinted 1986), is a biography; the title refers to Orson Welles's motion picture *Citizen Kane* (1941), in which the central character of Charles Foster Kane was modeled largely on Hearst.

heart, organ that serves as a pump to circulate the blood. It may be a straight tube, as in spiders and annelid worms, or a somewhat more elaborate structure with one or more receiving chambers (atria) and a main pumping chamber (ventricle), as in mollusks. In fishes the heart is a folded tube, with three or four enlarged areas that correspond to the chambers in the mammalian heart. In animals with lungs—amphibians, reptiles, birds, and mammals—the heart shows various stages of evolution from a single to a double pump that circulates blood (1) to the lungs and (2) to the body as a whole.

A brief treatment of the heart follows. For full treatment, *see* MACROPAEDIA: Circulation and Circulatory Systems.

In humans and other mammals and in birds, the heart is a four-chambered double pump that is the centre of the circulatory system. In humans it is situated between the two lungs and slightly to the left of centre, behind the breastbone; it rests on the diaphragm, the muscular partition between the chest and abdominal cavity.

The heart consists of several layers of a tough muscular wall, the myocardium. A thin layer of tissue, the pericardium, covers the outside, and another layer, the endocardium, lines the inside. The heart cavity is divided down the middle into a right and a left heart, which in turn are subdivided into two chambers. The upper chamber is called an atrium (or auricle), and the lower chamber is called a ventricle. The two atria act as receiving chambers for blood entering the heart; the more muscular ventricles pump the blood out of the heart.

The heart, although a single organ, can be considered as two pumps that propel blood through two different circuits. The right atrium receives venous blood from the head, chest, and arms via the large vein called the superior vena cava and receives blood from the abdomen, pelvic region, and legs via the inferior vena cava. Blood then passes through the tricuspid valve to the right ventricle, which propels it through the pulmonary artery to the lungs. In the lungs venous blood comes in contact with inhaled air, picks up oxygen, and loses carbon dioxide. Oxygenated blood is returned to the left atrium through the pulmonary veins. Valves in the heart allow blood to flow in one direction only and help maintain the pressure required to pump the blood.

The low-pressure circuit from the heart (right atrium and right ventricle), through the lungs, and back to the heart (left atrium) constitutes the pulmonary circulation. Passage of blood through the left atrium, bicuspid valve, left ventricle, aorta, tissues of the body, and back to the right atrium constitutes the systemic circulation. Blood pressure is greatest in the left ventricle and in the aorta and its arterial branches. Pressure is reduced in the capillaries (vessels of minute diameter) and is reduced further in the veins returning blood to the right atrium.

The pumping of the heart, or the heartbeat, is caused by alternating contractions and relaxations of the myocardium. These contractions are stimulated by electrical impulses from a natural pacemaker, the sinoatrial, or S-A, node located in the muscle of the right atrium. An impulse from the S-A node causes the two atria to contract, forcing blood into the ventricles. Contraction of the ventricles is controlled by impulses from the atrioventricular, or A-V, node located at the junction of the two atria. Following contraction, the ventricles relax, and pressure within them falls. Blood again flows into the atria, and an impulse from the S-A starts the cycle over again. This process is called the cardiac cycle. The period of relaxation is called diastole. The period of contraction is called systole. Diastole is the longer of the two phases so that the heart can rest between contractions. In general, the rate of heartbeat varies inversely with the size of the animal. In elephants it averages 25 beats per minute, in canaries about 1,000. In humans the rate diminishes progressively from birth (when it averages 130) to adolescence but increases slightly in old age; the average adult rate is 70 beats at rest. The rate increases temporarily during exercise, emotional excitement, and fever and decreases during sleep. Rhythmic pulsation felt on the chest, coinciding with heartbeat, is called the apex beat. It is caused by pressure exerted on the chest wall at the outset of systole by the rounded and hardened ventricular wall.

The rhythmic noises accompanying heartbeat are called heart sounds. Normally, two distinct sounds are heard through the stethoscope: a low, slightly prolonged "lub" (first sound) occurring at the beginning of ventricular contraction, or systole, and produced by closure of the mitral and tricuspid valves, and a sharper, higher-pitched "dup" (second sound), caused by closure of aortic and pulmonary valves at the end of systole. Occasionally audible in normal hearts is a third soft, low-pitched sound coinciding with early diastole and thought to be produced by vibrations of the ventricular wall. A fourth sound,

also occurring during diastole, is revealed by graphic methods but is usually inaudible in normal subjects; it is believed to be the result of atrial contraction and the impact of blood, expelled from the atria, against the ventricular wall.

Heart "murmurs" may be readily heard by a physician as soft swishing or hissing sounds that follow the normal sounds of heart action. Murmurs may indicate that blood is leaking through an imperfectly closed valve and may signal the presence of a serious heart problem.

For a depiction of the heart in human anatomy, shown in relation to other parts of the body, *see* the colour Trans-Vision in the PROPAEDIA: Part Four, Section 421.

heart attack, a sudden cardiac seizure that causes myocardial infarction (*q.v.*).

heart block, lack of synchronization in the contractions of the upper and the lower chambers of the heart—the atria and the ventricles. The lack of synchronization may range from a slight delay in the ventricular contractions to total heart block, a complete lack of synchronization between the atria and the ventricles. A characteristic of heart block is that the ventricles contract more slowly than the atria. Heart block is caused by disease of some portion of the pathway over which the contractive impulse travels through the heart. The condition is treated by increasing the rate of impulses that regulate ventricular contractions; this can be done by administering drugs or by implanting an artificial pacemaker, a device that regulates heart action by means of minute electric shocks.

heart clam (mollusk): *see* cockle.

heart failure, inability of either or both sides of the heart to pump sufficient blood to meet the needs of the body. The term is to be distinguished from heart attack, which generally refers to myocardial infarction, or death of a section of heart muscle. The condition also differs from heart block, a lack of coordination of the contractions of the upper and lower chambers of the heart, and from heart arrest, the sudden cessation of cardiac function. Heart failure is characterized by distension of the veins serving the lungs or of those serving the rest of the body, or of both; this engorgement is expressed in the term congestive heart failure. Failure of the right side of the heart may result from pulmonary heart disease. Other prominent causes of heart failure are abnormally high blood pressure (hypertension), coronary atherosclerosis (the presence of fatty deposits in the lining of the coronary arteries), and rheumatic heart disease.

A person with left-sided heart failure experiences shortness of breath after exertion, difficulty in breathing while lying down, spasms of breathlessness at night, and abnormally high pressure in the pulmonary veins. A person with right-sided failure experiences abnormally high pressure in the systemic veins, enlargement of the liver, and accumulation of fluid in the legs. A person with failure of both ventricles has an enlarged heart that beats in gallop rhythm—that is, in groups of three sounds rather than two.

Treatment is directed toward increasing the strength of the heart muscle's contraction (rest in bed and digitalis are prescribed); toward reduction of fluid accumulation by restriction of sodium intake and increase of sodium excretion; and toward elimination of the underlying cause of the failure. *See also* heart block; myocardial infarction.

heart–lung machine, a type of artificial heart (*q.v.*).

heart malformation, also called CONGENITAL HEART DISEASE, any deformity of the heart that develops within the first two months of fetal life. Such deformities have little effect before birth because, in the fetus, cellular respiration (via the mother's bloodstream) is accomplished through the placenta. After birth, some of these deformities impair the supply of oxygen to the tissues and cause disability or death.

The most common heart malformations in the infant are those in which oxygenated blood is recirculated through the lungs because of a left-to-right shunt in the heart. For example, the septum between the auricles may be partly missing; if the resulting opening is high (ostium secundum), the situation is usually not serious. If it is low (ostium primum), however, the opening is usually associated with a defect in the semilunar valves, and there is blood mixing in all four chambers. This condition is serious and is common among infants with Down syndrome.

Even more serious are anomalies in which oxygenated and deoxygenated blood mix; the poorly oxygenated blood reaches the tissues, resulting in cyanosis (bluish colouring of the skin) and growth retardation. The septum separating the ventricles may be absent. If so, oxygenated and deoxygenated blood mix freely and are pumped equally to the lungs and body. The right ventricle and pulmonary arteries come under severe strain and may fail. The major valves may be absent (atresia) or narrowed (stenosis), producing abnormal pressures on the heart and requiring accessory abnormal shunts.

The tetralogy of Fallot (blue baby syndrome) is an uncommon malformation in which there is ventricular septal defect, pulmonary valve stenosis, right ventricular hypertrophy (overgrowth), and a shift of the aorta from the left to the right side so that it receives blood from both sides of the heart. As the constriction becomes more severe, circulation depends increasingly on accessory connections between the aorta and pulmonary vessels. The aorta and pulmonary trunk may be transposed so that the aorta emerges from the right ventricle and the pulmonary trunk from the left ventricle. In such patients, life is impossible unless there are further anomalies, such as a ventricular septum defect that, by allowing some mixing of venous and arterial blood, permits oxygen to reach the tissues.

Abnormalities of the large vessels may also cause symptoms of circulatory failure but are in general less serious. If the fetal connection between the pulmonary trunk and aorta persists (persistent, or patent, ductus arteriosus), some mixing of oxygenated and deoxygenated blood occurs. Alone, this defect is often not serious, and in some malformations of the heart it is actually necessary for continued life.

The aorta may be narrowed just below the point where the arteries supplying the upper part of the body emerge (coarctation of the aorta), thus reducing the blood volume and pressure in the lower half of the body, which receives blood only through a bypass from the pulmonary trunk or from an accessory circulation that develops around the abnormal spot in the aorta. Both routes are relatively ineffective in remedying the deficiencies.

Malformations of the heart are repaired by modern surgical procedures with varying degrees of success.

Heart River, river rising in the Badlands, Billings county, west-central North Dakota, U.S. It runs between the Missouri and Little Missouri rivers and flows about 200 miles (320 km) east past Dickinson and Gladstone to join the Missouri River at Mandan, opposite Bismarck. The Dickinson Dam, impounding Patterson Lake; the Heart Butte Dam, impounding Lake Tschida; and Sweet Briar Dam (on a north-bank tributary of the Heart) are units of the Missouri River Basin irrigation and flood-control project.

heart rot, widespread disease of trees, root crops, and celery. Most trees are susceptible to heart-rotting fungi that produce a discoloured, lightweight, soft, spongy, stringy, crumbly, or powdery heart decay. Conks or mushrooms often appear at wounds or the trunk base. A dark brown to black, internal rot of beets, carrots, rutabagas, and turnips is caused by a deficiency of boron; a similar rot of celery, fennel, and parsley is induced by calcium deficiency. *See also* rot.

Heart Sūtra, Sanskrit PRAJÑĀPĀRAMITĀ-HṚDAYA-SŪTRA ("Sūtra on the Heart of the Prajñāpāramitā"), extremely brief distillation of the essence of *Prajñāpāramitā* (*q.v.*; "Perfection of Wisdom") writings, much reproduced and recited throughout Asia. True to its title, this little text goes to the heart of the doctrine it summarizes, in contrast to other brief wisdom sutras that tend to water it down for easier consumption. In the space of a single page (some versions adding an introductory and a concluding paragraph), in words placed in the mouth of the bodhisattva ("buddha-to-be") of compassion, Avalokiteśvara, and in a series of terse paradoxes, the sutra restates the essentials of Buddhist doctrine from the point of view of the *Prajñāpāramitā* emphasis on "emptiness." It ends with the formula considered to allay all pain: "Gone, gone, gone beyond gone altogether beyond, O what an awakening, all hail!"

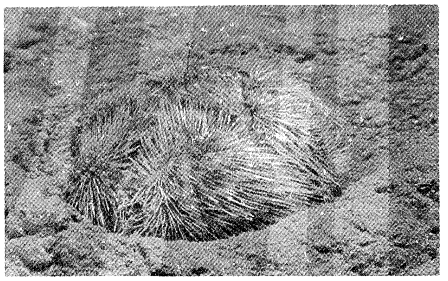
heart transplant, medical procedure involving the removal of a diseased heart from a patient with heart muscles damaged beyond surgical repair and its replacement with a sound heart, usually from a person who has just died. Because of the immense complexity of the operation and the difficulty of finding appropriate donors, heart transplant is performed only as a last resort in patients whose projected survival with their own heart is only a few weeks or months. In most cases, transplanted hearts are taken from persons who have suffered irreversible brain damage and been declared legally dead.

Norman E. Shumway achieved the first successful heart transplant in a dog at Stanford University, Calif., U.S., in 1958. He spent the next decade conducting laboratory research to refine the technique and improve immune suppression in the animal model. On Dec. 3, 1967, Christiaan Barnard of South Africa performed the first human heart transplant at Groote Schuur Hospital, Cape Town. His success was followed by attempts at many other medical centres; 101 heart transplants were undertaken around the world within the next 12 months. Problems with immune rejection of the transplanted heart, poor patient survival, and concern about the assignment of enormous resources to an experimental technique of limited applicability led most surgeons to abandon the procedure after the initial attempts. Shumway, Barnard, and some others, however, continued to perform heart transplants, developing methods that significantly improved patient survival to the point that more than 50 percent of all patients lived at least five years after surgery. Many of these patients were able to lead productive lives for eight years or more after the operation. As a result of these successes, interest in heart transplants revived somewhat, and several medical centres were again attempting them.

The current procedure involves removal of the diseased heart except for some of the tissue from the atria, the two upper chambers of the heart. Leaving this tissue in place preserves nerve connections to the sinoatrial node, a patch of electroconductive tissue that regulates heartbeat. The replacement heart is removed from the donor and preserved in a cold salt solution. During implantation it is trimmed to fit and sutured into place, making all necessary vascular connections. Great care is taken to match patients and donors as to

blood type and other immunologic indicators, but the body's natural immunity must be suppressed to prevent transplant rejection. Drugs such as prednisone or antithymocyte globulin that inhibit a major group of immunoprotective cells are used for this. Anticoagulants are also administered to prevent atherosclerosis (hardening of the arteries) in the transplanted heart, a problem that caused the death of many early transplant patients.

heart urchin, any echinoid marine invertebrate of the order Spatangoidea (phylum Echinodermata), in which the body is usually oval or heart-shaped. The test (internal skeleton) is rather fragile with four porous spaces, or petaloids. The body is covered with fine, usually short spines.



Heart urchin (*Brissopsis lyrifera*)
Ingmar Holmasen

Heart urchins live in burrows lined with mucus. Long tentacles (modified tube feet) reach out over the sand to pick up small particles of food; other tube feet have respiratory and sensory (not locomotive) functions. Movement is carried out by means of the spines.

The common heart urchin (*Echinocardium cordatum*) occurs in all oceans. *Spatangus purpureus* is common on the coasts of western Europe, the Mediterranean, and western Africa.

heartland, also called PIVOT AREA, landlocked region of central Eurasia whose control was posited by Sir Halford J. Mackinder in the early 20th century as the key to world domination in an era of declining importance for traditionally invincible sea power. Mackinder observed that the majority of the world's population resided on the Eurasian and African landmass and that control of this "world island" would lead to eventual world domination. This world island could be best controlled from the pivot area, which would guarantee self-sufficiency in food for the country dominating the region, and the pivot area's inaccessibility by sea would provide a formidable defensive barrier. The pivot area was vulnerable to land attack only by way of the plains of eastern Europe. Thus, control of eastern Europe would ensure domination of the pivot area and ultimately world domination. Mackinder's landbased theory of world power contradicted the conventional maritime theory advocated by Alfred Thayer Mahan during the 19th century. In 1919 Mackinder renamed the concept the heartland.

Between the two World Wars, Mackinder's ideas became important to German students of geopolitics. Following World War II, Mackinder became even more convinced of the validity of the heartland concept and warned of possible world domination by the Soviet Union if it were able to gain control of all of Germany and eastern Europe, much of which it did in fact gain.

Some critics believe that the advent of air power destroyed the validity of Mackinder's landbased theory of world power. Mackinder, however, writing some decades before the development of intercontinental ballistic missiles with nuclear warheads, believed that air power did not diminish the significance of the heartland.

hearts, card game that was developed in the United States about 1880. The object is to avoid winning tricks with hearts in them. Three to six can play, using a 52-card deck. If three play, a black 2 is taken from the deck; with five, both black 2s are removed; with six, a black 3 and all 2s except for the 2 of hearts are removed. These practices vary from place to place.

No bidding takes place, nor is a trump suit used. Players must follow the suit led if able, and the highest card of the suit led takes the trick. In the simplest form of the game, each heart counts one point against the player winning it in a trick. A running total score is kept for each player, and the lowest score wins.

Black maria hearts, also called black lady, or black widow, is the most popular version, with many variations in rules possible. Hearts count 1 penalty point each, while the queen of spades counts 13 penalty points. Prior to the opening lead, each player passes any three cards from his original hand face down to the right (or left). With four to six players, two cards may be passed. If a player wins all 13 hearts and the queen of spades as well, 26 points may be subtracted from his total or added to those of his opponents.

When discarding, a good player will not automatically discard penalties; instead, he gets rid of cards that may put him badly in the lead later. Low hearts are often kept to guard against high ones that may be passed. The queen of spades can be kept if the player has sufficient low spades to avoid being forced into taking a trick with it.

heartwood, also called DURAMEN, dead, central wood of trees. Its cells usually contain tannins or other substances that make it dark in colour and sometimes aromatic. Heartwood is mechanically strong, resistant to decay, and less easily penetrated by wood-preservative chemicals than other types of wood. One or more layers of living and functional sapwood cells are periodically converted to heartwood. *See also* sapwood; xylem.

heat, energy that is transferred from one body to another as the result of a difference in temperature. If two bodies at different temperatures are brought together, energy is transferred—*i.e.,* heat flows—from the hotter body to the colder. The effect of this transfer of energy usually, but not always, is an increase in the temperature of the colder body and a decrease in the temperature of the hotter body. A substance may absorb heat without an increase in temperature by changing from one physical state (or phase) to another, as from a solid to a liquid (melting), from a solid to a vapour (sublimation), from a liquid to a vapour (boiling), or from one solid form to another (usually called a crystalline transition). The important distinction between heat and temperature (heat being a form of energy and temperature a measure of the amount of that energy present in a body) was clarified during the 18th and 19th centuries.

Heat as a form of energy. Because all of the many forms of energy, including heat, can be converted into work, amounts of energy are expressed in units of work, such as joules, foot-pounds, kilowatt-hours, or calories. Exact relationships exist between the amounts of heat added to or removed from a body and the magnitude of the effects on the state of the body. The two units of heat most commonly used are the calorie and the British thermal unit (BTU). The calorie (or gram-calorie) is the amount of energy required to raise the temperature of one gram of water from 14.5° to 15.5° C; the BTU is the amount of energy required to raise the temperature of one pound of water from 63° to 64° F. One BTU is approximately 252 calories. Both definitions specify that the temperature changes are to be measured at a constant pressure of one atmosphere, because the amounts of energy involved depend in part on pressure. The calorie used in measuring the energy content of foods is the large calorie, or kilogram-calorie, equal to 1,000 gram-calories.

In general, the amount of energy required to raise a unit mass of a substance through a specified temperature interval is called the heat capacity, or the specific heat, of that substance. The quantity of energy necessary to raise the temperature of a body one degree varies depending upon the restraints imposed. If heat is added to a gas confined at constant volume, the amount of heat needed to cause a one-degree temperature rise is less than if the heat is added to the same gas free to expand (as in a cylinder fitted with a movable piston) and so do work. In the first case, all the energy goes into raising the temperature of the gas, but in the second case, the energy not only contributes to the temperature increase of the gas but also provides the energy necessary for the work done by the gas on the piston. Consequently, the specific heat of a substance depends on these conditions. The most commonly determined specific heats are the specific heat at constant volume and the specific heat at constant pressure. The heat capacities of many solid elements were shown to be closely related to their atomic weights by the French scientists Pierre-Louis Dulong and Alexis-Thérèse Petit in 1819. The so-called law of Dulong and Petit was useful in determining the atomic weights of certain metallic elements, but there are many exceptions to it; the deviations were later found to be explainable on the basis of quantum mechanics.

It is incorrect to speak of the heat in a body, because heat is restricted to energy being transferred. Energy stored in a body is not heat (nor is it work, as work is also energy in transit). It is customary, however, to speak of sensible and latent heat. The latent heat, also called the heat of vaporization, is the amount of energy necessary to change a liquid to a vapour at constant temperature and pressure. The energy required to melt a solid to a liquid is called the heat of fusion, and the heat of sublimation is the energy necessary to change a solid directly to a vapour, these changes also taking place under conditions of constant temperature and pressure.

Air is a mixture of gases and water vapour, and it is possible for the water present in the air to change phase; *i.e.,* it may become liquid (rain) or solid (snow). To distinguish between the energy associated with the phase change (the latent heat) and the energy required for a temperature change, the concept of sensible heat was introduced. In a mixture of water vapour and air, the sensible heat is the energy necessary to produce a particular temperature change excluding any energy required for a phase change.

Heat transfer. Because heat is energy in transition, some discussion of the mechanisms involved is pertinent. There are three modes of heat transfer, which can be described as (1) the transfer of heat by conduction in solids or fluids at rest, (2) the transfer of heat by convection in liquids or gases in a state of motion, combining conduction with fluid flow, and (3) the transfer of heat by radiation, which takes place with no material carrier. The flow of heat in metal bars was studied analytically by the French mathematician Jean-Baptiste-Joseph Fourier and measured by the French physicist Jean-Baptiste Biot in 1816. The conductivity of water was first determined in 1839; the conductivity of gases was not measured until after 1860. Biot formulated the laws of conduction in 1804, and Fourier published a mathematical description of this phenomenon in 1822. In 1803 it was found that infrared rays are reflected and re-

fracted as visible light is, and, thenceforth, the study of thermal radiation became part of the study of radiation in general. In 1859 a physicist in Germany, Gustav Robert Kirchhoff, presented his law of radiation, relating emissive power to absorptivity. An Austrian, Josef Stefan, established the relationship (now called the Stefan–Boltzmann law) between the energy radiated by a blackbody and the fourth power of its temperature. Boltzmann established the mathematical basis for this law of radiation in 1884. It was in the study of radiation that Planck arrived at the concept of the quantum. Understanding of heat transfer by convection was developed during the period 1880–1920, although an equation describing such processes had been suggested by Sir Isaac Newton in 1701.

heat, body: *see* body heat.

heat capacity, ratio of heat absorbed by a material to the temperature change. It is usually expressed as calories per degree in terms of the actual amount of material being considered, most commonly a mole (the molecular weight in grams). The heat capacity in calories per gram is called specific heat. The definition of the calorie is based on the specific heat of water, defined as one calorie per degree Celsius.

At sufficiently high temperatures, the heat capacity per atom tends to be the same for all elements. For metals of higher atomic weight, this approximation is already a good one at room temperature, giving rise to the law of Dulong and Petit (*see* Dulong and Petit's law). For other materials, heat capacity and its temperature variation depend on differences in energy levels for atoms (available quantum states). Heat capacities are measured with some variety of calorimeter and, using the formulation of the third law of thermodynamics (*see* thermodynamics, laws of), heat-capacity measurements became important as a means of determining the entropies of various materials.

heat exchanger, any of several devices that transfer heat from a hot to a cold fluid, decreasing the energy of the hot fluid and increasing that of the cold. Heat exchangers are manufactured in many different designs and are used extensively in various technologies—for instance, in fossil-fuel and nuclear power plants, in gas turbines, in heating and air-conditioning, in refrigeration, and in the chemical industry. Special types of heat exchangers have been developed for artificial satellites and other space vehicles. Heat exchangers are given different names when they serve a special purpose. Thus boilers, evaporators, superheaters, condensers, and coolers may all be considered heat exchangers.

Principles of operation. The basic operation of a heat exchanger may be discussed with the help of a simple type shown in Figure 1. This exchanger is constructed from two pipes in a concentric arrangement. Inlet and exit ducts are provided for the two fluids. In the diagram the cold fluid flows through the inner tube and the warm fluid in the same direction through the annular space between the outer and the inner tube. This flow arrangement is called parallel flow. In it heat is transferred from the warm fluid through the wall of the inner tube (the so-called heating surface) to the cold fluid. The temperature in both fluids varies as shown in the lower part of Figure 1. The temperature of the warm fluid decreases from t_{w1} to t_{w2}, and the temperature of the cold fluid increases from t_{c1} to t_{c2}. The amount of heat Q that is transferred from one fluid to the other per unit of time, called heat flow, can be calculated from the following equation:

$$Q = mc\,(t_2 - t_1).$$

This equation states that the heat flow Q (in kilowatts [kW]) can be obtained by multiplying the mass per unit time of fluid m (in kilograms per second [kg/sec]) by the specific heat c of the fluid and by the temperature increase $t_2 - t_1$ of the fluid from the entrance to the exit of the heat exchanger (in degrees Celsius). The specific heat is a property of the fluid involved. The amount of heat leaving the warm fluid must be the same as the amount of heat received by the cold fluid.

The temperature difference Δt_1 between the fluids at the entrance of the heat exchanger decreases to the value Δt_2 at the exit, as illustrated in Figure 1. A heat exchanger is operated in counterflow when the flow direction of one of the fluids is reversed. The counterflow arrangement has the advantage that the exit temperature t_{c1} of the colder fluid can be increased beyond the exit temperature t_{w2} of the warm fluid. In addition, a smaller surface area is required in counterflow than in parallel flow to transfer the same amount of heat. This is so because the mean temperature difference Δt_m in the counterflow heat exchanger, for a given heat flux and prescribed inlet temperatures, is larger than in the parallel-flow exchanger.

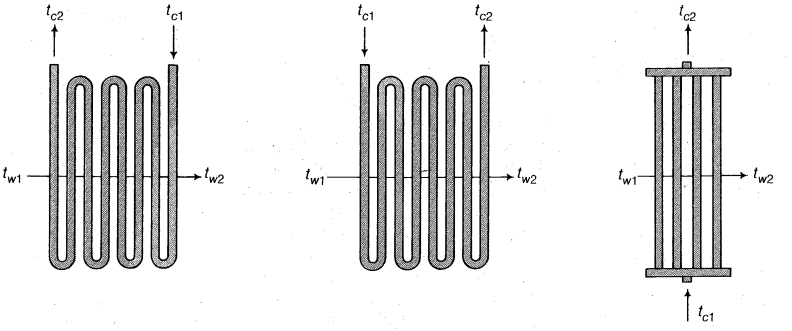


Figure 2: (Left) Counterflow, (centre) parallel flow, and (right) cross flow in tubular heat exchangers

Larger heat exchangers utilize a bundle of tubes through which one of the fluids flows. The tubes are enclosed in a shell with provisions for the other fluid to flow through the spaces between the tubes. Fluid flowing outside the tubes can be directed either in the same direction as or counter to the effective flow in the tube bundles (see Figure 2). In the latter arrangement, parallel or counter flow can be approximated in the way shown in Figure 2. In another arrangement, the cold fluid is distributed in such a manner that it flows in parallel through the tubes forming the heating surface and is then collected by a header. This arrangement creates a cross flow, as shown schematically in Figure 2. In nuclear reactors fuel rods may replace the tubes, and the cooling fluid flowing around the rods removes the heat generated by the fission process. In a similar way, rods containing electric resistance heaters may supply heat to the fluid passing through the exchanger between the rods.

Mechanism of heat transfer. Several physical processes are involved in the transfer of heat from the hot to the cold fluid in a heat exchanger.

The process that causes the heat to flow through the solid wall from one surface to another is called heat conduction. It has to be visualized in a specific way: each atom of the wall passes on its energy to the neighbouring atoms of lower temperature, handing heat energy from the hot side of the wall to the cold side. The temperature drop required to produce this heat flux depends on the thickness of the wall, its surface area, and its thermal conductivity.

Heat transfer from a fluid to a solid surface takes place partially by conduction. It is supplemented, however, by a process in which the fluid carries heat along as it moves through the heat exchanger. This process is called convection and depends on the nature of the flow. There are two types of flow that occur in nature. In one type, called laminar, the fluid particles move along in a smooth

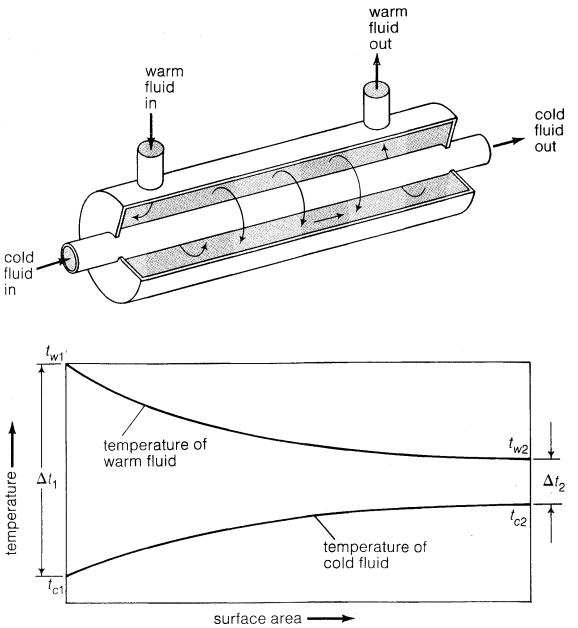


Figure 1: (Top) Operating principle of a parallel-flow heat exchanger and (bottom) changes in fluid temperatures that take place therein

way side by side. In turbulent flow conditions, waves and vortices are continuously formed and destroyed again. Superimposed on the mean flow, these vortices cause a continuous mixing of fluid particles. Whether the flow through a tube is laminar or turbulent depends on the tube diameter, on the velocity of the fluid, and on fluid viscosity. The flow tends to be laminar when the velocity is low, the tube diameter is small, and the viscosity is large. Laminar flow is encountered in oil coolers, for example, because oil has a high viscosity. Heat exchangers for liquids like water or for gases usually operate with turbulent flow. The heat transfer from the bulk of the fluid to the tube wall in laminar flow results mainly from conduction. Consequently, it is determined by the conductivity of the fluid and by the tube diameter. Liquids have considerably larger heat conductivity values than gases and thus transfer heat more readily. Liquid metals have especially large heat conductivity values and are for this reason used in engineering applications in which large amounts of heat have to be transferred at small temperature differences. Some designs of nuclear reactors use liquid metals as heat transfer media.

In turbulent flow, the mixing process described previously constitutes a third mechanism that transfers the heat from the bulk of the fluid to the wall. It is understandable that this process depends strongly on the velocity of the fluid. Heat transfer in turbulent flow is therefore larger than in laminar flow.

Types of heat exchangers. Specific heat exchangers had to be developed for space vehicles. These vehicles operate in a vacuum; therefore heat cannot be transferred by conduction or convection. Here, heat transfer has to be effected by another process called thermal radiation. This mechanism of heat transfer, used in such heat exchangers, is the same as the process by which the Earth receives energy from the Sun. Energy transfer by radiation is especially effective at high temperatures. In devices operating at such elevated temperatures (*e.g.,* steam boilers or gas turbines), heat transfer is caused by radiation added to the conductive and convective heat transfer.

In designing a heat exchanger for a specific purpose, the initial cost resulting from the weight of the heat exchanger, the material used, and the labour involved must be balanced against the operating cost of the power required. Power, usually in the form of electrical energy, has to be expended to overcome the pressure drop of the fluids in the heat exchanger. Much thought has been given to the problem of optimizing heat exchangers. In general, it has been found that small tube diameters and small clearances between the tubes reduce the initial and the operating costs.

Regenerative heat exchangers. A different type of heat exchanger, conventionally referred to as a regenerative heat exchanger, is constructed from a porous material through which the warm and the cold fluids are ducted alternately. The heat is stored in the porous material—the matrix—during the time the warm fluid passes through and is released from the porous material to the cold fluid when the latter fluid passes through. The matrix can be formed in a multitude of ways from plates, screens, fibres, or other elements. Nonmetallic materials, like ceramic and glass, have also been used. The surface area per unit volume can be made very large by providing many passages with small dimensions. This leads to compact heat exchangers. The alternate flow of the two fluids can be controlled by valves that at the proper time open and close the inlet and exit ducts for the two fluids, or the heat exchanger can be designed in such a way that the matrix rotates through the passages of the two fluids. Such heat exchangers were used frequently, beginning around 1930, in steam power plants. The compact size of this heat exchanger makes it desirable for gas turbines that power automobiles, airplanes, or other vehicles.

Heat pipes. A heat exchanger of a different kind has stimulated much attention in recent years. Called the heat pipe, it is used to transport heat over relatively large distances with the temperature difference kept as small as possible. The heat pipe consists of a hollow tube closed at both ends and partially filled with a liquid that boils at a desired temperature. One end of the tube is immersed in the warm region, and the other in the cold region. The objective is to transfer heat through the pipe from the warmer to the colder region. The process may be visualized by assuming that the tube is in a vertical position with the lower end immersed in the warm region. The liquid fills the lower end of the tube and starts boiling when the temperature of the warmer region exceeds the evaporation (or boiling) temperature of the liquid. The accumulation of vapour increases the pressure at the lower end of the tube. This forces the vapour upward, where it condenses since the temperature of the colder region is below the evaporation temperature. Gravity causes the condensed liquid to run down along the inner surface of the tube. In this way a steady circulation of the fluid is maintained. Heat is required to evaporate the liquid. In the boiling process this heat of evaporation is removed from the hot region. The same amount of heat is released when the fluid is condensed and is transferred to the cold region. Consequently, circulation of fluid causes transport of heat from the warm to the cold region.

Experiments conducted by E. Schmidt, a German engineer, in 1939 demonstrated that this mechanism for transporting heat is especially effective if the working fluid is close to its critical point. In 1960 he reported that a tube filled with ammonia or carbon dioxide near its critical point transfers an amount of heat per unit time that is more than 4,000 times larger than the amount of heat transferred by a solid rod of copper with the same dimensions and at the same temperature difference between the hot and cold regions.

A device of this kind can only operate in a vertical position, with the hot region located below the cold region. This limitation was eliminated through an improvement conceived by R. Gaugler at General Motors Corp. in 1942. He incorporated a wick or porous matrix covering the inside wall of the tube into the design, as shown in Figure 3. Because the wick contained many capillary passages, capillary action transported the liquid through the wick from the cold to the hot end of the tube, regardless of the direction in which it was oriented. In the wick the working fluid continuously evaporates at its hot end. Capillary forces continuously replace the evaporated liquid. The circulation of the fluid in the pipe occurs in such a way that a pressure difference in the vapour causes the vapour to flow from the warm to the cold end of the tube. Capillary forces return the liquid through the wick.

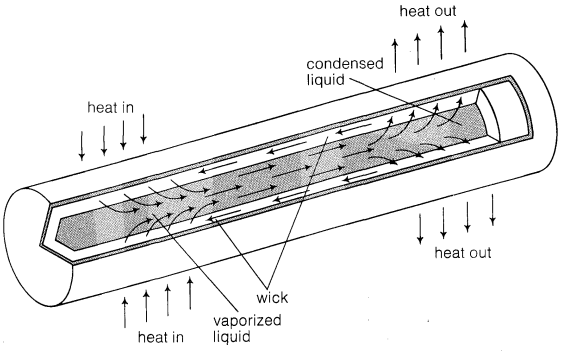


Figure 3: Basic operation of a heat pipe in which condensed liquid (at right) is returned to evaporator section (at left) by means of a wick

From *The Heat Pipe* by G. Eastman, Copyright © 1968 by Scientific American, Inc. All rights reserved

Since the device conceived by Gaugler did not become widely known, G.M. Grover, at Los Alamos Scientific Laboratory, described it again in 1963. He gave it the name "heat pipe," suggesting that it be used to transport heat in power plants for space vehicles. The effectiveness of the device derives from the fact that only small temperature differences are required to move the heat through the tube wall. Additionally, the transport of heat with the vapour requires almost no temperature difference. In this way, very large quantities of heat can be transported over considerable distances with extremely small temperature differences. In one such device, for instance, a heat flux in the amount of 11 kW was transported by a heat pipe 2.5 centimetres (1 inch) in diameter and 69 cm in length, with a temperature difference so small that it was difficult to measure.

This ability to transport very large quantities of heat with small temperature differences is the main feature characterizing the heat pipe. The device has other desirable features as well. For instance, the heat pipe operates whether the heat at the warm or cold end is transferred to a large or small surface area. When heat is concentrated at one location, it can be removed through a heat pipe and distributed over a large region. This feature has become important in the miniaturization of electronic equipment. In such equipment heat is generated as a by-product; the heat pipe makes it possible to remove a large amount of heat from the interior and transport it to someplace where it can easily be removed by a cooling air stream. Consequently, electronic equipment can be constructed in compact form. The fact that heat can be transported through the pipe with very small temperature differences suggests its application in cases where a uniform temperature of an engineering device is desirable. The heat pipe has thus been found useful in space flight. It eventually operates at a nearly constant temperature regardless of the amount of heat it has to transfer per unit time. It can be used, therefore, to keep temperatures in various devices constant in time even when the amount of heat that has to be removed varies.

Heat pipes can be designed to operate in a wide temperature range from below 0° C (32° F) up to around 2,000° C (3,632° F). This is accomplished by proper choice of the liquid that the pipe contains and the material of which the pipe is manufactured. Methanol, acetone, water, fluoridated hydrocarbons, mercury, lithium, lead, bismuth, and

a variety of inorganic salts have been used as working fluids; the tube itself has been made of glass, ceramic, copper, stainless steel, nickel, tungsten, molybdenum, tantalum, and a number of alloys. Wicks have been constructed of sintered, porous materials, woven mesh, fibre glass, longitudinal slots, and combinations of these structures.

heat of reaction (chemistry): *see* reaction, heat of.

heat pipe, form of heat exchanger (*q.v.*) useful for transporting heat over relatively large distances with a small temperature difference.

heat pump, device for transferring heat from a substance or space at one temperature to another substance or space at a higher temperature. It consists of a compressor, a condenser, a throttle or expansion valve, an evaporator, and a working fluid (refrigerant), such as carbon dioxide, ammonia, or a halocarbon. The compressor delivers the vaporized refrigerant under high pressure and temperature to the condenser, located in the space to be heated. There, the cooler air condenses the refrigerant and becomes heated in the process. The liquid refrigerant then enters the throttle valve and, expanding, comes out as a liquid–vapour mixture at a lower temperature and pressure; it then enters the evaporator, where the liquid is evaporated by contact with a comparatively warmer space. The vapour then passes to the compressor, and the cycle is repeated.

heat regulation (biology): *see* thermoregulation.

heat transfer, any or all of several kinds of phenomena, considered as mechanisms, that convey energy and entropy from one location to another. The specific mechanisms are usually referred to as convection, thermal radiation (*qq.v.*), and conduction (*see* thermal conduction). Conduction involves transfer of energy and entropy between adjacent molecules, usually a slow process. Convection involves movement of a heated fluid, such as air, usually a fairly rapid process. Radiation refers to the transmission of energy as electromagnetic radiation from its emission at a heated surface to its absorption on another surface, a process requiring no medium to convey the energy.

Transfer of heat, whether in heating a building or a kettle of water or in a natural condition such as a thunderstorm, usually involves all these processes.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

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heath, any of the low evergreen shrubs of the genus *Erica*, of the family Ericaceae, with about 500 species, most of which are indigenous to South Africa; some occur in the Mediterranean region and in northern Europe, and species have been introduced to North America.

The heaths have small, narrow leaves arranged in whorls set closely together on the shoots. The long-lasting flowers have four sepals, a four-cleft, bell-shaped, or tubular corolla (ring of petals), inflated in many species, and a four-celled capsule. Most heaths are low shrubs, but some African species are large bushes or trees.

The purple, or Scotch, heath, or bell heather (*E. cinerea*), is common in Great Britain and western Europe; its minute flowers yield much nectar. Other British species are cross-leaved heath, or bog heather (*E. tetralix*); Cornish heath (*E. vagans*), found also in western Europe; fringed heath (*E. ciliaris*), in western England and Ireland; and Irish heath (*E. mediterranea*), which reaches 1 to 1.5 metres (3

Heath (*Erica carnea*)
Douglas David Dawn

to 5 feet) tall in Ireland. The white, or tree, heath (*E. arborea*), found in southern France and the Mediterranean region, is the source of briar root, used for making briarwood pipes. Some southern African species (*e.g., E. melanthera, E. verticillata,* and *E. ventricosa*) are cultivated in cool greenhouses and outdoors in southwestern North America. *See also* heather.

Heath, Edward (Richard George) (b. July 9, 1916, Broadstairs, Kent, Eng.), Conservative prime minister of Great Britain from 1970 to 1974. In that office he scored a major triumph by winning French acceptance of British entry into the European Economic Community.

Of modest origins, Heath was educated at Oxford, where he was elected president of the University Conservative Association in 1937. In 1938, as chairman of the Federation of University Conservative Associations and president of the Oxford Union, he actively opposed the policy of appeasement toward Nazi Germany pursued by the Conservative prime minister Neville Chamberlain. He served in the army during World War II, worked in the Ministry of Civil Aviation in 1946–47, was editor of the *Church Times* from January 1948 to October 1949, and then became a member of a merchant banking firm.

Heath was elected to Parliament as a Conservative in the election of February 1950. In February 1951 he became an assistant whip. After a succession of posts in the whip's office he was made parliamentary secretary to the Treasury and chief government whip under Prime Minister Anthony Eden in December 1955. He served as minister of labour in the government of Prime Minister Harold Macmillan from October 1959 to July 1960, when he became lord privy seal with Foreign Office responsibilities. In this capacity he represented Britain in negotiations for entry into the European Economic Community. In October 1963 he became secretary of state for industry, trade, and regional development and president of the Board of Trade.

After the Conservative defeat in October 1964, Heath became a major opposition figure. Upon Sir Alec Douglas-Home's resignation he was elected leader of the opposition in July 1965. His party suffered a decisive defeat in the March 1966 general election but won a victory in the election of June 1970, defeating the Labour Party of Prime Minister Harold Wilson. As prime minister Heath had to face the crisis of violent conflict in Northern Ireland. He was unable to ameliorate the economic crises of 1973, however and called for a general election on Feb. 28, 1974. The Conservatives lost seats in the Commons to Labour, Heath failed to form a coalition government, and he was succeeded by Harold Wilson on March 4. After the Conservatives were defeated in another general election in October, Heath was replaced as party leader by Margaret Thatcher in 1975.

Heath was the co-author of *One Nation—A Tory Approach* (1950), editor of *Carols: The Joy of Christmas* (1977), and author of *Old World, New Horizons* (1970), *Sailing: A Course of My Life* (1975), *Music* (1976), *Travels: People and Places in My Life* (1977), *Our Community* (1977), and *British Approach to European Foreign Policy* (1977).

Heath-Stubbs, John (Francis Alexander) (b. July 9, 1918, London), English poet, translator, dramatist, and critic, whose poetry is characterized by wide erudition, a strong moral sense, and perfection of style. He also became known as an anthologist.

Heath-Stubbs won first-class honours in English at Oxford, where C.S. Lewis and Charles Williams were among those who influenced him. He afterward taught at Leeds University, at the University of Alexandria, Egypt, and at the University of Michigan. He was lecturer in English literature at the College of St. Mark and St. John in Chelsea (1963–73). From his earliest volumes—*Wounded Thammuz* (1942), *Beauty and the Beast* (1943), *The Divided Ways* (1946), and *The Swarming of the Bees* (1950)—Heath-Stubbs showed a predilection for past cultures, for myth and legend, and for both Humanistic and Christian traditions. A poet of notable technical skill and musical sensibility, he developed personal and satirical themes in his later work, which includes *A Charm Against the Toothache* (1954), *The Triumph of the Mule* (1958), *The Blue-Fly in His Head* (1962), *Satires and Epigrams* (1968), *The Watchman's Flute* (1978) and *Naming the Beasts* (1982).

Heath-Stubbs' translations include a selection of the prose and poetry of the 19th-century Italian poet Giacomo Leopardi (1966). He also wrote a number of plays, collected in *Helen in Egypt and Other Plays* (1959), and a critical work on Charles Williams.

Heathcoat, John (b. Aug. 7, 1783, Duffield, Derbyshire, Eng.—d. Jan. 18, 1861, Tiverton, Devon), pioneering inventor of lace-making machinery. One of his machines (patented in 1809), the most expensive and complex textile machine then in existence, simulated the movements of the bobbins in the hands of the pillow-lace workers, producing an exact

Heathcoat, detail of an engraving by T.L. Atkinson after a portrait by W. Beetham, mid-19th century
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

imitation of pillow lace. Heathcoat and his partner, Charles Lacy, built a mill at Loughborough to exploit the new process. The Luddites invaded the mill in 1816 and destroyed 55 lace frames. Heathcoat afterward installed new and greatly improved machines at a mill in Tiverton, Devon.

He also developed contrivances for ornamenting net in the course of manufacture and for making ribbons and plaited and twisted net; invented improved yarn-spinning frames; and, finally, devised methods for winding raw silk from cocoons. From 1832 to 1859 he represented Tiverton in Parliament.

Heathcoat-Amory, Lady (golfer): *see* Wethered, Joyce.

heather, also called SCOTCH HEATHER, or LING (*Calluna vulgaris*), low evergreen shrub, of the heath family (Ericaceae), widespread in western Europe and Asia, North America, and Greenland. It is the chief vegetation on many wastelands of northern and western Europe. *C. vulgaris* is distinguished from true heaths, which are sometimes loosely called heather,

Heather (*Calluna vulgaris*)

©A.W. Ambler—The National Audubon Society Collection/Photo Researchers, Inc.

by the lobes of its calyx, which conceal the petals; in true heaths the petals cover the calyx.

Scotch heather has purple stems, close-leaved green shoots, and feathery spikes of bell-shaped flowers. In sheltered places it grows to 0.9 m (3 feet) or more, but on arid slopes it frequently rises only a few centimetres above the ground.

Heather has a number of economic uses: large stems are made into brooms, shorter ones are tied into bundles that serve as brushes, and long trailing shoots are woven into baskets. The plant has also been used for bedding. With the peat about its roots, it serves as an effective fuel. The huts of Scottish Highlanders were formerly made of heather and heath stems cemented with peat mud mixed with dry grass or straw; today, temporary sheds are often built in a similar way and roofed with heather. The young, juicy shoots and the seeds of heather are the principal food of the red grouse (*Lagopus scoticus*), and ripe seeds of heather are eaten by many other species of birds.

heating, process and system of raising the temperature of an enclosed space for the primary purpose of ensuring the comfort of the occupants.

The earliest method of providing interior heating was an open fire. Such a source, along with related methods such as fireplaces, cast-iron stoves, and modern space heaters fueled by gas or electricity, is considered to be direct heating because the conversion of energy into heat takes place at the site to be heated. A more common form of heating in modern times is known as central, or indirect, heating. It consists of the conversion of energy to heat at a source outside of the site or sites to be heated; a medium such as air, water, or steam to convey heat to the site; and an emitting device to distribute heat once it is delivered.

Except for the ancient Greeks and Romans, most cultures relied upon direct-heating methods. In a great many Roman buildings, mosaic floors were supported by columns below, which created air spaces or ducts. At a site central to all the rooms to be heated, charcoal, brushwood, and, in Britain, coal were burned, and the hot gases traveled beneath the floors, warming them in the process. The hypocaust system, as it was called, disappeared with the decline of the Roman Empire, and central heating was not reintroduced until some 1,500 years later.

Central heating was adopted for use again in the early 19th century when the Industrial Revolution caused an increase in the size of buildings for industry, residential use, and human services (such as hospitals). Coal-fired boilers made of riveted wrought-iron plates delivered hot steam to rooms by means of standing radiators. In the 20th century central-heating systems generally use warm air and hot water for heat conveyance. Water is especially favoured both because its high density allows it to hold more heat and because its temperature can be regulated more easily.

The use of air as the primary heat conveyor was common in domestic heating of American homes, although there has been a growing preference for hot-water systems, which have been used in European countries for some time. Because of its low density, air carries less heat for shorter distances. Furnaces usually fueled by gas or oil heat the air in ducts, which then rises to rooms above where it is emitted through registers. Air currents through open doors and return air vents help distribute the heat evenly.

Air also works in conjunction with other systems. When the primary heated medium is steam or hot water, forced air propelled by fans distributes heat by convection (air movement). Even the steam radiator depends more on convection for heat emission than on radiation (the emission of heat energy in waves). One system uses hot air as the primary medium to heat closed ducts from which heat is radiated. Both of these systems are more common in industry than in domestic heating.

Air temperature and the effects of radiation, relative humidity, and convection all influence the design of a heating system. An equally important consideration is the amount of physical activity that is anticipated in a particular setting. In a work atmosphere in which strenuous activity is the norm, the human body gives off more heat. In compensation, the air temperature is kept lower (approximately 55° F [13° C]) in order to allow the extra body heat to dissipate.

Electricity creates heat when it passes through an element with current resistance. This heat may be transferred to water for conveyance; it may be radiated directly from the resistance coils, as in a space heater; and it may be distributed by convection with fans. Gas is used with forced-warm-air systems, either central or direct, and with overhead radiant units. Because burning gas produces a noxious exhaust, gas heaters must be vented to the outside. Warm-air oil furnaces are similar to gas units, except that oil is stored on premises and gas is piped in by a utilities company. Solar energy frequently works on a storage basis, in which water coils placed beneath heat-absorbing panels collect the radiant heat of the sun. This water may then be stored in a tank for use in heating lines or to provide hot water for washing and bathing.

heatstroke, debility caused by exposure to high temperature and humidity. The term sunstroke refers to the same disorder when exposure to direct sunlight is the main source of environmental heat. The fundamental feature of heatstroke is an extreme and uncontrolled elevation of body temperature (106° to 110° F [41° to 43° C], or even higher), which can harm the central nervous system.

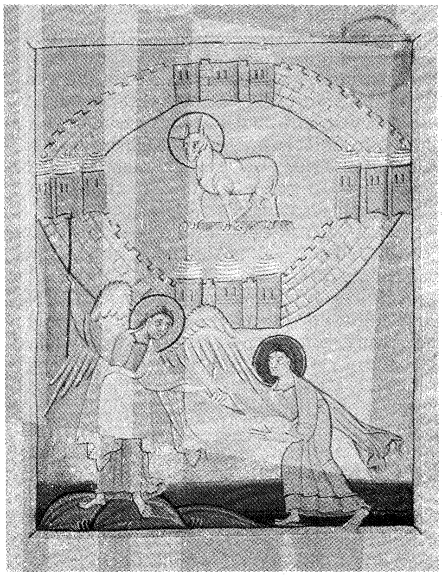
There is good evidence that heatstroke in its uncomplicated form is caused by the failure of sweating to cool the body. The average human body produces 70 calories of heat per hour at rest and up to eight times this figure in severe muscular work. In mild climates this heat is eliminated by radiation and convection from the skin and lungs and by evaporation of sweat. As the surroundings become hotter, all methods of heat elimination become ineffective except the evaporation of sweat. Experiments involving prolonged work in heat demonstrate a slow decline in rate of sweating. Thus, physiologic mechanisms for control of body temperature seem to become fatigued if exposure to heat is prolonged. When the sweat rate is insufficient, rapid changes may occur, including a further drop in or near cessation of sweating, a rapid rise in temperature, collapse, and coma. If prompt treatment by cooling is not instituted, the victim will die.

It is notable that continuous exposure to heat for many hours is usually necessary to produce heatstroke. In the early stages of heatstroke the victim is irrational or comatose with rapid bounding pulse and hot, dry, flushed skin. As collapse persists, the coma deepens and a weak, thready pulse and a more dusky skin will follow. Cooling of the body is urgent if the victim's life is to be saved. Ice-water baths or packs, with massage to promote circulation, are effective. Cooling should be stopped when the rectal temperature reaches 102° F (39° C) but should be reinstituted if temperature rises again. After this first-aid procedure, expert medical care is necessary to manage the effects of possible circulatory disorder and brain damage. Death from such residual damage is not unusual. The recovered patient may have increased susceptibility to the ill effects of heat.

Persons exposed to extreme environmental heat often experience other difficulties. They need large amounts of water and salt to replace those lost in the sweat. Without sufficient water, they suffer from dehydration and may collapse from inadequate circulation. This collapse, whether caused by dehydration or other phenomena, is called heat exhaustion, or heat prostration. It can be distinguished readily from heatstroke by the moderate or absent elevation of body temperature and by the persistence of heavy sweating. Salt, or other mineral, and sugar depletion may contribute to heat exhaustion or cause other difficulties, among them heat cramps, which are relieved specifically by supplying added salt, minerals, or sugar to the diet. Although such difficulties may complicate or even precipitate heatstroke, they are complications rather than essential features.

heaven, the dwelling place of God, gods, or other spiritual beings and the abode or state of being of the saved, the elect, or the blessed in the afterlife or in the time after the Last Judgment. The term also designates the celestial sphere or spheres in contrast to the earth (the dwelling place of man) and to the underworld (the abode of the damned), often called hell (*q.v.*). As celestial space, heaven also is the place of the Sun, Moon, planets, and stars, all of which give and symbolize light, a quality of the sacred and the good, as opposed to darkness, the quality of the underworld and evil.

The concept of heaven is interpreted in various ways in the different religions of the world. In the Old Testament heaven is regarded as the abode of Yahweh, the God of the Israelites; because he also is heaven's creator, he transcends the celestial sphere. Until the 3rd–2nd century BC, Israelites generally did not view heaven as the abode of those who died but rather believed that all men (good and evil) slept in Sheol, the underworld, which was



"The Angel Shows John the Heavenly Jerusalem," from the *Apocalypse of St. John, c.* 1020; in the Staatsbibliothek Bamberg, Germany (MS. 140)
By courtesy of the Staatsbibliothek Bamberg, Germany

a place of neither pain nor pleasure, punishment nor reward. In later Judaism, however, heaven came to be viewed as the postmortem destination of the righteous, who would be resurrected to live with God.

Christianity, coming out of this matrix of Judaism, viewed heaven as the destination of the true believers and followers of Christ. Some of the more recent interpretations view heaven symbolically as a state of life with Christ, rather than as a place to which the elect or the saved go after death.

Islām, influenced by Judaism and Christianity, views heaven as a place of joy and bliss to which faithful Muslims go, according to the will of Allāh (God). In the Qur'ān, the Islāmic scriptures, there are references to the belief that everyone must go through or pass by hell before reaching heaven.

In the Eastern religions, concepts of heaven vary considerably, some being similar to Western religious views and others being very dissimilar. The Chinese Heaven (T'ien; *q.v.*) is the guardian of the moral laws of man and the physical laws of nature. T'ien also is synonymous with the divine will. In some Mahāyāna (Greater Vehicle) Buddhist sects, such as the Pure Land sect, heaven is a "Western Paradise" for those who have received the saving grace of Amitābha, a buddha (enlightened one) who vowed to save all living creatures. Orthodox Buddhists, especially those of the Theravāda (Way of the Elders), do not usually speak of heaven, but rather of Nirvāṇa, the state of existence in which there is an extinction of desires. In Hinduism there are many and varied concepts of heaven. Worshippers of Vishnu, the Preserver, for example, believe that they will go to a heaven in which there is no suffering, fear, or death and that they will be able to live in the glory of Vishnu's eternal light.

heaves, also called BROKEN WIND, chronic disorder of the lungs of horses and cows, characterized by difficult breathing and wheezy cough. The symptoms are worsened by vigorous exercise, sudden weather changes, and overfeeding. Heaves resulting from bronchitis may be associated with the feeding of dusty or moldy hay. In horses the condition may be of allergic origin. Chronic pulmonary emphysema also induces heaves. *See* emphysema.

Heaviside, Oliver (b. May 18, 1850, London—d. Feb. 3, 1925, Torquay, Devon, Eng.), physicist who predicted the existence of the ionosphere, an electrically conductive layer in the upper atmosphere that reflects radio waves. In 1870 he became a telegrapher, but increasing deafness forced him to retire in 1874. He then devoted himself to investigations of electricity. In *Electrical Papers* (1892), he dealt with theoretical aspects of problems in telegraphy and electrical transmission, making use of an unusual calculatory method called operational calculus, now better known as the method of Laplace transforms, to study transient currents in networks. His work on the theory of the telephone made long-distance service practical. In *Electromagnetic Theory* (1893–1912), he postulated that an electric charge would increase in mass as its velocity increases, an anticipation of an aspect of Einstein's special theory of relativity. When wireless telegraphy proved effective over long distances, Heaviside theorized that a conducting layer of the atmosphere existed that allows radio waves to follow the Earth's curvature instead of travelling off into space in a straight line. His prediction was made in 1902, shortly after Arthur E. Kennelly, working in the United States, made a similar prediction. Thus the ionosphere was known as the Kennelly–Heaviside layer for many years.

heavy hydrogen: *see* deuterium.

heavy ion, in nuclear physics, any particle with one or more units of electric charge and a mass exceeding that of the helium-4 nucleus (alpha particle). Special types of accelerators are capable of producing fairly intense, high-energy beams of heavy ions, which are used in basic research, as in the production of synthetic transuranium elements (*e.g.*, hahnium [atomic number 105]).

heavy spar (mineral): *see* barite.

heavy water (D_2O), also called DEUTERIUM OXIDE, water composed of deuterium, the hydrogen (*q.v.*) isotope with a mass double that of ordinary hydrogen, and oxygen. (Ordinary water has a composition represented by H_2O.) Thus, heavy water has a molecular weight of about 20 (the sum of twice the atomic weight of deuterium, which is 2, plus the atomic weight of oxygen, which is 16), whereas ordinary water has a molecular weight of about 18 (twice the atomic weight of ordinary hydrogen, which is 1, plus oxygen, which is 16).

Ordinary water as obtained from most natural sources contains about one deuterium atom for every 6,760 ordinary hydrogen atoms. If water is electrolyzed the gas produced at the cathode is mostly hydrogen, and thus the residual water is enriched in deuterium content. Continued electrolysis of hundreds of litres of water until only a few millilitres remain yields practically pure deuterium oxide. This operation, until 1943 the only large-scale method used, has been superseded by less expensive processes, such as fractional distillation (D_2O becomes concentrated in the liquid residue because it is less volatile than H_2O). The heavy water produced is used as a moderator of neutrons in nuclear power plants. In the laboratory heavy water is employed as an isotopic tracer in studies of chemical and biochemical processes.

Heb-Sed festival, also called SED FESTIVAL, one of the oldest feasts of Egypt, celebrated by the king after 30 years of rule and repeated every three years thereafter. The festival was in the nature of a jubilee, and it is believed the ceremonies represented a ritual reenactment of the unification of Egypt, first accomplished by Menes. From numerous wall reliefs and paintings and from the Heb-Sed court in the Step Pyramid complex of Djoser, at Ṣaqqārah, much information has been gleaned about the festival. The king first presented offerings to a series of gods and then was crowned, first with the white crown of Upper Egypt and then with the red crown of Lower Egypt. Finally, the king, dressed in a short kilt with an animal's tail in back, ran a ritual course four times and was then carried away in a great procession to visit the chapels of the gods Horus and Seth. Reconstruction of the Heb-Sed building at Ṣaqqārah was under way during much of the 20th century.

Hebat, also spelled HEPA or HEPATU, in the religions of Asia Minor, a Hurrian goddess, the consort of the weather god Teshub. She was called Queen of Heaven and was assimilated by the Hittites to their national goddess, the sun goddess of Arinna. Teshub and Hebat had cult centres at Kummanni (classical Comana Cappadociae) and at Aleppo (Ḥalab) and other cities in the region of the Taurus Mountains. Hebat is represented as a matronly figure either standing on a lion or seated on a throne. She survived during Hellenistic times as Hipta, a goddess of Lydia and Caria, but the goddess of Comana was then Ma, a warlike deity identified by the Greeks with Enyo and by the Romans with Bellona. From this it may perhaps be inferred that Hebat also had warlike characteristics, though this aspect of her nature is not apparent in the extant texts. Her name has been compared to Hebrew Ḥawwa (Eve) and with Greek Hecate.

Hebbel, (Christian) Friedrich (b. March 18, 1813, Wesselburen, Schleswig-Holstein—d. Dec. 13, 1863, Vienna), poet and dramatist who added a new psychological dimension to German drama and made original use of

Hebbel, detail of a lithograph by Fritz Kriehuber, 1858
By courtesy of the Friedrich-Hebbel Museum, Wesselburen, Ger.

Hegel's concepts of history to dramatize conflicts in his historical tragedies. He was concerned not so much with the historical aspects of the characters or events as with the process of change as it led to new moral values.

Hebbel was the son of a poor mason and was brought up in poverty. After his father's death in 1827, he spent seven years as a clerk and messenger to a tyrannical parish bailiff. He founded a literary circle and had his first poems published in a local newspaper and in a Hamburg fashion magazine, whose editor, Amalie Schoppe, invited him to Hamburg in 1835 to prepare for the university. He was supported during this time, both spiritually and materially, by a seamstress, Elise Lensing, with whom he lived. At this time he started his *Tagebücher* (published 1885–87; "Diaries"), which became an important and revealing literary confession. Provided with a small income from his patrons, he went to Heidelberg to study law but soon left for Munich to devote himself to philosophy, history, and literature. Unable to publish his poems, however, he returned penniless and ill to Hamburg, where he was nursed by Elise Lensing.

Hebbel's powerful prose play *Judith,* based on the biblical story, brought him fame in 1840 upon its performance in Hamburg and Berlin. His poetic drama *Genoveva* was finished in 1841. Still in need of money, Hebbel received a grant from the Danish king to spend a year in Paris and one in Italy. While

in Paris in 1843 he wrote most of the realistic tragedy *Maria Magdalena,* published with a critical and philosophical preface in 1844 and performed in 1846. This skillfully constructed play, technically a model "tragedy of common life," is a striking portrayal of the lower middle-class.

In 1845 he met the actress Christine Enghaus, whom he married in 1846. His life became more tranquil, although he was permanently weakened by rheumatic fever as a result of his earlier privation. The first tragedy written in this period of his life was the verse play *Herodes und Mariamne* (published 1850, performed 1849). His later work *Die Niebelungen Trilogie* (1862)—including *Der Gehörnte Siegfried* ("The Invulnerable Siegfried"), *Siegfrieds Tod* ("Siegfried's Death"), and *Kriemhilds Rache* ("Kriemhild's Revenge")—grandiosely pictures the clash between heathen and Christian. The prose tragedy *Agnes Bernauer* (1852) treats the conflict between the necessities of the state and the rights of the individual. *Gyges und sein Ring* (1854; *Gyges and His Ring*), probably his most mature and subtle work, shows Hebbel's predilection for involved psychological problems. His other works include two comedies, a volume of novellas and stories, collections of poems, and essays in literary criticism. On his 50th birthday, nine months before he died, he received the Schiller Prize.

Hebe (from Greek *hēbē,* "young maturity," "bloom of youth"), daughter of Zeus, the chief god, and his wife Hera. In Homer this princess was a divine domestic, appearing most frequently as cupbearer to the gods. As the goddess of youth, she was generally worshiped along with her mother, of whom she may have been regarded as an emanation or specialized form. She was also associated with the hero-god Heracles, whose bride she became when

Hebe carrying nectar and ambrosia, detail of a vase painting; in the Museo Jatta, Ruvo di Puglia, Italy

Alinari—Giraudon from Art Resource/EB Inc.

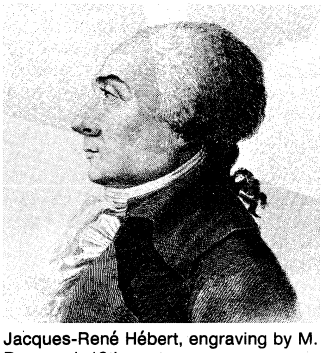
he was received into heaven. The most important centres of her worship were Phlious and Sicyon, where she was called Ganymeda and Dia. Hebe was sometimes identified with the Roman deity Juventas.

Hébert, Anne (b. Aug. 1, 1916, Sainte-Catherine-de-Fossambault, Que., Can.), French-Canadian poet, novelist, and playwright.

Hébert began writing poetry in her teens under the tutelage of her father, Maurice-Lang Hébert, a distinguished literary critic, and her cousin, Hector de Saint-Denys-Garneau, a poet. Her early poetry, *Les Songes en equilibre* (1942) and *Le Tombeau des rois* (1953; *The Tombs of Kings*), reveals the poet in anguish, trading a child's joy of living for the stifling responsibilities of maturity.

Hébert's first novel, *Les Chambres de bois* (1958; *The Silent Rooms*), and the short stories in *Le Torrent* (1963; *The Torrent*) take place in a world of symbolism and fantasy. Two subsequent novels deal with murders of passion (*Kamouraska,* 1970) and demonic possession (*Les Enfants du sabbat,* 1975; *Children of the Black Sabbath*). She also wrote for television and the theatre. Her plays were collected as *Le temps sauvage* (1967).

Hébert, Jacques-René, pseudonym PÈRE (Father) DUCHESNE (b. Nov. 15, 1757, Alençon, Fr.—d. March 24, 1794, Paris), political journalist during the French Revolution who became the chief spokesman for the Parisian sansculottes (extreme radical revolutionaries). He and his followers, who were called Hébertists, pressured the Jacobin regime of 1793–94 into instituting the most radical measures of the Revolutionary period.



Jacques-René Hébert, engraving by M. Peronard, 19th century

By courtesy of the Bibliotheque Nationale, Paris

Born into a bourgeois family, Hébert settled in Paris in 1780. For the next 10 years he lived in poverty. He greeted the outbreak of the Revolution (1789) with enthusiasm; and in 1790 he launched his career as a journalist by writing a series of ribald, sacrilegious political satires, adopting the pen name le père Duchesne (a popular comic figure). His newspaper *Le Père Duchesne* first appeared in November 1790 and soon became the most successful newspaper of the French Revolution. Although Hébert at first focused his editorial wrath on the aristocracy and clergy, he launched a virulent campaign against King Louis XVI in the spring of 1792.

Hébert became an influential member of the Club of the Cordeliers, and as a representative to the Revolutionary Commune he helped plan the popular insurrection that overthrew the monarchy on Aug. 10, 1792. In the ensuing autumn the Hébertists had the Cathedral of Notre-Dame turned into a Temple of Reason and had some 2,000 other churches converted to the worship of Reason. In December Hébert was elected assistant procurator general of the Commune, which had become the governing body of Paris. By that time Hébert had also joined the Club of Jacobins. The Jacobin deputies waged a fierce campaign against the moderate Girondin faction in the National Convention, which convened in September 1792. In this struggle Hébert made his newspaper a mouthpiece of the sansculottes: he demanded the death sentence for the king, the elimination of the Girondins, and the establishment of a revolutionary government. Hébert was a leader of the sansculotte crowds that forced the Convention to expel the leading Girondist deputies on June 2, 1793.

Hébert's supporters organized the massive demonstrations of Parisian workers (September 4–5) that forced the Convention to inaugurate a state-controlled economy and institute the Reign of Terror. The anti-Christian campaign of the autumn of 1793, which sought to destroy Roman Catholic institutions in France, was also largely inspired by Hébert.

Once the Committee of Public Safety, the Convention's executive body, had consolidated its power by early 1794, however, it came to regard Hébert and his extreme left-wing followers as dangerous. The Jacobins' right wing, under Georges Danton, attacked the extremism of the Hébertists, and the Committee's chief spokesman, Maximilien Robespierre, joined battle with both factions. While a food shortage was stimulating popular discontent, Hébert on March 4, 1794, persuaded the Cordeliers Club to call for a popular uprising. The sansculottes did not respond, however, and on March 14 the Committee of Public Safety had Hébert arrested. He and 17 of his followers were guillotined 10 days later. His execution cost the government the support of the sansculottes and contributed to the collapse of the Jacobin dictatorship in July 1794.

Hebi (China): *see* Ho-pi.

Hebra, Ferdinand von (b. Sept. 7, 1816, Brünn, Moravia [now Brno, Czech.]—d. Aug. 5, 1880, Vienna, Austria), physician who founded the New Vienna school of dermatology, which became a basis for modern dermatology.

A graduate in medicine (1841) of the University of Vienna, von Hebra was influenced by Karl Rokitansky, one of the founders of modern pathological anatomy. He applied his training in pathology to a classification of skin diseases, which was first published in 1845. Von Hebra held that diseases of the skin were related to local irritation, disputing the previously held humoral doctrine that related them to a disease-producing condition of body fluids.

Hebraic law, body of ancient Hebrew law codes found in various places in the Old Testament and similar to earlier law codes of ancient Middle Eastern monarchs—such as the Code of Hammurabi, an 18th–17th century BC Babylonian king, and the Code of Lipit-Ishtar, a 20th-century-BC king of the Mesopotamian city of Eshnunna. The codes of both Hammurabi and Lipit-Ishtar are described in their prologues as imparted by a deity so that the monarchs might establish justice in their lands. Such law codes thus had the authority of divine command.

The laws of the Hebrews were conceived in the same manner. Two types of law are noted in the Hebrew law codes: (1) casuistic, or case, law, which contains a conditional statement and a type of punishment to be meted out; and (2) apodictic law, *i.e.,* regulations in the form of divine commands (*e.g.,* the Ten Commandments). The following Hebraic law codes are incorporated in the Old Testament: (1) the Book of the Covenant, or the Covenant Code; (2) the Deuteronomic Code; and (3) the Priestly Code.

The Book of the Covenant, one of the oldest collections of law in the Old Testament, is found in Exodus 20:22–23:33. Similar to the Code of Hammurabi, the Covenant Code is divided into the following sections: (1) a prologue; (2) laws on the worship of Yahweh; (3) laws dealing with persons; (4) property laws; (5) laws concerned with the continuance of the Covenant; and (6) an epilogue, with warnings and promises. In both the Code of Hammurabi and the Covenant Code, the lex talionis (the law of retribution)—namely, the "eye for an eye, a tooth for a tooth" law—

is found. The substitution of financial compensation or a fine for the literal punishment, however, was allowed.

The Deuteronomic Code, found in Deuteronomy, chapters 12–26, is a reinterpretation or revision of Israelite law, based on historical conditions as interpreted by the 7th-century-BC historians known as the Deuteronomists. Discovered in the Temple at Jerusalem in 621 BC, the Deuteronomic Code attempted to purify the worship of Yahweh from Canaanite and other influences. The greatest sin was considered to be apostasy, the rejection of faith, the penalty for which was death. The Deuteronomic Code is divided into the following sections: (1) statutes and ordinances, especially related to dealings with the Canaanites and worship in the Temple in Jerusalem alone, to the exclusion of the high places (*see* high place); (2) laws (known as sabbatical laws) concerned with the year of release from obligations, especially financial; (3) regulations for leaders; (4) various civil, cultic, and ethical laws; and (5) an epilogue of blessings and curses.

The Priestly Code, containing a major section known as the Code of Holiness (in Leviticus, chapters 17–26), is found in various parts of Exodus, all of Leviticus, and most of Numbers. Emphasizing ceremonial, institutional, and ritualistic practices, the Priestly Code comes from the post-Exilic period (*i.e.,* after 538 BC). Though most of the laws of the Code of Holiness probably come from the pre-Exilic period (pre-6th century BC), the laws reflect a reinterpretation encouraged by the Exile experiences in Babylon. Purity of worship of Yahweh is emphasized.

Hebrew, any member of an ancient northern Semitic people that were the ancestors of the Jews. Historians use the term Hebrews to designate the descendants of the patriarchs of the Old Testament (*i.e.,* Abraham, Isaac, and so on) from that period until their conquest of Canaan (Palestine) in the late 2nd millennium BC. Thenceforth these people are referred to as Israelites until their return from the Babylonian Exile in the late 6th century BC, from which time on they became known as Jews.

In the Bible the patriarch Abraham is referred to a single time as the *ivri,* which is the singular form of the Hebrew-language word for Hebrew (plural *ivrim,* or *ibrim*). But the term Hebrew almost always occurs in the Old Testament as a name given to the Israelites by other peoples, rather than one used by themselves. For that matter, the origins of the term Hebrew itself are uncertain. It could be derived from the word *eber,* or *ever,* a Hebrew word meaning the "other side" and conceivably referring again to Abraham, who crossed into the land of Canaan from the "other side" of the Euphrates or Jordan rivers. The name "Hebrew" could also be related to the seminomadic Habiru people, who are recorded in Egyptian inscriptions of the 13th and 12th centuries BC as having settled in Egypt.

Hebrew alphabet, either of two distinct Semitic alphabets—the Early Hebrew and the Classical, or Square, Hebrew. Early Hebrew was the alphabet used by the Jewish nation in the period before the Babylonian Exile—*i.e.,* prior to the 6th century BC—although some inscriptions in this alphabet may be of a later date. Several hundred inscriptions exist. As is usual in early alphabets, Early Hebrew exists in a variety of local variants and also shows development over time; the oldest example of Early Hebrew writing, the Gezer Calendar, dates from the 10th century BC, and the writing used varies little from the earliest North Semitic alphabets. The Early Hebrew alphabet, like the modern Hebrew variety, had 22 letters, with only consonants represented, and was written from right to left; but the early alphabet is more closely related in letter form to the Phoenician than to the modern Hebrew. Its only surviving descendant is the Samaritan alphabet, still used by a few hundred Samaritan Jews.

Between the 6th and 2nd century BC, Classical, or Square, Hebrew gradually displaced the Aramaic alphabet, which had replaced Early Hebrew in Palestine. Square Hebrew became established in the 2nd and 1st centuries BC and developed into the modern Hebrew alphabet over the next 1,500 years. It was apparently derived from the Aramaic alphabet rather than from Early Hebrew but was nonetheless strongly influenced by the Early Hebrew script. Classical Hebrew showed three distinct forms by the 10th century AD: Square Hebrew, a formal or book hand; rabbinical or "Rashi-writing," employed by medieval Jewish scholars; and various local cursive scripts, of which the Polish-German type became the modern cursive form.

Hebrew Bible: *see* Old Testament.

Hebrew language, Semitic language of the Northern Central (also called Northwestern) group; it is closely related to Phoenician and Moabite, with which it is often placed by scholars in a Canaanite subgroup. Spoken in ancient times in Palestine, Hebrew was supplanted by the western dialect of Aramaic beginning about the 3rd century BC; the language continued to be used as a liturgical and literary language, however. It was revived as a spoken language in the 19th and 20th centuries and is the official language of Israel.

The history of the Hebrew language is usually divided into four major periods: Biblical, or Classical, Hebrew, until about the 3rd century BC, in which most of the Old Testament is written; Mishnaic, or Rabbinic, Hebrew, the language of the Mishna (a collection of Jewish traditions), written about AD 200 (this form of Hebrew was never used among the people as a spoken language); Medieval Hebrew, from about the 6th to the 13th century AD, when many words were borrowed from Greek, Spanish, Arabic, and other languages; and Modern Hebrew, the language of Israel in modern times. Scholars generally agree that the oldest form of Hebrew is that of some of the Old Testament poems, especially the "Song of Deborah" in chapter 5 of Judges. The sources of borrowed words that first appeared during this period include the other Canaanite languages, as well as Akkadian. Hebrew also contains a small number of Sumerian words borrowed from an Akkadian source. Few traces of dialects exist in Biblical Hebrew, but scholars believe this to be the result of Masoretic editing of the text. In addition to the Old Testament, a small number of inscriptions in Hebrew of the biblical period are extant; the earliest of these is a short inscription in Phoenician characters dating from the 9th century BC.

During the early Mishnaic period, some of the guttural consonants of Biblical Hebrew were combined or confused with one another, and many nouns were borrowed from Aramaic. Hebrew also borrowed a number of Greek, Latin, and Persian words.

Use of the spoken language declined from the 9th century until the 18th century. Nevertheless, the medieval language underwent development, however spasmodic, in various directions. The cult of the liturgical poem called a *piyyûṭ* (itself a Greek word) in the 6th–9th century enriched the written vocabulary by giving fresh meanings to old words and coining new ones, especially in the so-called Kalirian style; and the Spanish-Hebrew poets of the period 900–1250 followed suit. This period saw also the addition of about 2,000 or 3,000 scientific, philological, and philosophical terms; some of these were formed by making new use of old roots, as in the case of *geder,* "fence," which served also for "definition." Some were based on existing Hebrew words like *kammût,* "quantity," from *kammāh,* "how much?", and others were adapted from foreign languages, chiefly Greek and Arabic, such as *'aqlîm,* "climate," and *ṭib'î,* "natural."

Modern Hebrew, based on the biblical language, contains many innovations designed to meet modern needs; it is the only colloquial speech based on a written language. The pronunciation is a modification of that used by the Sephardic (Hispano-Portuguese) Jews rather than that of the Ashkenazic (East European) Jews. The old guttural consonants are not clearly distinguished (except by Oriental Jews) or are lost. The syntax is based on that of the Mishna. Characteristic of Hebrew of all stages is the use of word roots consisting usually of three consonants, to which vowels and other consonants are added to derive words of different parts of speech and meaning. The language is written from right to left in a Semitic script of 22 letters.

Hebrew literature, the body of written works produced in the Hebrew language and distinct from Jewish literature, which also exists in other languages, including Greek, Aramaic, Arabic, Judeo-Spanish (Ladino), and Yiddish. Hebrew literature has had a continuous tradition from the early 12th century BC to contemporary Israel.

A brief account of Hebrew literature follows. For full treatment, *see* MACROPAEDIA: Hebrew Literature.

The earliest Hebrew literature, composed over a period of many centuries, is the collection of historical, legal, ethical, and liturgical works that constitute the Old Testament. These works were studied and taught in the synagogues and schools, from the period of the return to Palestine from exile in the 6th century BC. The teachings and amplifications of the rabbinic sages, however, were not written down but were rather orally preserved and transmitted. Classified as to content, the Halakha (Way) dealt with Jewish religious and legal practice, and the Haggada (Narration) dealt with Jewish legend, ethics, history, and homiletics. Finally, in about AD 220, the Jews' main juridical and religious laws were compiled by Judah ha-Nasi and committed to writing in the Mishna (Teaching by Repetition), which was divided into six main sections and about 60 tractates.

The expansion of the Mishna by successive generations of scholars was known as the Gemara (Completion). The Mishna and Gemara together constituted the Talmud (Study, or Learning), which was written down in the 4th and 5th centuries in two forms: the Jerusalem Talmud, reflecting the traditions of the Palestinian School, and the Babylonian Talmud, reflecting those of the Jewish centre in Mesopotamia. Contemporary with the Talmud and produced in Palestine was the Midrash (Exposition, or Investigation), a series of works compiled over many years, giving the legendary and imaginative interpretation of the Bible as the rabbis had expounded it in the synagogues.

During the Judeo-Hellenic period Hebrew ceased to be the language of the Jewish people but was used only by scholars and in divine worship. After the Talmudic era it lapsed even as a literary language, to be revived again in Palestine and in Spain from the 7th century, after the Muslim conquests. In this period the centre of Jewish culture was transferred first to North Africa and then to Muslim Spain, where Hebrew literature, particularly poetry, flourished. Both the liturgy and secular Spanish-Jewish poetry in Hebrew were raised to a level of excellence by poets such as Ibn Gebirol, Moses ibn Ezra, and Judah ha-Levi, while in Italy the most gifted Hebrew poet was Immanuel ben Solomon of Rome.

The Judeo-Arabic school reached its zenith

with Spanish-born Moses Maimonides, who formulated a code of rabbinic law, the *Mishne Torah.* His other masterpiece, the *Dalālat al-ḥā'irīn* (1204; "The Guide of the Perplexed"), the foremost medieval work of Jewish philosophy, was translated from Arabic into Hebrew.

The interests of the Jewish communities of northern Europe were concentrated on the study of Bible and Talmud. The greatest exponent of Biblical commentary was Rashi (Rabbi Shlomo Yitzḥaqi) of Troyes, whose commentary on the Bible is still universally studied by Jews. From the 12th to the 17th century, legal and ethical compositions were produced steadily in every part of the world, including Ẕefat (now in Israel), where Joseph ben Ephraim Karo created his *Shulḥan ʿarukh* ("Prepared Table"), the guide for the layman to Talmudic Law. The 16th and 17th centuries saw the rise of Poland as a major centre of Jewish learning, producing scholars who devoted themselves to the exposition of the Babylonian Talmud.

In the 18th century, Moses Mendelssohn in Berlin embarked on a program of Jewish educational reform and to this end translated the Old Testament into German in Hebrew characters and founded a Hebrew-language periodical, *Ha-Me'assef* ("The Gleaner"). Mendelssohn's influence permeated the Jewish communities of Russia and Poland, where Haskala, the Jewish enlightenment movement, became firmly established. It produced a new literature in Hebrew comprising poetry, novels, and essays, among other forms.

After the rise of the Zionist movement toward the end of the 19th century, the centre of Hebrew literary activity gradually moved to Palestine. Eliezer ben Yehuda initiated a campaign to revive Hebrew as a spoken tongue, and the success of this endeavour widened the Hebrew readership in Palestine. The literature of the settlements in Palestine consisted of poetic idylls, descriptions of Arab life, and stories about the Biblical past or Jewish life in eastern Europe. Shmuel Yosef Agnon, Nobel laureate of 1966, wrote about life both in his native Galicia and in Palestine.

After the establishment of the state of Israel in 1948 and the adoption of Hebrew as one of its official languages, Hebrew literature passed into the hands of Hebrew-speaking Israelis who deal almost exclusively with the concerns of their own environment, using a literary style that echoes colloquial speech. A native Hebrew drama has been established, and both poetry and prose reflect the vitality of a diverse and unique culture.

Hebrew Union College, the oldest Jewish seminary in the United States for the training of rabbis, long a stronghold of American Reform Judaism. It was founded in 1875 at Cincinnati, Ohio, by Rabbi Isaac Mayer Wise, and it became the major training centre for rabbis and teachers of the Reform movement.

In 1950 the college merged with the Jewish Institute of Religion of New York, which was founded (1922) by Rabbi Stephen S. Wise. The California school of the college-institute was chartered at Los Angeles in 1954. A fourth campus, the Hebrew Union College Biblical and Archaeological School, was opened in Jerusalem in 1963 as a postdoctoral institution.

The Klau Library at Cincinnati has one of the most extensive compilations of Hebraica and Judaica in the United States, including outstanding collections on Benedict de Spinoza, Jewish sacred music, and Jewish Americana. The Hebrew Union College Museum was established in 1913. The Hebrew Union College's publications include the *Hebrew Union College Annual, Studies in Bibliography and Booklore, Bibliographia Judaica, American Jewish Archives,* and *Sacred Music Press.*

Hebrew University of Jerusalem, Hebrew HA-UNIVERSIṬA HA-ʿIVRIT BI-YERUSHALAYIM, state-subsidized institution of higher learning in Jerusalem. The foremost university in Israel, it attracts many Jewish students from abroad. Originally inaugurated (1925) on Mount Scopus, it was transferred to Givʿat Ram in the Israeli-controlled sector of Jerusalem after 1948, when Mount Scopus became a demilitarized Israeli area within Jordanian territory. After the Israeli reoccupation of Mount Scopus in 1967, the university used both campuses, and Arab students began attending. It has faculties of humanities, science, social sciences, law, agriculture, dental medicine, and medicine, and schools of education, social work, pharmacy, home economics, and applied science and technology and a graduate library school.

Hebrews, Letter to the, New Testament letter traditionally attributed to Paul but now widely believed to be the work of a Jewish Christian, perhaps one of Paul's associates. The letter was composed sometime during the latter half of the 1st century. To judge from its contents, the letter was addressed to a Christian community whose faith was faltering because of strong Jewish influences. To fortify Christian beliefs, the author describes the perfect priesthood of Christ, who, unlike the Jewish high priest, offered but one sacrifice as God's own Son, thereby redeeming all of mankind once and for all. The office of the Jewish high priest, by contrast, was filled by a temporary appointee whose imperfect sacrifice had to be repeated over and over. The author concludes that Christianity is consequently superior to Judaism. The Christians are then warned against apostasy and the "fearful prospect of judgment" (10:27) that awaits "the man who has spurned the Son of God" (10:29). They are urged to persevere in their faith following the heroic example of others well known to them. The emphasis on Christ's priestly mediation and statements on faith and the Mosaic Law are not typical of other Pauline writings; other parts of the letter, however, clearly reflect Pauline influences.

Hebrides, group of islands extending in an arc off the Atlantic (west) coast of Scotland. They are subdivided into the Inner Hebrides (*q.v.*) to the east and the Outer Hebrides (*q.v.*) to the west and are separated from each other by the channels called the North Minch and Little Minch. The Outer Hebrides are administered as the Western Isles, one of the three Islands areas of Scotland. The Inner Hebrides are divided into several administrative districts: Skye and Lochalsh district and Lochaber district of Highland region, and Argyll and Bute district of Strathclyde region.

The Hebrides are composed of more than 40 islands and innumerable barren islets, but only a few of these islands are inhabited. There has been considerable depopulation, especially in the Outer Hebrides, during the 20th century because of a lack of economic opportunities. The chief islands of the crescent-shaped chain of the Outer Hebrides are Lewis, Harris, North Uist and South Uist, Barra, and Benbecula. St. Kilda lies some 40 miles (65 km) northwest of the main chain. The main islands of the Inner Hebrides are Skye, Small Isles (Canna, Sanday, Rum [Rhum], Eigg, and Muck), Tiree, Mull, Colonsay, Jura, Islay, and Coll.

The Hebrides are known for their unique natural features. The Cuillin Hills of Skye (rising to 3,309 feet [1,009 m]) are said to be the most spectacular massif in Britain. The small island of Rum [Rhum] became a Nature Conservancy Research Centre in 1957, specializing in the study of the local geology, flora, and fauna. The wildlife of the Hebrides is particularly rich and includes red deer, wild goats, Highland cattle and ponies, and, on Soay Island, a primitive wild sheep.

The economy of the islands centres on crofting (tenant farming), weaving, and fishing. The grassy plains (machair) on the western coasts of some of the islands are the most fertile agricultural areas in the Hebrides, especially when fertilized with seaweed, the common local practice. The cool climate, however, limits cultivation to hardy fodder crops, potatoes, and a few vegetables. Cattle raising and dairying are also practiced.

Weaving and fishing are concentrated on the rocky and infertile eastern coasts of the islands. The best-known textile enterprise is the manufacture of Harris tweed, which traditionally has provided a part-time occupation for the crofters. The manufacture of tweed in the Hebrides is historically of ancient origin, the wool being vegetable-dyed, hand-spun, and handwoven in the crofters' own homes. It is mostly produced in the Uists. A much greater quantity of aniline-dyed, machine-spun, handwoven tweed is produced on Lewis. Herring fishing is important at Stornoway on Lewis.

The Hebrides' Celtic inhabitants of the 1st millennium AD suffered from Norse raids after the 8th century and were eventually placed under Norse sovereignty until 1266. The fusion of Celts and Norsemen produced a period of relatively high cultural and material well-being in the 11th and 12th centuries.

The cessation of local wars and the increased cultivation of the potato as a food crop were instrumental in the subsequent population increase, which soon reached the limit of the subsistence economy. A period of social unrest ensued, and in the 19th century emigration to Australia and Canada became common. The immigration from the Scottish mainland of sheep farmers, who paid high rents for large acreages of ground, caused the eviction of many small tenants, who resettled in coastal townships where they supplemented the produce of their small plots of land by fishing.

In the 19th and 20th centuries the United Kingdom assumed a greater role in the islands' administration. In 1886 an act of Parliament gave the crofters security and heritability of tenure. Later, fair rents were established by a Crofters Commission. Pop. (1981) Lewis, 21,253; Barra, 1,232; Harris, 2,137; North Uist, 1,454; South Uist, 2,223; Skye, 8,139; Islay, 3,997; Jura and Colonsay, 371; Mull, 2,605; Tiree and Coll, 933.

Hebron, Arabic AL-KHALĪL, in full AL-KHALĪL AR-RAḤMĀN ("The Beloved of [God] the Merciful" [a reference to Abraham]), Hebrew ḤEVRON, city in the southern Judaean Hills, south-southwest of Jerusalem. It is 3,050 feet (930 m) above sea level. In modern times, it was part of mandated Palestine during 1923–48; after the Arab–Israeli War of 1948–49, it was in the territory annexed by Jordan (1950); since the Six-Day War of June 1967, it has been part of the West Bank (Judaea and Samaria) territory under Israeli administration.

Hebron is one of the oldest cities in the region; because of its associations with the biblical patriarchs Abraham, Isaac, and Jacob and with King David, it is one of the four holy cities of Judaism (Jerusalem, Hebron, Tiberias, and Ẕefat [Safed]). Islām, which reveres Abraham as a founder of monotheism and precursor of Muḥammad, also considers it a holy city.

An ancient Canaanite royal city, Hebron was founded "seven years before Zoan in Egypt" (Numbers 13:22), and Zoan, later Tanis, the capital of the Hyksos invaders, has been dated to the 18th century BC. Abraham, founder of the Jewish people, long lived in Hebron, which was often referred to as Qiryat Arbaʿ (Hebrew: "City of the Four," or "Tetrapolis"), possibly referring to four confederated settlements in the area in biblical times, or to the fact

that the city is built on four hills. At Hebron, Abraham purchased the cave of Mach-pelah as a burial place for his wife, Sarah, from Ephron the Hittite (Genesis 23); this became a family sepulchre. According to tradition, Abraham, Isaac, and Jacob, with their wives Sarah, Rebekah, and Leah, were buried in the cave. After the exodus from Egypt, Hebron was one of the cities visited by the spies sent by Moses. Later, Joshua fought the Battle of Aijalon, where "the sun stood still," against a confederation of Amorite chiefs including the "king of Hebron" (Joshua 10).

King David (*c.* 10th century BC) was ordered by God to go to Hebron; he was anointed king of Israel there, and made it his capital for 7½ years, until the taking of Jerusalem (II Samuel 2–5). In post-exilic times Hebron fell to the Edomites; King Herod the Great (ruled 37–4 BC) built a wall around the cave of Mach-pelah, portions of which survive beneath additions by Byzantines, crusaders, and Mamlūks. The Muslims ruled the city from AD 635 until after World War I, except for 1100–1260, when the crusaders controlled it.

In the early 20th century, Hebron was a Muslim Arab city, with a small, old Jewish community, largely of pious seminarians. In the Arab riots of 1929, 67 Hebron Jews were massacred; the remainder of the community left the city after the beginning of the Arab uprising of 1936–39.

Modern Hebron is an agricultural marketing and trade centre, with glass and leather manufactures. The Cave of Mach-pelah (Hebrew Me'arat ha-Makhpela) is surmounted by a large mosque, al-Ḥaram al-Ibrahimī al-Khalīl (The Sanctuary of Abraham, the Friend). After the Six-Day War (1967), the tombs of the patriarchs were opened to all worshippers for the first time in exactly 700 years, the original prohibition against non-Muslims having been made by the Mamlūk sultan Baybars in 1267. Both Muslim and Jewish services are now held in the cave; the upper mosque remains the exclusive property of the Muslims. In 1968 Orthodox settlers renewed Jewish presence in the city; their presence was finally approved by the Israeli government in 1970, and a new housing project for them was built in the early 1970s. Many tourists and pilgrims visit the Cave of Mach-pelah and other sites connected with the lives of the patriarchs, such as Abraham's Oak (Hebrew, Eshel Avraham), just northwest of the city. Pop. (1984 est.) 75,000.

Hecataeus OF MILETUS (fl. 6th–5th century BC, Ionia), Greek author of an early history and of a book of travels. During the time of the Persian invasion, he tried to dissuade the Ionians from revolt against Persia, and in 494, when they were obliged to sue for terms, he was one of the ambassadors to the Persian satrap, whom he persuaded to restore the constitution of the Ionic cities.

One of his two known works, the *Genealogia,* or *Historiai,* seems to have been a systematic account of the traditions and mythology of the Greeks, but comparatively few fragments of it survive. More than 300 fragments, however, remain of the *Ges periodos* or *Periegesis* ("Tour Round the World"); it was written in two parts—one covering Europe, the other "Asia" (which included Egypt and North Africa). He was in general the pioneer in those geographical and ethnographical fields that remained always attractive to the Greek historians. His work was used freely by the 5th-century-BC historian Herodotus, who acknowledged it only when he found occasion to complain. That his literary style was good, though simple, was allowed by the 1st-century-BC rhetorician Dionysius of Halicarnassus and other critics.

Hecate (from Greek *hekatē,* "she who works her will"), goddess accepted at an early date into Greek religion but probably derived from the Carians in southwest Asia Minor. In Hesiod she is the daughter of the Titan Perses and the nymph Asteria and has power over heaven, earth, and sea; hence, she bestows wealth and all the blessings of daily life.

Hecate was the chief goddess presiding over magic and spells. She witnessed the abduction of Demeter's daughter Persephone to the underworld and, torch in hand, assisted in the search for her. Thus, pillars called Hecataea stood at crossroads and doorways, perhaps to keep away evil spirits. Hecate was represented as single-formed, clad in a long robe, holding burning torches; in later representations she was triple-formed, with three bodies standing back to back, probably so that she could look in all directions at once from the crossroads.

Hecate Strait, passage of the eastern North Pacific, off central British Columbia, Canada. Stretching south from Dixon Entrance 160 mi (260 km) to Queen Charlotte Sound, the waterway, which ranges in width from 40 to 80 mi, separates the Queen Charlotte Islands (west) from the mainland. The deep strait is a site of salmon and halibut fishing grounds. It was named after the "Hecate," a ship used by the British captain George H. Richards in his survey (1861–62) of the mainland coast.

Hecatompylos, ancient Parthian city in western Khurasan and capital of the Iranian Arsacid dynasty. It might have already fallen into decline when the Seleucids revived it as a military outpost about 300 BC. By about 200 BC it was the Arsacid capital and is mentioned as such by Pliny, Strabo, and Ptolemy. Hecatompylos lay on the Silk Road trade route between the Near East and China. Although it is thought to have been built at a location now between the Iranian cities, Dāmghān and Shāhrūd, its precise site has not been established.

Hechingen, city, Baden-Württemberg *Land* (state), southwestern Germany, in the Schwäbische Alb (Swabian Jura), southwest of Tübingen. From the 13th century, it was the seat of the counts of Zollern (after 1623, princes of Hohenzollern-Hechingen); it passed to Prussia in 1850. The Hohenzollern Castle on Hohenzollern Mountain (2,782 ft [848 m]) was destroyed in 1423 and was rebuilt by Frederick William IV, king of Prussia, in 1850–56. It houses the Prussian crown jewels, and Frederick the Great and his father, Frederick William I, are buried in its Christ Chapel. Other notable buildings are the former abbey church of St. Lutzen (1586–89), the classical Collegiate Church of St. Jacob (1779–83), and Villa Eugenia (1786–1833), former residence of the prince. Nearby are Lindich Castle (1742) and the Stetten Abbey church (1280).

Hechingen is a rail junction and manufactures machinery, textiles, wood products, plastics, and electrical equipment. Pop. (1989 est.) 16,029.

Hecht, Ben (b. Feb. 28, 1894, New York City—d. April 18, 1964, New York City), U.S. novelist, playwright, and film writer who, as a newspaperman in the 1920s, perfected a type of human interest sketch that was widely emulated. His play *The Front Page* (1928), written with Charles MacArthur, influenced the public's idea of the newspaper world and the newspaperman's idea of himself.

Hecht was the son of Russian-Jewish immigrants, and after attending high school in Racine, Wis., he moved to Chicago, then in the midst of an artistic and literary renascence. He worked as a reporter for the *Chicago Journal* (1910–14) and then the *Chicago Daily News,* which sent him to Berlin during the revolutionary upheaval following World War I. From this experience came some of the material for his first novel, *Erik Dorn* (1921). For the *Daily News* he developed a column that formed the basis of his collection of sketches *A Thousand and One Afternoons in Chicago* (1922).

He was dismissed by the *Daily News* after his novel *Fantazius Mallare* (1922) was seized

Hecht
EB Inc.

by the government on obscenity charges. He was associated in Chicago with the bohemian novelist and poet Maxwell Bodenheim (*q.v.*).

Lively reminiscences of Hecht's Chicago years are found in his *Gaily, Gaily* (1963; motion-picture version 1969, British title *Chicago, Chicago*), *Letters from Bohemia* (1946), and his autobiography, *A Child of the Century* (1954).

Hecht later divided his time between New York City and Hollywood. He collaborated with MacArthur on another successful stage comedy, *Twentieth Century* (1923). In Hollywood he wrote scripts, often with MacArthur, for a number of successful motion pictures, among them *The Front Page* (film version 1931), *The Scoundrel* (1935), *Nothing Sacred* (1937), *Gunga Din* (1938), *Wuthering Heights* (1939), *Spellbound* (1945), and *Notorious* (1946). Hecht also wrote the script for the film *Spectre of the Rose* (1946).

Hecht's last Broadway success was *Ladies and Gentlemen* (1939; also with MacArthur). Columns written for the New York newspaper *PM* appeared as *1001 Afternoons in New York* (1941). Among his other works are *A Guide for the Bedevilled* (1944), an analysis of anti-Semitism; *Collected Stories* (1945); and *Perfidy* (1961), which concerns the struggle to establish Israel.

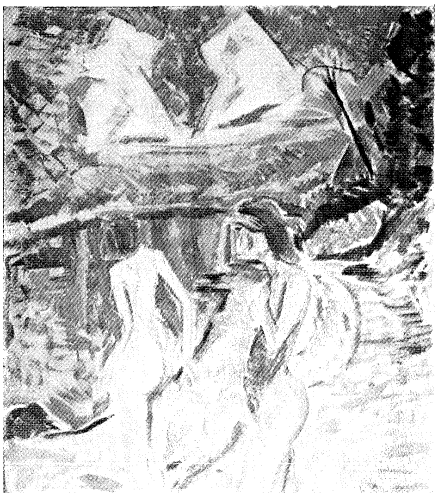
Hechtia, genus of semidesert plants of the pineapple family (Bromeliaceae), consisting of

Hechtia texensis
J.M. Langham

about 35 New World species, chiefly tropical. Several species are cultivated indoors as ornamentals.

The spiny-edged leaves of *Hechtia* species grow in dense rosettes that are purplish above and silvery underneath. The inconspicuous white flowers are borne in small stalked clusters.

Heckel, Erich (b. July 31, 1883, Döbeln, Ger.—d. Jan. 27, 1970, Radolfzell, W.Ger.), painter, printmaker, and sculptor who was one of the founding members of Die Brücke (The Bridge), an influential group of Expressionist artists (*see* Brücke, Die). He is best known for his paintings of nudes and landscapes.



"Women by a Lake," oil on canvas by Erich Heckel, 1913; in the Wilhelm-Lehmbruck-Museum, Duisburg, Ger.

By courtesy of the Wilhelm-Lehmbruck Museum, Duisburg, Ger.

In 1904 Heckel began to study architecture in Dresden, where Die Brücke was formed the following year. Heckel's early works as a member of that group reveal his admiration for Van Gogh. Having moved to Berlin in 1911, he became increasingly interested in formal pictorial composition. Yet he had the ability to use colour and distorted space to achieve a highly emotive effect. "Women by a Lake" (1913; Wilhelm-Lehmbruck-Museum, Duisburg, Ger.) reflects the influence of the Futurist painters' volatile representation of fractured light.

His interest in African sculpture is best displayed in such woodcuts as "Sleeping Negress" (1908) and in his wood sculpture, "Crouching Girl" (1912; Collection of the Artist, Hemmenhofen, Ger.).

Heckel served as a medical corpsman in World War I. Most of his prewar works were lost, and after 1920 his painting became more appealing to popular taste. Nevertheless, in 1937 the Nazis declared his works "decadent." After World War II he taught at the Academy of Art in Karlsruhe, W.Ger. (1949–56), until his retirement. In 1963 a retrospective exhibit was held in Munich, Berlin, and Stuttgart.

heckelphone, also spelled HECKELPHON, double-reed woodwind instrument resembling the baritone oboe. It was perfected by Wilhelm Heckel in 1904 as a result of a request from the composer Richard Wagner about 20 years earlier for a low-register instrument combining the qualities of the oboe and the alphorn.

The heckelphone is of conical bore (wider than the baritone oboe's) and has a bent metal crook and a wooden bell. It is usually built in C an octave below the oboe, with an extended lower register. It was first used by Richard

Contemporary heckelphone

L.G. Aubin—EB Inc.

Strauss in his operas *Salome* and *Elektra.* The compass is from the second A below middle C to the second G above. Other forms are the smaller terzheckelphone in E♭ and the piccolo-heckelphone in F.

Hecker, Friedrich (Karl Franz) (b. Sept. 28, 1811, Eichtersheim, Baden—d. March 24, 1881, St. Louis, Mo., U.S.), German revolutionary republican politician who led radical forces that demanded that the 1848 revolution establish a republican form of government in Germany.

A lawyer, Hecker in 1842 was elected to Baden's second chamber, where he quickly established himself as the leader of the liberal opposition. He became a Democrat, and in the revolutionary Vorparlament (Preparliament) he attempted to turn that body into a permanent revolutionary peoples' committee (1848), demanding the elimination of the monarchies. When the assembly majority decided to try to win Germany's princes over to

Friedrich Hecker, lithograph by Valentin Schertle

By courtesy of the Staatliche Kunsthalle, Karlsruhe, Ger.

their new constitution, Hecker and the radicals walked out.

After a popular rising, fomented in Baden (spring 1849), was quickly crushed by Baden and Hessian troops, Hecker fled to Switzerland and the United States, where, during the U.S. Civil War (1861–65), he served as a colonel in the Union army. He revisited Germany several times, but, although he admired the new united German empire founded in 1871, he could never reconcile himself to its Prussian leadership.

Hecker, Isaac Thomas (b. Dec. 18, 1819, New York City—d. Dec. 22, 1888, New York City), Roman Catholic priest who founded the Paulist Fathers, a diocesan organization for missionary work in New York.

Educated in Europe, he was ordained a Redemptorist priest in England (1849) and with four associate priests (Francis A. Baker, George Deshon, Augustine F. Hewit, and Clarence A. Walworth) conducted missions in America. Well received, he later found it possible to open a house for U.S. Redemptorist missionaries. Having gone without permission to Rome for help, he was expelled from the order, but on appeal Pope Pius IX dispensed him and his associates from their vows, encouraging them to work under local bishops. With Hecker as superior, they (excluding Walworth) founded the Paulist Fathers, which by 1940 became a papal institute with houses in the United States, Canada, Italy, and South Africa.

Hecker wrote three books: *Questions of the Soul* (1852), *Aspirations of Nature* (1857), and *The Church and the Age* (1887). He also established the Catholic Publication Society and

Isaac Thomas Hecker, oil painting by George Healy, 1858

By courtesy of Paulist Public Relations, New York

two magazines, *Catholic World* (1865) and *Young Catholic* (1870).

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Hecker, Johann Julius (b. Nov. 7, 1707, Werden, near Essen, Ger.—d. June 24, 1768, Berlin), German theologian and educator, significant as the founder of secondary schools in which students were prepared for practical life rather than provided a purely classical education.

Born into a family of schoolmasters, Hecker was educated in his father's school, then later at the Essen gymnasium and the University of Halle. Appointed teacher of the Paedagogium in Halle, Hecker taught a multitude of subjects—sciences (*i.e.,* chemistry, anatomy, physiology), classical literature, and even Hebrew.

In 1735, after six years at the Paedagogium, Hecker moved to Potsdam, where he served as pastor and school inspector. From 1739 to his death he was pastor of Berlin's Trinity Church, a position in which he was responsible for the parish's elementary schools. In 1747 he opened what he called the Realschule, an institution that by emphasizing practical education represented a sharp break in the tradition of purely classical secondary schools.

Hecker published textbooks on anatomy and physiology, and he wrote an introduction to botany. He also contributed greatly to drafting Prussia's first general school law, issued by Frederick II in 1763.

Heckmann, Otto (Hermann Leopold) (b. June 23, 1901, Opladen, Ger.), German astronomer noted for his work in measuring stellar positions and for his studies of relativity and cosmology. He also made notable contributions to statistical mechanics.

An assistant astronomer at the University of Bonn Observatory (1925–27) and at the University Observatory in Göttingen (1927–35), Heckmann became lecturer in astronomy at the University of Göttingen in 1929 and assistant professor in 1935. In 1941 he was ap-

pointed director of the Hamburg Observatory and head of the department of astronomy at Hamburg University.

Heckmann organized an international program to photograph and chart the positions of the stars in the Northern Hemisphere. This monumental task, involving observatories in England, France, West Germany, East Germany, the Soviet Union, Canada, and the United States, led to the publication in the late 1960s of the third German Astronomical Society (Astronomische Gesellschaft) catalog, commonly known as the *AGK3*.

In 1931 Heckmann proved that, under the assumptions that matter is homogeneously distributed throughout the universe and is isotropic (having identical properties in every direction), the theory of general relativity could result in an open, or Euclidean, universe as readily as a closed one.

During the 1950s, in collaboration with Engelbert Schücking, Heckmann found that an expanding universe might have an absolute rotation, which would have extraordinary influence upon the choice of an evolutionary cosmological model. The mathematical analysis of these models is so complex, however, that definite results have not yet been found.

From 1967 to 1970, Heckmann was president of the International Astronomical Union. Among his many honours, he received the Watson Medal of the U.S. National Academy of Sciences (1961) and the Bruce Medal of the Astronomical Society of the Pacific (1964).

Heckscher, Eli Filip (b. Nov. 24, 1879, Stockholm—d. Nov. 26, 1952, Stockholm), Swedish economist and economic historian.

Heckscher graduated from the University of Uppsala in 1904, receiving his Ph.D. in 1907. He became a professor in 1909 at the then recently founded Stockholm School of Economics. In 1929 he was one of the founders and director of the Stockholm Institute for Economic History.

Although Heckscher is now chiefly remembered as an economic historian, he was also an economist of distinction. Among his significant contributions to economics is the concept of commodity points which limits the fluctuation of inconvertible paper currencies (*Ekonomisk Tidskrift*, 1916). In a famous article of 1919 he put forward the hypothesis that the comparative advantage of different countries with respect to commodities in trade is due to different endowments of productive factors. This was taken up by his pupil, Swedish economist Bertil Ohlin, and is now known as the Heckscher–Ohlin theory.

After 1918 Heckscher turned his attention to historical interests, writing *The Continental Sytem* (1922), published four years earlier in Swedish. His most famous work, *Merkantilismen* (1931), is a classic on mercantilism. It has been translated into German, English, Italian, and Spanish. The latter part of his life was devoted to a pioneering study of the early economic history of Sweden.

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hectare, unit of area in the metric system equal to 100 ares, or 10,000 square metres, and the equivalent of 2.471 acres in British Imperial and U.S. Customary measure. The term is derived from the Latin *area* and from *hect-*, an irregular contraction of the Greek word for hundred. Although the are is the primary metric unit of land measurement, in practice the hectare is more commonly used. The hectare is, by subsequent definition, equal to a *djerib* in Turkey, a *jerib* in Iran, a *kung ch'ing* in mainland China, a *manzana* in Argentina, and a *bunder* in The Netherlands.

hectograph, direct-process duplicator using either gelatin or the spirit process for making a master copy.

The gelatin process, now rarely used, requires the preparation of a special master paper upon which the copy to be duplicated is typed, written, or drawn with a special ink or ribbon. This sheet is then pressed face down against a moist gelatin surface, to which the image is transferred in reverse form. Sheets of paper pressed against this impregnated gelatin receive an image impression. Either a flatbed or rotary machine can make the duplicate copies. The master copy can be prepared in a variety of colours by using ink and carbon sheets of different shades. Multicoloured copies may thus be produced in one operation. The practical limit on copies produced by the gelatin process is about 200.

The spirit method is also referred to as the direct, or fluid, process. The master copy is prepared by typewriter, handwriting, punched card, or computer-printing devices. Master copies can also be prepared by copying machines and microfilm reader-printers. The master sheet is then fastened to a rotating drum. As copy sheets, slightly moistened by a special liquid, are brought into direct contact with the master sheet, a minute amount of the carbon is transferred to them, resulting in finished copies. Multicolour duplication in one operation is possible, as it is with the gelatin process. A further advantage of the spirit process is that information can be added to or deleted from the master. Up to 300 copies can be made from one master sheet.

Hector, in Greek legend, the eldest son of the Trojan king Priam and his queen Hecuba. He was the husband of Andromache and the chief warrior of the Trojan army. In Homer's *Iliad* he is represented as an ideal warrior and the mainstay of Troy. His character is drawn in most favourable colours as a good son, a loving husband and father, and a trusty friend. His leave-taking of Andromache in the sixth book of the *Iliad*, and his departure to meet Achilles for the last time, are movingly described. He is an especial favourite of Apollo, and later poets even described him as son of that god. His chief exploits during the Trojan War were his defense of the wounded Sarpedon, his fight with Ajax, son of Telamon (his particular enemy), and the storming of the Greek ramparts. When Achilles, enraged with Agamemnon, deserted the Greeks, Hector drove them back to their ships, which he almost succeeded in burning. Patroclus, the friend of Achilles, who came to the help of the Greeks, was slain by Hector with the help of Apollo. Then Achilles, to revenge his friend's death, returned to the war, slew Hector, dragged his body behind his chariot to the camp, and afterward round the tomb of Patroclus. Aphrodite and Apollo preserved it from corruption and mutilation. Priam, guarded by Hermes, went to Achilles and prevailed on him to give back the body, which was buried with great honour. Hector was afterward worshipped in the Troad and also at Tanagra, east of Thebes.

Hector, Charles: *see* Estaing, Charles Hector, comte d'.

Hecuba, Greek HEKABE, in Greek legend, the principal wife of the Trojan king Priam, mother of Hector, and daughter, according to some accounts, of the Phrygian king Dymas. When Troy was captured by the Greeks, Hecuba was taken prisoner. Her fate was told in various ways, most of which connected her with the promontory Cynossema (Dog's Monument) on the Hellespont. According to Euripides (in the *Hecuba*), her youngest son, Polydorus, had been placed under the care of Polymestor, king of Thrace. When the Greeks reached the Thracian Chersonese on their way home, she discovered that her son had been murdered and in revenge put out the eyes of Polymestor and murdered his two sons. Later, she was turned into a dog, and her grave became a mark for ships.

Heda, Willem Claesz(oon) (b. *c.* 1594, Haarlem?, Neth.—d. Aug. 24, 1680, Haarlem), one of the principal Dutch Baroque still life painters.

Early in his career Heda produced some figure subjects, but nearly all of his known works are still lifes, of which the earliest dated example is a "Vanitas" of 1621. His most characteristic works are restrained compositions of glass and metal vessels delicately arranged on a table with oysters, a half-peeled lemon, or other motifs that display his precise draftsmanship and his skill in imitating the varied qualities of different light-reflecting surfaces. His colour range is a subdued one of silvery grays, golden yellows, and browns, the naturalistic effects being achieved by accurate tone values.

Hedāyat, Ṣādeq, also spelled ṢĀDEQ-E HEDĀYAT (b. Feb. 17, 1903, Tehrān—d. April 4, 1951, Paris), Iranian author.

Born into a prominent aristocratic family, Hedāyat was educated first in Tehrān and then studied dentistry and engineering in France and Belgium. After coming into contact with the leading intellectual figures of Europe, Hedāyat abandoned his studies for literature.

He was immensely drawn to the works of the 19th-century U.S. fiction writer Edgar Allen Poe, the French writer Maupassant, as well as the contemporary writer Franz Kafka and the 19th-century Russian masters Chekhov and Dostoyevsky. He translated many works of Kafka, including *The Penal Colony*, for which he wrote a revealing introduction called "Payām-e Kafka" ("Kafka's Message"). Returning to Iran in 1930 after four years, he published his first book of short stories, *Zendeh be gūr* (1930; "Buried Alive"), and *Sē qaṭreh- khūn* (1932; "Three Drops of Blood"). He also began to write plays, and in 1930 his first, *Parvīn dokhtar-e Sāsān* ("Parvin Daughter of Sasan"), appeared.

Hedāyat was the central figure in Tehrān intellectual circles and belonged to the literary group known as the Four. He began to develop his interests in Iranian folklore and published *Osāneh* (1931), a collection of popular songs, and *Neyrangestān* (1932). In these, Hedāyat greatly enriched Persian prose and influenced younger writers through his use of folk expressions. He also wrote articles and translated the works of leading European authors, Chekov and the French Existentialist Jean-Paul Sartre among them. He began to study history, beginning with the Sāsānian period (224–651) and the Pahlavi, or Middle Persian, language, and he used this study in later fiction. In 1936–37 he went to Bombay to live in the Parsee Zoroastrian community there, in order to further his knowledge of the ancient Iranian religion.

One of his most famous novels, *Būf-A Kūr* (1937; *The Blind Owl*, 1957), is a deeply pessimistic, Kafkaesque novel. A deeply melancholy man, he lived with a vision of the absurdity of human existence. In 1951, overwhelmed by despair, he left Tehrān and went to Paris, where he took his own life.

Hedberg, Olle (b. May 31, 1899, Norrköping, Swed.—d. 1974), Swedish novelist whose stylistic precision and elegant craftsmanship served to satirize the conventional world of the middle classes. Beginning with *Rymmare och fasttagare* (1930; *Prisoner's Base*, 1932), Hedberg produced a full-length novel almost every year for several decades.

In Hedberg's works of the 1940s, a search for moral and religious values, as in *Bekänna färg* (1947; "Confess Colour"), takes the place

of his otherwise more satiric attitude. Hedberg apparently did not find much comfort in this search. In his *Dockan dansar klockan slår* (1955; "The Doll Dances, the Clock Strikes") and *Djur i bur* (1959; *Animals in Cages,* 1962), he is strongly disillusioned and mercilessly castigates the hypocrisy and sterility of middle-class society. His first novel, *Tank att ha hela livet främför sig* ("Imagine Having Your Entire Life Ahead of You"), was published the year he died.

heddle loom, also called HEALD LOOM, device used in weaving that is characterized by heddles—short lengths of wire or flat steel strips—used to deflect the warp to either side of the main sheet of fabric. The heddle is considered to be the most important single advance in the evolution of looms in general.

Originally heddles were movable rods, but later cords, wires, or steel bands were used. They are supported by the loom's harness, and each has an eyelet through which the warp threads pass.

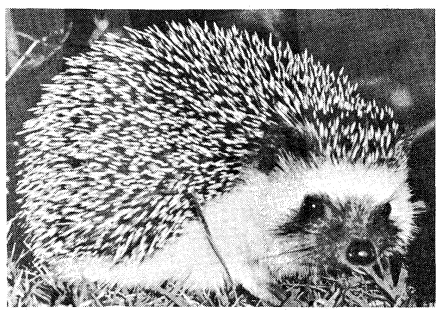
Hedeby (Danish), Norwegian HADDEBY, ancient HAITHABU, in medieval Danish history, trade centre at the southeastern base of the Jutland Peninsula on the Schlei estuary. It served as an early focus of national unification and as a crossroads for Western–Eastern European and European–Western Asian trade.

One of the earliest Scandinavian urban centres, Hedeby was established in the late 8th century. Its trade, which included slaves, furs, textiles, iron, and weapons, was complimented by a well-developed artisan and industrial establishment. In the early 9th century King Godfred of Denmark built the Danewirk, an earthwork barrier, along the base of the peninsula south of Hedeby to protect the thriving centre from Frankish incursions. Despite this and other precautions, the Danes lost Hedeby for most of the 10th century—first to the Swedes and then to the Franks. Even after King Harald Bluetooth regained Hedeby in 983, the town suffered Norwegian and Wendish Slav raids into the 11th century; by the middle of that century it was abandoned, its activity being transferred to neighbouring Schleswig (ancient Sliesthorp, or Sliaswic).

Hédelin, François: *see* Aubignac, François Hédelin, abbé d'.

hedenbergite, silicate mineral, calcium iron silicate, closely analogous to diopside (*q.v.*).

hedgehog, any of 14 species of Old World mammals composing the family Erinaceidae, order Insectivora. There are two kinds: the gymnure (*q.v.*), or hairy hedgehog, and the spiny hedgehog. All members of the family are omnivorous but prefer animal food. Head and body length ranges from 10 to 44 centimetres (4 to 17 inches). The spiny hedgehogs (subfamily Erinaceinae) are of middling size and have short, barbless spines on the back, a round body, small head, pointed face, and little or no tail. They are typified by the 25-cm common hedgehog (*Erinaceus europaeus*) of Britain and Morocco to Manchuria (introduced in New Zealand). Its young—usually four—are blind and soft spined at birth. This species hibernates in a nest of dry leaves. In defense it rolls into a ball, and it is remarkably resistant to various poisons. It has the habit of anointing its spines with saliva after licking various substances.



East African hedgehog (*Erinaceus hindei*)
Spinage—Annan Photo Features

Found from northern Africa into Asia are the three desert hedgehogs (genus *Paraechinus*) and the two long-eared hedgehogs (*Hemiechinus*).

For Madagascar hedgehog, *see* tenrec. The term hedgehog is sometimes used for the porcupine (*q.v.*).

hedgehog cactus, the genus *Echinocereus,* about 35 species of the family Cactaceae, native from central Mexico to the western U.S. Hedgehog refers to the spiny fruit. Hedgehog cacti are cylindroid, usually many headed, generally have green stigma lobes (receptive surfaces for pollen), and are often soft bodied. Tubercles (projections) are strongly joined into ribs. Fruit is fleshy, often delicious.

The *E. viridiflorus* complex, with small fragrant green to brown flowers, is the northernmost group, growing from Mexico to Wyoming and South Dakota. The *E. triglochidiatus* complex ranges from north of Mexico City to northern Utah and southern Colorado.

hedging, method of reducing the risk of loss caused by price fluctuation. It consists of the purchase or sale of equal quantities of the same or very similar commodities, approximately simultaneously, in two different markets with the expectation that a future change in price in one market will be offset by an opposite change in the other market.

One example is that of a grain-elevator operator who buys wheat in the country and at the same time sells a futures contract for the same quantity of wheat. When his wheat is delivered later to the terminal market or to the processor in a normal market, he buys back his futures contract. Any change of price that occurred during the interval should have been cancelled out by mutually compensatory movements in his cash and futures holdings. If the grain price has dropped, he can buy back his futures contract at less than he sold it for; his profit from doing so will be offset by his loss on the grain.

The hedger thus hopes to protect himself against loss resulting from price changes by transferring the risk to a speculator who relies upon his skill in forecasting price movements. Selling futures is called a short hedge; buying futures is called a long hedge. Hedging is also common in the securities and foreign-exchange markets.

Hedin, Sven Anders (b. Feb. 19, 1865, Stockholm—d. Nov. 26, 1952, Stockholm), Swedish explorer who led through Central Asia a series of expeditions that resulted in important archaeological and geographical findings.

Travels in the Caucasus, Persia, and Mesopotamia when he was 20 and an appointment as an interpreter for the Swedish–Norwegian mission to Nāser od-Dīn, shah of Iran (1890), marked the beginning of Hedin's life of exploration. In 1891 he visited Khorāsān (northeastern Persia) and Russian Turkestan, and between 1893 and 1898 he crossed Asia to Peking by way of the Urals, the Pamir range, and Lop Nor (Lake Lop), in western China. Following the Tarim River through western China, he explored the Gobi (desert) from 1899 to 1902. He was the first to explore the Trans-Himalaya mountain range of Tibet and to prepare a detailed map of the country (1905–08).

Hedin's pro-German sympathies during World War I cost him influential friends and the trust of the Indian, Russian, and Chinese governments. He was able, however, to initiate and conduct the important Sino-Swedish expedition of 1927–33, which located 327 archaeological sites between Manchuria and Sinkiang (westernmost China), and disclosed an extensive Stone Age culture in present-day desert and steppe areas. Signs of Old Stone Age culture were found, and artifacts from later Stone Age periods evidenced a life dependent on hunting and fishing. Agricultural implements were discovered on the China–Mongolia borderland. In 1928 Hedin solved the puzzle of the changing basins of Lop Nor, related to the shifting lower course of the Tarim River. His many published works include *Through Asia* (1898), *Southern Tibet* (13 vols., 1917–22), *My Life as an Explorer* (1926), and *The Silk Road* (1938).

Hedjaz (Saudi Arabia): *see* Hejaz.

Hedley, William (b. July 13, 1779, Newburn, near Newcastle upon Tyne, Northumberland, Eng.—d. Jan. 9, 1843, near Lanchester, Durham), English coal-mine official and inventor who built probably the first commercially useful steam locomotive of the adhesion type (*i.e.,* dependent on friction between wheels and rails, as are almost all modern railway engines). He patented his design on March 13, 1813, and in that year his locomotive "Puffing Billy" began to pull coal trucks about five miles from a mine at Wylam, Northumberland, to dockside at Lemington-on-Tyne.

Hedmark, *fylke* (county), southeastern Norway. It borders Sweden to the east for about 235 mi (378 km) and has an area of 10,575 sq mi (27,388 sq km); the county seat is at Hamar, on the east bank of Mjøsa (lake). Mountainous in the north and northwest, the *fylke* barely touches the high ranges of the Dovrefjell and Rondane. The area shows evidences of heavy glaciation in its many narrow north–south-trending lakes and river valleys. The largest lakes are Femund (north, partly in Sør-Trøndelag *fylke*) and Mjøsa (*q.v.*). The principal valley is Østerdalen, bearing the Glåma River; the Rena River is an important tributary. Population is mainly concentrated in the rich agricultural district adjoining Lake Mjøsa to the southeast. The county's extensive forests supply much of Norway's timber; logs are floated down the Glåma to the coast. Pyrites are mined in Folldalen (Foll Valley), in the northwest, near the Dovrefjell. Pop. (1983 est.) 187,784.

Hedtoft (-Hansen), Hans (Christian) (b. April 21, 1903, Århus, Den.—d. Jan. 29, 1955, Stockholm), Danish politician and statesman who initiated a change in Danish policy from neutrality to active membership in the North Atlantic Treaty Organization (NATO).

At the age of 25 Hedtoft-Hansen became president of the Social Democratic Party's youth organization. As secretary of the party in 1935 he was elected to Parliament, but he resigned his seat in 1940, during the German occupation of Denmark in World War II. A member of the Danish resistance movement, Hedtoft-Hansen became minister of social affairs in the first postwar government in 1945. He headed a minority Social Democratic government in 1947–50 (thenceforth as Hans Hedtoft). Alarmed by the Communist coup in Czechoslovakia in 1948, he and his finance minister, H.C. Hansen, inaugurated a strong defense policy for Denmark, including membership in NATO (1949) and closer ties with Norway and Sweden. Hedtoft again became prime minister in 1953, continuing his foreign- and defense-policy initiatives. He died in Stockholm while attending a meeting of the Nordic Council.

Hedvig, also spelled HEDWIG (queen of Poland): *see* Jadwiga.

Hedwig, Johann (b. Dec. 8, 1730, Kronstadt, Transylvania—d. Feb. 18, 1799, Leipzig),

Johann Hedwig, detail from an engraving, 1793

By courtesy of the Ashmolean Museum, Oxford

botanist who did more than any other scientist to advance the knowledge of mosses.

Hedwig studied medicine at the University of Leipzig but took up botany when the city of Kronstadt refused to grant him a license to practice medicine. In 1781 he returned to Leipzig and became professor of medicine in 1786 and of botany in 1789. Meanwhile, he had begun a study of the mosses and produced *Fundamentum Historiae Naturalis Muscorum Frondosorum,* 2 vol. (1782–83; "Elements of the Natural History of Leafy Mosses"), in which he dealt with the anatomy, fertilization, and reproduction of mosses and introduced a new method of classification based on the distribution of spores (reproductive bodies). Hedwig was the first to recognize the true organs of reproduction in mosses. Skilled in the use of the microscope, he identified more mosses than any other botanist of his time and produced a series of well-illustrated, informative books on them.

At his death, Hedwig was working on his most important contribution, *Species Muscorum Frondosorum* (1801; "Species of Leafy Mosses"), which became the official basis for the nomenclature of the mosses.

Hedwig glass, Egyptian-made glass of the 11th or 12th century, of which only 12 known examples exist; they are among the last cut glass produced in the East. Their designs of stylized lions and griffins among palm leaves are cut in high relief, a technique derived from rock-crystal cutting. Carried to Europe by returning crusaders, these glasses often became the property of Western churches. Their name derives from St. Hedwig (died 1243), patron saint of Silesia, who allegedly performed a wine miracle in one of these glasses. Another glass—once belonging to St. Elizabeth and later given to Martin Luther—was said to give strength to women in labour when they drank from it.

Hedwig glass beaker, cut in relief, Egyptian, 11th or 12th century; in the Rijksmuseum, Amsterdam

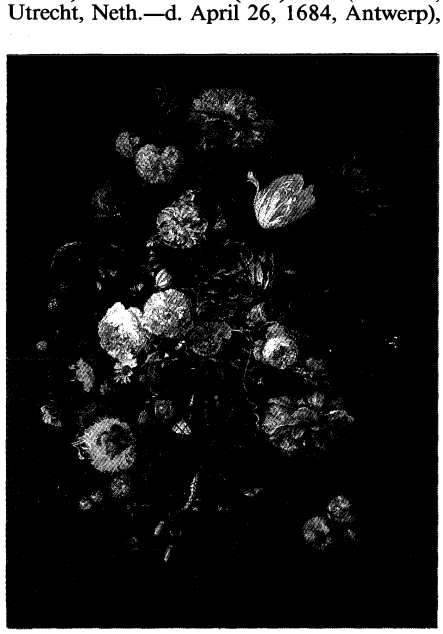
By courtesy of Rijksmuseum, Amsterdam

heel, in anatomy, back part of the human foot, below the ankle and behind the arch, and the corresponding part of the foot in other mammals that walk with their heels touching the ground, such as the raccoon and the bear; it corresponds to the point of the hock of hoofed mammals and those that walk on their toes (*e.g.,* horse, dog, cat). The contained tarsal bone, the calcaneus, appears first among the crocodilian reptiles; it was lost in birds by fusion with other tarsals and metatarsals but retained in mammals.

In humans the heel consists of the calcaneus (largest of the tarsal bones), cushioned below by a bursal sac, fat pad, and thickened skin. The calcaneus is roughly rectangular, articulating above with the talus bone of the ankle joint and in front with the cuboid, another tarsal bone. Posteriorly, a roughened area, the tuber calcanei, takes much of the weight in standing. On one side of this is a small protuberance, the lateral process, developed only in humans, related to balance in the upright position. The Achilles tendon (tendo calcaneus) attaches to the posterior border of the calcaneus. The calcaneus functions both as a lever for muscles of the calf in walking and as a weight-bearing structure in standing.

heel fly: *see* warble fly.

Heem, Jan Davidsz(oon) de (b. 1606, Utrecht, Neth.—d. April 26, 1684, Antwerp),



"Flowers in a Glass and Fruit," painting by Jan Davidsz. de Heem; in the Gemäldegalerie, Dresden

By courtesy of the Staatliche Kunstsammlungen Dresden; photograph, G. Reinhold, Leipzig-Molkau

one of the greatest Baroque painters of still life in Holland. His most numerous and characteristic works are arrangements of fruits, metal dishes, and wine glasses; compositions of books and musical instruments; and examples of the popular "vanity of life" theme, with such symbolic articles as skulls and hourglasses. In some of his paintings the name of his father, David I de Heem, is joined to his own. His son, Cornelis de Heem, was not quite the equal of Jan, but many of his paintings are preserved in museums in The Hague, Vienna, and elsewhere. Jan's younger brother, David Davidsz. de Heem, and Jan's eldest son, David Jansz. de Heem, were also well-known painters.

Heemskerck, Jacob van (b. March 13, 1567, Amsterdam—d. April 25, 1607, Bay of Gibraltar, off Spain), explorer and admiral remembered for his voyage (1596–97) in the Barents Sea region in search of an Arctic passage to India and for his victory over the Spanish fleet off Gibraltar (1607), which led to an armistice between Spain and the United Provinces (now The Netherlands) and brought about the Twelve Years' Truce (1609–21).

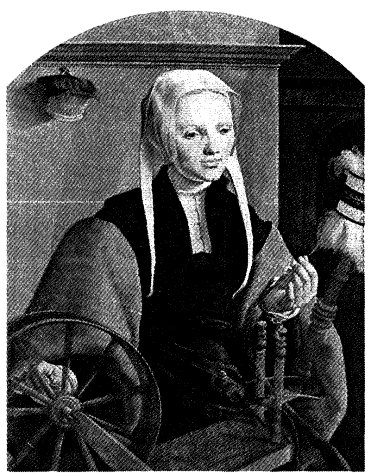
Under the direction of the Dutch navigator Willem Barents, van Heemskerck captained a vessel that penetrated the Barents Sea in search of a northeast route to the Indies. After rounding Novaya Zemlya the ship became trapped in the ice, and the men were forced to spend the winter of 1596–97 on the island. Living in a hut made of driftwood, they were the first Europeans to survive a winter in the Arctic. They abandoned their still-icebound ship in June 1597 and left in two of the ship's open boats; although the captain led most of the crew to safety, Barents died on the journey.

A vice admiral in 1598, van Heemskerck accompanied Adm. Jacob van Neck, a commercial representative of the Verre Company, on a trade mission to the East Indies; and, on van Neck's return to Amsterdam (1599), van Heemskerck took over the company's fleet and established trade relations with the rulers of Ternate, Banda, and Amboina.

After visiting Amsterdam in 1600, van Heemskerck returned to the East Indies as a full admiral. Three years later he captured the armed and heavily laden Portuguese treasure ship "Santa Catarina" in the Straits of Malacca. Appointed commander of the entire fleet of the United Provinces in 1607, he was killed while directing an attack that resulted in the capture or destruction of the 21 ships of a Spanish fleet off Gibraltar.

Heemskerck, Maerten van (b. 1498, Heemskerck, Holland—d. 1574, Haarlem), one of the leading Mannerist painters in 16th-century Holland working in the Italianate manner.

He spent a period (*c.* 1528) in the Haarlem studio of Jan van Scorel, then lately returned from Italy. Van Heemskerck's earliest works—"Ecce Homo" (Musée des Beaux-Arts, Ghent) and "St. Luke Painting the Portrait of the Virgin" (Frans Halsmuseum, Haarlem), both dated 1532—while adhering closely to the Romanist style of Scorel, seek to outdo it by dramatic lighting and illusionistic effects of plasticity.



"Portrait of a Woman at the Spinning Wheel," oil painting by Maerten van Heemskerck, 1529; in the Rijksmuseum, Amsterdam

By courtesy of the Rijksmuseum, Amsterdam

From 1532 to 1535 he was in Rome, recording in innumerable sketches, some of which are preserved in Berlin, the architecture and sculpture of classical antiquity and the painting of the High Renaissance. Of the latter he directed his attention particularly to the frescoes of Michelangelo in the Sistine Chapel and those of Raphael in the Villa Farnesina.

Throughout the rest of his long career, which was spent almost exclusively in Haarlem, he drew liberally on this garnered store of Roman motifs. Among the more notable of the religious paintings of his maturity are a great "Crucifixion" altarpiece (1538–43; Linköping cathedral, Sweden) and a "Crucifixion" (1543, Ghent). He also painted portraits, among them a self-portrait with the Colosseum (1553; Fitzwilliam Museum, Cambridge, Eng.) and the well-known "Portrait of a Woman at the Spinning Wheel" (Rijksmuseum, Amsterdam). From 1548 onward he produced many designs for engravings.

Heemstede, *gemeente* (commune), Noordholland *provincie,* western Netherlands. It lies along the Ring Canal, which borders the reclaimed Haarlem Lake polder, drained between 1840 and 1852. Heemstede is chiefly a residential suburb for Amsterdam and Haarlem. Many dunes in the vicinity have been leveled, and the land is used for bulb cultivation. Among the town's 17th- and 18th-century country houses is the Hartecamp estate, where Carolus Linnaeus, the Swedish botanist, worked in 1736–38. The Cruquius Polder Museum was a pumping station for Haarlem Lake from 1849 to 1933. Pop. (1986 est.) 26,106.

Heenan, John (Carmel), byname BENICIA BOY (b. May 2, 1833, West Troy, N.Y., U.S.—d. Oct. 28, 1873, Green River Station, Wyoming Territory [now in Wyoming]), professional boxer, American heavyweight champion (*i.e.,* of the United States and Canada) under the London Prize Ring, or bareknuckle, rules. He fought Tom Sayers for the world championship in a famous bout.

On Oct. 20, 1858, at Long Point, Ont., Can., in a match for the American heavyweight title, Heenan injured his right hand and was knocked out in 11 rounds by John Morrissey. When Morrissey refused to fight Heenan again and retired from the ring, Heenan was recognized as champion.

In his fight with Sayers, at Farnborough, Hampshire, Eng., on April 17, 1860, the much bigger (6-foot 2-inch, 195-pound) and younger Heenan apparently had the advantage over the English champion when, after 42 rounds, spectators broke into the ring. The fight was declared a draw and each contestant was awarded a championship belt. Heenan retired after his defeat by the English heavyweight Tom King in 24 rounds at Wadhurst, Kent, on Dec. 8, 1863, in another world-title match.

Heerenveen, *gemeente* (commune), Friesland *provincie,* northern Netherlands. Founded in 1551, Heerenveen ("Lords' Peat Bog") was at first a peat-cutting town. Now industrialized, it manufactures machinery, buses, plastics, and bicycles. It has a 17th-century town hall and a museum of bicycles and motorcycles. Nearby is the Oranjewoud, a small wooded park, once the possession of the house of Orange-Nassau. Pop. (1986 est.) 37,304.

Heerlen, *gemeente* (commune), Limburg *provincie,* southeastern Netherlands. It lies just northeast of Maastricht. Situated on the site of the Roman settlement Coriovallum (with remains of a Roman bath), it is essentially a modern town that grew rapidly as the centre of the Dutch coal-mining district. With supplies of coal running low or too deep, however, the mines were closed by the early 1970s. Heerlen has developed into a light industrial district; manufactures include petrochemicals, automobiles, briquettes, iron, stoneware, and cement. There are geological and archaeological museums, the latter in the modern town hall (1938–48). St. Pancras Church (1180) has a tower that was formerly part of the Herle fortress (1390). Pop. (1986 est.) 93,871; Heerlen-Kerkrade metropolitan area, 266,617.

Hefa (Israel): *see* Haifa.

Hefei (China): *see* Ho-fei.

Hegang (China): *see* Ho-kang.

Hegel, Georg Wilhelm Friedrich (b. Aug. 27, 1770, Stuttgart, Württemberg [Germany]—d. Nov. 14, 1831, Berlin), German idealist philosopher who developed a dialectical scheme that emphasized the progress of history and ideas from thesis to antithesis and thence to a higher and richer synthesis. He was one of the great modern creators of a philosophical system that influenced the development of existentialism, Marxism, positivism, and analytic philosophy.

A brief account of the life and works of Georg Wilhelm Friedrich Hegel follows; for a full biography, *see* MACROPAEDIA: Hegelianism, Hegel and.

Hegel graduated from the University of Tübingen in 1790 after studying philosophy. While tutoring in Berne for three years he became impressed with Kant's philosophy. In 1796 he obtained a tutorship at Frankfurt am Main. Convinced that the limitations placed on reason by Kant were unjustified, he began to work out his phenomenology of mind.

A new phase in his career began at Jena (1801), where his lectures reflected the continuing evolution of his thought. Hegel's first great work, *Phänomenologie des Geistes* (1807; *The Phenomenology of Mind*), describes how the human mind has risen from mere consciousness, through self-consciousness, reason, spirit, and religion, to absolute knowledge. Between 1812 and 1816 he published *Wissenschaft der Logik* (*Science of Logic*), in which his system was first presented in what was essentially its ultimate shape; this work earned him the professorship at the University of Heidelberg, where the keynote of his teaching was to present the entire universe as a systematic whole. The compendium of his dialectical system is the *Encyklopädie der philosophischen Wissenschaften im Grundrisse* (1817).

Hegel accepted the chair of philosophy at the University of Berlin (1818), published his *Grundlinien der Philosophie des Rechts* (1821; *The Philosophy of Right*), and then devoted himself almost solely to his lectures. He was rector of the university in 1830 and died the following year of cholera.

Hegelianism, the collection of philosophical movements that developed out of the thought of the 19th-century German philosopher G.W.F. Hegel.

A brief treatment of Hegelianism follows. For full treatment, *see* MACROPAEDIA: Hegelianism, Hegel and.

Certain philosophical movements derived a number of important doctrines from Hegel. The most influential of these doctrines included the claim that all previous philosophical speculation had failed to give a clear view of reality, since it lacked the key Hegelian insight that reality can only be understood as a totality ("the truth is the whole"), and that the attempt to understand the apparently individual and unconnected phenomena of nature, history, and human life through separate categories of thought is utterly mistaken.

For Hegel, there is a unifying metaphysical process underlying the apparent diversity of the world, which he called the dialectic. This process is essentially the necessary emergence of higher and more adequate entities out of a conflict between their less developed and less adequate anticipations. This process can be seen to be operating both at the most abstract levels of thought as well as at the level of simple phenomena. So, for example, at the most abstract level of thought, pure "being" (the thesis in this particular dialectical progression), because it is pure indeterminacy, can be seen to imply its opposite, "nothingness" (the antithesis). However, the truth about these concepts must contain both being and nothingness. This truth is the interaction or movement between being and nothingness which is "becoming" (the synthesis).

At a less abstract level history can be seen as a passage from primitive tribal life with all its inadequacies to the more adequate, fully rational state. For Hegel and the Hegelian tradition, the truth about reality, with such concepts as being and the nature of tribal life, could not be grasped if these phenomena were studied in isolation from other concepts and social phenomena. This dialectical process culminates in the self-understanding of the "absolute," which is, according to most interpreters of Hegel, the totality of everything which exists. Because of the necessarily progressive nature of this fundamental dialectical process, Hegel believed that the "real is rational."

Hegel applied this system in detail to religion, politics, logic, aesthetics, history, and ethics, producing one of the most comprehensive philosophical systems ever devised.

Inevitably, Hegel's followers—who built on such a diverse, complex, and ambiguous intellectual base—did not long remain in agreement as to what Hegel actually meant or should have meant. In Germany itself, not long after Hegel's death in 1831, two competing schools of Hegelianism emerged. On one side there were the Right, or Old Hegelians, conservative and Christian. They followed the later Hegel in interpreting the dialectical process as culminating in the Prussian state and interpreted the absolute as equivalent to traditional Protestant conceptions of God. This school of thought produced no major figures and after enjoying the support of the Prussian state went into rapid decline. It was fully eclipsed by the 1860s.

But there was also a rival school of Hegelianism known as the Left, or Young Hegelians. They interpreted the Hegelian dialectic in a revolutionary and atheistic sense, arguing that existing reality, including the prevailing political and religious order, was inadequate and needed to be made more rational. Moreover, they believed that, according to Hegel's own views, such change was necessarily entailed by the dynamic logic of the dialectic. The great metaphysical process of the dialectic, they scornfully asserted, did not simply culminate in the 19th century, the Prussian state, and Lutheran religion.

Initially, much of the radicalism of this version of Hegelianism was directed at theology. David Strauss's book *Das Leben Jesu kritisch bearbeitet,* 2 vol. (1835–36; *The Life of Jesus, Critically Examined*), one of the most influential works of the century, attempted to reinterpret Christ's mission as a parable of the Hegelian truth that being is the unification of the divine nature and the human. Strauss's contemporary, Ludwig Feuerbach, went even further and argued in *Das Wesen des Christentums* (1841; *The Essence of Christianity*) that humanity could now see that religion was merely the projection of its own divinity and that humanity itself was the new religion.

At the philosophical and political level radical Hegelians began to diverge. Such Hegelians as Max Stirner interpreted the Hegelian dialectic in a psychologistic sense as supporting the view that self-consciousness was the highest manifestation of reality. They moved increasingly toward an anarchistic, aristocratic individualism. Other radical Hegelians, such as Karl Marx, sought to locate the Hegelian dialectic not primarily in the psychological realm, nor in the realm of abstract thought, but rather in the material conditions of historical evolution. In this analysis, the notion of the inadequacy of certain entities leading to the realization of more adequate ones was interpreted specifically as the evolution of

primitive economic systems and class societies toward more sophisticated ones. This dialectical process culminated, not in the triumph of some nebulous absolute, but in the revolutionary transition to a classless society.

Although in the 19th century Hegelianism continued to exert a powerful influence on the intellectual life of Germany in history and aesthetics, it declined as a philosophical movement.

In the same period various forms of Neo-Hegelianism emerged in Italy, Britain, and the United States. In the English-speaking nations in particular, Hegelianism offered an attractive alternative to prevailing empiricist and utilitarian philosophies. Adaptations of Hegelianism seem to allow for subtle metaphysical reconciliations between, for example, the freedom of the individual and the claims of the state, or of the conflict between science and religion. Such compromises had not been possible in the simpler, pragmatic philosophies that had until then dominated British and American thought. Both in English-speaking lands and in Italy the Hegelian argument that reality, truth, and fulfillment were only possible through the comprehension of certain totalities of thought, experience, and social forms had a special appeal. A number of thinkers in this neo-Hegelian mold emerged in the late 19th and early 20th centuries, including F.H. Bradley and J.E. McTaggart in Britain, Josiah Royce in the United States, and Benedetto Croce in Italy.

The later reemergence of positivist, empiricist modes of thought in English-speaking countries rendered Hegelianism less intellectually respectable. It was only the gradual discovery by such men as the French historian Jean Hyppolite of the influence Hegel had had on the young Marx and Marxist concepts and the growing awareness of Hegel's importance in the transition from the Enlightenment to the Romantic Age that led to a widespread revival of interest in Hegel and Hegelianism.

Many of Hegel's ideas are reemerging in works on political philosophy and aesthetics. Nevertheless, no version of Hegelianism succeeds in giving a clear and philosophically convincing account of many of the ideas at the heart of his system, in particular the dialectical process as a key to the true nature of reality. In this sense Hegelianism has not endured as an intellectually viable philosophical system.

Hegesippus, SAINT (fl. 2nd century; feast day April 7), Greek Christian historian and champion of orthodoxy who opposed the heresy of Gnosticism (*q.v.*). His single known work, five books of memoirs, constitutes a prime source on the organizational structure and theological ferment of the primitive Christian church.

Probably of Jewish descent, Hegesippus *c.* 180 composed his memoirs, containing a mélange of historical, doctrinal, polemical, and catechetical interpolations. In his memoirs he noted the succession of Roman bishops down to Pope Eleutherius (174–189), accenting, however, their doctrine rather than the chronology of succession. Recent scholarship infers Hegesippus' Hebraic background from the attention he pays in his memoirs to the Jewish-Christian community in Jerusalem and its history of episcopal leaders. The preservation of segments of his memoirs by the 4th-century historian Eusebius of Caesarea provides the most direct existing witness to the primitive church of Jerusalem and the fate of Palestinian Christianity as a result of the anti-Jewish pogrom conducted after AD 70 by the Roman emperors Vespasian and Domitian.

Hegira, also spelled HEJIRA, Arabic HIJRAH, or HIJRA ("flight," or "emigration"), the Prophet Muḥammad's migration (AD 622) from Mecca to Medina in order to escape persecution; the date represents the starting point of the Muslim era. Muḥammad himself dated his correspondence, treaties, and proclamations after other events of his life. It was 'Umar I, the second caliph, who in the year AD 639 (AH 17) introduced the Hegira era (now distinguished by the initials AH, for Latin Anno Hegirae, "in the year of the Hegira"). 'Umar started the first year AH with the first day of the lunar month of Muḥarram, which corresponded to July 16, 622. In 1677–78 (AH 1088) the Ottoman government, still keeping the Hegira era, began to use the solar year of the Julian calendar, eventually creating two different Hegira era dates, resulting from the differences between a solar and lunar year.

The term *hegira* has also been applied to the emigrations of the faithful to Ethiopia and of Muḥammad's followers to Medina before the capture of Mecca. Muslims who later quitted lands under Christian rule were also called muhajirun ("emigrants"). The Khawārij (Kharijites), those Muslims who withdrew their support from the arbitration talks that called into question the right of the fourth caliph, 'Alī, to the caliphate in 657, used the term to describe those who joined them.

The most honoured muhajirun, considered among those known as the Companions of the Prophet, are those who emigrated with Muḥammad to Medina. Muḥammad praised them highly for having forsaken their native city and followed him and promised that God would favour them. They remained a separate and greatly esteemed group in the Muslim community, both in Mecca and in Medina, and assumed leadership of the Muslim state, through the caliphate, after Muḥammad's death.

As a result of the Hegira, another distinct body of Muslims came into being, the ansar ("helpers"); these were Medinese who aided Muḥammad and the muhajirun. The ansar were members of the two major Medinese tribes, the feuding al-Khazraj and al-Aws, whom Muḥammad had been asked to reconcile when he was still a rising figure in Mecca. They came to be his devoted supporters, constituting three-fourths of the Muslim army at the Battle of Badr (624). When no one of their number was chosen to the caliphate to succeed Muḥammad, they declined in influence as a group and eventually merged with other Muslims who had settled in Medina.

Hegius, Alexander (b. *c.* 1433, Heek, Westphalia [Germany]—d. Dec. 7, 1498, Deventer, Neth.), German schoolmaster who is remembered both for his effective promotion of the new humanism and for the subsequent fame of his pupils.

His long teaching career included the directorship of schools in Wessel, Emmerich, and Deventer, where Erasmus and the future pope Adrian VI were among his pupils. At Deventer, Hegius practiced the humanistic ideas of his youthful friend and teacher Rodolphus Agricola, who brought from Italy the new learning, stressing the liberal arts and the art of conduct. Hegius reformed instructional methods to make Latin and Greek grammar subordinate to the appreciation of classical literature. He succeeded in abolishing the old-fashioned medieval textbooks and teaching methods and led his pupils to the direct study of the classical authors themselves.

Heh (Egyptian religion): *see* Hu, Sia, and Heh.

Hehe, Bantu-speaking agricultural people occupying the Iringa region of southern Tanzania. Numbering about 192,000 in the late 20th century, the Hehe are a cluster of peoples with similar language and culture. They were amalgamated into a single polity by Munyigumba, head of the Muyinga family, in the mid-19th century. Using a military organization and tactics borrowed from the Ngoni, the Hehe under Munyigumba, and later his son Mkwawa, greatly expanded their domain. They were subdued by German forces in 1898, but only after seven years of severe fighting and after Mkwawa had committed suicide to avoid capture. The paramountcy was restored in 1926, the heads of the formerly independent peoples being mostly subchiefs under the paramount.

The Hehe are divided into dispersed patrilineal and exogamous clans. Religion centres upon the cult of ancestors, but Christianity and Islām have made many converts.

The Hehe practice a cereal agriculture, corn (maize) being the major crop. They are also cattle owners. They hire out as farm labourers to obtain a cash income.

Hei-ho (town, China): *see* Ai-hui.

Hei River, Wade–Giles romanization HEI HO, Pinyin HEI HE, river rising in central Kansu province, China, and flowing into the western Ala Shan Desert in northern Kansu. The river is formed by a series of small glacier-fed rivers flowing north from the Nan and Ch'i-lien mountain ranges in Kansu, between Chang-yeh and Chiu-ch'üan. It then flows northward across the desert into a depression filled with salt marshes and swamps that vary greatly in size from one season to another. Between Ting-hsin and Hsi-miao it is called the Jo River. At Hsi-miao the river bifurcates into two streams, the Hsi and Tung rivers, which empty, respectively, into Lakes Ka-shun and Su-ku.

The Hei Valley is virtually the only part of the Ala Shan plateau that has any permanent agriculture or permanent population. It was colonized on a small scale as long ago as the 1st century BC; its permanent settlement is comparatively recent. Even with irrigation, however, which is imperative in the arid climate of the area, the intense salinity of the soil is a major problem for agriculture.

The lower course of the Hei River from about 102 BC formed a forward defense line for the armies of the Han dynasty (206 BC–AD 220), defending the region against the nomadic Hsiung-nu. In 1930–31 a Sino-Swedish expedition in the area discovered great numbers of documents written on wooden strips and dating from the period before the Later Han (AD 23–220). Most of them date from 73 to 48 BC and are the earliest surviving Chinese official documents.

hei tiki, small neck pendant in the form of a human fetus, used by the Maori of New Zealand as a fertility symbol. Usually carved

Hei tiki of nephrite, from New Zealand; in the British Museum

By courtesy of the trustees of the British Museum

of green nephrite or a jadelike stone called *pounamu* that is found along the western coast of the South Island, *hei tiki*s normally are worn only by women. The object is believed to possess magical powers that increase as it is passed on from generation to generation. According to one idea, the *hei tiki* protects its wearer against the vengeful spirits of stillborn infants, who have been deprived of the chance to live. Another theory holds that the figure represents the Polynesian god Tiki, the creator of life.

*Hei tiki*s have been prized by European and American collectors for their beauty and elegance; but to the Maori the greatest value of these pendants lies in their possession of magical powers and in the prestige acquired from previous owners.

Heian period, in Japanese history, the period between 794 and 1185, named for the location of the Imperial capital, which was moved from Nara to Heian-kyō (Kyōto) in 794. The Chinese pattern of centralized government that was first adopted in the Nara period (710–784) gradually changed as the growth of private estates (*shōen*), exempt from taxation, encroached upon the public domain and reduced the substance of state administration. From the mid-9th century the court was dominated by members of the Fujiwara family, who controlled the Imperial line as regents by marrying their daughters to Imperial heirs. Their influence reached its peak under Fujiwara Michinaga, who dominated the court from 995 to 1027, but then declined as a succession of non-Fujiwara emperors came to power. A new centre of authority emerged in 1086 when Emperor Shirakawa retired early and established a cloistered regime (*insei*) to rule behind the throne, a system continued sporadically by later emperors.

The period was characterized by the flourishing culture of the court aristocracy, which actively engaged in the pursuit of aesthetic refinement, leading to new developments in art and literature. Lady Murasaki Shikibu's 11th-century novel, *The Tale of Genji,* is a brilliant record of life among the nobility and is considered one of the great works of world literature. In religion the esoteric sects of Tendai and Shingon Buddhism practiced formalistic rites that paralleled elaborate court ritual. The doctrines of the True Pure Land sect, emphasizing simple faith in Buddha Amida, also grew in popularity. These doctrines offered solace to the populace during the social upheaval that occurred in the late Heian period, which was marked by local disturbances and armed struggle among provincial military bands. This strife reached the capital itself in 1156, when warriors of the Taira and Minamoto clans backed rival claimants to the throne. The Taira were victorious, and they maintained tenuous control over the court until 1185. *See also* Fujiwara style.

Heiberg, Gunnar (Edvard Rode) (b. Nov. 18, 1857, Christiania, Nor.—d. Feb. 22, 1929, Oslo), dramatist, exponent of Expressionism, considered the most noteworthy Norwegian playwright after Ibsen.

Left alone as a child when his parents separated, he was educated at King Frederick's University, Kristiania. Heiberg's plays were always highly provocative, and their opening nights caused the greatest scandals in the history of Norwegian theatre. *Paradesengen* (1913) deals with the exploitation of a famous man's death by his children in such a way that it was clear to contemporary audiences that the dying hero was meant to be the beloved Norwegian writer Bjørnstjerne Bjørnson. His political plays, the ironically titled *Jeg vil værge mit land* (1912; "I Will Defend My Country") and *Folkerådet* (1897; "The People's Council"), were violently booed. In *Folkerådet* some of the booing was directed against the composer Frederick Delius, who had parodied the national anthem in music written for the play.

His erotic plays mainly became known in other countries: *Balkonen* (1894; *The Balcony,* 1922) and *Kjærlighetens tragedie* (1904; *The Tragedy of Love,* 1921). In Norway, Heiberg's first play, *Tante Ulrikke* (1884; "Aunt Ulrikke"), has remained the most frequently performed of his works. Aunt Ulrikke is a lonely fighter for the rights of the underdog in a world ruled by an incompetent and self-serving minority.

Heiberg, Johan Ludvig (b. Dec. 14, 1791, Copenhagen—d. Aug. 25, 1860, Bonderup, Den.), playwright, poet, literary historian, and critic who brought the Danish Romantic School to an end and established a new era of topical, sophisticated, and satirical literature; he also introduced both Hegelian philosophy and vaudeville, or ballad opera, to Denmark.

Johan Ludvig Heiberg, detail of a lithograph, 1869, after a portrait by David Monies, *c.* 1844

By courtesy of the Nationalhistoriske Museum, Frederiksborg, Den.

Originally Heiberg planned an academic career and taught Danish at the University of Kiel (1819), but he turned to writing about 1825. The son of the political writer Peter Andreas Heiberg and his wife, the novelist Thomasine, Baroness Gyllembourg-Ehrensvärd, Heiberg was a central figure in Danish literature and criticism for many years. During this time he originated Danish vaudeville, a form of popular folk musical, in which critical and satirical verses were set to well-known melodies. Besides his vaudeville pieces, Heiberg's most frequently performed plays are *Elverhøj* (1828; "Elfinhill") and *En sjael efter døden* (1841; "A Soul After Death"), which was his greatest literary success. From 1827 to 1830 Heiberg edited an influential literary paper in Copenhagen in which he carried on many literary feuds but also introduced many new talents, most significantly Søren Kierkegaard and Hans Christian Andersen.

Heiberg, Johanne Luise, *née* PÄTGES (b. Nov. 22, 1812, Copenhagen—d. Nov. 22, 1890, Copenhagen), Danish actress and manager, lionized by the intelligentsia of her day.

Heiberg began performing at an early age, singing for the patrons of her father's tavern and billiard parlour. She made her initial appearance as a singer-dancer at the Royal Theatre at age 14. In 1828 she played the role of Agnete in a new vaudeville production, *Elverhøj* ("Elfinhill"). The play was an unmitigated success (it is revived to the present day and is the source of the Danish National Anthem), and Johanne became a star. In 1831 she married the playwright, Johan Ludvig Heiberg.

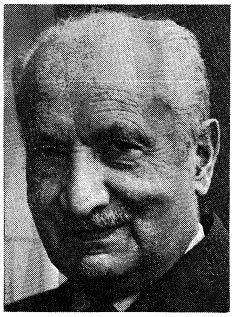
Until 1864, when she retired from acting upon the death of her frequent co-star, Michael Wiehe, Heiberg was the premiere actress of the Danish stage, excelling in the classics and in the musicals that established her fame. Her coterie represented the best minds in Danish culture. Until 1879 she directed plays, and it was her encouragement that resulted in Henrik Ibsen having the majority of his later plays premiere at the Royal Theatre. Her autobiography in four volumes, *A Life Relived in Recollection* (1891–92), was published posthumously.

Heiberg, Peter Andreas (b. Nov. 16, 1758, Vordingborg, Den.—d. April 30, 1841, Paris), Danish poet, playwright, and militant spokesman for the radical political ideas generated by the French Revolution.

Heiberg worked as an assistant to a notary public in Copenhagen while composing verse and prose satires in which he attacked social snobbery and political conservatism. A representative example is his play *De Vonner og de Vanner* (1792; "The Vons and the Vans"). From 1787 to 1793 he published the periodical *Rigsdalersedlens hændelser* ("The Adventures of a Banknote") as a vehicle for his opinions. Exiled in 1800 for his writings, he spent his last 40 years in France. He was the father of the dramatist Johan Ludvig Heiberg.

Heidegger, Martin (b. Sept. 26, 1889, Messkirch, Schwarzwald, Ger.—d. May 26, 1976, Messkirch, W.Ger.), German philosopher, counted among the main exponents of 20th-century Existentialism. He was an original thinker, a critic of technological society, a leading ontologist of his time, and an influence on a younger generation of continental European cultural personalities.

Background and youth. The son of a Catholic sexton, Heidegger showed an early interest in religion and, upon finishing high school, joined the Jesuits as a novice. At the University of Freiburg he studied Catholic theology and medieval Christian philosophy. In fact, his interest in philosophy had already begun when, at secondary school, he started an intensive study of the late 19th-century Catholic philosopher Franz Brentano, author of a "descriptive" psychology, as presented in Brentano's *Von der mannigfachen Bedeutung des Seienden nach Aristoteles* (1862; "On the Manifold Meaning of Being According to Aristotle").



Martin Heidegger

Camera Press

For the rest of his life Heidegger was to contemplate the possibility that there is a basic sense of the verb "to be" that lies behind its variety of usages. From his early study of Brentano also stems his enthusiasm for the Greeks, especially the pre-Socratics, whose thought marks the dawning of the penetrating reflection that transpired before the cleavage of thinking into poetry, philosophy, and science.

The philosophy of Heidegger is obviously dependent upon the philosophers prior to

Socrates, upon Plato and Aristotle, and upon the Gnostics. He was particularly influenced, however—positively or negatively—by several 19th- and early 20th-century philosophers: by the Danish theological thinker Søren Kierkegaard and the Dionysian vitalist Friedrich Nietzsche, founders of Existentialism; by the historical vitalist Wilhelm Dilthey, noted for directing the attention of philosophers to the human and historical sciences; and by the founder of Phenomenology, Edmund Husserl.

While still in his 20s, Heidegger studied at Freiburg with Heinrich Rickert, later of the southwest school of axiological Kantianism, and with Husserl, who was then already famous. Husserl's Phenomenology, and especially his struggle against the intrusion of psychology into essential studies of man—which he felt should, instead, be conducted on the philosophical level—determined the background of the young Heidegger's doctoral dissertation (1914). Consequently, what Heidegger later said and wrote about anxiety, thinking, forgetfulness, curiosity, distress, care, or awe was not meant as psychology; and what he said about man, publicness, and other-directedness was not intended to be sociology, anthropology, or political science. His utterances were meant to disclose ways of Being.

His magnum opus: "Being and Time." Heidegger started teaching at the University of Freiburg during the winter semester of 1915 and earned his habilitation through a study of the 13th-century British Franciscan philosopher Duns Scotus. In this position, as a colleague of Husserl, Heidegger was expected to carry the Phenomenological movement further along in the spirit of his former master. As a religiously inclined young man, however, he went his own way instead and in 1927 astonished the German philosophical world with *Sein und Zeit* (*Being and Time,* 1962)—a work that, though almost unreadable, was immediately felt to be of prime importance, whatever its relation to Husserl might be. In spite of, or perhaps partly because of, its intriguingly difficult style, this book was acclaimed as a deep and important work not only in German-speaking countries but also in Latin countries, where Phenomenology was already well known. It strongly influenced Jean-Paul Sartre in France and other Existentialists, and, despite Heidegger's protestations, he was classed, on the strength of this book, as the leading atheistic Existentialist. Its reception in the English-speaking world, however, was rather chilly, and its influence was negligible for several decades.

In *Being and Time,* Heidegger's declared purpose is to bring to light what it means for a man to be, or, more accurately, *how* it is to be. This leads to a more fundamental question: what it means to ask "What is the meaning of Being?" These questions lie behind the obviousness of everyday life and, therefore, also behind the empirical questions of natural science. They are usually overlooked because they are too near to be grasped in everyday life. One might say that the whole prophetic mission of Heidegger amounts to making each man ask that question with maximum involvement. Whether he will ever arrive at any definite answer or not is, in the present crisis of mankind, of secondary importance.

This crisis, according to Heidegger, stems from a deep fall (*Verfall*) that Western thought has undergone, owing to a one-sided technical development, a development that results in alienation (*Entfremdung*), or, as expressed in terms more central to Heidegger's thought, in a "highly inauthentic way of being." Fallenness, or inauthenticity, belongs to the inescapable way of human existence; *i.e.,* it is an existential, an essential, potentiality (*Möglichkeit*), but epochs and individuals may be coloured by it in different degrees. This somewhat stern outlook was mitigated, however, in Heidegger's later writings, in which he suggests that there are possibilities of redemption by "thinking of Being" and, thus, again coming closer to Being—a process in which, he believes, continental European rather than Eastern or other Western countries are to lead the way.

The wealth of ideas contained in *Being and Time* is best discussed, however, in conjunction with those developed in another, short work, *Was ist Metaphysik?* (1929; *What Is Metaphysics?,* 1949). At the time of publishing *Being and Time,* Heidegger had been a professor ordinarius at Marburg for several years (since 1923). He resigned that post and, in 1928, returned to Freiburg, this time as Husserl's successor. *What Is Metaphysics?* was Heidegger's inaugural lecture; it elaborates one of his favourite themes, *das Nichts* ("nothing"); *i.e.,* the no-thing.

As Heidegger learned from Husserl, it is the phenomenological and not the scientific method that unveils man's ways of Being. Thus, in pursuing this method, Heidegger comes into conflict with the dichotomy of the subject–object relation, which has traditionally implied that man, as knower, is something (some-thing) within an environment that is against him. This relation, however, must be transcended. The deepest knowing, on the contrary, is a matter of *phainesthai* (Greek: "to show itself" or "to be in the light"), the word from which phenomenology, as a method, is derived. Something is just "there" in the light. Thus, the distinction between subject and object is not immediate but comes only later through conceptualization, as in the sciences.

As an aid in the effort to get back to "Thinking of Being" and its redemptive effects, Heidegger employs linguistic or hermeneutical techniques. He develops his own German, his own Greek, and his own kind of etymologies. He coins, for example, about 100 new complex words ending with "-being." In reading his works one must, thus, translate many of its key terms back into Greek words and then consider his free, often special (but never uninteresting), interpretations and etymologies.

Man stands out (*ex-sists,* not merely *ex-ists*) from things, says Heidegger in *Being and Time,* never being completely absorbed by them, but nevertheless being nothing (no-thing) apart from them. Man dwells in a world that he has been, and continues to be, thrown into until death. Being thrown into things, being-there (*Da-sein*), he falls away (*Verfall*) and is on the point of being submerged into things. He is continually a pro-ject (*Ent-wurf*); but periodically, or even normally, he may be submerged in things to such a degree that he is temporarily absorbed (*Aufgehen in*). He is then nobody in particular; and a structure that Heidegger calls *das Man* ("the they") is revealed, which recalls certain Anglo-American sociological criticisms of modern industrial society that stress man's "other-directedness," his tendency to measure himself in terms of his peers. But Heidegger's phenomenological metaphors avoid social science terms as much as possible in favour of ontological one. Characteristic of *das Man* are idle talk (*Gerede*) and curiosity (*Neugier*). In *Gerede,* talker and listener do not stand in any genuine personal relation or in any intimate relation to what is talked about; hence, it leads to shallowness. Curiosity is a form of distraction, a need for the "new," a need for something "different," without real interest or capability of wonder.

But there is a mood, anxiety or dread (*Angst*), that functions to disclose (dis-close) authentic being, freedom (*Frei-sein*), as a potentiality. It manifests the freedom of man to choose himself and take hold of himself. The relevance of time, of the finiteness of human existence, is then experienced as a freedom to meet his own death (*das Freisein für den Tod*), a preparedness for and continuous relatedness to his own death (*Sein zum Tode*). In anxiety, all entities (*Seiendes*) sink away into a "nothing and nowhere," man hovers in himself as ex-sisting, being nowhere at home (*Un-heimlichkeit, Un-zu-hause*). He faces no-thing-ness (*das Nichts*); and all average, obvious everydayness disappears—and this is good, since he now faces the potentiality of authentic being.

Thus, the "sober" (*nüchtern*) anxiety and the implied confrontation with death are for Heidegger primarily of methodological importance: fundamentals are revealed. Among the structures revealed are potentialities for being joyfully active (". . . knowing joy [*die wissende Heiterkeit*] is a door to the eternal"). Anxiety opens man up to Being. This does not imply that Being partakes in the dark aspect of dread, however; Being is associated with "light" and with "the joyful" (*das Heitere*). Being "calls the tune"; "to think Being" is to arrive at one's (true) home. Though Heideggerian students are often baffled by just what Being and thinking stand for, it is clear that Heidegger opposes a cult of mankind and wishes to call attention to something greater.

Later life. In the early 1930s there occurred an event in the thought of Heidegger that scholars call his *Kehre* ("turning around"), which is said by some specialists to involve a turning away from the problem of *Being and Time.* This was denied by Heidegger himself, who insisted that he had been asking the same basic question since his youth, but in his later years he clearly became more reluctant to offer any answer. He did not even indicate a way in which to reach an answer to the basic problem of *Being and Time.*

At about the time of the *Kehre,* there also occurred Heidegger's short but eloquent pro-Nazi participation in the cultural politics of the Third Reich, which became a matter of considerable controversy. Even before Adolf Hitler assumed power in November 1933, German universities were exposed to heavy pressures. They were supposed to support the "national revolution" and eliminate Jewish scholars and doctrines (such as relativity). The anti-Nazi scientist who had been the rector at Freiburg resigned in protest, and the teaching staff unanimously elected Heidegger as his successor.

Heidegger's inauguration speech ("The German University's Self-Affirmation") was widely declared to be an affirmation of Nazism. To be sure, he divided student tasks into work service, military service, and scientific service; but this fell within the area of the authoritarian educational policy of Plato, and the speech ended not with a "*Heil,* Hitler!" but with a quotation from Plato's *Republic:* "All great things stand in peril." The speech turned against scientific specialization; it urged the asking of the question "What is it to be?"; and it warned against losing oneself in "things" (*Seiendes;* opposite *das Sein*). On other occasions, however, Heidegger gave solidly pro-Hitler speeches. "The Führer himself," he said, "and he alone is the German reality, present and future, and its law." In short, Heidegger succumbed to Hitlerism but not to Nazi cultural policy or philosophy.

Under some pressure, Heidegger joined the Nazi Party and did not try to leave it. His relations to the party, however, and to the whole Nazi environment rapidly deteriorated. He resigned as rector as early as the beginning of 1934. After World War II, Heidegger characterized Hitlerism as the historical explosion of a structural sickness in mankind as a whole and expressed concern that it would take time to get rid of the poison.

In November 1944 Heidegger terminated his university lectures, and in 1945 the occupying powers forbade him to take up official lecturing again. He was "investigated"; but his

support of Hitler in 1933–34 was not found to be of the serious, "active" kind, and he did not lose his professional rights. His status remained a matter of controversy, however, until he reached the age of retirement in 1959. Nevertheless, he gave influential regular lectures in the years 1951–58, and his attitude in 1933–34 did not affect his strong position within the international Phenomenological movement.

Assessment. Perhaps the specific pretension of Heidegger's phenomenological method rests on a grandiose illusion, and perhaps the search for thinking Being is merely a disguised quest for a kind of belief in God; perhaps his abstruse terminology is only a mask covering and mystifying a more traditional approach. Such irreverent evaluations would scarcely be unsympathetic to Heidegger, if joined with the intent to verify or falsify it by genuinely following his own path through his writings. After all, he asks, or rather, provokes, us *to question,* not to listen to answers. It is, therefore, misleading to present Heidegger's philosophy as a set of clearly understandable results. His metaphors must remain, rather than be translated into a usual philosophical terminology that he rejected. (A.D.N.)

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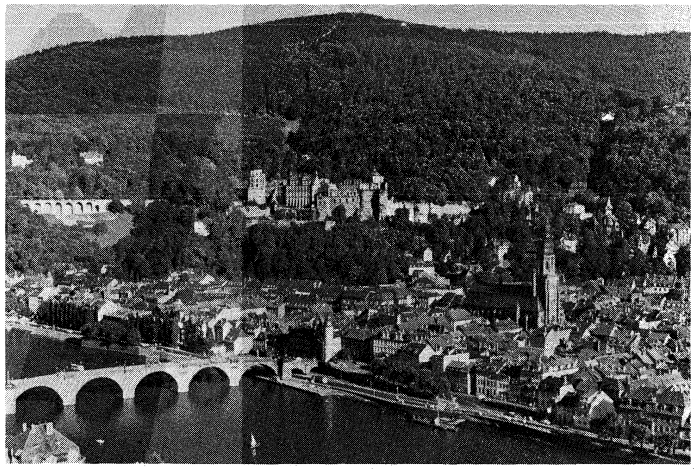
Heidelberg, city, Baden-Württemberg *Land* (state), southwestern Germany, on the canalized Neckar River where it emerges from the forested hills of Odenwald into the Rhine plain. First mentioned in 1196, it was the capital of the Rhenish Palatinate (Pfalz) and the residence of the electoral counts Palatine until 1720. It was devastated during the Thirty Years' War (1622) and almost completely destroyed by the French in 1689 and 1693, so that most of its important buildings are in the Baroque architectural style (which prevailed until the late 18th century) rather than Gothic medieval. It passed to Baden in 1802 and experienced considerable growth in the 20th century.



Heidelberg Castle and Alte (or Karl-Theodor) Brücke (bridge) over the Neckar River, Heidelberg, Ger.
Hans Huber

The only buildings to escape razing in 1693 were the Holy Ghost Church (1400–36), the Marstall (1590; formerly the Royal Mews), and the Haus zum Ritter (1592). Other landmarks include the Alte (or Karl-Theodor) Brücke (bridge; 1786–88, rebuilt after 1945), the town hall (1701–03), and the Jesuit church (1712). By far the most interesting and imposing building is Heidelberg Castle. Although devastated by the French in 1689 and 1693 and then struck by lightning in 1764, this magnificent red sandstone structure, 330 ft (100 m) above the river, still dominates the city. Construction began in the 13th century, but the most notable work was done in the Renaissance period and includes the Otto-Heinrichsbau and the Friedrichsbau wings. In the cellar of the Friedrichsbau is the Heidelberg Tun (1751), an enormous wine cask with a capacity of 49,000 gallons (185,500 litres). The castle can be reached from the lower city by a cable railway, which continues to the summit of the Königsstuhl (massif).

Heidelberg University (Ruprecht-Karl-Universität), the oldest in Germany, was founded by Rupert I and chartered by Pope Urban VI in 1386. In its Geological-Paleontological Institute is the Heidelberg jaw, a fossil jawbone, probably 400,000 years old, that was found in the vicinity in 1907. It is classified by some scholars as *Homo erectus.*

Though it remains primarily a university and residential city, the number of factories greatly increased after World War II. Products include machines, precision instruments, and leather, tobacco, and wood products. The main business, however, is the tourist trade; several million people visit the castle every year. Pop. (1989 est.) 131,429.

Articles are alphabetized word by word, not letter by letter

Heidelberg, University of, German in full RUPRECHT-KARL-UNIVERSITÄT HEIDELBERG, state-supported institution of higher learning at Heidelberg, Ger. Modelled on the University of Paris, it was founded in 1386 by the elector Rupert I and, like other German universities, was endowed by a foundation of colleges. The first was the college of the Cistercian order (1389); the first secular college was founded in 1390 by the university chancellor. During the 17th and 18th centuries, in a period of religious and political upheaval in Germany, the university suffered a decline, but it regained its prestige in the early 19th century after thorough reorganization by the elector Charles Frederick, becoming a centre of sciences, law, and philosophy. Among its faculties today are theology, law, medicine, and philosophy. Also affiliated are many institutions, seminars, and clinics of the different faculties.

Heidelberg Catechism, Reformed confession of faith that is used by many of the Reformed churches. It was written in 1562 primarily by Caspar Olevianus, the superintendent of the Palatinate church, and Zacharias Ursinus, a professor of the theological faculty of the University of Heidelberg. It was accepted at the annual synod of the Palatinate church in 1563.

The Heidelberg Catechism was prepared as part of a reform program directed by Elector Frederick III the Pious, who was attempting to complete the religious reformation of the Palatinate. Although Frederick preferred the Reformed faith, he hoped to conciliate the contending Protestant groups, which included the orthodox Lutheran party ranged against both the Reformed party and the more moderate Lutheran followers of Philipp Melanchthon.

The elector hoped that the Heidelberg Catechism would form the basis for reconciliation.

The authors of the Heidelberg Catechism based the work on earlier catechetical works by themselves and others, and they attempted to prepare a catechism acceptable to all. In discussing the sacraments, they sought to bring their Reformed statements as near to the moderate Melanchthonian–Lutheran position as they could. The controversial doctrine of predestination was very mildly stated. The strength and appeal of the catechism was the fact that it was a practical and devotional work, rather than an intellectual, dogmatic, or polemical one.

Although the Heidelberg Catechism failed to conciliate the Protestant groups in Germany, it was widely accepted and used. It has been translated into more than 25 languages.

Heidelberg jaw, also called MAUER JAW, enigmatic human mandible, thought to be nearly 400,000 years old, found in 1907 in the great sand pit at Mauer, southeast of Heidelberg, Ger. Elephant and rhinoceros remains found in association indicate a warm climate; the jaw has been assigned to an early interstadial of the middle Pleistocene. The chinless mandible is massive and apelike, with ascending branches almost as broad as they are high. The teeth, proportionately too small for so large a jaw, are human. The dental arch is parabolic without spaces between the canines and first premolars, and the molars are like those of modern man, but larger. The fossil, long an isolated discovery, is difficult to classify. It was originally designated *Homo heidelbergensis* and later judged to be a European example of *Homo erectus,* but its taxonomic position remains uncertain. The Montmaurin mandible (France) and Ternifine fossils (Algeria)—both sometimes considered examples of *Homo erectus*—are the most similar to the Heidelberg jaw of other known fossils.

Heidelberg Romantics, poets of the second phase of Romanticism in Germany, who were centred in Heidelberg about 1806. Their leaders were Clemens Brentano, Achim von Arnim, and Joseph von Görres; their brief-lived organ was the *Zeitung für Einsiedler* (1808). The most characteristic production of this school was the collection of folk songs entitled *Des Knaben Wunderhorn* (1805–08; "The Boy's Magic Horn"). Compared with the Jena Romantics, who represented the first school of Romanticism in Germany, the Heidelberg writers were more practical, and their immediate influence on German intellectual life was greater. They stimulated their compatriots' interest in German history and founded the study of German philology and medieval literature. The group also strengthened the national and patriotic spirit and helped prepare the way for the rising against Napoleon.

Heiden, Eric (Arthur) (b. June 14, 1958, Madison, Wis., U.S.), American athlete who in the 1980 Winter Olympic Games became the first skater to win gold medals in all speed-skating events (500, 1,000, 1,500, 5,000, and 10,000 metres).

Heiden started skating soon after learning to walk. His early training involved running, bicycling, and weightlifting. In his first Winter Olympic Games (1976), he placed 7th in the 1,000-metre race and 19th in the 5,000 metres. He became the first U.S. world speed-skating champion (1977) and was also overall world junior champion, repeating this victory in 1978 and 1979. He later turned to competitive cycling. His younger sister, Beth, was also a world-class skater.

Heidenheim, officially HEIDENHEIM AN DER BRENZ, city, Baden-Württemberg *Land* (state), southwestern Germany, on the Brenz River in the eastern Swabian Alps. The site of a Roman settlement, it was chartered in 1356. It is overlooked by the ruined castle of Hellenstein (with a museum) standing on a hill (1,985 feet [605 m]). Since 1723 it has held traditional shepherds' competitions. Precision instruments, tools, machinery, textiles, and cement are manufactured. Pop. (1989 est.) 48,497.

Heidenstam, (Carl Gustaf) Verner von (b. July 6, 1859, Olshammar, Swed.—d. May 20, 1940, Övralid), poet and prose writer who led

Heidenstam, oil painting by J.A.G. Acke, 1900; in the Bonnier's Collection, Stockholm

By courtesy of the Svenska Portrattarkivet, Stockholm

the literary reaction to the Naturalist movement in Sweden, calling for a renaissance of the literature of fantasy, beauty, and national themes. He won the Nobel Prize for Literature in 1916.

Ill health forced Heidenstam to spend most of his youth in the central and eastern Mediterranean countries. His first book of poems, *Vallfart och vandringsår* (1888; "Pilgrimage and Wander Years"), full of the fables of the southern lands and the philosophy of the East, was an immediate success with the Swedish public. With his essay "Renässans" (1889) he first voiced his opposition to Naturalism and the realistic literary program that had been rather short-lived in Sweden.

His efforts toward the realization of a new Swedish literature include two volumes of poems, *Dikter* (1895) and his last volume, *Nya dikter* (1915), many poems of which are translated in *Sweden's Laureate: Selected Poems of Verner von Heidenstam* (1919). He also wrote several volumes of historical fiction, the most important of which are *Karolinerna,* 2 vol. (1897–98; *The Charles Men*), and *Folkungaträdet* (1905–07; *The Tree of the Folkungs*). After the turn of the century Heidenstam's works lost their popular appeal, and he wrote virtually nothing during the last 25 years of his life.

Heifetz, Jascha (b. Feb. 2 [Jan. 20, Old Style], 1901, Vilna, Lithuania, Russian Empire [now Vilnius, Lithuanian S.S.R.]—d. Dec. 10, 1987, Los Angeles), Russian-born American violinist noted for his conscientious musical interpretation, his smooth tone, and his technical proficiency. His name became associated with musical perfection.

Heifetz studied violin from age three and at six performed Felix Mendelssohn's *Violin Concerto.* At nine he entered the St. Petersburg (Russia) Conservatory, where he studied under the noted violinist and teacher Leopold Auer. His first Berlin appearance in 1912 led to an invitation from the celebrated conductor Arthur Nikisch to play Tchaikovsky's *Violin Concerto* with the Berlin Philharmonic. He toured Europe from age 12.

In 1917 he fled the Russian Revolution via Siberia. He made his American debut in 1917 at Carnegie Hall, New York City, and became a U.S. citizen in 1925. He toured widely in Europe, the Orient, the Middle East, and Australia. Heifetz transcribed works of Johann Sebastian Bach, Antonio Vivaldi, and the 20th-century French composer Francis Poulenc for the violin. He also commissioned violin concerti by modern composers, among them Sir William Walton and Louis Gruenberg. After 1962 he taught at the University of Southern California, Los Angeles, where the Heifetz Chair in Music was established in 1975.

Heijermans, Herman (b. Dec. 3, 1864, Rotterdam—d. Nov. 22, 1924, Zandvoort, Neth.), Dutch author and playwright, both naturalistic and didactic, who in his work attacked all aspects of bourgeois hypocrisy.

After failing in business, Heijermans became a journalist in Amsterdam. His novel *Kamertjeszonde* (1898; "Petty Sin"), published under the pseudonym Koos Habbema, sharply criticizes prevailing sexual attitudes, and, in his play *Allerzielen* (1905; "All Souls"), Heijermans treats the theme of the repudiation of a "fallen" woman.

He first realized the theatre's potential value while working in Berlin and founded his own company when he returned to The Netherlands. Among his more politically oriented plays, *Op hoop van zegen* (1901; *The Good Hope*) has as its theme the exploitation of fishermen, and *Glück auf* (1911; "Good Luck"), the exploitation of the miners. In the novel *Diamantstad* (1904; "Diamond Town") he realistically depicts the life of the Amsterdam diamond cutters.

Heijermans, crayon drawing by Jan Toorop, 1914

By courtesy of the Iconographisch Bureau, The Hague

Heijermans also wrote satirical sketches (under the name Samuel Falkland), and his skillful use of irony is also evident in the play *De wijze kater* (1917; "The Wise Tomcat").

Heikal, Muhammad Hassanein (b. 1923, Cairo), leading Egyptian journalist who gained fame as the editor in chief of *Al-Ahram,* the semiofficial Egyptian newspaper. During his tenure (1957–74) *Al-Ahram* was called the *New York Times* of the Arab world, partly because of the editor's weekly analytical pieces, some of them covering a full page.

Educated at Cairo University, Heikal became a reporter for the *Egyptian Gazette* in 1943. The following year he joined the staff of *Rosal Yussef,* a weekly, and from 1953 to 1956 he served as editor of *Akher Saa,* an illustrated Arabic-language weekly. In 1956 and 1957 he served as editor of *Al-Akhbar,* a daily.

Heikal was a longtime friend of Gamal Abdel Nasser, and when Nasser came to power he installed Heikal as editor of *Al-Ahram.* Heikal at once began improving the paper's accuracy and objectivity and subdued the high emotional and sensational tone that had characterized it. He also insisted on high production quality. Under his tenure *Al-Ahram* became a newspaper of record for the Arab world. He hired and trained university graduates as investigative reporters and set up an *Al-Ahram* Strategic Studies Centre. While holding the post of editor of *Al-Ahram,* he served as chair-

man of the Al-Ahram Establishment Board (1959–74). He was a member of the Central Committee of the Arab Social Union from 1968 to 1974 and a minister of national guidance from April to October of 1970.

After Nasser's death in 1970 Heikal remained editor of *Al-Ahram* until 1974, when the paper's criticisms of Anwar el-Sādāt led to his removal, and he became a free-lance journalist. He was the author of several books, including *Nasser: The Cairo Documents* (1972), *The Road to Ramadan* (1975), *Sphinx and Commissar* (1978), *Iran: The Untold Story* (1982), and *Autumn of Fury* (1983), the last a criticism of Sādāt.

Heike monogatari, English THE TALE OF THE HEIKE, medieval Japanese heroic epic, which is to Japanese literature what the *Iliad* is to Western literature, a prolific source of later dramas, ballads, and tales. It stems from unwritten traditional tales and variant texts composed between 1190 and 1221, which were gathered together (*c.* 1240) by an unknown author to form a single epic. Its poetic prose is intended to be chanted to the accompaniment of a biwa (four-stringed lute). Based on the actual historical struggle between the Taira (Heike) and Minamoto (Genji) families, which convulsed Japan in civil war for years, the *Heike monogatari* features the exploits of Minamoto Yoshitsune, the most popular hero of Japanese legend, and recounts many episodes of the heroism of aristocratic samurai warriors. Its overall theme is the tragic downfall of the Taira family. Beginning pessimistically with the tolling of a bell, it carries the story to the final defeat of the Taira clan at the sea battle of Dannoura (1185), in which, along with many warriors, the seven-year-old emperor and many noble courtiers were drowned. The epic concludes by describing the subsequent life of the empress mother and ends as it began, with the tolling of a bell, as she dies in a remote convent. Throughout, there is a tone of Buddhist skepticism toward the fleeting fortunes of the world.

Heilbronn, city, Baden-Württemberg *Land* (state), southwestern Germany. It lies along the Neckar River and is surrounded by vineyards and the Swabian Forest. Built on the site of an old Roman settlement, it was first mentioned in 741, and the Carolingian princes had a palace there. Created a free imperial city in 1281, its name—originally Heiligbronn, or "holy spring"—refers to a stream that issued from under the high altar of St. Kilian's Church. The city suffered severe damage in World War II, but most of its historic buildings have been rebuilt or restored, including St. Kilian's Church, built in the Gothic and Renaissance styles with a unique tower, and the town hall (1540) with a curious clock installed in 1580. The house of the Teutonic Knights (Deutsches Haus) is in ruins. Several old towers survive, including the Diebsturm, or Götzenturm, on the Neckar.

Situated in a fertile fruit-, vegetable-, and grape-growing region, the city is a commercial centre with a harbour that serves as a transloading point on the Rhine–Neckar shipping route. Metal processing and the manufacture of wine and machinery are important industries. Pop. (1989 est.) 112,279.

heiligenschein (physics): *see* Cellini's halo.

Heilungkiang, Wade-Giles romanization HEI-LUNG-CHIANG, Pinyin HEILONGJIANG, the northernmost *sheng* (province) of China's Northeast Region (formerly known as Manchuria), bounded on the north and east by the U.S.S.R. along the Heilung River and Wu-su-li River, on the west by the Inner Mongolia Autonomous Region of China, and on the south by the Chinese province of Kirin.

A brief treatment of Heilungkiang follows. For full treatment, *see* MACROPAEDIA: China.

The province of Heilungkiang occupies more than half of the huge Manchurian Plain and is surrounded on three sides by old mountain ranges of medium elevation. Its central part is the Sungari-Nen river plain, which is delimited by the Greater Khingan Range on the west, the Lesser Khingan Range on the north, and the Lao-yeh Ling and Chang-kuang-t'sai mountains on the east. The Hei-lung (Amur) River is the longest stream in the province. This river's upper and middle sections serve as the international boundary for a distance of 1,180 miles (1,890 km). Its chief tributary, the Sungari River, is the province's main waterway. Heilungkiang has severe winters, lasting five to eight months. Summer is short but coincides with the rainy season, making it possible to raise temperate-climate crops in most areas.

Although the population is more than nine-tenths Chinese, there are some significant ethnic groups: Manchus, Koreans, Muslims, Mongolians, Ta-hu-erh, O-lun-chun, O-wen-k'o, Ho-che, and Chi-erh-chi-szu. Smaller groups include Tibetans, Russians, and Yakuts. The Manchus, distributed in the southern part of the province, are the largest minority group, but they have been culturally assimilated by the Chinese. Their way of life is similar to the Chinese, and intermarriage is common.

Industrial development in the province has drawn a great number of peasants from the countryside to the cities. Heilungkiang's main industrial centres include Chia-mu-ssu, also a railway centre, which produces threshing machines, pressing machines, grain sowers, combines, mining machinery, and electrical and telecommunication equipment. The city's paper mill is one of the largest in China. Shuang-ya-shan, about 43 miles (69 km) east, produces coal, lumber, and construction materials and engages in metal and food processing. Ch'i-ch'i-ha-erh, the second largest city and former capital, has over a dozen machinery-manufacturing plants and a large food-products industry. Harbin, the largest city and the capital, is the major transportation hub and communications centre of northern Manchuria, with direct rail links to the Russian railroad network and to the Sea of Japan. Through the South Manchurian Railway, Harbin is linked with the Chinese and Korean rail networks and the Pacific. Heavy industry in the capital includes industrial machinery, machine tools, agricultural machinery, and the production of chemicals, fertilizers, textiles, lumber, and construction materials. Harbin is also an important educational centre, especially in the fields of engineering and applied science.

Until the 19th century, northern Manchuria remained an undeveloped steppe and forest region occupied by a few primitive nomadic tribes. In 1650 the Russians built a fort on the Amur River. In 1858 Russia annexed additional regions and retained its domination until 1917. After that year's Russian Revolution, the Bolsheviks renounced special privileges in northern Manchuria as a friendly gesture toward China. The province remained under Chinese control until Japan invaded Manchuria in 1931. Soviet troops entered Manchuria in August 1945, at the end of World War II, but they evacuated it later to make way for the People's Liberation Army of the Chinese Communists. After the Sino-Soviet rift in 1960, border clashes occurred repeatedly along the lengthy international border, which has been the scene of Russo-Chinese clashes since the 17th century.

Heilungkiang includes the administrative area of Hulunbuir League, which was transferred to it from the Inner Mongolia Autonomous Region in 1969. Area 179,000 square miles (463,600 square km). Pop. (1986 est.) 33,110,000.

Heim, Albert (b. April 12, 1849, Zürich—d. Aug. 31, 1937, Zürich), Swiss geologist whose studies of the Swiss Alps greatly advanced the knowledge of the dynamics of mountain building and of glacial effects on topography and geology.

Heim was appointed to the chair of geology at Federal Polytechnic School in Zürich in 1873. He served as director of the Swiss Geological Commission for 30 years and was professor of geology at the University of Zürich from 1875 to 1911. In 1912 he helped prepare the geological map of Switzerland. In addition to his famous *Untersuchungen über den Mechanismus der Gebirgsbildung* (1878; "Inquiries into the Mechanism of Mountain Building"), Heim's works include *Handbuch der Gletscherkunde* (1885; "Handbook of Glaciology") and the classic work *Geologie der Schweiz* (1916–22; "Geology of Switzerland").

Heimdall, Old Norse HEIMDALLR, in Norse mythology, the watchman of the gods. Called the shining god and whitest skinned of the gods, Heimdall dwelt at the entry to Asgard, where he guarded Bifrost, the rainbow bridge. He required less sleep than a bird, could see 100 leagues, and could hear grass growing in the meadows and wool growing on sheep. Heimdall kept the "ringing" horn, Gjallarhorn, which could be heard throughout heaven, earth, and the lower world; it was believed that he would sound the horn to summon the gods when their enemies, the giants, drew near at the Ragnarök, the end of the world of gods and men. When that time came, Heimdall and his enemy Loki would slay each other.

Heimlich maneuver, emergency procedure that is used to dislodge foreign bodies from the throats of choking victims. In the early 1970s, the American surgeon Henry J. Heimlich observed that food and other objects causing choking were not freed by the recommended technique of delivering sharp blows to the back. As an alternative, he devised a method of using air expelled from the victim's lungs to propel the object up and out of the throat. The Heimlich maneuver is used only when the victim's airway is totally obstructed and he is rendered unable to speak, breathe, or to cough the object out; with only partial blockage of the throat, the victim can generally work the object free by his own efforts.

In performing the maneuver, the rescuer stands behind the choking victim and wraps his arms around his upper abdomen, joining his two hands just below the rib cage and pressing his balled left hand into the victim's belly. Grasping one fist in the other, the rescuer then makes four sharp upward squeezes or thrusts into the victim's abdomen, thus forcing out of his lungs the air that will expel the foreign object from the throat. An unconscious victim is laid on his back and the thrusts administered from above. The abdominal thrusts are repeated until the foreign object is expelled.

Heimskringla (*c.* 1220; "Orb of the World"), collection of sagas of the early Norwegian kings, written by the Icelandic poet-chieftain Snorri Sturluson. It is distinguished by Snorri's classical objectivity, realistic psychology, and historically feasible (if not always accurate) depiction of cause and effect. The collection opens with the *Ynglinga saga,* which traces the descent of the Norwegian kings from the god Odin, who is presented by Snorri as a historical figure, a great conqueror and master wizard from the Black Sea region, who settled in the Scandinavian Peninsula, where his knowledge of runes and magic made him ruler over all. It continues with 16 lives of high kings, covering the period of the development of the Norsemen as roving Vikings, through their conversion to Christianity and their eventual settling down to unification and

administration of Norway. One-third of the work is devoted to the 15-year reign of Olaf II Haraldsson, the patron saint of Norway. This saga of St. Olaf (*Ólafs saga helga*) was written first and the rest of the chronicle built around it. It portrays the character development of the King from a ruthless Viking raider to a serious statesman who fought to regain his kingdom and to establish Christianity and just government in Norway. The King gains sainthood at last by his death in battle and the miracles occurring on the spot where he fell.

Many of the other lives are abbreviated. Among the more interesting are those of Harald Fairhair, Haakon the Good, and Olaf Tryggvason.

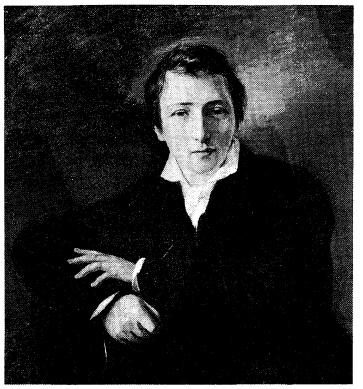
The value of these sagas as history is still debated, but Snorri ranks high as a critical historian. The sources he used were varied, but he relied heavily on the poems of the early skalds (court poets), which Snorri understood better than any scholar of his age. The best English translation is by L.M. Hollander in 1964.

Heimwehr (German: Home Defense Force), any of the local organizations formed in various parts of Austria to expel invading Yugoslavs or preserve order immediately after World War I. Composed of conservative-minded country dwellers, the Heimwehr came to represent much of the Austrian right wing between World Wars I and II. Imbued with corporativism (an authoritarian view of the state as composed of interest groups rather than individuals), the Heimwehr also drew on strong monarchistic, patriotic, and religious feelings. Some members looked to Italy and Benito Mussolini for guidance, but historians disagree over whether the Heimwehr was outrightly Fascist.

Local Heimwehr sections were often quite distinct, some in eastern Austria being under Christian Social Party leadership, others in the west having Nazi sympathizers as directors. Though a "march on Vienna" by the Styrian Heimwehr in 1931 failed, Heimwehr forces assumed much power in the provinces after Parliament was suspended in 1933, and they played an important part in suppressing Socialists in February 1934. After the *Anschluss* (Union) with Germany of 1938, the Heimwehr was overshadowed by the Nazis; and some Heimwehr members found their reactionary views so much at odds with more "radical" right-wing tendencies that they turned against the Germans and actively helped opposition to the *Reich*.

Hein, Piet (Dutch admiral): *see* Heyn, Piet.

Heine, Heinrich, in full CHRISTIAN JOHANN HEINRICH HEINE, original name (until 1825) HARRY HEINE (b. Dec. 13, 1797, Düsseldorf, Prussia—d. Feb. 17, 1856, Paris), German poet whose international literary reputation and influence were established by the *Buch der Lieder* (1827; *The Book of Songs*), frequently set to music, though the more sombre poems of his last years are also highly regarded.



Heine, detail of an oil painting by Moritz Oppenheim, 1831; in the Hamburger Kunsthalle

By courtesy of the Hamburger Kunsthalle

Life. Heine was born of Jewish parents. His father was a handsome and kindly but somewhat ineffectual merchant; his mother was fairly well educated for her time and sharply ambitious for her son. Much of Heine's early life, however, was influenced by the financial power of his uncle Salomon Heine, a millionaire Hamburg banker who endeavoured to trade generosity for obedience and with whom Heine remained on an awkward and shifting footing for many years. After he had been educated in the Düsseldorf Lyceum, an unsuccessful attempt was undertaken to make a businessman of him, first in banking, then in retailing. Eventually, his uncle was prevailed upon to finance a university education, and Heine attended the universities of Bonn, Göttingen, Berlin, and Göttingen again, where he finally took a degree in law with absolutely minimal achievement in 1825. In that same year, in order to open up the possibility of a civil service career, closed to Jews at that time, he converted to Protestantism with little enthusiasm and some resentment. He never practiced law, however, nor held a position in government service; and his student years had been primarily devoted not to the studies for which his uncle had been paying but to poetry, literature, and history.

Early works. Heine's pre-university years are rather obscure, but during this period he apparently conceived an infatuation for one, and possibly both, of his uncle's daughters, neither of whom had the slightest notion of mortgaging her future to a dreamy and incompetent cousin. Out of the emotional desolation of this experience arose, over a period of years, the poems eventually collected in *The Book of Songs.* The sound of Romantic poetry was firmly lodged in Heine's ear; but the Romantic faith, the hope for a poeticization of life and the world to overcome the revolution, alienation, and anxiety of the times, was not in his heart. Thus, he became the major representative of the post-Romantic crisis in Germany, a time overshadowed by the stunning achievements of Goethe, Schiller, and the Romantics but increasingly aware of the inadequacy of this tradition to the new stresses and upheavals of a later age. The most consistent characteristic of Heine's thought and writing throughout his career is a taut and ambiguous tension between "poesy," as he called the artistic sensibility, and reality. His love poems, though they employ Romantic materials, are at the same time suspicious of them and of the feelings they purportedly represent. They are bittersweet and self-ironic, displaying at the same time poetic virtuosity and a skepticism about poetic truth; their music is now liquid, now discordant, and the collection as a whole moves in the direction of desentimentalization and a new integration of the poet's self-regard in the awareness of his artistic genius.

The steady growth of Heine's fame in the 1820s was accelerated by a series of experiments in prose. In the fall of 1824, in order to relax from his hated studies in Göttingen, he took a walking tour through the Harz Mountains and wrote a little book about it, fictionalizing his modest adventure and weaving into it elements both of his poetic imagination and of sharp-eyed social comment. "Die Harzreise" ("The Harz Journey") became the first piece of what were to be four volumes of *Reisebilder* (1826–31; *Pictures of Travel*); the whimsical amalgam of its fact and fiction, autobiography, social criticism, and literary polemic was widely imitated by other writers in subsequent years. Some of the pieces were drawn from a journey to England Heine made in 1827 and a trip to Italy in 1828, but the finest of them, "Ideen. Das Buch Le Grand" (1827; "Ideas. The Book Le Grand"), is a journey into the self, a wittily woven fabric of childhood memory, enthusiasm for Napoleon, ironic sorrow at unhappy love, and political allusion.

Later life and works. When the July Revolution of 1830 occurred in France, Heine did not, like many of his liberal and radical contemporaries, race to Paris at once but continued his more or less serious efforts to find some sort of paying position in Germany. In the spring of 1831 he finally went to Paris, where he was to live for the rest of his life. He had originally been attracted by the new Saint-Simonian religion (a socialistic ideology according to which the state should own all property and the worker should be entitled to share according to the quality and amount of his work); it inspired in him hopes for a modern doctrine that would overcome the repressive ideologies of the past and put what he variously called spiritualism and sensualism, or Nazarenism (adherence to Judeo-Christian ideals) and Hellenism (adherence to ancient Greek ideals), into a new balance for a happier human society. His critical concern with political and social matters deepened as he watched the development of limited democracy and a capitalist order in the France of the citizen-king, Louis-Philippe. He wrote a series of penetrating newspaper articles about the new order in France, which he collected in book form as *Französische Zustände* (1832; "French Affairs") and followed with two studies of German culture, *Die Romantische Schule* (1833–35; *The Romantic School*) and "Zur Geschichte der Religion und Philosophie in Deutschland" (1834–35; "On the History of Religion and Philosophy in Germany"), in which he mounted a criticism of Germany's present and recent past and argued the long-range revolutionary potential of the German heritage of the Reformation, the Enlightenment, and modern critical philosophy. The books were conceived with a French audience in mind and were originally published in French. In 1840–43 he wrote another series of newspaper articles about French life, culture, and politics, which he reedited and published as *Lutezia,* the ancient Roman name for Paris, in 1854.

During these years, then, Heine's attention turned from "poesy" to writing of contemporary relevance. His second volume of poems, *Neue Gedichte* (1844; *New Poems*), illustrates the change. The first group, "Neuer Frühling" ("New Spring," written mostly in 1830/31), is a more mannered reprise of the love poems of *Buch der Lieder,* and the volume also contains some ballad poetry, a genre in which Heine worked all his life. But the second group, "Verschiedene" ("Varia"), is made up of short cycles of sour poems about inconstant relationships with the blithe girls of Paris; the disillusioning tone of the poems was widely misunderstood and held against him. Another section is called "Zeitgedichte" ("Contemporary Poems"), a group of harsh verses of political satire. Several of these were written for Karl Marx's newspaper *Vorwärts* ("Forward"). Heine had become acquainted with the young Marx at the end of 1843, and it was at this time that he produced, after a visit to his family in Germany, a long verse satire, *Deutschland, Ein Wintermärchen* (1844; *Germany, a Winter's Tale*), a stinging attack on reactionary conditions in Germany. Though Heine remained on good, if not intimate, terms with Marx in later years, he never was much taken with Communism, which did not fit his ideal of a revolution of joy and sensuality. About the time that he met Marx, he also wrote another long poem, *Atta Troll. Ein Sommernachtstraum* (1843–45; *Atta Troll, a Midsummer Night's Dream*), a comic spoof of radical pomposity and the clumsiness of contemporary political verse.

Heine's early years in Paris were his happiest. From an outcast in the society of his own rich uncle, he was transformed into a leading literary personality, and he became acquainted with many of the prominent people of his time. In 1834 he found in an uneducated shopgirl, Crescence Eugénie Mirat, whom for some reason he called "Mathilde," a loyal if obstreperous mistress. He married her in 1841. But troubles were soon hard upon him. His critical and satirical writings brought him into grave difficulties with the German censorship, and, at the end of 1835, the Federal German Diet tried to enforce a nationwide ban on all his works. He was surrounded by police spies, and his voluntary exile became an imposed one. In 1840 Heine wrote a witty but ill-advised book on the late Ludwig Börne (1786–1837), the leader of the German radicals in Paris, in which Heine attempted to defend his own more subtle stand against what he thought of as the shallowness of political activism; but the arrogance and ruthlessness of the book alienated all camps.

Though never destitute, Heine was always out of money; and when his uncle died in 1844, all but disinheriting him, he began, under the eyes of all Europe, a violent struggle for the inheritance, which was settled with the grant of a right of censorship over his writings to his uncle's family; in this way, apparently, the bulk of Heine's memoirs was lost to posterity. The information, revealed after the French Revolution of 1848, that he had been receiving a secret pension from the French government, further embarrassed him.

The worst of his sufferings, however, were caused by his deteriorating health. An apparently venereal disease began to attack one part of his nervous system after another, and from the spring of 1848 he was confined to his "mattress-grave," paralyzed, tortured with spinal cramps, and partially blind. Heine returned again to "poesy." With sardonic evasiveness he abjured his faith in the divinity of man and acknowledged a personal God in order to squabble with him about the unjust governance of the world. His third volume of poems, *Romanzero* (1851), is full of heartrending laments and bleak glosses on the human condition; many of these poems are now regarded as among his finest. A final collection, *Gedichte 1853 und 1854 (Poems 1853 and 1854),* is of the same order. After nearly eight years of torment, Heine died and was buried in the Montmartre Cemetery.

Assessment. Heine's power to annoy was as great as his power to charm and move, and rarely has a great poet been so controversial in his own country. His aggressive satires, radical postures, and insouciance about his methods made him appear to many as an unpatriotic and subversive scoundrel, and the growth of anti-Semitism contributed to the case against him. Efforts in the late 19th and early 20th centuries to erect monuments to him in various German cities touched off riots and shook governments. In view of the popularity of many of his songs, the Nazis were obliged to include them in anthologies but marked them "author unknown." For many decades his literary reputation was stronger abroad, especially in France, England, and America, where his wit and ambivalence were better appreciated, than at home. Today the evaluation of Heine's political role and its relationship to Marxism supplies a bone of contention between East and West. Deplorable as much of this history of his reputation has been, it is testimony to the enduring impact of a genuinely European poet and writer.

(J.L.Sa.)

MAJOR WORKS. *Gedichte* (1821), first collection of poems; *Tragödien nebst einem lyrischen Intermezzo* (1823), the tragedies were *Almansor* and *William Ratcliff; Reisebilder,* vol. 1: "Die Heimkehr," "Die Harzreise," "Nordsee I," first of the "North Sea" cycles (1826); vol. 2: "Nordsee II," "Nordsee III," "Ideen. Das Buch Le Grand," "Briefe aus Berlin" (1827); vol. 3 included "Reise von München nach Genoa" and "Die Bäder von Lucca" (1829); vol. 4 included "Die Stadt Lucca" and "Englische Fragmente" (1831); *Buch der Lieder* (1827), poems; *Französische Zustände* (1832), a collection of political essays; *Zur Geschichte der neueren schönen Literatur in Deutschland* (1833), on contemporary German literature; reprinted and expanded in *Die Romantische Schule* (1835); *Der Salon,* 4 vol. (1834–40), vol. 1 included a description of French painting, the "Salon" of 1831, a collection of poems, and "Aus den Memoiren des Herren von Schnabelewopski"; vol. 2 (1835) consisted largely of a synopsis of the history of religion and philosophy in Germany, "Zur Geschichte der Religion und Philosophie in Deutschland"; vol. 3 (1837) contained two prose works, "Elementargeister" and "Florentinische Nächte"; vol. 4 (1840) included "Vertraute Briefe über die französische Bühne" and the opening chapters of the novel *Der Rabbi von Bacherach; Ludwig Börne, eine Denkschrift* (1840); *Deutschland. Ein Wintermärchen* (1844), satirical verse; *Neue Gedichte* (1844), second collection of shorter poems; *Atta Troll. Ein Sommernachtstraum* (1847), mock-epic poem; *Der Doktor Faust. Ein Tanzpoem* (1851); *Romanzero* (1851), included the "Historien," "Lamentationen," and "Hebräische Melodien"; *Gedichte 1853 und 1854* (1854); *Lutezia* (1854), political essays written 1840–43; *Vermischte Schriften* (1854), included "Geständnisse" and "Götter im Exil."

Translations. Heinrich Heine: The Poems, trans. by Louis Untermeyer (1937), is the most comprehensive English translation of Heine's poetry; various of Heine's works have been translated into English many times and into some 50 other languages. Other notable English translations are: *The Prose Writings of Heinrich Heine,* ed. by Havelock Ellis (1887); *The Works of Heinrich Heine,* trans. by C.G. Leland *et al.,* 12 vol. (1892–1905); *The Poems of Heine,* trans. by E.A. Bowring (1859); and *Heinrich Heine: The North Sea,* trans. by Vernon Watkins (1951).

BIBLIOGRAPHY. Gottfried Wilhelm and Eberhard Galley, *Heine-Bibliographie (1817–1953),* 2 vol. (1960); Siegfried Seifert, *Heine-Bibliographie 1954–1964* (1968).

Manuscripts, papers, and memorabilia. The major collections of materials are in the Heine Archive of the Landes- und Stadtbibliothek, Düsseldorf; in the Bibliothèque Nationale in Paris; and in the Nationale Forschungs- und Gedenkstätten der klassischen deutschen Literatur in Weimar. Manuscript materials are also at Harvard and Yale universities. Since 1962 the Düsseldorf archive has published a *Heine-Jahrbuch* with a running annual bibliography.

Editions. Ernest Elster (ed.), *Sämtliche Werke,* 7 vol. (1887–90); Oskar Walzel *et al.* (eds.), *Sämtliche Werke,* 10 vol. (1910–15; index volume, 1920); Hans Kaufmann (ed.), *Werke und Briefe,* 10 vol. (1961–64); Friedrich Hirth (ed.), *Briefe,* 6 vol. (1950–51), letters. New critical editions began publication in Düsseldorf and Weimar in 1976 and 1970, respectively.

Biographies. Adolf Strodtmann, *Heinrich Heines Leben und Werke,* 2nd ed., 2 vol. (1873–74), the first and, in some ways, still the best comprehensive biography; Ludwig Marcuse, *Heinrich Heine: Ein Leben zwischen Gestern und Morgen* (1932; *Heine: A Life Between Love and Hate,* 1933); Louis Untermeyer, *Heinrich Heine: Paradox and Poet,* vol. 1, *The Life* (1937), a companion volume to the translation of poems; E.M. Butler, *Heinrich Heine: A Biography* (1956); H.H. Houben, *Gespräche mit Heine* (1926), a compendium of contemporaries' recollections and a valuable biographical sourcebook; Fritz Mende, *Heinrich Heine, Chronik seines Lebens und Werkes* (1970), a day-by-day account of all known events and activities in Heine's life; Jeffrey L. Sammons, *Heinrich Heine: A Modern Biography* (1979), covers controversies arising after World War II.

Critical studies. Barker Fairley, *Heinrich Heine: An Interpretation* (1954); William Rose, *Heinrich Heine: Two Studies of His Thought and Feeling* (1956); S.S. Prawer, *Heine: The Tragic Satirist* (1961); Laura Hofrichter, *Heinrich Heine* (1963); Jeffrey L. Sammons, *Heinrich Heine: The Elusive Poet* (1969).

Heinemann, Barbara (b. Jan. 11, 1795, Leiterswelier, Alsace, Fr.—d. May 21, 1883, Amana, Iowa, U.S.), French-born U.S. spiritual leader of the Community of True Inspiration, also known as the Amana Colony.

The Community of True Inspiration had been founded in 1714 by Pietistic mystics and was revived later by Michael Krausert and Christian Metz. In 1818 Heinemann was "illuminated" with a sense of religious calling. She subsequently became known in the Community as an "inspired instrument"—a prophet and orator. In 1823 Heinemann married George Landmann, a schoolteacher, and the couple emigrated with 800 other Inspirationists to the United States in the mid-1840s. There she led, with Christian Metz, the founding of seven collective religious communities in Iowa, which were called the Amana Colonies.

After Metz died in 1867, Heinemann directed the religious affairs of the community of 1,600. A strict fundamentalist, she outlawed many recreations, the use of cameras, and co-ed play. In 1932 the Amana Society was restructured into a new cooperative organization with greater economic and individual liberties for its members.

Heinemann, William (b. May 18, 1863, Surbiton, Surrey, Eng.—d. Oct. 5, 1920, London), English publisher whose firm published outstanding contemporary fiction and drama, introduced translations of important works of European literature to Great Britain, and produced inexpensive translations of classical Greek and Roman texts.

Heinemann studied music in England and Germany but decided instead to become a publisher and served his apprenticeship with a British publishing house. In 1890 he established in London the firm that bears his name. Three years later he was joined by a partner, Sydney Pawling.

In the years that followed, Heinemann's firm became famous for its outstanding fiction list. Authors included Robert Louis Stevenson, Rudyard Kipling, Max Beerbohm, John Masefield, John Galsworthy, Joseph Conrad, H.G. Wells, and Somerset Maugham. He published plays as well, including those of Sir Arthur Pinero and Maugham.

Heinemann's International Library of translations, under the editorship of Sir Edmund Gosse, made important works in French, Spanish, German, and Italian available to British readers for the first time. He also commissioned Constance Garnett to translate works of Fyodor Dostoyevsky, Ivan Turgenev, and Leo Tolstoy into English; these translations greatly influenced the English novel during the early 20th century. He also published English-language versions of the plays of Henrik Ibsen and Bjørnstjerne Bjørnson. Another important contribution was Heinemann's publication of the Loeb Classical Library, in which Greek and Latin texts were printed with English translations on the facing page, in uniform format at a modest price.

Heinicke, Samuel (b. April 10, 1727, Nautschütz, Saxony—d. April 30, 1790, Leipzig), German advocate for and teacher of lipreading in the education of the deaf.

After receiving only a village school education, Heinicke enlisted in the army, where he found time to indulge his intense fondness for books and his interest in languages. He studied Latin and French and began to teach both languages. He was stirred by the publication of *Surdus loquens* (1692; "The Talking Deaf") by a Swiss physician who had succeeded in teaching deaf persons to speak. This impression remained with him when he was taken prisoner by the Prussians during the Seven

Years' War. He managed to escape and eventually became secretary to the Danish ambassador in Hamburg. In 1769 the ambassador helped Heinicke secure a teaching position in nearby Eppendorf, where he found his real calling in the instruction of deaf children.

In 1778 Heinicke opened the first German school for the education of the deaf. He insisted that lipreading was the best training method because it made his students speak and understand the language as it was used in society. He bitterly opposed dependence on sign language and in 1780 published a book attacking the Abbé de l'Epée, whose Parisian school for the deaf taught communication through gestures.

In addition to his pioneering work with the deaf, which made the oral method the preferred mode of training throughout most of Europe, Heinicke promoted the phonetic method of teaching reading and argued his conviction that concrete experiences should precede the teaching of abstractions.

Heinkel, Ernst Heinrich (b. Jan. 24, 1888, Grunbach, Ger.—d. Jan. 30, 1958, Stuttgart, W.Ger.), German designer and builder of the first rocket-powered aircraft shortly before the outbreak of World War II.

Heinkel's first plane, constructed in 1910, crashed and burned. Continuing his work, he became chief designer for the Albatros Aircraft Company in Berlin before the beginning of World War I. After the war he organized (1922) the Ernst Heinkel Flugzeugwerke in Warnemünde, where he built the He 70, which set eight world speed records in the early 1930s; the He 176, first aircraft to fly successfully with reaction motors; the He 178, first turbojet-powered aircraft; and the He 111 and He 162, widely used by Germany's air force during World War II. Though he fell into disfavour with the Nazis late in the war, he was arrested by the Allies and tried for war crimes; he was released after the trial. Because his firm had been dissolved, he began a new company in 1950 to manufacture bicycles, motorbikes, and midget autos.

Heinlein, Robert A(nson) (b. July 7, 1907, Butler, Mo., U.S.—d. May 8, 1988, Carmel, Calif.), prolific American writer considered to be one of the most literary and sophisticated of science-fiction writers. He did much to develop the genre.

After graduating from the U.S. Naval Academy in 1929 and serving in the Navy for five years, Heinlein pursued graduate studies in physics and mathematics at the University of California at Los Angeles. Except for engineering service with the Navy during World War II, he was an established professional writer from 1939.

His first story, "Life-Line," was published in the action-adventure pulp magazine *Astounding Science Fiction.* He continued to write for that publication—along with other notable science-fiction writers—until 1942, when he began war work as an engineer. Heinlein returned to writing in 1947, with an eye toward a more sophisticated audience. His first book, *Rocket Ship Galileo* (1947), was followed by a large number of novels and story collections, including works for children and young adults. After the 1940s he largely avoided shorter fiction. His popularity grew over the years, probably reaching its peak after the publication of his best-known work, *Stranger in a Strange Land* (1961). His broad interests and concern for characterization as well as technology brought him a considerable number of admirers among general-interest readers. Among his more popular books are *The Green Hills of Earth* (1951), *Double Star* (1956), *The Door into Summer* (1957), *Citizen of the Galaxy* (1957), and *Methuselah's Children* (1958).

Heinrich (German personal name): *see under* Henry, except as below.

Heinrich VON MELK (fl. 1150), early Middle High German poet, the first satirist in German literature.

A Benedictine lay brother of the Austrian monastery of Melk, he composed a vivid poem *Von des Tôdes gehügede* (*c.* 1150–60; "Remembrance of Death" or "Memento Mori"). The monkish theme is traditional, but the poem's satiric edge and unflattering description of the contemporary emerging feudal and courtly culture is new. Heinrich portrays the knights as adulterous and bloodthirsty, the noble ladies as arrogant and vain, and the lower classes as apes of the aristocrats. Another poem, *Vom Priesterleben* ("About Priestly Life"), is an ironic picture of the behaviour of worldly priests.

Heinrich VON MORUNGEN (d. 1222, near Leipzig), German minnesinger, one of the few notable courtly poets from east-central Germany.

A native of Thuringia, he spent much of his later life in the service of Duke Dietrich of Meissen. His poems, of which some 33 are to be found in the Heidelberg manuscript, are all devoted to the fashionable cult of love. His poems show more originality and spontaneity than those of his contemporaries because of his vivid imagination and the intensity of his emotion. As a result his poems appeal to the modern reader more than those of any other minnesinger with the exception of Walther von der Vogelweide.

Heinrich VON VELDEKE (fl. 1185; b. near Maastricht, Lower Lorraine [now in The Netherlands]), Middle High German poet of noble birth whose *Eneit,* telling the story of Aeneas, was the first German court epic to attain an artistic mastery worthy of its elevated subject matter.

While at the court of the landgrave Hermann of Thuringia, Heinrich completed the *Eneit,* modeled on the French *Roman d'Eneas* rather than directly on Virgil's *Aeneid. Eneit* was written not in Heinrich's native Flemish but in the Franconian literary language of such works as Eilhart von Oberg's *Tristrant und Isalde.* Following its French example, *Eneit* greatly expands the episode of Aeneas and Dido and transforms Virgil's epic into a courtly romance that minutely analyzes the psychology of love. The epic poets Gottfried von Strassburg and Wolfram von Eschenbach both testified to the value of the *Eneit* as a model. The language of the poem is simple and direct, if somewhat pedantic and conventional, and the verse flows smoothly.

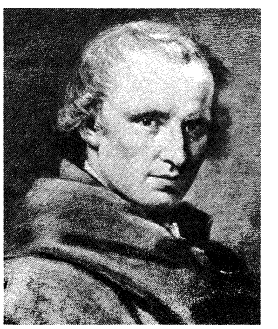
Heinrich also wrote a religious epic, *Servatius* (*c.* 1170), on the life and miracles of the patron saint of Maastricht, and a number of lyric poems. In these, as in his epics, he appears as the ideal transmitter to Germany of the new courtly literary fashions introduced in Romance models. Because of his borderland dialect, he is also claimed by the Dutch as the earliest known poet in their literature.

Heinrich Julius (b. Oct. 15, 1564, Schloss Hessen, near Wolfenbüttel, Saxony [Germany]—d. July 20, 1613, Prague), duke of Brunswick, a representative of early Baroque culture who was important in the development of German drama. His work incorporated the theatrical effect of English Elizabethan drama and the English clown, or fool, into German theatre.

A gifted scholar, theologian, and patron of the arts, Heinrich Julius became rector of the University of Helmstedt in 1576 and bishop of the Catholic see of Halberstadt in 1578. He became duke in 1589, succeeding his father. In 1592 he brought English actors and dramatists (notably Thomas Sackville) to Wolfenbüttel and thereafter maintained a troupe at his court. His moralizing plays (*Von einem Wirthe* [1593; "Of an Innkeeper"]; *Von einem Buler und einer Bulerin* [1593; "Of Two Lovers"]; *Von einer Ehebrecherin* [1594; "Of an Adulteress"]), written for these actors and influenced by the English tradition, treat topics of everyday middle-class life in a realistic style. An autocrat by conviction and a persecutor of Jews and witches, Heinrich wrote in a didactic tone aimed at instilling the ideology of the landed aristocracy.

His best-known tragedy, *Von einem Ungeratnen Sohn* (1594; "Of a Spoiled Son"), showed his predilection for the scenes of horror and crime that characterized the repertoire of the English actors then common in Germany. His best work, the comedy *Von Vincentio Ladislao* (1594), showed his skill at characterization and used elements of the much-imitated style of the English actors, the exaggerated language and the pretensions of the braggart, as objects of satire. In 1607 he lost interest in the duchy and moved to Prague, where he became an adviser to Emperor Rudolf II.

Heinse, (Johann Jakob) Wilhelm (b. Feb. 16, 1746, Langewiesen, near Ilmenau, Thuringia [Germany]—d. June 22, 1803, Aschaffenburg, near Frankfurt am Main [Germany]), German novelist and art critic whose work combined grace with the stormy fervour that is characteristic of literature of the Sturm und Drang period and exerted a strong influence on the Romanticists.



Heinse, portrait by an unknown artist

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

A law student at Erfurt, Heinse met the Romantic writer Christoph Martin Wieland and through him Johann Wilhelm Ludwig Gleim, who was known for his patronage of young poets and who in 1772 procured Heinse a post as tutor in a family in Quedlinburg. In 1774 he went to Düsseldorf, where he helped edit *Iris,* a periodical for women. After traveling in Italy between 1780 and 1783, he returned to Germany to become librarian to the Archbishop of Mainz at Aschaffenburg.

In Heinse's famous novel *Ardinghello und die glückseligen Inseln* (1787; "Ardinghell and the Blessed Islands"), the hero is an artist and a dreamer who founds a utopia on a Greek island. Glorifying eroticism and the aesthetic life, it is a forerunner of the *Künstlerroman* ("artist novel") of the Romantic movement. His second novel, *Hildegard von Hohenthal* (1795–96; "Hildegard of Hohenthal"), in which music plays the role that painting had done in *Ardinghello,* is considered a contribution to musical criticism. In a critical work, *Über einige Gemälde der Düsseldorfer Galerie* (1776–77; "On Several Paintings in the Düsseldorf Gallery"), he stresses the dependence of artistic production on historical and national circumstances and expresses particular appreciation of Peter Paul Rubens.

Heinsius, Anthonie (b. Nov. 23, 1641, Delft, Neth.—d. Aug. 3, 1720, The Hague), statesman who as councillor pensionary of Holland (1689–1720) and the leading Dutch adviser of William III, prince of Orange, guided the Dutch Republic's campaigns against France in

the War of the Grand Alliance (1687–97) and the War of the Spanish Succession (1701–14).

A scion of an urban patrician family, Heinsius practiced law in Delft until 1679, when he

Anthonie Heinsius, engraving by L.A. Claesens, after a portrait by Gerbrand van den Eeckhout

By courtesy of the Iconographisch Bureau, The Hague

became pensionary of the city. Although he was at first critical of the stadholder William III's militant opposition to Louis XIV, king of France, he became convinced in the early 1680s of the necessity of opposing Louis's expansionist policies; and in 1689, at William's insistence, he accepted the office of councillor pensionary of Holland. He acted as William's leading Dutch collaborator in the War of the Grand Alliance against France, mediating with the States General (national assembly) and serving as one of two Dutch negotiators at the peace settlement at Rijswijk (1697).

After William's death in 1702, Heinsius was unable to maintain control of the States General, which criticized his leadership during the War of the Spanish Succession. His critics believed that while the Dutch had borne a greater share of the war effort, their English allies won greater benefits in the peace Treaty of Utrecht (1713). Heinsius' concentration on foreign affairs had left public finances in poor condition, and after 1713 he sought to avoid further international commitments.

Heinsius, Daniël (Latin), Dutch DANIËL HEINS (b. Jan. [June ?] 9, 1580, Ghent—d. Feb. 25, 1655, Leiden, Neth.), Dutch poet, famous in his day as a classical scholar.

At Leiden, Heinsius produced classical editions, verses, and orations from an early age. He annotated many Latin poets and Greek writers from Hesiod to Nonnus, and the popularity of his lectures dazzled his colleagues. By 1614 he was professor of history, librarian, and secretary to the senate, and his advice determined the policy of the publishing firm of Elzevirs. At the Synod of Dort he supported the condemnation of the Remonstrants, who included his close friend, Grotius, and thereby earned the official good will of the victorious Calvinists. Attacked after three decades of success, he failed to parry the criticisms evoked by his New Testament commentary (1639). He published little after 1640. His literary productions, which include the Dutch tragedy *Herodes infanticida* (1632), reveal him as a skillful craftsman without originality or taste. But he deserves to be remembered for his edition of Aristotle's *Poetics* (1611), his *De tragoediae constitutione* (1611), which decisively influenced the French classical theatre, and his Dutch poetry (1616), which was indebted to the French group La Pléiade.

Heinz Company, in full H.J. HEINZ COMPANY, INC., major U.S. manufacturer of processed foods, which are distributed throughout the world. The company's "57 Varieties" slogan was devised in 1896; today the company markets several hundred products. Headquarters are in Pittsburgh.

The company was initially founded at Sharpsburg, Pa., in 1869 by Henry John Heinz (1844–1919), who was later to become nationally known as the "Pickle King." Heinz had become interested in selling foods when he was a child; by the age of 16, he had several employees working to cultivate the hotbeds and gardens he had built and to deliver his produce to Pittsburgh grocers. His first company, a partnership with two other men, was formed to prepare and market horseradish. Although the company did not survive the business panic in 1875, Heinz reorganized it in 1876 and built it into a major national company by the end of the century. By 1905 it had become the H.J. Heinz Company, the largest producer of pickles, vinegar, and ketchup (catsup) in the United States. By 1919 the company had more than 6,000 employees and 25 factories. Heinz was an astute marketer of his products as well, and he set up the first electric sign in New York City (1900) in order to advertise his firm's pickles. Heinz was a progressive employer for his time and was one of the few food processors to support a federal Pure Food Act. The corporation was headed by members of the Heinz family until 1969, and the family remained the largest stockholder thereafter.

In addition to such products as ketchup and vinegar, Heinz also markets canned tuna and frozen dinner items. The Hubinger Company is a major Heinz subsidiary. Heinz has processing plants in several countries and is the major producer of prepared soups in England.

heir, one who succeeds to the property of a person dying without a will or who is legally entitled to succeed by right of descent or relationship. In most jurisdictions, statutes of descent determine transfer of title to property if there is no will naming the legatee. In English common law, originally an heir was one who inherited real estate; next of kin inherited personal property. With important exceptions (titles of nobility, etc.) statutory law has all but abolished the distinction.

One may be either heir apparent or heir presumptive during the lifetime of the property holder. The heir apparent is one whose right to inherit is indefeasible as long as he or she outlives the property holder. The heir presumptive is one whose right may be defeated by the birth of a nearer heir. In Sweden, the eldest child of the sovereign is heir apparent to the crown. In Great Britain, the heir apparent of the sovereign is the eldest son. If there are no sons, the eldest daughter is heiress presumptive unless there is no possibility of the birth of a brother to replace her in the line of descent.

heirloom, an item of personal property that by immemorial usage is regarded as annexed by inheritance to a family estate. The owner of such an heirloom may dispose of it during his lifetime, but he cannot bequeath it by will away from the estate. If he dies intestate (without a will), the object goes to his heir at law; otherwise it goes to whoever takes the estate under his will. Such heirlooms are now almost unknown, but the word has acquired a secondary and popular meaning of items of special, endearing value, such as furniture or pictures, handed down from one generation to the next.

Heisenberg, Werner (Karl) (b. Dec. 5, 1901, Würzburg, Ger.—d. Feb. 1, 1976, Munich), German physicist and philosopher who discovered a way to formulate quantum mechanics in terms of matrices (1925). For that discovery, he was awarded the Nobel Prize for Physics for 1932. In 1927 he published his indeterminacy, or uncertainty, principle, upon which he built his philosophy and for which he is best known.

A brief account of the life and works of Werner Heisenberg follows; for a full biography, *see* MACROPAEDIA: Heisenberg.

Heisenberg studied theoretical physics at the University of Munich under Arnold Sommerfeld and obtained his doctor's degree in 1923. In the same year he became assistant to Max Born at Göttingen; he was appointed lecturer there in 1924. He then worked for three years with Niels Bohr at Copenhagen, and from 1927 to 1941 he was professor of theoretical physics at Leipzig. From 1942 to 1945 he was director of the Max Planck Institute for Physics at Berlin and from 1946 was director of the Max Planck Institute for Physics at Göttingen.

In the 1920s Heisenberg proposed a radical reinterpretation of the basic concepts of mechanics as applied to atomic particles. He sacrificed the existing model of discrete particles moving in prescribed paths for an approach in which such phenomena merely represented observable, or measurable, quantities that could be expressed by arrays of numbers obeying the rules of matrix algebra. Heisenberg and other scientists found that with the application of matrix theory, they could specify the set of possible values for physical variables on the particle level and could provide mathematically expressed probabilities for the occurrence of distinctive energy states and transitions among those states.

Heisenberg's work on the quantum theory profoundly influenced the development of atomic and nuclear physics. He wrote *Die physikalischen Prinzipien der Quantentheorie* (1930; *The Physical Principles of the Quantum Theory*) and many other books and papers on quantum mechanics, atomic physics, and cosmic rays.

Heisenberg uncertainty principle (physics): *see* uncertainty principle.

Heisman, John (William) (b. Oct. 23, 1869, Cleveland—d. Oct. 3, 1936, New York City), U.S. collegiate football coach for 36 years and one of the greatest innovators of the game. He was responsible for legalizing the forward pass in 1906, and he originated the centre snap and the "hike," or "hep," count signals of the quarterback in starting play. He was also the first coach to use the hidden ball play (later outlawed), the quarterback as safety on defense, the double pass, use of interference on end runs, the spin buck, and the Heisman shift. He also promoted the division of game halves into quarters.

Heisman played tackle for Brown University (Providence, R.I.; 1887–89) and centre, tackle, and end for the University of Pennsylvania (Philadelphia; 1890–91). He coached at Oberlin (Ohio) College (1892, 1894), at Auburn (Ala.) University (1895–99), at Clemson (S.C.) University (1900–03), at Georgia Institute of Technology (Atlanta; 1904–19), Washington and Jefferson College (Washington, Pa.; 1923), and Rice University (Houston, Texas; 1924–27). During his career teams coached by him won 185 games, lost 68, and tied 18.

During the off-season, Heisman was a Shakespearean actor, and he used polysyllabic language in coaching: the football was a "prolate spheroid." The Downtown Athletic Club of New York City, of which he was director when he died, posthumously named its trophy given annually to the best collegiate player each season the Heisman Trophy.

Heisman Trophy, cup awarded annually to the outstanding college football player in the United States as determined by a poll of sportswriters. The trophy was instituted in 1935 by the Downtown Athletic Club of New York City and the next year was named in honour of its first athletic director, John Heisman, a player and successful coach of the

1890s and early 1900s. The first winner of the trophy was John J. ("Jay") Berwanger of the University of Chicago.

Heiss, Carol (Elizabeth) (b. Jan. 20, 1940, New York City), leading U.S. woman figure skater from 1955 through 1960, when she retired from amateur competition. In that same year, she married Hayes Alan Jenkins, a former U.S. Olympic skater and began a professional skating career.

Heiss began to skate at age 4 or 5, and at 11 she won the U.S. novice championship. After finishing second in the world championship competition in 1955, she won the world title for each of the next five years. She also captured the North American championship in 1957 and 1959 and the United States championship from 1957 through 1960. Although narrowly defeated by Tenley Albright of the United States in the 1956 Olympic Winter Games, she won the gold medal for women's figure skating in the 1960 Winter Olympics at Squaw Valley, Calif.

Hejaz, also spelled HEDJAZ, Arabic AL-ḤIJĀZ, region of western Saudi Arabia, along the mountainous Red Sea coast of the Arabian Peninsula from Jordan on the north to Asir region on the south. The northern part of the province was occupied as early as the 6th century BC, when the Chaldean kings of Babylon

Nabataean tombs at Madā'in Ṣāliḥ, Hejaz, Saudi Arabia

Christian Monty—Rapho/Photo Researchers

maintained Taymā' as a summer capital. Later the Hejaz became a part of the Nabataean kingdom (100 BC–AD 200), the centre of which was Madā'in Ṣāliḥ. The province was again under control of Baghdad until 1258, when it fell to the Egyptians. In 1517 it was occupied by the Turks. Nominal rule, however, remained in the hands of the *sharīfs* ("nobles") of Mecca until the religious upheavals at the beginning of the 19th century, when the holy cities were raided by the fundamentalist Wahhābī Muslims. The Ottomans directly controlled the Hejaz after 1845 and built (1900–08) the Damascus–Medina railroad to unify their domain. In 1916, during World War I, Sharīf Ḥusayn ibn ʿAlī, who claimed lineal descent from the Prophet Muḥammad, revolted against Turkish rule, destroyed the railroad, and proclaimed himself the king of Hejaz. Ḥusayn's reign ended in 1924, when he abdicated in the face of a Wahhābī invasion, and in 1925 his son and successor, ʿAlī, also abdicated and left the country.

Ibn Saʿūd, the sultan of Najd, assumed the title king of Hejaz in 1926, and in 1932 Hejaz, Najd, and other districts under his control were united to form the Kingdom of Saudi Arabia.

The economy of the region, once dependent on gold mining, is now based on pilgrimage spending, light industries (particularly at Jidda), commerce, a limited agricultural production of dates and cereals, and the wealth generated from the oil deposits of eastern Arabia. In addition to the two holy cities of Mecca and Medina, the principal centres are Jidda, the largest Red Sea port, aṭ-Ṭā'if (a summer resort), and Yanbuʿ (Medina's port).

Hejaz Railway, Turkish HICAZ DEMIRYOLU, railroad between Damascus and Medina (now in Saudi Arabia), one of the principal railroads of the Ottoman Turkish Empire.

Its main line was constructed in 1900–08, ostensibly to facilitate pilgrimages to the Muslims' holy places in Arabia but in fact also to strengthen Ottoman control over the most distant provinces of the empire. The main line, built by a multiracial labour force mainly under the supervision of a German engineer, traversed 820 miles (1,320 kilometres) of difficult country and was completed in only eight years. It ran from Damascus southward to Darʿā (Deraa) and thence over Transjordan via Zarqā', al-Qaṭrānah, and Maʿān into northwestern Arabia, and inland via Dhāt al-Ḥajj and al-ʿUlā to Medina. The major branch line, 100 mi long, from Darʿā to Haifa on the Mediterranean coast of Palestine, was completed in 1905.

Even before World War I (1914–18) the Bedouins of the adjacent desert areas attacked the railway, which challenged their control over the pilgrims' route to the holy places from the north. When the Arabs of the Hejaz revolted against Turkish rule in 1916, the track between Maʿān and Medina was put out of operation by Arab raids, largely inspired by T.E. Lawrence. After the war the operative sections of the track were taken over by the Syrian, Palestinian, and Transjordanian governments. The section of the railway running from Maʿān, Jordan, to Medina was heavily damaged and was abandoned after 1917. Plans to restore the line in the 1960s were not fulfilled.

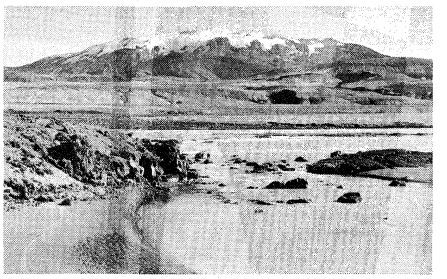
hejira: *see* hijrah.

heka, also spelled HIKE, in ancient Egyptian religion, the personification of one of the attributes of the sun god Re; the term is usually translated as "magic," or "magical power," though its exact meaning remains obscure. *Heka* was believed to accompany Re in his solar boat on its daily trip across the heavens; it could also be given to and used by common men. Consequently, the Egyptians believed that *heka* could be used to procure the favour of the gods, to acquire what was ordinarily unobtainable, or to prevent the return of the dead to this world.

Hekabe (Greek mythology): *see* Hecuba.

Hekinan, city, Aichi *ken* (prefecture), Honshu, Japan, at the mouth of the Yahagi-gawa (Yahagi River), facing Chita-wan (Chita Bay). It was formed in 1948 by the merger of the towns of Ohama, Shinkawa, and Tarao. During the Tokugawa era (1603–1867), Ohama was an important port for the shipment of rice, salt, and sake (rice wine) to Edo (now Tokyo). Shinkawa, settled in 1700, was known for its pottery and roof tile manufacture. Such traditional activities continue beside modern industries that include the manufacture of transport equipment. Pop. (1980) 62,021.

Hekla, active volcano, southern Iceland, 70 mi (110 km) east of Reykjavík, the capital. Hekla stands 4,892 ft (1,491 m) above sea level, at the eastern end of the island's most extensive farming region. Of its several craters, the largest is nearly 400 ft (122 m) deep. Hekla, known in early times as the Mountain of Hell, erupted 14 times between 1104 and 1970, with major eruptions occurring in 1300, 1766, and 1947; the 1766 explosion caused great loss of life.



Hekla volcano, Iceland

By courtesy of the Iceland Tourist Bureau

Hektorović, Petar (b. 1487, Starigrad, Hvar Island, Dalmatia, Republic of Venice—d. March 13, 1572, Starigrad), folk poet and collector of Dalmatian songs, an important figure in the Ragusan (Dubrovnik) Renaissance in South Slavic literature.

An aristocratic landowner educated in Italy and influenced by the Venetian background of his native island, Hektorović was impressed by the Italian Humanist adaptation of classical forms for vernacular literature. Although he wrote Italian and Latin verse and translated Ovid, popular Dalmatian lyrics intersperse his chief work, *Ribanje i ribarsko prigovaranje* (1555; "Fishing and Fishermen's Talk"), a pastoral and philosophic poem.

Hel, in Norse mythology, originally the name of the world of the dead; it later came to mean the goddess of death. Hel was one of the children of the trickster god Loki, and her kingdom was said to lie downward and northward. It was called Niflheim, or the World of Darkness, and appears to have been divided into several sections, one of which was Náströnd, the shore of corpses. There stood a castle facing north; it was filled with the venom of serpents, in which murderers, adulterers, and perjurers suffered torment, while the dragon Nidhogg sucked the blood from their bodies. Mention is made in an early poem of the nine worlds of Niflheim. It was said that those who fell in battle did not go to Hel but to the god Odin, in Valhalla, the hall of the slain.

HeLa cell, a cancerous cell belonging to a strain continuously cultured since its isolation in 1951 from a patient suffering from uterine cervical carcinoma. The designation HeLa is derived from the name of the patient. HeLa cells have been widely used in laboratory studies, especially in research on viruses.

Held, John, Jr. (b. Jan. 10, 1889, Salt Lake City, Utah, U.S.—d. March 2, 1958, Belmar, N.J.), cartoonist whose work epitomized the "jazz age" of the 1920s in the United States.

At the age of 16 he was drawing sports and political cartoons for the *Salt Lake Tribune,* and at 19 he sold his first cartoon to a national magazine. Shortly afterward he went to New York City, where he worked in the art department of a newspaper.

After service in the U.S. Navy during World War I, Held returned to New York City, where he gained fame and wealth for his drawings in the popular humour magazines *Life, Judge,* and *College Humor.* These drawings conveyed a spirit of the era comparable to that in the writings of F. Scott Fitzgerald. In particular, Held created such immortal characters as the short-skirted, short-haired "flapper," who rolled her stockings and used a long cigarette holder, and her escort, who wore a raccoon coat, had patent-leather hair parted in the middle, smoked a pipe, and carried a hip flask. Held's ability to point up the foibles of the time without sentimentality or bitterness made his cartoons notable. Also during the 1920s, he drew two comic strips: "Merely Margie, an Awfully Sweet Girl" and "Rah, Rah, Rosalie," both of which ended with the Depression.

During the 1930s Held wrote novels and short stories and did sculpture and woodcuts. His woodcuts, often evoking the "Gay Nineties," appeared in *The New Yorker* magazine. During World War II he served in the U.S.

Army Signal Corps and was stationed in Belmar, N.J., where he made his home after the war. *Held's Angels* (1952), illustrated by Held, with text by Frank Bunker Gilbreth, Jr., was a word and picture evocation of the 1920s.

Heldenbuch, Das, English BOOK OF HEROES, collection of German metrical romances of the 13th century. The individual poems deal with heroic themes of the struggles and conquests of the Germanic tribes during the great migrations. The poems of the *Heldenbuch* belong to two cycles. One group deals with the Ostrogothic sagas of Ermanaric, Etzel (Attila), and Dietrich von Bern (*q.v.*), who is its central figure and the ideal type of German medieval hero. The chief romances of this cycle are *Biterolf und Dietlieb, Der Rosengarten,* and *Laurin und der kleine Rosengarten.* The second cycle, probably of Franconian origin, is of less literary value. It includes several long, popular romances, notably those about the heroes Hugdietrich, Ortnit, and Wolfdietrich (*q.v.*).

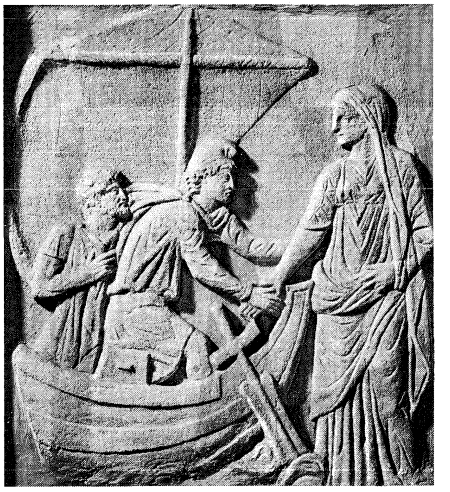
Heldenlieder, English SONGS OF HEROES, body of short, poignant poetic songs celebrating dramatic, and usually tragic, episodes in the lives of the Germanic heroes. Other themes concerned pagan religious ritual, battle songs, and laments for the dead. The heroic lay originated *c.* 375–500, during the period of the great migrations (*Völkerwanderungen*). Because they were transmitted orally, very little survives. Some examples survive in Scandinavian and Old English (in the fragmentary *Fight at Finnsburg*), but the sole survivor in Old High German is the *Hildebrandslied* (*c.* 800), which, though incomplete, reveals a sophisticated technique of dramatic selection and treatment.

Originally composed and recited by *Skofs* (court poets), the hero songs survived in the Christian Era as an underground literature, despite church disapproval, and were later disseminated by *Spielleute* (wandering minstrels). Their stories, which survived the actual poems in popular memory, centred about historic persons and events, the Ostrogothic kings Ermanaric and Theodoric (Dietrich von Bern), and the Hunnish king Attila (Etzel). Other cycles commemorated the Low German hero Siegfried and the fate of the Burgundians. In the 13th century they supplied the subject matter for the great Middle High German epic *Nibelungenlied.*

Helder, Den, *gemeente* (municipality) and port, Noordholland *provincie* (province), northwestern Netherlands, at the northern end of the North Holland Canal, opposite Texel Island on the Marsdiep, a channel linking the North Sea and Waddenzee. Offshore, in 1673, a Dutch fleet under Adm. Michiel A. de Ruyter and Cornelis Tromp defeated an Anglo-French fleet. In 1794 a French cavalry troop captured a Dutch fleet icebound in the Marsdiep, and in 1799 Den Helder was the site of the Russo-British troop landing that began the unsuccessful campaign to overthrow the Batavian Republic. It was a fishing village until strongly fortified by Napoleon in 1811. Den Helder later served as foreport for Amsterdam, a position it yielded to IJmuiden after the opening of the North Sea Canal (1876). It is now the main Dutch naval base and site of the Royal Naval College and the Admiralty Palace; there are also fishery, zoological, and meteorological institutes; a museum; and a wildlife preserve. In addition to fishing, economic activities include shipbuilding and tourism. The harbour is protected by a granite dike 6 mi (10 km) long. Pop. (1982 est.) 63,364.

Helderbergian Stage, lowermost division of Lower Devonian rocks and Early Devonian time in North America (the Devonian Period began about 395,000,000 years ago and lasted about 50,000,000 years). It precedes the Deerparkian Stage and was named for exposures studied in the Helderberg Mountains in Albany County, N.Y. During Helderbergian time, the Appalachian Geosyncline (great downbuckle in the Earth's crust in the region of the present Appalachian Mountains) slowly subsided but did not receive much sediment from bordering lowlands. This resulted in a compact record, only about 90 metres (300 feet) thick, and complex facies relationships predominate. Helderbergian rocks consist primarily of limestones and calcareous shales and have long been studied in the northeast. The uppermost formation of the Helderbergian is the Port Ewen Limestone, a shaly limestone, which is followed, in descending order, by the Alsen Limestone Formation, a cherty limestone with a crinoid and brachiopod fauna; the Becraft Limestone, a compact, pinkish limestone rich in crinoid columnals and brachiopod-shell fragments; the New Scotland Limestone, a shaly limestone with a rich and well-preserved fauna of brachiopods, trilobites, and gastropods; the Kalkberg Limestone Formation, noted for its well-preserved silicified fossils and black chert nodules; the Coeymans Limestone Formation, a hard, massive, bluish-gray limestone with excellently preserved silicified fossils; and the Manlius Limestone Formation, formerly included in the Silurian Period but now recognized as lowermost Helderbergian, which contains the enigmatic fossil *Tentaculites.*

Helen, Greek HELENE, in Greek legend, the most beautiful woman of Greece and the indirect cause of the Trojan War. She was daughter of Zeus, either by Leda or by Nemesis, and sister of the Dioscuri. She was also the sister of Clytemnestra, who married Agamemnon, and wife of Menelaus, Agamemnon's younger brother. During an absence of Menelaus, however, Helen fled to Troy with Paris, son of the Trojan king Priam; when Paris was slain, she married his brother Deïphobus, whom she betrayed to Menelaus when Troy was subsequently captured. Menelaus and she then returned to Sparta, where they lived happily until their deaths.



The abduction of Helen, Greek bas-relief; in the Lateran Museum, Rome

Alinari—Art Resource/EB Inc.

According to a variant of the story, Helen, in widowhood, was driven out by her stepsons and fled to Rhodes, whose queen, Polyxo, hanged her in revenge for the loss of her husband Tlepolemus in the Trojan War.

The poet Stesichorus, however, related in his second version of her story that she and Paris were driven ashore on the coast of Egypt and that Helen was detained there by King Proteus. The Helen carried on to Troy was thus a phantom, and the real one was recovered by her husband from Egypt after the war. This version of the story was used by Euripides in his play *Helen.*

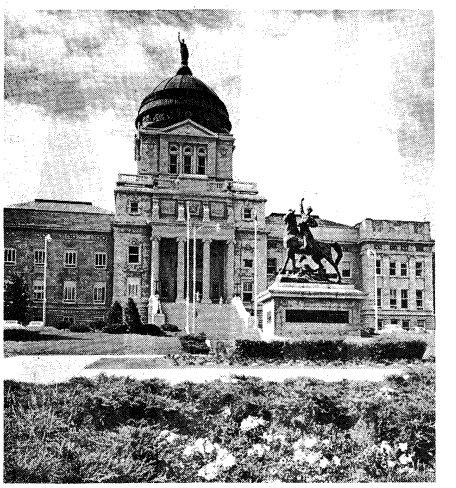
Helen was worshipped and had a festival at Therapnae in Laconia; she also had a temple at Rhodes, where she was worshipped as Dendritis (the tree goddess). Like her brothers, the Dioscuri, she was a patron deity of sailors. Her name is pre-Hellenic and in cult may go back to the pre-Greek periods.

Helena, city, seat (1830) of Phillips County, eastern Arkansas, U.S., port of the Mississippi River, adjacent to the city of West Helena. Originally settled in 1797, the community, first called Monticello and then St. Francis, grew around a warehouse built for barge shipping. In 1811 the steamboat "New Orleans" called there, opening a prosperous era of river traffic. The county was named for Sylvanus Phillips, and the settlement was renamed (1821) for his daughter. The city was a Federal supply depot during the Civil War, and the Battle of Helena (July 4, 1863) was a futile attempt by Confederates to capture it.

The economy, traditionally based on cotton and lumber, became increasingly industrialized after World War II, especially at West Helena (founded 1909, incorporated 1917). Helena is the seat of Phillips County Community College (1965). St. Francis National Forest is immediately to the north. Inc. town, 1833; city, 1856. Pop. (1980) 9,598.

Helena, city and capital of Montana, U.S., seat (1867) of Lewis and Clark County, near the Missouri River, at the eastern foot of the Continental Divide (elevation 3,955 ft [1,205 m]), in Prickly Pear Valley, a fertile region surrounded by rolling hills and lofty mountains. Mounts Helena (5,462 ft) and Ascension (5,360 ft) form scenic backdrops. The area was first visited by the expedition of Meriwether Lewis and William Clark in 1805. Gold was discovered (July 1864) in Last Chance Gulch, now occupied by the city's main street. The town (named for Helena, Minn.) was founded on Oct. 30, 1864. It became capital of the territory in 1875 and of the state in 1889. By 1893 the mining boom (based on gold, silver, and lead) passed, and future prosperity came in cycles—with the building of the Canyon Ferry, Hauser, and Holter dams on the Missouri River (1900–10); with the renewal of mining activities following the demand for metals in World War I; and with the piping of natural gas from surrounding fields. Damage caused by earthquakes in 1935, 1936, and 1937 was rapidly repaired.

In addition to state government activities, Helena is an agricultural and livestock trade centre and has light manufactures. It is the



State Capitol, Helena, Mont.

David Muench—EB Inc.

headquarters of Helena National Forest, and tourism is an added source of income. Adjacent East Helena has smelting and refining works. Helena is the seat of the Roman Catholic Carroll College (1909) and of the Montana Historical Society (with a museum and art gallery). The capitol building has a copper-covered dome surmounted by a reproduction of the Statue of Liberty. Nearby are several state recreation areas. Inc. 1881. Pop. (1980) 23,938.

Helena, SAINT, also called HELEN (b. *c.* 248, Drepanon?, Bithynia, Asia Minor—d. *c.* 328, Nicomedia; Western feast day August 18; Eastern feast day [with Constantine] May 21), Roman empress who was the reputed discoverer of Christ's cross.

Helena was married to the Roman emperor Constantius I Chlorus, who renounced her for political reasons. When her son Constantine I the Great became emperor at York (306), he made her empress dowager, and under his influence she later became a Christian. She was devoted to her eldest grandson, Crispus Caesar, whom Constantine made titular ruler of Gaul, but a mysterious embroilment in the imperial family culminated with the execution of Crispus and Fausta, Constantine's second wife and Crispus' stepmother. Thereafter, the story became current that Fausta had accused Crispus of attempting to seduce her—hence Crispus' execution (326). Fausta, in turn, was denounced by the grief-stricken Helena and was executed shortly afterward. Immediately after the double tragedy Helena made a pilgrimage to the Holy Land. She caused churches to be built on the reputed sites of the nativity and of the Ascension.

Before 337 it was claimed in Jerusalem that Christ's cross had been found during the building of Constantine's church on Golgotha. Later in the century Helena was credited with the discovery. Many subsequent legends developed, and the story of the "invention," or the finding of the cross, enhanced by romances and confusions with other Helens, became a favourite throughout Christendom.

Helenus, in Greek legend, son of King Priam of Troy and his wife Hecuba, brother of Hector, and twin of the prophetess Cassandra. According to Homer he was a seer and warrior. After the death of Paris in the Trojan War, Helenus paid suit to Helen but was rejected and withdrew in indignation to Mt. Ida, where he was captured by the Greeks. Other accounts, however, relate that Odysseus captured him, or he surrendered voluntarily in disgust at the treacherous murder of Achilles. He told the Greeks that in order to capture Troy they must do three things: gain possession of the Trojans' image of Pallas Athena (the Palladium), obtain the bow of Heracles, and have the help of Achilles' son Neoptolemus. Helenus and Andromache, his brother Hector's widow, were later taken by Neoptolemus to Epirus. After Neoptolemus' death, Helenus married Andromache and became ruler of the country.

Helga, SAINT: *see* Olga, Saint.

Helgaud, also spelled HELGALDUS (d. 1048), French Benedictine monk at the abbey of Fleury-sur-Loire whose major work, *Epitoma vitae Roberti regis,* is an artless, historically unreliable biography of the French king Robert II the Pious.

Exhibiting more adulation than knowledge of the King, Helgaud related how Robert cured blind men and allowed himself to be robbed by beggars. Nevertheless, Helgaud furnishes a few details of the little-known reign and private life of Robert.

He also wrote a history of the founding of the abbey at Fleury-sur-Loire in the 7th century. The text of his works is printed by J.-P. Migne in *Patrologia Latina* (vol. 141, 1844).

Helgesen, Paul, Latin PAULUS HELIE, PAULUS ELIAE, or PAULUS ELIESEN (b. *c.* 1485, Varberg, Danish Sweden—d. *c.* 1535), Danish Humanist and champion of Scandinavian Roman Catholicism who opposed the Lutheran Reformation in Denmark. The author of several works against Scandinavian Reformers, he also translated works by the Dutch Humanist Erasmus and wrote the Skiby chronicle, a discussion of Danish religious and political events of his time. He refused to break with the pope and the Roman Catholic Church but criticized the worldliness of the church and the selling of indulgences.

A Carmelite monk, he was professor of theology at the University of Copenhagen (1519–22) and was provincial (province superior) of the Scandinavian Carmelites (1522–34).

Helgoland, also spelled HELIGOLAND, island, Schleswig-Holstein *Land* (state), northwestern Germany. It lies in the Deutsche Bucht (German Bay) of the North Sea, in the angle between the coast of Schleswig-Holstein and the estuaries of the Jade, Weser, and Elbe rivers 40 mi (65 km) offshore northwest of Cuxhaven. The island area, 520 ac (210 ha), consists of a level, cliff-girded, red sandstone plateau, called the Oberland (184 ft [56 m] at highest point); a smaller, low sandy tract in the southeast, the Unterland, extended by reclamation; and a low sandy island ¼ mi east, called Düne. Geological and historical evidence suggest that Helgoland and Düne are the last remnants of a single island whose periphery in AD 800 was about 120 mi (190 km). Continuous wave attack on the cliffs and a rise in sea level or fall in land level had reduced the island's periphery to about 8 mi by 1649. It has an oceanic climate with mild winter temperatures.

Occupied originally by Frisian herdsmen and fishermen, the island came under the control of the dukes of Schleswig-Holstein in 1402 and became a Danish possession in 1714. Seized by the British navy in 1807, it was formally ceded in 1814 to Britain, which in 1890 transferred it to Germany in exchange for Zanzibar and other African territories. The Germans developed the island into the "Gibraltar of the North Sea" with a great naval base, extensive harbour and dockyard installations, underground fortifications, and coastal batteries. In constant use by German naval forces in World War I, the military and naval works were demolished in 1920–22 in accordance with the Treaty of Versailles, and the island became a popular tourist resort. Under the Nazi regime, however, it was again made a naval stronghold and sustained severe Allied bombing toward the end of World War II. Before its destruction, the town of Helgoland extended from the Unterland to the Oberland, where the church occupied the highest point of the island. With the defeat of Germany, the population was evacuated, and the British occupation authorities destroyed the remaining fortifications by deep blasting that changed the physical character of much of the island. It was used as a bombing range by the Royal Air Force until it was returned to West Germany on March 1, 1952. The town, the harbour, and the bathing resort on Düne have been rebuilt. The island is used in navigation and scientific research, especially the study of birds. Pop. (1983 est.) 2,011.

Red sandstone cliffs on the coast of Helgoland, Germany

Hans Huber

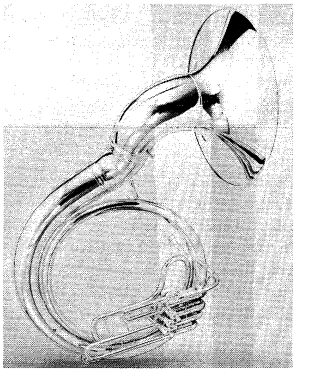
Helgoland-Zanzibar Treaty: *see* Zanzibar Treaty.

Heliand (Old Saxon: Saviour), epic on the life of Christ in Old Saxon alliterative verse dating from about 830. It attempted to make the newly imposed Christian religion intelligible to the warlike Saxons. Christ was made a Germanic king who rewarded his retainers (the disciples) with arm rings; Herod's feast became a drinking bout; and Nazarethburg, Bethleemaburg, and Rumuburg had the homely familiarity of Saxon towns.

The poem consists of almost 6,000 lines. A Latin commentary, published in 1562 and usually dated to the 9th century, stated that *Heliand* was undertaken by an unnamed, eminent Saxon poet at the behest of Louis the Pious, who reigned 813–840.

Heliand, extant in four manuscripts, and the fragmentary Old Saxon *Genesis* are all that remain of Old Saxon poetry.

helicon, also called SOUSAPHONE, a bass or contrabass tuba built in a spiral circular form and resting on the shoulder. It is believed to have been invented in Russia but was perfected in 1849 by Ignaz Stowasser in Vienna. The helicon is chiefly used in military bands.



Sousaphone, a helicon with a removable bell

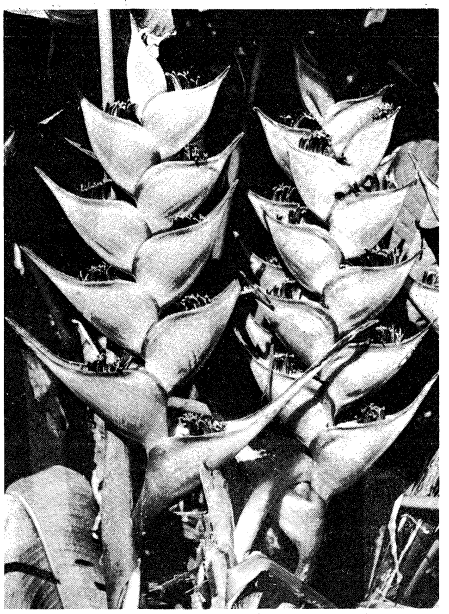
By courtesy of Conn Corporation, Oak Brook, Ill.

In the United States, where the bandmaster John Philip Sousa introduced a removable bell, it is usually known as a sousaphone.

Helicon, Mount, Modern Greek ÓROS ELIKÓN, mountain of the Helicon range in Boeotia, Greece, between Límni (lake) Kopaïs and the Gulf of Corinth. A continuation of the Parnassus range, which rises to about 8,000 ft (2,400 m), the Helicon range reaches only about 5,000 ft. The mountain was celebrated in classical literature as the favourite haunt of the Muses, and its eastern, or Boeotian, side was particularly sacred. On those fertile eastern slopes stood a sacred temple and grove adorned with numerous statues, eventually taken by Constantine the Great to adorn his new city, Constantinople. Nearby were the fountains Aganippe and Hippocrene, the latter in legend created by the imprint of the hooves of the winged horse Pegasus. The 2nd-century-AD Greek geographer Pausanias described Helicon as the most fertile mountain in Greece. His descriptions made it possible to reconstruct the classical topography and led to the discovery of an ancient theatre at Thespiae (modern Thespiaí).

Heliconia, the only genus of the family Heliconiaceae, with approximately 120 species in

tropical America and the western Pacific. The large perennial herbs have brightly coloured bracts (leaf-shaped structures) and bear numerous flowers. The fruit is bluish.



Heliconia
W.H. Hodge

These attractive plants have stout or reed-like stems. The banana-like leaves sometimes show a coppery sheen, and the midrib may be ivory and pink. One colourful species, *H. psittacorum,* named for its resemblance to a parrot's plumage, has greenish yellow flowers with black spots near the tips and red bracts.

helicopter, aircraft with one or more power-driven horizontal propellers or rotors that enable it to take off and land vertically, to move in any direction, or to remain stationary in the air. It is often described as a rotary-wing aircraft in contrast to conventional fixed-wing airplanes. A helicopter does not require a runway but can land on, and take off from, small areas that are inaccessible to most fixed-wing aircraft. It can land in a small clearing in the jungle, on the deck of a ship, or on suitable flat roofs. Its ability to hover motionless over a given area enables it to deliver or take on personnel or cargo without actually landing.

U.S. Army CH-37 helicopter lifting a tank
By courtesy of Sikorsky Aircraft

Because of its versatility, the helicopter is used extensively by the armed forces for transportation of troops into otherwise inaccessible areas; for rescue and medical evacuation; and for communication, surveillance, and search at sea and on land. It proved its military value during the Korean War (1950–53), when it was used to evacuate thousands of wounded men from the front lines. Its commercial uses include short-haul transportation between city centres and outlying airports, transportation into undeveloped or inaccessible areas, crop dusting, surveying, and exploration. The helicopter also gained widespread publicity as a result of its lifesaving activities in civil emergencies, particularly those resulting from floods and earthquakes. With the increasing congestion of ground transportation, there is a promising future for the helicopter in the field of commuter travel.

The helicopter was one of the earliest ideas for flying. For many years Leonardo da Vinci was credited with the original idea, but it is now known that the Chinese and the Renaissance Europeans made helicopter toys before Leonardo's time. Various experimenters before 1900 failed with helicopters because they lacked an engine powerful enough to produce the vertical thrust required to raise its own weight plus some useful load from the ground. Thus, these early designers never became aware of the difficult in-flight control problems that would perplex later experimenters.

It was not until 1907 that the first manned helicopter, built by Paul Cornu, made a brief vertical flight. Controlled vertical and forward flight by a helicopter was finally attained in 1930, and in 1939 Igor Sikorsky established the practical single-rotor helicopter with record-breaking flights of his VS-300. In 1923 the Spaniard Juan de la Cierva had successfully flown an autogiro (*q.v.*) for the first time. It was the technical innovations introduced by Cierva that paved the way for Sikorsky's first successful prototype of 1939. Once the basic principles of helicopter design had been established, development was rapid on both sides of the Atlantic.

Helicosporidium, protozoan parasite genus found in insects. It is the only genus of the cnidosporidian order Helicosporida. The young live in the body cavity, fat, or nervous tissue of the host insect. The life cycle, which is not fully known, includes a sexual period of multiple division followed by spore formation from uninucleate individuals.

Helie, Paulus: *see* Helgesen, Paul.

Heligoland (Germany): *see* Helgoland.

heliocentric system, any theoretical model of the solar system (or of the universe) in which it is assumed that the Sun lies at or near the centre and the Earth is included with other bodies revolving around it. The Greek philosopher Philolaus in the 5th century BC (and perhaps Hicetas of Syracuse, a century later) held that the Earth was a sphere revolving daily around a "central fire," which was, however, not the Sun. Aristarchus of Samos, about 270 BC, is the first known to have proposed that the Earth moves around the Sun.

For many centuries the geocentric (Earth-centred) system of Ptolemy of Alexandria (2nd century AD) was generally accepted. Nicholas of Cusa in the 15th century AD argued for the movement of the Earth; and the heliocentric theory was gradually reestablished after being put forward again by Copernicus in 1543. Galileo's espousal of it resulted in his famous trial before the Inquisition in 1633. *See also* geocentric system; Tychonic system.

Heliodorus OF EMESA (fl. 3rd century AD), Greek writer from Emesa in Syria, author of the *Aethiopica,* the longest and most readable of the extant ancient Greek novels.

The *Aethiopica* tells the story of an Ethiopian princess and a Thessalian prince who undergo a series of perils (battles, voyages, piracy, abductions, robbery, and torture) before their eventual happy marriage in the heroine's homeland. The work, written in an imitation of pure Attic dialect, shows an uncommon mastery of narrative technique. The development of the plot is masterful; in spite of its amplitude, its complexity, and its large cast of characters, the story never becomes confused. Through flashbacks, the appropriate linking of accessory episodes, and surprises intervening at the right moment, the tension of the narrative is never relaxed. The characterization, however, is rather weak. The *Aethiopica* is pervaded throughout with the author's deep religious faith, which centres in the book on the sun-god Helios, who is identified with Apollo. The *Aethiopica* was popular with Byzantine and Renaissance critics because of its good entertainment value and high moral tone and was used as a model by the Italian poet Torquato Tasso and the Spanish author Cervantes.

helioflagellate, freshwater protozoan of the order Rhizomastigida, class Zoomastigophorea. Helioflagellates sometimes are considered relatives of the heliozoans (organisms having pseudopodia but no flagella) because of their slender radiating cytoplasmic masses called pseudopodia. The cores of the pseudopodia of some genera of helioflagellates radiate from a central granule as they do in some heliozoans. Helioflagellates' life cycles involve alternations between flagellate and heliozoan phases. They reproduce asexually by binary fission. Members of the representative genus *Ciliophrys* are spherical in shape and have very slender pseudopodia; those of the genus *Dimorpha* are oval in shape. Formerly, helioflagellates were classified as the order Helioflagellidia (subphylum Sarcodina).

Heliogabalus (Roman emperor): *see* Elagabalus.

Hélion, Jean (b. April 21, 1904, Couterne, Orne, Fr.—d. Oct. 27, 1987, Paris), French painter noted for his abstract paintings.

Hélion initially studied engineering and architecture in Lille and then went to Paris, where he became interested in painting. After being introduced to Cubism in the mid-1920s, he adopted abstraction in his own painting. He became acquainted with Piet Mondrian and also with Theo van Doesburg, with whom he helped found the Art Concret group of artists. He was also active in the Abstraction-Création group in the early 1930s. Hélion became a leading figure in French nonobjective painting in the 1930s with his sophisticated compositions of large and oddly curving flat planes arranged in sequences against a background of flat colour. These paintings are notable for their subtle harmonies of cool and pastel colours and the mechanistic connotations of their monumental shapes.

Hélion joined the French Army in 1940, was taken prisoner by the Germans, and escaped in 1942 from a prison camp to eventually reach the United States. He returned to France after the end of World War II but thereafter abandoned pure abstraction in his work. He began using figurative elements in his paintings and eventually became a somewhat mannered painter of scenes from everyday life. Hélion's book *They Shall Not Have Me* (1943) described his wartime adventures.

heliopause, boundary of the heliosphere, the teardrop-shaped region around the Sun that is filled with solar-magnetic fields and outward-moving solar gas consisting of protons and electrons. Outside the heliopause lies the heliosheath, a region of transition between the heliosphere and the hydrogen atoms and galactic magnetic fields of the local interstellar medium. The tail of the heliopause is theoretically estimated to be between 50 and 100 astronomical units from the Sun. The shape of the heliopause fluctuates and is influenced by a wind of interstellar gas produced by the Sun's motion through it. The orbits of all the major planets, including the Earth, lie well within the heliopause.

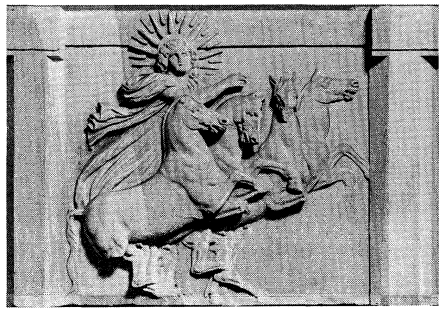
Heliopolis (Greek), Egyptian IUNU, or ONU (Pillar City), biblical ON, one of the most an-

cient Egyptian cities, seat of worship of the sun god, Re. Capital of the 15th nome of Lower Egypt, it was important as a religious rather than as a political centre. The great temple of Re was second in size only to that of Amon at Thebes, and its priesthood wielded great influence, particularly during the 5th dynasty, when the worship of Re became the state cult. In the New Kingdom, the temple of Re-Horakhte became the repository of royal records.

Little remains today of this great city. The sole surviving monument is the obelisk of Sesostris I at Al-Maṭarīyah, the oldest obelisk in existence. Of the pair erected by Thutmose III, now known as Cleopatra's Needles, one stands on the Thames embankment in London and the other in Central Park, New York City.

Heliopolis (ancient Syria): *see* Baalbek.

Helios (Greek: "Sun"), in Greek religion, the sun god. He drove a chariot daily from east to west across the sky and sailed around the northerly stream of Ocean each night in a huge cup. In classical Greece Helios was especially worshiped in Rhodes, where from at least the early 5th century BC he was regarded as the chief god, to whom the island belonged.



Helios in his chariot, relief sculpture, excavated at Troy, 1872; in the Staatliche Museen zu Berlin
By courtesy of the Staatliche Museen zu Berlin

His worship spread as he became increasingly identified with other deities, often under eastern influence.

From the 5th century BC, Apollo, originally a deity of radiant purity, was more and more interpreted as a sun god; during the Roman Empire the sun itself came to be worshiped as the Unconquered Sun.

Helios, either of two unmanned solar probes developed by West Germany in cooperation with the U.S. National Aeronautics and Space Administration (NASA). Helios 1 and Helios 2 were launched by NASA from the John F. Kennedy Space Center in Cape Canaveral, Fla., on Dec. 10, 1974 and Jan. 15, 1976, respectively. Both probes traveled closer to the Sun than any other spacecraft: Helios 1 passed within 28,000,000 miles (45,000,000 km) and Helios 2 within 27,000,000 miles (43,400,000 km). Equipped with special heat-dispersal systems, the probes were able to withstand extremely high temperatures, which reached an estimated 700° F (370° C). Both spacecraft returned useful data about the Sun's magnetic field and the solar wind in addition to measurements of cosmic rays from a variety of sources.

heliostat, astronomical instrument consisting of a flat mirror that is rotated slowly by a motor to reflect the Sun continuously into a fixed telescope or in a fixed direction. In traditional heliostats, the mirror is mounted to rotate about an axis through the centre of its front surface pointing to a celestial pole. The mirror is turned at a rate of one revolution in 24 hours, and the reflection of the Sun off its surface is along that polar axis. The telescope image of the Sun is thus stationary but rotates every 24 hours.

Portable heliostats are useful in eclipse expeditions because they eliminate the need to mount telescopes equatorially. Certain large models at permanent installations have been employed to track both the Sun and other stars.

heliotrope (genus *Heliotropium*), any of about 250 species of tropical or temperate, mostly

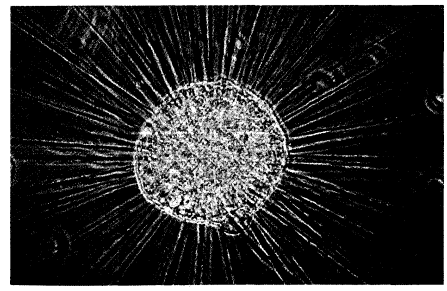
Garden heliotrope (*Heliotropium arborescens*)
Walter Dawn

herbaceous plants distributed throughout the world, belonging to the family Boraginaceae. There are many weedy species.

The best known is garden heliotrope (*H. arborescens*), a shrubby perennial up to 2 m (over 6 feet) tall but usually less. It has fragrant, purple to white, flat-clustered, five-lobed flowers in coiled sprays, similar to forget-me-nots.

heliotrope (petrology): *see* bloodstone.

heliozoan, any member of the protozoan subclass Heliozoia (class Actinopodea). These spherical, mostly freshwater organisms are found either floating or stalked, often enveloped by a shell (or test) composed of separate scales. Genera without tests have many peripheral vacuoles. The numerous radiating cytoplasmic masses, called pseudopodia (axopodia), are used more for capturing food than for locomotion. Heliozoans ingest protozoans, algae, and other small organisms and reproduce asexually by binary fission or by budding. Flagellated forms, which may be gametes, have been described in several genera. *Actinophrys sol* is a common species often referred to as the sun animalcule. *Acanthocystis turfacea* is a similar species commonly called the green sun animalcule because its body is coloured by harmless parasitic green algae (zoochlorellae). *Actinosphaerium* species are multinucleate, often reaching a diameter of 1 mm (0.04 inch).



Heliozoan *Actinosphaerium eichhorni* (highly magnified)
Eric V. Grave

helium (He), chemical element, inert gas of Group 0 (noble gases) of the periodic table. The second lightest element (only hydrogen being lighter), helium is a colourless, odourless, and tasteless gas that becomes liquid at −268.6° C (−452° F). Only under increased pressure (approximately 25 atmospheres) does helium solidify. Below 2.17 kelvins, the isotope helium-4 has unique properties: it becomes a superfluid (its viscosity vanishes) and its thermal conductivity becomes more than 1,000 times greater than that of copper. In this state it is called helium II to distinguish it from normal liquid helium I. Chemically inert, helium does not form compounds, and its molecules consist of single atoms.

Helium was discovered (1868) in the gaseous atmosphere surrounding the Sun by Joseph Norman Lockyer, who observed a yellow line in the solar spectrum not accountable by any element then known on Earth. Lockyer used the Greek word for sun, *hēlios,* in naming the element. Sir William Ramsay discovered helium on Earth (1895) in a uranium-bearing mineral (cleveite); a unique bright-yellow line in its spectrum matched that observed in the spectrum of the Sun.

Second in abundance to hydrogen in the cosmos, helium is concentrated in stars, where it is synthesized from hydrogen by nuclear fusion. Although helium occurs in the Earth's atmosphere only to the extent of one part in 186,000 (0.0005 percent), and small amounts occur in radioactive minerals, meteoric iron, and mineral springs, great volumes of helium are found as a component (up to 7.6 percent) in natural gases in the United States (especially in Texas, New Mexico, Kansas, Oklahoma, Arizona, and Utah). Smaller supplies have been discovered in Canada, the Soviet Union, South Africa, and in the Sahara Desert.

The helium present on Earth is not a primordial component of the Earth but has been generated by radioactive decay. Alpha particles, ejected from the nuclei of heavier radioactive substances, are nuclei of the isotope helium-4. Unlike argon gas, helium does not accumulate in large quantities in the atmosphere because Earth's gravity is not sufficient to prevent its gradual escape into space. The trace of the isotope helium-3 on Earth is attributable to the negative beta decay of the rare hydrogen-3 isotope (tritium). Thus, the helium found in large quantities on Earth consists of a mixture of two stable isotopes: helium-4 (99.99987 percent) and helium-3 (0.00013 percent).

Helium gas (98.2 percent pure) is isolated from natural gas by liquefying the other components at low temperatures and under high pressures. Adsorption of other gases on cooled, activated charcoal yields 99.995 percent pure helium. Helium is used as an inert-gas atmosphere for welding metals such as aluminum; in rocket propulsion (to pressurize fuel tanks, especially those for liquid hydrogen, because only helium is still a gas at liquid-hydrogen temperature); in meteorology (as a lifting gas for instrument-carrying balloons); in cryogenics (as a coolant because liquid helium is the coldest substance); and in high-pressure breathing operations (mixed with oxygen, as in scuba diving and caisson work, especially because of its low solubility in the bloodstream). Meteorites and rocks have been analyzed for helium content as a means of dating.

atomic number	2
atomic weight	4.0026
melting point	none
boiling point	−268.6° C (−452° F)
density (1 atm, 0° C)	0.1785 g/litre
valence	0
electronic configuration	2 or $1s^2$

helium dating, method of age determination that depends on the production of helium during the decay of the radioactive isotopes uranium-235, uranium-238, and thorium-232. Because of this decay, the helium content of any mineral or rock capable of retaining helium will increase during the lifetime of that

mineral or rock, and the ratio of helium to its radioactive progenitors then becomes a measure of geologic time. If the parent isotopes are measured, the helium dating method is referred to as uranium–thorium–helium dating; if only the alpha-particle emission and helium content are measured, the method is called the alpha-helium radioactive clock. Alpha particles are the nuclei of helium atoms emitted from the nucleus of the radioactive progenitor.

Before the use of mass spectrometry in isotopic geochronology, helium dating provided most of the dates used in the early geologic time scales. Helium ages, however, tend to be too low because the gas escapes from the rock. A thermal event that will leave most radioactive clocks relatively unaffected may have a drastic effect on the helium radioactive clock. In the future, helium dating may be found very useful for dating rocks of the late Cenozoic and Pleistocene, because rocks and minerals of this age have not been subject to the complex history of older rocks and minerals; thus, all the helium is more likely to have been retained. Fossils, as well as minerals and rocks, may be dated by helium dating. The relatively large amount of helium produced in rocks may make it possible to extend helium dating to rocks and minerals as young as a few tens of thousands of years old.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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hell, the abode or state of being of evil spirits or souls that are damned to postmortem punishment. Derived from an Anglo-Saxon word meaning "to conceal," or "to cover," the term hell originally designated the torrid regions of the underworld, though in some religions the underworld is cold and dark.

The concept of a state of being or place that separates the good from the evil or the living from the dead is found in most religions of the world. In religions of ancient and primitive peoples, the dwelling place of the dead as the destiny of the soul might be a gloomy subterranean realm or a distant island (*e.g.,* the Greek Hades); a deep abyss in the lower world in which the souls of persons are punished (*e.g.,* the Greek Tartarus); a dark region in the lower world in which both good and evil souls continue to exist as shades in constant thirst (*e.g.,* the ancient Israelite Sheol); an underworld of cold and darkness (*e.g.,* the Norse Niflheimr, also called Hel); a celestial dwelling place in which the souls of the departed reside (as with the Pueblo Indians, who upon death become clouds and, thus, bringers of rain); or a nebulous existence in which the soul might eventually fade into nonexistence (as with the North American Indian hunting tribes).

"The Jaws of Hell," illumination from the Psalter of Henry of Blois (MS. Cotton Nero CIV, folio 39); in the British Library

By courtesy of the trustees of the British Library

The view that hell is the final dwelling place of the damned after a Last Judgment is held by the Western prophetic religions: Zoroastrianism, Judaism, Christianity, and Islām. In Zoroastrianism, a religion founded by the 6th-century-BC Iranian prophet and reformer Zoroaster, the soul at death waits three nights to be judged and on the fourth day goes to the Bridge of the Requiter, where his deeds in life are weighed. If the good outweighs the evil, the soul crosses the bridge, which becomes broad, and goes to heaven; if the evil deeds are greater, the bridge becomes too narrow to cross and the soul falls into a freezing and ill-smelling hell to suffer torment and chastisement until the Resurrection. For those whose good and evil deeds are equal is reserved *hamēstagān* ("the place of the mixed"), wherein such souls suffer from both heat and cold. *Hamēstagān* corresponds to the Christian concept of purgatory (*q.v.*).

Judaism, as it developed from Hellenistic times, viewed hell in terms of Gehenna (*q.v.*), an infernal region of punishment for the wicked. The Christian view of hell, based on Jewish concepts, regarded hell as the fiery domain of the devil and his evil angels, a place of eternal damnation for those who have lived a life of sin and who thereby deny God. Some early Christian thinkers, such as Origen of Alexandria and Gregory of Nyssa, questioned the eternity of hell and the literalistic view that hell was a place of a fiery afterlife. The majority of Christian thinkers, however, taught that hell is a state of punishment for those who die unrepentant of their sins. Some modern theologians have again questioned the literalistic view but still hold that hell is, at least, a state of separation of the wicked from the good.

Islām, basing its concepts of hell, *Jahannam* (*q.v.*), on Zoroastrianism, Judaism, and Christianity, describes it as a huge crater of fire beneath a narrow bridge that all souls must pass over to go to paradise. The damned fall from the bridge and suffer torments, unless Allāh (God) wills otherwise.

In Hinduism, hell is only one stage in a career of the soul. Because all actions have consequences and because of reincarnation, the time spent in one or more of the 21 hells beneath the netherworld is not of ultimate significance. Eventually, the soul will return to the World (or Ultimate) Soul, even though it takes many life periods to do so. The Jaina hell (*bhumis*) is a place where demons torture sinners until any evil accumulated during their lives has been exhausted.

In Buddhism, which denies the existence of both the individual and the World Soul, multiple hells correspond to *karmavacara,* the cosmic realm in which the five senses may be experienced in a variety of bodies and perceptions.

In China, a primarily Buddhist conception of the realm of punishment and expiation after death was accepted and modified by Taoists. Popular notions of hell are based on fictional accounts of journeys to the netherworld, such as *Travels in the West* and the *Life of Yüeh Fei,* and on Buddhist scriptures describing the journeys of mercy taken there by the bodhisattva (one who is destined to be enlightened) Ti-ts'ang. At the moment of death, the dead are conducted by messengers to the god of walls and moats, Ch'eng Huang, who gives the dead a kind of preliminary hearing. The virtuous may go straight to one of the Buddhist paradises; to K'un-lun Mountain, the dwelling place of the Taoist immortals; or to the tenth court of hell for immediate rebirth. After 49 days the sinners descend to the realm of hell, located at the base of Mt. Meru. The courts of the 10 kings (*see* Shih Wang) are in the chief town, Feng-tu. The sinners undergo a fixed period of punishment in one hell or in a series of hells, which can be modified by the intercessions of the merciful Ti-ts'ang. In preparation for their rebirth the dead drink the broth of oblivion and climb onto the wheel of transmigration, which carries them to their next existence. (According to other accounts the dead are thrown off the bridge of pain into a river that sweeps them off to their new destiny.) For the Japanese Buddhist view of hell, *see* Jigoku.

Hell Creek Formation, division of Upper Cretaceous rocks in North America (the Cretaceous Period began about 136,000,000 years ago and lasted about 71,000,000 years). Named for exposures studied on Hell Creek, near Jordan, Mont., it occurs in eastern Montana and portions of North Dakota, South Dakota, and Wyoming. In Montana, the Hell Creek overlies the Lennep Formation and is the uppermost formation of the Cretaceous Period. The Hell Creek consists of about 175 metres (575 feet) of grayish sandstones and shales with interbedded lignites. It was deposited as coastal-plain sediments during the withdrawal of the shallow Cretaceous seas that covered much of the interior of western North America. Fossils in the Hell Creek include the remains of plants and dinosaurs such as *Tyrannosaurus* and *Triceratops* and many small Cretaceous mammals, including the oldest known primates.

Hellabrunn Zoo, German TIERPARK HELLABRUNN, also called GEO-ZOO, zoological garden in Munich. The spacious, wooded, 70-ha (173-ac) grounds resemble the animals' natural habitats. Hellabrunn specializes in breeding species threatened with extinction, such as the Przewalski's horse, and back breeding to species already extinct, such as the aurochs, a wild ox said to have become extinct in the 1620s. Founded in 1928, the zoo is financed by the city. It has more than 4,500 specimens of about 580 species. It is called the Geo-zoo because the animals are grouped according to continent of origin.

Helladic civilization, Late: *see* Mycenaean civilization.

Helland-Hansen, Bjørn (b. Oct. 16, 1877, Christiania, Nor.—d. Sept. 7, 1957, Bergen), Norwegian pioneer of modern oceanography whose studies of the physical structure and dynamics of the oceans were instrumental in transforming oceanography from a science that was mainly descriptive to one based on the principles of physics and chemistry.

Most of Helland-Hansen's work was done in Bergen, where he was successively director of the Marine Biological Station, professor at the Bergen Museum, and first director of the Geophysical Institute, which was established in 1917 largely through his efforts. He was active in international scientific affairs and in 1945 was elected president of the International Union of Geodesy and Geophysics.

Hellanicus OF LESBOS (fl. late 5th century BC), Greek historian whose work marks an advance in the development of historiography. He lived for some time at the court of one of the kings of Macedonia and died at Perperene, in Asia Minor.

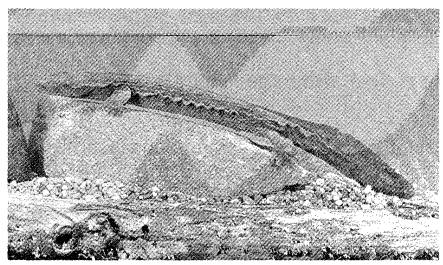
Some 30 works (of which fragments survive) are attributed to him, including *Hiereiai tes Heras en Argei* ("Priestesses of Hera at Argos").

Hellanicus was not content to repeat the traditions that had gained general acceptance through the poets but tried to render them as they were locally remembered and told. By using a few national or priestly lists, he attempted to lay the foundations of a scientific chronology, based primarily on a list of the Argive priestesses of Hera and secondarily on genealogies, lists of magistrates (*e.g.*, the archons at Athens), and Oriental dates, in place of the old reckoning by generations. But his materials were insufficient, and he often fell back on the older methods. Because he deviated so much from common tradition, he was thought untrustworthy by the ancients themselves.

Hellanicus appears to have made no systematic use of inscriptions and, unlike his contemporary Herodotus, never developed a conception of a single current of events wider than local and ethnic distinctions.

Hellas basin, largest recognizable impact feature on the planet Mars, measuring about 1,600 km (990 miles) in diameter. Photographs taken by the U.S. Viking spacecraft (1976–80) revealed that the basin's floor, which was once erroneously thought to be featureless, is the lowest topographic region on Mars, lying some 4 km (2.5 miles) below the planet's mean surface level.

hellbender (*Cryptobranchus alleganiensis*), salamander belonging to the family Cryptobranchidae (order Urodela) found in the larger, swift-flowing streams of the Ohio River system and other streams in the eastern and central United States. The animal grows to about 63 cm (25 inches) long and is stout-bodied and flat-headed, with a broad tail fin and wrinkled sides. The hellbender is typically coloured brownish gray with black spots.



Hellbender (*Cryptobranchus alleganiensis*)
Karl H. Maslowski

Adults breathe with lungs, but a gill slit persists from the larval stage on each side behind the animal's head. The conspicuous wrinkled fleshy folds on the hellbender's body and legs are important in cutaneous respiration, which is the dominant mode. During the day hellbenders lie under stones, but they emerge at night to feed on crayfish, small fishes, worms, and almost any other type of small animal. Mating takes place in late summer, and fertilization is external. The female hellbender lays a string of 300 to 400 eggs on the stream bottom in a nest that is scooped out by the male, who then guards them for the 10–12 weeks before they hatch.

The Ozark hellbender (*C. bishopi*) is somewhat smaller, and its spots tend to be large blotches. It is found in the Black River system of Arkansas and Missouri.

hellebore, member of either of two genera of poisonous herbaceous plants, *Helleborus* and *Veratrum,* some species of which are grown as garden ornamentals.

Helleborus, of the buttercup family (Ranunculaceae), is composed of about 20 species of perennial herbs native to Eurasia, including black hellebore, or Christmas rose (*H. niger*); Lenten rose (*H. orientalis*); stinking hellebore, or bear's foot (*H. foetidus*); and green hellebore (*H. viridis*). Typically, the plants are nearly stemless, with thick roots and long-stalked, divided leaves. The showy flowers, with five petallike sepals, are borne above the foliage.

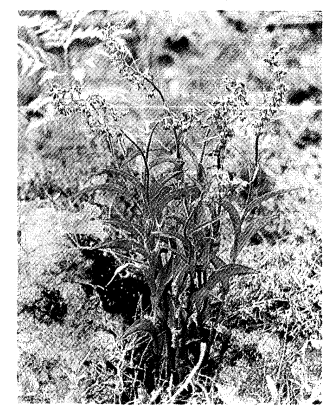
Veratrum, of the lily family (Liliaceae), is composed of about 45 species, better-called false hellebores, native widely in damp areas of the Northern Hemisphere. Included are European white hellebore (*V. album*), once

Green hellebore (*Helleborus viridis*)
G.E. Hyde from The Natural History Photographic Agency—EB Inc.

used as an arrow poison, and American white hellebore (*V. viride*), also called itchweed. The plants have simple, parallel-veined leaves and terminal clusters of small flowers.

helleborine, any member of either of two similar genera of orchids (family Orchidaceae): *Cephalanthera,* with about 14 north-temperate species, and *Epipactis,* with about 24 species native to north-temperate areas, tropical Africa, and Mexico. *Epipactis* has small, stalked flowers borne horizontally or drooping on a flexible spike. *Cephalanthera* has larger, white or bright pink flowers that have no stalks and are held erect. Plants of both genera usually have tall, thin stems and crinkled leaves.

The most common British species of *Cephalanthera* is large white helleborine (*C. damasonium*). It has many long, thick roots. The petals are borne close together, giving the flower a closed appearance. Large white helleborine is self-pollinating and does not require the action of an insect as other *Cephalanthera* species do. Dune helleborine (*Epipactis dunensis*) grows along the sandy coasts of Great Britain and



Helleborine (*Epipactis rubiginosa*)
Ingmar Holmasen

northwestern Europe. Marsh helleborine (*E. palustris*) is found in marshes and wet places throughout Europe. Broad-leaved helleborine (*E. helleborine*) is a common species in Europe and has been introduced into the eastern United States. Its flowers are green, whitish green, or reddish purple.

Hellen, in Greek mythology, king of Phthia (at the northern end of the Gulf of Euboea) and grandson of the god Prometheus; he was the eponymous ancestor of all true Greeks, called Hellenes in his honour. The Hellenes consisted of the Aeolians, Dorians, Ionians, and Achaeans, traditionally descended from and named for Hellen's sons, Aeolus and Dorus, and grandsons, Ion and Achaeus.

Hellenic Republic: *see* Greece.

Hellenistic Age (323–30 BC), in the eastern Mediterranean and the Middle East, the period between the death of Alexander the Great and the conquest of Egypt by Rome. Alexander's exploits had changed the face of the area, and from the breakup of his empire there arose numerous monarchies, most of them ruled by Macedonians, which covered the eastern Mediterranean and the Middle East and were the framework for the spread of Greek (Hellenic) culture, the mixture of Greek and non-Greek populations, and the fusion of Greek and Oriental elements.

A brief treatment of the Hellenistic Age follows. For full treatment, *see* MACROPAEDIA: Greek and Roman Civilizations, Ancient.

Alexander's empire became, after his death, the scene of a long struggle among his generals, most of whom, installed by Alexander as satraps, aimed at breaking up the empire and creating realms of their own. For more than 40 years (323–280 BC) they battled, with shiftings of territories and power; and their conflicts laid the foundations of a new type of monarchial ruler and bureaucratic state and a new civilization of multiple nations united culturally by the Greek language. The three leading realms—the Macedonian (north of Greece), the Seleucid (reaching from Palestine and Anatolia to Persia), and the Ptolemaic (centred in Egypt)—thereafter maintained a balance of power. The ensuing wars and foreign policy signified a constant probing of that balance and were concentrated mainly on the border areas of Syria, Asia Minor, and the Aegean. Greece itself in the 3rd century BC saw the rise of two leagues, the Aetolian (which held central and northern Greece) and the Achaean (which held all the Peloponnese except Sparta and Elis); they gradually extended their power and rivalry and weakened the position of Macedonia.

Culturally the period from about 280 to 160 BC was highly creative, producing the historian Polybius, the mathematician Euclid, the astronomers Aristarchus, Hipparchus, and Seleucus, the geographers Eratosthenes and Poseidonius, and the grammarian Dionysius Thrax. It was the philosophic period of the Epicureans and Stoics and the artistic period that left to posterity such now-famous works as the "Venus de Milo," the "Victory of Samothrace," and the "Laocoon." The museum at Alexandria (not a museum in the modern sense but rather a research institute), with its large library, became the meeting place of scholars and writers. Callimachus, who was the leading Greek poet of the 3rd century BC, was responsible for the catalog of the library. Other cities besides Alexandria also had substantial libraries.

The decline of the Hellenistic states began in the late 3rd century BC and accelerated after 160 BC. It was the moment when "the clouds from the West" began to threaten the Hellenistic world and its balance of power. Rome, by defeating the Illyrian pirates, ruled the Adriatic Sea and became Macedonia's neighbour. In a succession of Macedonian Wars (214–205, 200–196, 171–168, 149–148 BC), Rome defeated and finally conquered Macedonia and Greece. By this time the Seleucid empire had shrunk as a result of dismemberment and loss of territories and allegiances; it was practically confined to Mesopotamia and Syria, with a weak hold on the seven "upper provinces" in the east. A new power, Pontus, on the southern coast of the Black Sea, was flexing its

muscles under Mithradates VI Eupator. Rome stepped in, and, after three Mithradatic Wars (88–85, 83–82, 74–63 BC), the Seleucid empire ceased to exist. Syria and Bithynia (with western Pontus) became Roman provinces, and client-kings were recognized in Armenia, Commagene, Cappadocia, and elsewhere.

Egypt under the Ptolemys limped along, gradually surrendering to Rome such territories as Cyrene (96 BC). The final act of the Hellenistic Age came when Egypt was drawn into the civil war between Octavian (the future Augustus) and Mark Antony. After the deaths of Antony and Cleopatra, Egypt became a province of the Roman Empire (30 BC).

Hellenistic religion, any of various systems of beliefs and practices of eastern Mediterranean peoples from the period of the Greco-Macedonian conqueror Alexander the Great (356–323 BC) to the period of Constantine, the first Christian Roman emperor (d. AD 337).

A brief treatment of Hellenistic religions follows. For full treatment, see MACROPAEDIA: European Religions, Ancient.

The empire that Alexander established constituted most of Europe, the Mediterranean, the Middle East, Africa, Persia, and the borderlands of India. The political and economic unification of such a vast territory opened the way for religious interchange between East and West. Almost every so-called Hellenistic religion occurred in both its homeland and in diasporic centres—the foreign cities in which its adherents lived in minority groups. For example, Isis (Egypt), Baal (Syria), the Great Mother (Phrygia), Yahweh (Palestine), and Mithra (Kurdistan) were worshiped in their native lands as well as in Rome and other cosmopolitan centres.

In many cases, the imposition of Greco-Roman political and cultural forms in disparate regions prompted a conscious revival of ancient religious practices, which became linked to nationalistic or messianic movements seeking to overthrow the foreign oppressors (*e.g.*, the Maccabean rebellion led by Judas Maccabeus against Jewish hellenizing parties and the Syrian overlords in 167–165 BC). Among the dispersed groups, however, ties to the homeland tended to weaken with successive generations, and religion shifted its focus from national prosperity to individual salvation. In terms of transmission, the diasporic groups may be seen as shifting from "birthright" to "convinced" religion.

The archaic religions of the Mediterranean world had been primarily religions of etiquette, in which the interrelationships among people, between the people and the gods, between individuals and the state, and between the living and the dead were all seen to mirror the divine order of the cosmos, which in turn was discernible through astrology, divination, oracles, and other occult practices. In the Hellenistic period, such an emphasis on conformity no longer spoke to the needs of displaced and subjugated peoples. The formerly revered law and order of the cosmos came to be viewed as an evil, perverse, and confining structure from which to be liberated. Most Hellenistic religions offered a highly dualistic cosmology in which the earthly realm in all its aspects—from despotic rulers to one's own body—constituted the imprisoning power of evil over the soul. Liberation was attainable through cultic activity, secret knowledge (*gnōsis*), and divine intervention (*see* Gnosticism).

The esotericism to which these changes led, emphasizing radical reinterpretation of the sacred texts and rigid codification of dogma, creeds, and means of admission, was met with deep suspicion by the Greco-Roman authorities. Attempts were made to expel foreigners or suppress foreign worship, and the emperor Augustus, among others, sought to revive traditional Roman religious practices. Externally, the heightened tension between Greco-Roman authority and the "new" Eastern religions expressed itself in wars, riots, and persecutions. The emergence of "emperor worship" with the deification of Augustus in AD 14 further escalated the animosity.

The dominant feature of the decline of Hellenistic influence was the rapid spread of Christianity throughout the Roman Empire, culminating in the conversion of the emperor Constantine in 313. In this period the various Hellenistic cults were persecuted and eventually extinguished, although their influence continued even within Christianity. Hellenistic philosophy (Stoicism, Cynicism, Neo-Aristotelianism, Neo-Pythagoreanism, and Neoplatonism) provided key formulations for Jewish, Christian, and Muslim thought through the 18th century. Hellenistic magic, theurgy, astrology, and alchemy remained influential until modern times in both East and West. And many formal aspects of Hellenistic religion—from art and architecture to modes of worship to forms of literature—persist in the Jewish and Christian traditions today.

Hellenistic romance, adventure tale, usually with a quasi-historical setting, in which a virtuous heroine and her valiant lover are separated by innumerable obstacles of human wickedness and natural catastrophe but are finally reunited. A precursor of the modern novel, the Hellenistic romance is the source for classic love stories, such as those of Hero and Leander, Pyramus and Thisbe, Sappho and Phaon, and Daphnis and Chloë.

Introduced in the 1st century BC, the form reached its height in the 2nd and 3rd centuries AD in the works of writers such as Chariton, Xenophon, Longus, and Heliodorus. It combined elements of the imaginative rhetorical exercise, popular Alexandrian poems and tales of love and adventure, the erotic Milesian adventure tale, Utopian stories, and travel narratives. An example of the Hellenistic romance is Chariton's *Chaereas and Callirhoe* (2nd century), a tale of lovers who marry and quarrel but are finally reunited.

Heller, Joseph (b. May 1, 1923, Brooklyn, N.Y., U.S.), American writer whose novel *Catch 22* (1961) was one of the most significant works of protest literature to appear after World War II. The satirical novel was both a critical and a popular success, and a film version appeared in 1970.

Heller flew 60 combat missions as a bombardier with the U.S. Air Force in Europe. He received an M.A. at Columbia University in 1949 and was a Fulbright scholar at the University of Oxford (1949–50). He taught English at Pennsylvania State University (1950–52) and worked as an advertising copywriter for the magazines *Time* (1952–56) and *Look* (1956–58) and as promotion manager for *McCall's* (1958–61), meanwhile writing *Catch 22* in his spare time. The plot of the novel centres on the antihero Captain John Yossarian, stationed at an airstrip on a Mediterranean island in World War II, and portrays his desperate attempts to stay alive. The "catch" in *Catch 22* involves a mysterious Air Force regulation, which asserts that a man is considered insane if he willingly continues to fly dangerous combat missions; but, if he makes the necessary formal request to be relieved of such missions, the very act of making the request proves that he is sane and therefore ineligible to be relieved. The term Catch 22 thereafter entered the English language as a reference to a proviso that trips one up no matter which way one turns.

His later novels including *Something Happened* (1974), an unrelievedly pessimistic novel, *Good as Gold* (1979), a satire on life in Washington, D.C., and *God Knows* (1984), a wry, contemporary-vernacular monologue in the voice of the biblical King David, were less successful. Heller's dramatic work includes the play *We Bombed in New Haven* (1968).

Heller, Robert, original name WILLIAM HENRY PALMER (b. *c.* 1830, England—d. Nov. 28, 1878, Philadelphia), British-born magician who popularized conjuring in the United States. Trained as a musician, Heller turned to magic after he saw a performance by the French magician Robert-Houdin in 1848.

Heller settled in the United States, where he found success as a magician in the 1860s. At first an imitator of his more famous contemporaries, Heller eventually emerged as an entertaining and witty performer whose most famous act was a second-sight (mind-reading) presentation.

Heller, Yom Ṭov Lipmann ben Nathan ha-Levi (b. 1579, Wallerstein, Bavaria [Germany]—d. Sept. 7, 1654, Kraków, Pol.), Bohemian Jewish rabbi and scholar who is best known for his commentary on the Mishna. His works also indicate that he had extensive knowledge of mathematics, the sciences, and other secular subjects.

Raised by his grandfather Moses Wallerstein, a respected rabbi, Heller studied at the yeshiva of Judah Loew ben Bezalel and was appointed a dayan (judge) in Prague at the age of 18. He served as a rabbi to communities in Moravia and Vienna, but he was recalled to Prague in 1627 to the office of the chief rabbinate. At this time, because of involvement in the Thirty Years' War, the Holy Roman emperor Ferdinand II had imposed heavy taxes on the Jews of Bohemia. As chief rabbi, Heller was responsible for overseeing the collection of the tax, a task that aroused bitter opposition within the Jewish community and made him the object of false accusations. Charged with contemning both the state and Christianity, he was heavily fined and briefly imprisoned; he was also forbidden to serve the rabbinate anywhere within the empire.

Later, while serving as a rabbi in Vladimir, Volhynia, Pol., Heller again became the centre of controversy. At a rabbinical conference known as the Council of the Four Lands, he fought for the renewal of a decree preventing the purchase of rabbinical offices, simony being a practice at that time. This aroused the anger of some of the wealthier Jews, who succeeded in obtaining a decree from the governor ordering Heller's expulsion. Although the decree was eventually rescinded, in 1643 Heller accepted an appointment to the chief rabbinate in Kraków, where he lived the remainder of his life.

Among Heller's many written works are an autobiography, *Megillat eyva* ("Scroll of Hate"; first published in 1818), which documented the various communities in which he had lived and included accounts of massacres of Jews in Prague (1618) and the Ukraine (1643). The most famous of his many religious works is his commentary on the Mishna, *Tosafot Yom Ṭov* (1614–17, 2nd ed. 1643–44; "The Additions of Yom Ṭov"). Heller's commentary was intended to serve as a supplement to the commentary of Obadiah of Bertinoro; both works are found in many modern editions of the Mishna.

Hellespont (strait, Turkey): *see* Dardanelles.

Hellman, Lillian (b. June 20, 1905, New Orleans—d. June 30, 1984, Vineyard Haven, Martha's Vineyard, Mass., U.S.), American playwright and motion-picture screenwriter whose dramas bitterly and forcefully attacked injustice, exploitation, and selfishness.

Hellman attended New York public schools and New York University and Columbia University. Her marriage (1925–32) to the playwright Arthur Kober ended in divorce. She had already begun an intimate friendship with the novelist Dashiell Hammett (which would

Lillian Hellman
Brown Brothers

continue until his death in 1961). In the 1930s, after working as book reviewer, press agent, play reader, and Hollywood scenarist, she began writing plays.

Her dramas exposed various forms in which evil appears—a malicious child's lies about two schoolteachers (*The Children's Hour,* 1934); a ruthless family's exploitation of fellow townspeople and of one another (*The Little Foxes,* 1939, and *Another Part of the Forest,* 1946); and the irresponsible selfishness of the Versailles-treaty generation (*Watch on the Rhine,* 1941, and *The Searching Wind,* 1944). Criticized at times for her doctrinaire views and characters, she nevertheless kept her characters from becoming merely social points of view by credible dialogue and a realistic intensity matched by few of her contemporaries. These plays exhibit the tight structure and occasional overcontrivance of what is known as the "well-made play." In the 1950s she showed her skill in handling the more subtle structure of Chekhovian drama (*The Autumn Garden,* 1951) and in translating and adapting (Jean Anouilh's *The Lark,* 1955, and Voltaire's *Candide,* 1957, in a musical version). She returned to the well-made play with *Toys in the Attic* (1960), which was followed by another adaptation, *My Mother, My Father, and Me* (1963; from Burt Blechman's novel *How Much?*). She also edited Anton Chekhov's *Selected Letters* (1955) and a collection of stories and short novels, *The Big Knockover* (1966), by Dashiell Hammett. Her reminiscences, *An Unfinished Woman* (1969), were continued in *Pentimento* (1973) and *Maybe* (1980). Hellman was a longtime supporter of leftist causes, and in *Scoundrel Time* (1976) she detailed her troubles and those of her friends during Joseph McCarthy's anticommunist witch-hunt of the 1950s.

Her *Collected Plays* was published in 1972.

Hells Canyon, gorge of the Snake River in the United States, forming part of the Idaho–Oregon boundary, between the Seven Devils and Wallowa mountains. It has a total length of 125 miles (201 km), along 40 miles (64 km) of which it is more than a mile deep. A maximum depth of 7,900 feet (2,400 m) makes it the deepest gorge on the North American continent. Parts of the canyon are richly coloured in shades of yellow, red, and orange, and in places the walls rise perpendicularly for several thousand feet.

After much controversy between public and private power advocates over damming the Snake River (to help contain downstream floods in the Columbia River), the Idaho Power Company completed three dams in the area—Brownlee (1959), Oxbow (1961), and Hells Canyon (1968). The Hells Canyon-Seven Devils Scenic Area is divided between Wallowa-Whitman National Forest (Oregon) and Nezperce and Payette national forests (Idaho). Hells Canyon, with its surrounding area (662,000 acres [268,000 hectares]), was designated a national recreation area in 1975.

Hellström, (Erik) Gustaf (b. Aug. 28, 1882, Kristianstad, Swed.—d. Feb. 27, 1953, Stockholm), Swedish realist novelist, journalist, and literary critic.

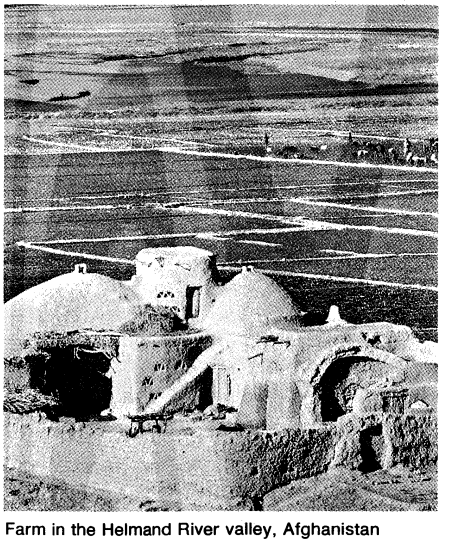
As foreign correspondent for several Scandinavian newspapers, Hellstrom lived in Paris, London, and New York City (1907–35), and these cities form the background for much of his early fiction. His critical studies interpreted European and American culture for Swedish readers. His best work, however, deals with Swedish themes. *Snörmakare Lekholm får en idé* (1927; *Lacemaker Lekholm Has an Idea*), considered his masterpiece, is a family chronicle covering three generations of life in a provincial garrison town. He also wrote a fictionalized autobiography, *Stellan Petreus: en man utan humor* (1921–52; "Stellan Petreus: A Man Without Humour").

Hellweg, plateau and historic corridor in North Rhine-Westphalia *Land* (state), western Germany. It extends east–west from Duisburg to Paderborn, parallel to the northern edge of the Sauerland, and is bounded by the Ruhr (south) and Lippe (north) rivers.

The region centres on and is named for an ancient migration road between the Rhine River and the mountains of the Teutoburger Wald. Several explanations are offered for the derivation of the name Hellweg—it may mean Road to Hell, or it is possibly a corruption of "Halweg" ("Salt Route"), being once part of the medieval salt road from the east. Both a federal highway and a railway line now follow the ancient route. The Hellweg overlaps the Ruhr industrial region in the west and passes eastward through the Soester Börde, a fertile agricultural region, centring on the city of Soest.

Helmand River, also spelled HELMUND, or HILMAND, Persian DARYĀ-YE HELMAND, Latin ERYMANDRUS, river in southwestern Afghanistan and eastern Iran, about 715 miles (1,150 km) long. Rising in the Bābā Range in east-central Afghanistan, it flows southwestward across more than half the length of Afghanistan before flowing northward for a short distance through Iranian territory and emptying into the Helmand (Sīstān) swamps on the Afghan-Iranian border. It receives several tributaries, including the Arghandāb and Tarnak, and drains more than 100,000 square miles (160,000 square km).

The Helmand is one of Afghanistan's most important rivers and has been extensively developed under the Helmand Valley Authority. A reservoir has been built at Kajakī, 50 miles (80 km) above Gereshk, for irrigation and flood control, and just above the same town a dam diverts water to a canal. Below the reservoir much of the river's length is tapped for irrigation, and a fertile, populous belt follows its course. A long-standing dispute between Afghanistan and Iran has centred on Iran's claim to a portion of the Helmand's waters.



Farm in the Helmand River valley, Afghanistan
Carl Purcell

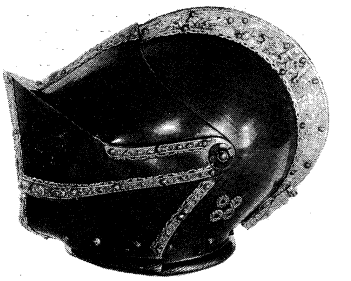
Helmarshausen, Roger of: *see* Theophilus.

Helmbrecht (literary hero): *see* Meier Helmbrecht.

helmet, defensive covering for the head, one of the most universal forms of armour. Helmets are usually thought of as military equipment, but helmets are also worn by firemen, miners, construction workers, riot and motorcycle police, and football and ice-hockey players.

Military helmets date from ancient times. Their basic function was to protect the head, face, and sometimes the neck from the cutting blows of swords, spears, arrows, and other weapons. The Assyrians and Persians had helmets of leather and iron, and the Greeks brought helmetmaking to a pinnacle of craftsmanship with their bronze helmets, some of which covered the entire head, with only a narrow opening in front for vision and breath. The Romans developed several forms of helmets, including the round legionary's helmet and the special gladiator's helmet, with broad brim and pierced visor, giving exceptional protection to head, face, and neck.

In northern and western Europe, early helmets were of leather reinforced with bronze or iron straps and usually took the form of conical or hemispherical skullcaps. Gradually the amount of metal increased until entire helmets were fashioned of iron, still following the same form. About the year 1200 the helm, or heaume, emerged. It was a flat-topped cylinder that was put on over the skullcap just before an engagement; experience soon dictated rounded contours that would cause blows to glance off. At the same time, the skullcap developed into the basinet, with pieces added to protect the neck and with a movable visor for the face. By 1500 several highly sophisticated types of helmets were in use, employing hinges or pivots to permit the piece to be put on over the head and then fitted snugly around head and neck so that it could not be knocked off in combat.



Helmet of the "Blue and Gold" garniture belonging to the future Holy Roman Emperor Maximilian II, 1557; in the Imperial Armoury, Kunsthistorisches Museum, Vienna
By courtesy of the Kunsthistorisches Museum, Vienna

In the 16th and 17th centuries light, open helmets with broad brims became popular. In the 18th and 19th centuries, with the growing effectiveness of firearms and the consequent decline in use of the sword and spear, helmets largely disappeared except for the use of light helmets by cavalry. The steel helmet reappeared, however, as a standard item for infantry in the opening years of World War I because it protected the head against the high-velocity metal fragments of exploding artillery shells. The French first adopted the helmet as standard equipment in late 1914 and were quickly followed by the British, the Germans, and then the rest of Europe. The modern

infantry helmet is a smoothly rounded hemisphere designed to present glancing surfaces off of which bullets or shell fragments will bounce without imparting their full impact. The typical helmet is a hardened-steel shell with an inner textile liner and weighs about 1 to 4 pounds (0.5 to 1.8 kg).

Separate traditions of materials and workmanship used in making military helmets have developed in non-Western parts of the world. Conical iron and steel helmets—developed in medieval Persia, Turkey, and India—are valued as works of art because of their fine forging and delicate damascening. In Tibet and China, helmets of bronze, leather, and horn have been made for centuries, while Japanese helmets with detachable face guards, finely forged and lacquered, have been recognized as outstanding examples of the armourer's craft.

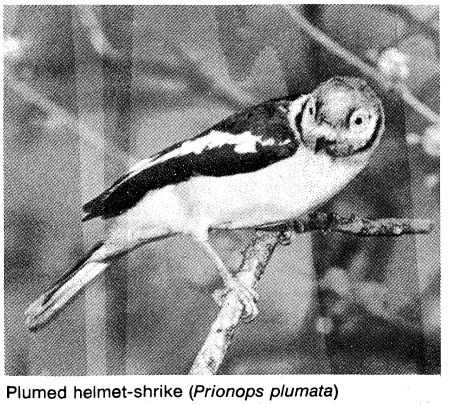
helmet shell, any marine snail of the family Cassidae (subclass Prosobranchia, class Gastropoda), characterized by a large, thick shell with a shieldlike inner lip. An example is the 18-centimetre (7-inch) king helmet (*Cassis tuberosa*) of the Caribbean.

King helmet shell (*Cassis tuberosa*)
Douglas Faulkner

Cameos are carved from helmet shells. Smaller, more rounded cassids (*Phalium*) are called bonnet shells.

helmet-shrike, family name PRIONOPIDAE, any of nine species of African songbirds (order Passeriformes) characterized by a forwardly directed crest on the forehead. Several *Prionops* species, often called red-billed shrikes, were formerly separated in the genus *Sigmodus*. They are about 20 cm (8 inches) long. In all species the plumage is predominately gray, white, and black, accented in some with rufous or buff. The bill is slender and hooked at the tip.

Unlike the more typical shrikes (family Laniidae), with which they are united by some authorities, helmet-shrikes travel in parties of a dozen or more birds, which move through forest vegetation chattering, bill-snapping, fluttering, and gleaning insects. They also breed socially, a single nest often being attended by all of the adults in the flock.



Plumed helmet-shrike (*Prionops plumata*)
Peter Johnson from the Natural History Photographic Agency—EB Inc.

Helmholtz, Hermann von, original name HERMANN LUDWIG FERDINAND HELMHOLTZ (b. Aug. 31, 1821, Potsdam, Prussia [Germany]—d. Sept. 8, 1894, Charlottenburg, Berlin, Ger.), German scientist and philosopher who made fundamental contributions to physiology, optics, electrodynamics, and meteorology. He is best-known for his statement of the law of conservation of energy.

A brief account of the life and works of Hermann von Helmholtz follows; for a full biography, *see* MACROPAEDIA: Helmholtz.

Helmholtz graduated from the Friedrich Wilhelm Medical Institute, Berlin, in 1843. He became professor of physiology at Königsberg in 1849, moved to the chair of physiology at Bonn in 1855, and was made professor of anatomy and physiology at the University of Bonn three years later. In 1871 he took the chair of physics at the University of Berlin and in 1888 was appointed to the additional post of director of the Physico-Technical Institute of Berlin.

Helmholtz's concern for sensory perception is indicated by his two great works, *On the Sensations of Tone as a Physiological Basis for the Theory of Music* (1875, translation) and *Handbook of Physiological Optics* (1867). Toward the end of his life he wrote on the physical meaning of the principle of least action and applied the principle to electrodynamics; he also wrote and lectured on philosophical and aesthetic problems. His position was that of an empiricist, denying the doctrine of innate ideas and holding that all knowledge is founded on experience, hereditarily transmitted or acquired.

Helminthosporium, genus of imperfect fungi (form-class Deuteromycetes, division Mycota) that causes leaf blight, especially of grasses (*e.g.,* bluegrass, corn, oats), in humid areas. Symptoms include grayish green, tan, or brown elliptical spots that appear on lower leaves and spread later to upper leaves. Control is possible through spraying of fungicide and use of resistant plants.

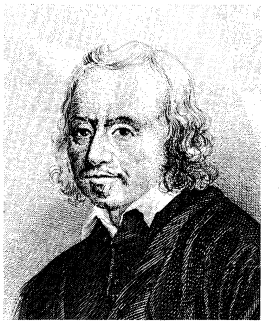
Helmold OF BOSAU (b. *c.* 1120, Lower Saxony [Germany]—d. after 1177, Bosau, Holstein [Germany]), German historian and priest who wrote *Chronica Slavorum* (*Chronicle of the Slavs*). Completed in about 1172, this work was a history of the lower Elbe River region from about 800 to 1170.

Educated at Brunswick (1139–42) under Gerold (later bishop of Oldenburg and Lübeck) and at the Augustinian monastery at Neumünster (1147–53), Helmold became a deacon (*c.* 1150) and priest (1156) at Bosau. *Chronica Slavorum,* written at Gerold's request, recorded the Saxon colonization of the area east of the lower Elbe and the conversion to Christianity of its Slavic inhabitants. The *Chronica* is also important as a contemporary history of the reign (1142–80) of Henry the Lion, Duke of Saxony.

Helmond, *gemeente* (commune), Noordbrabant *provincie,* southeastern Netherlands. It lies along the Aa River and the Zuid-Willems Canal east of Eindhoven. It is a modern industrial town with textile factories, iron foundries, and engineering plants. Helmond's town hall is in a castle (1402), and its Music Hall, housed in a former church, has a collection of barrel organs. There are several wildlife preserves and other castles in the vicinity. Pop. (1987 est.) 63,909.

Helmont, Jan Baptista van, Jan also spelled JOANNES (b. Jan. 12, 1580 [1579, Old Style], Brussels—d. Dec. 30, 1644, Vilvoorde, Spanish Netherlands [now in Belgium]), Belgian chemist, physiologist, and physician who recognized the existence of discrete gases and identified carbon dioxide.

Helmont may be regarded as having bridged alchemy and chemistry. Though mystically inclined and believing in the philosopher's stone, he was a careful observer and exact experimenter. He was the first scientist to recognize the existence of gases distinct



Helmont, engraving by C. Onghena
By courtesy of the Bibliotheque Royale, Brussels

from atmospheric air. In fact, he invented the word "gas," and he perceived that the *spiritus sylvestre* ("wild spirit"; actually carbon dioxide) given off by burning charcoal was the same as that produced by fermenting must, or grape juice. Helmont regarded water as the chief, if not the only, constituent of matter and "proved" his idea by growing a tree in a measured quantity of earth. With the addition of water only, over a five-year period the tree increased in weight by 164 pounds, whereas the soil weight decreased by only a few ounces.

In his researches on digestion and nutrition, Helmont was one of the first to apply chemical principles to the study of physiological problems. For this, he has been called the "father of biochemistry." In his speculations Helmont also introduced a system of supernatural agencies that preside over and direct the affairs of the body, however. At the same time, chemical principles guided him in his choice of medicines—*e.g.,* alkali to correct undue acidity of the digestive juices. His collected works were published in 1648.

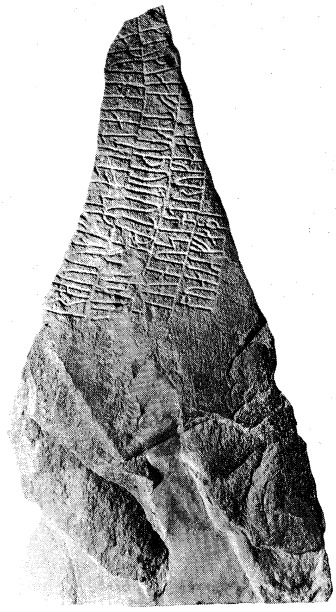
Helmstedt, city, Lower Saxony *Land* (state), north-central Germany, east of Brunswick. Probably founded in the 9th century, it was chartered in 1050, joined the Hanseatic League in 1426, and passed to Brunswick in 1490. In 1576 Julius, Duke of Brunswick, founded a university there that became one of the chief seats of Protestant learning in the 17th century; closed by Jérôme, king of Westphalia, in 1810, it was incorporated into the University of Göttingen.

From 1945 to 1990 Helmstedt was an important frontier post between East and West Germany. Its principal buildings are the Renaissance Juleum (1592–97), the former university; the 13th-century Stephans Church, and the former Ludgerian monastery (founded 9th century). The city's chief products are brown coal, yarn, bricks, and machinery. Pop. (1989 est.) 26,554.

Helmund River (Asia): *see* Helmand River.

Helnaes Stone, runic monument found at Fyn, Den., in 1860; it is among the oldest inscriptions with so-called Danish runes and is the first Danish example of a stone with the memorial formula: "[Person's name] raised this stone in memory of." The monument measures about 6 feet 10 inches (2 m) in height.

Probably carved in about 800, the runic inscriptions say, "Rolf raised this stone, priest and chieftain of the Helnaes dwellers, in mem-



Helnaes Stone

By courtesy of the Royal Danish Ministry for Foreign Affairs, Copenhagen

ory of his brother's son, Gudmund. The men were drowned at sea. Aveir wrote [the runes]."

Héloïse (b. *c.* 1098—d. May 15, 1164, Paraclete Abbey, near Nogent-sur-Seine, Fr.), wife of the theologian and philosopher Peter Abelard, with whom she was involved in one of the best known love tragedies of history. Fulbert, Héloïse's uncle and a canon of Notre-Dame, entrusted Abelard with the education of his brilliant niece (*c.* 1118). The two fell in love and were secretly married after Héloïse returned to Paris from Brittany, where she had given birth to Abelard's son. Her relatives, outraged by the situation, caused Abelard to be attacked and castrated. He became a monk at the monastery of St. Denis, and Héloïse entered the convent at Argenteuil. After the convent dispersed, Abelard gave Héloïse and her nuns the property of the community of the Paraclete (Le Paraclet), which he had been allowed to found. There Héloïse became abbess.

Héloïse was buried beside Abelard at the Paraclete, but the remains of both were removed to the Père-Lachaise cemetery in Paris in the 19th century. Her correspondence with Abelard became part of the extensive literature about their relationship.

helot, a state-owned serf of the ancient Spartans. The ethnic origin of helots is uncertain, but they were probably the original inhabitants of Laconia (the area around the Spartan capital) who were reduced to servility after the conquest of their land by the numerically fewer Dorians. After the Spartan conquest of Messenia in the 8th century BC, the Messenians were also reduced to the status of helots. The helots were in a sense state slaves, bound to the soil and assigned to individual Spartans to till their holdings; their masters could neither free them nor sell them, and the helots had a limited right to accumulate property, after paying to their masters a fixed proportion of the produce of the holding. Owing to their own numerical inferiority, the Spartans were always preoccupied with the fear of a helot revolt. The ephors (Spartan magistrates) of each year on entering office declared war on the helots so that they might be murdered at any time without violating religious scruples. It was the responsibility of the Spartan secret police, the Krypteia, to patrol the Laconian countryside and put to death any supposedly dangerous helots. Sparta's conservative foreign policy is often attributed to the fear of revolts by the helots. During wartime helots attended their masters on campaign and served as light-armed troops, and sometimes also as rowers in the fleet. The Messenian helots were lost to Sparta when Epaminondas liberated Messenia *c.* 370, but the helot system continued in Laconia until the 2nd century BC.

Hélou, Charles (Alexandre) (b. Dec. 25, 1912, Beirut), president of Lebanon, 1964–70.

Hélou was educated at St. Joseph's University (1919–29) and received a law degree from the French faculty of law in Beirut. He founded two French-language newspapers, *L'Eclair du Nord* (Aleppo, 1932) and *Le Jour* (Beirut, 1935–46). He served as ambassador to the Vatican in 1947 and later held several Cabinet posts, including minister of justice and health (1954–55) and education (1964).

Not long after his inauguration as president in 1964, Hélou agreed at an Arab summit meeting to Arab sponsorship of the Palestine Liberation Organization (PLO), but he refused to allow the stationing of PLO bases in Lebanon, an issue that grew increasingly explosive in the course of his term. In 1968–69 a pattern emerged in which the Christian president and the army command opposed the stationing of Palestinian guerrillas in Lebanon, while the Muslim prime minister, Rashid Karami, favoured it. Under great pressure from Arab nations and from Lebanese Muslims, Hélou in 1969 moved to avert a crisis by accepting Karami's proposed policy of coordination between the PLO and the Lebanese Army, whereby the PLO secured the right to establish armed units in Lebanese refugee camps.

Helper, Hinton Rowan (b. Dec. 27, 1829, Davie County, N.C., U.S.—d. March 9, 1909, Washington, D.C.), the only prominent American Southern author to attack slavery before the outbreak of the American Civil War (1861–65). His thesis widely influenced Northern opinion and served as an important force in the antislavery movement.

Despite his limited education, Helper was suddenly catapulted into the national limelight in 1857 with the publication of *The Impending Crisis of the South: How to Meet It,* in which he attacked slavery not because it exploited the black bondsman but because it victimized nonslaveholding whites and inhibited Southern economic progress. As almost the only Southern protest against slavery since early in the 19th century, *The Impending Crisis* caused a furor in both North and South. For his own safety, Helper moved to New York City, and in 1861 he was appointed by President Abraham Lincoln as consul in Buenos Aires, where he served until 1866.

Although Helper opposed slavery, he was not pro-black. After the war, he wrote three bitter racist tracts advocating deportation of blacks to Africa or Latin America. He later developed an obsession to build a railroad from Hudson Bay to the Strait of Magellan. Poverty-stricken after many years as a Washington lobbyist and political hanger-on, he committed suicide.

Helphand, Alexander Israel (Lazarevitsch), Russian ALEKSANDR IZRAIL LAZAREVICH GELFAND, byname PARVUS (b. Sept. 8 [Aug. 27, Old Style], 1867, Berezino, Russia—d. Dec. 12, 1924, Berlin), Russian-German socialist who helped enable Lenin to reenter Russia in 1917 from exile in Switzerland, thus helping to ignite the Russian Revolution of October 1917.

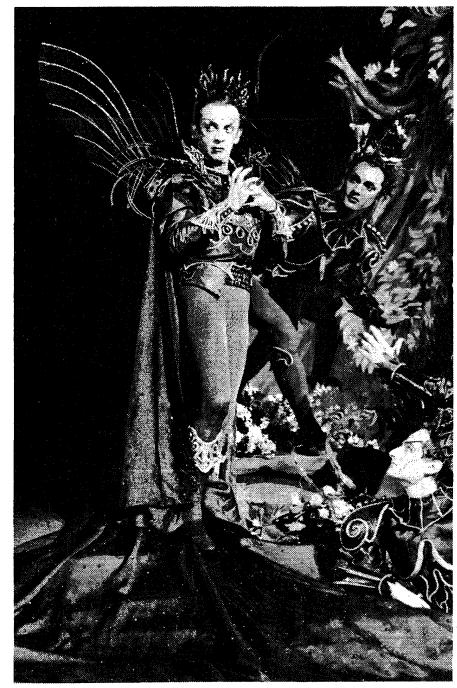
Helphand, the son of Jewish parents, grew up in Odessa, on the Black Sea. He was attracted to revolutionary Socialism at an early age and became a Marxist during his prolonged residence in Germany (from 1891), where he eked out a living as an itinerant left-wing journalist. He met Lenin and Trotsky and other exiled revolutionaries and returned to Russia to participate in the Revolution of 1905. Arrested by the Russian police and sentenced to Siberia in 1906, he escaped to Germany and never returned to his native country.

With the onset of World War I, Helphand was able to obtain subsidies from the German government in exchange for his advice on ways to subvert Russia's tsarist regime. He also convinced the German government to provide him with large sums to funnel to the Bolsheviks, though it is unlikely that this service had much impact. Although Helphand helped negotiate with German authorities Lenin's passage in the notorious "sealed train" across Germany on the way to Russia in April 1917, Lenin refused to allow the disreputable Helphand to return to Russia after the October Revolution of 1917.

A man of dissolute character, Helphand grew immensely rich as a result of his trading and publishing ventures during World War I. A bold thinker in many respects, he was viewed as a brilliant but unscrupulous maverick by many of his fellow revolutionaries throughout his career.

Helpmann, Sir Robert (Murray), Helpmann originally spelled HELPMAN (b. April 9, 1909, Mount Gambier, Australia—d. Sept. 28, 1986, Sydney), Australian ballet dancer, choreographer, actor, and director. His career encompassed activities in ballet, theatre, and motion pictures.

Helpmann first appeared on the stage in 1923 as a dancer in musical comedy, and then, after seeing Anna Pavlova dance, he joined Pavlova's company and toured Australia and



Helpmann as Oberon in *A Midsummer Night's Dream*, 1954

Houston Rogers

New Zealand. He remained in Australia for several years as a dancer and actor in the troupe managed by J.C. Williamson.

In 1933 Helpmann went to London to study and later that year joined the Vic-Wells (later Sadler's Wells and now the Royal) Ballet. That same year he interpreted the important role of Satan in Ninette de Valois's *Job* and in the following year became premier danseur and danced opposite Alicia Markova in de Valois's *Haunted Ballroom.* He became the regular partner of prima ballerina Margot Fonteyn in 1935. They were a popular pair, particularly during World War II, and danced a large clas-

sical repertoire. He left Sadler's Wells in 1950 but occasionally returned as guest artist and choreographer.

Helpmann danced in the ballet films *The Red Shoes* (1948), which he also choreographed, and *Tales of Hoffman* (1950).

As a choreographer, he created ballets that were strongly theatrical and often contained elements of violence. *Hamlet* (1942) was a study in motivation; the ballet began with Hamlet's death and probed backward into his memories and last thoughts. Helpmann created the leading role, as he did in such other of his works as *Miracle in the Gorbals* (1944) and *Adam Zero* (1946). In 1965 he became co-artistic director of the Australian Ballet, a post he held until 1976.

Throughout his ballet career Helpmann was active in the theatre, both as an actor and as a producer and director. His first important part came in 1937–38 as Oberon in Shakespeare's *A Midsummer Night's Dream.* Shylock in *The Merchant of Venice* and the title role in *Hamlet* were among the other Shakespearean roles he played. Helpmann also appeared in a wide variety of films including *One of Our Aircraft Is Missing* (1942), *Henry V* (1944), and *Patrick* (1978). In 1950 he produced the opera *Madame Butterfly* at Covent Garden in London, and he also directed plays including *Murder in the Cathedral* (1953), *As You Like It* (1955), and *Duel of Angels* (1960). In 1973 he codirected (with Rudolf Nureyev) and appeared in a filmed version of *Don Quixote.* He was knighted in 1968.

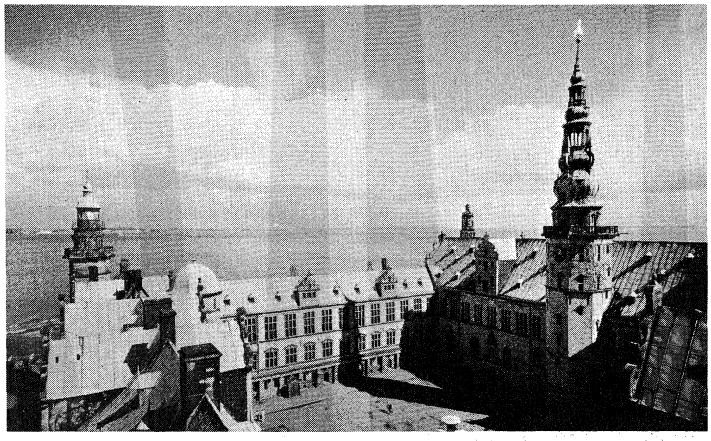
Helsingborg (Sweden): *see* Hälsingborg.

Helsingen Sanomat (Finnish: "Helsinki News"), morning daily newspaper published in Helsinki, the largest paper in Finland and the only one of substance that remains free of political-party control.

The paper was founded in 1889 by Eero Erkko as the *Paivalehti.* In 1904 it was suppressed, but it resumed publication some months later. Its progressive stance and independent-liberal policy attracted writers who gave the paper a vigorous tone even while Finland was ruled by Russia (until 1917). Eljas Erkkonen, the son of the founder, assumed directorship of the paper in 1927, and after his death in 1925, the paper remained in family hands, which has enabled it to maintain its independent stance. Its foreign coverage is among the best in the world, and its presentation tends to be unbiased and balanced.

Helsingør, also called ELSINORE, city, Frederiksborg *amtskommune* (county), Denmark. It lies on the northeast coast of Sjælland (Zealand), at the narrowest part of The Sound (Øresund) opposite Hälsingborg, Swed., with which it is connected by two ferries. In medieval times when a toll for crossing The Sound was introduced, Helsingør, which had been a trading community since the 13th century, was granted a charter (1426) and prospered until the abolition of the toll in 1857.

Kronborg Slot (castle), the Elsinore Castle of Shakespeare's *Hamlet,* was built in Helsingør between 1574 and 1585 by Frederick II in Dutch Renaissance style to replace an earlier fortress; its design was altered by Christian IV after a fire in the 17th century. The castle played a major role in the collection of the toll. It was used as a barracks from 1785 to 1922 and was thoroughly restored in the late 1920s. Notable features are its banquet hall, chapel, and the Trade and Seafaring Museum of Kronborg. The city's Gothic St. Olai Kirke (church); Karmeliterklostret (1430), a former Carmelite monastery; and Marienlyst (*c.* 1587), a royal chateau, which has housed a museum and *Hamlet* collection since 1930, are historic sites. Helsingør is now a commercial and industrial centre; port facilities, shipbuilding, rubber manufacturing, and tourism are the main economic factors. The ancestral home of author Isak Dinesen (Karen Blixen) is in the vicinity. Pop. (1984 est.) 43,559; (1985 est.) mun., 56,388.



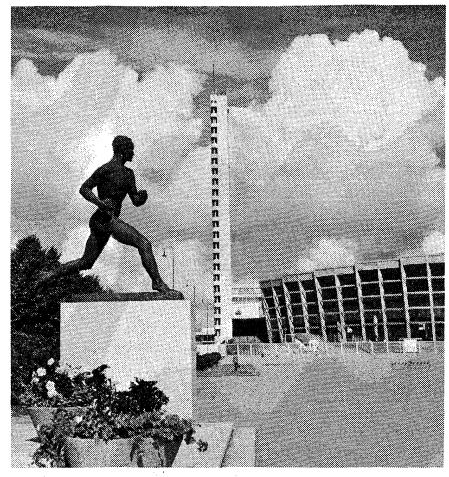
Kronborg Slot, Helsingør, Den.
Fritz Henle—Photo Researchers

Helsinki, Swedish HELSINGFORS, capital of Finland and administrative centre of Uudenmaan *lääni* (province). It is the leading seaport and industrial city of the nation. Helsinki lies in the far south of the country, on a peninsula site fringed by fine natural harbours and protruding into the Gulf of Finland, an extension of the Baltic Sea. It is the most northerly of continental European capitals.

Helsinki was founded in 1550 by King Gustav Vasa of Sweden and was intended to compete with the city of Reval (now Tallinn, in the Estonian S.S.R.) situated on the opposite side of the Gulf of Finland. Helsinki was originally located on the Vantaa estuary but was moved down to its present location in 1640. It was ravaged by a plague in 1710 and burned to the ground in 1713. Its redevelopment was hindered by Russian attacks later in the 18th century. Another fire, in 1808, added to the city's difficulties.

In 1809 Finland was ceded to Russia, and in 1812 the tsar Alexander I moved the capital of the grand duchy of Finland from Turku (Åbo) to Helsinki. In 1748 the settlement became much more secure when a fortress was constructed on a group of small islands outside the harbour of Helsinki.

Meanwhile, the centre of Helsinki had been completely reconstructed under the influence of the German-born architect C.L. Engel, who designed a number of distinctive buildings. These include government buildings, the main building of Helsinki University, and the Lutheran cathedral, known as the Great Church, completed in 1852. All of them surround the broad expanse of Senate Square. Nearby rise the cupolas of the Uspenski Orthodox Cathedral, one of the few recognizable reminders of the period of Russian rule.



Helsinki Stadium and a statue of Paavo Nurmi, Finnish long-distance runner
By courtesy of the Finnish Tourist Association

In December 1917 Finland declared independence from Russia, and a brief but bloody civil war ensued in the capital between Finnish troops and Russian units occupying the city. Conditions soon became more stabilized, with the Helsinki parliament electing Finland's first president in 1919. In subsequent decades Helsinki developed into an important centre of trade, industry, and culture, a process interrupted only by World War II.

Helsinki's economic life and development is based on its excellent harbours and on good railway and road connections to the extensive interior of the nation. More than half of Finland's total imports consequently pass through the port of Helsinki. Only a small proportion of the national exports, however, pass through Helsinki, as the largest export ports are elsewhere along the Finnish coast. Helsinki's main industries include food and metal processing, printing, textiles, and clothing. The Wärtsilä shipyard and the wares of the Arabia porcelain factory, one of the largest of its kind in Europe, are internationally known.

Helsinki has theatres, an opera and ballet company, and several symphony orchestras. An annual Helsinki festival features world-famous orchestras and artists and a program of rich variety. In addition to museums and galleries, cultural landmarks include a modern city theatre by Timo Penttilä and a concert building by Alvar Aalto. Other architectural features of the city are the Helsinki Stadium, built for the 1952 Olympic Games, and the railway station (1914), designed by Eliel Saarinen. Helsinki University is the largest university in Scandinavia. Pop. (1985 est.) city, 484,410; metropolitan area, 947,208.

Helsinki Accords (Aug. 1, 1975), the Final Act of the Conference on Security and Cooperation in Europe (*see* Security and Cooperation in Europe, Conference on). The Helsinki Accords were signed by all the countries of Europe (except Albania), the United States, and Canada; the Accords recognize the inviolability of the post-World War II frontiers in Europe and pledged the 35 signatory nations to respect human rights and fundamental freedoms and to cooperate in economic, scientific, humanitarian, and other areas. The Helsinki Accords are nonbinding and do not have treaty status.

Sought by the Soviet Union from the 1950s, a European security conference was proposed by the Warsaw Pact in 1969 and accepted in principle by NATO. However, it was not until November 1972 that preparatory talks on

the ambassadorial level opened in Helsinki. Over the next several months, an agenda was prepared consisting of four general topics, or "baskets": (1) questions of European security; (2) cooperation in economics, science and technology, and the environment; (3) humanitarian and cultural cooperation; and (4) follow-up to the conference.

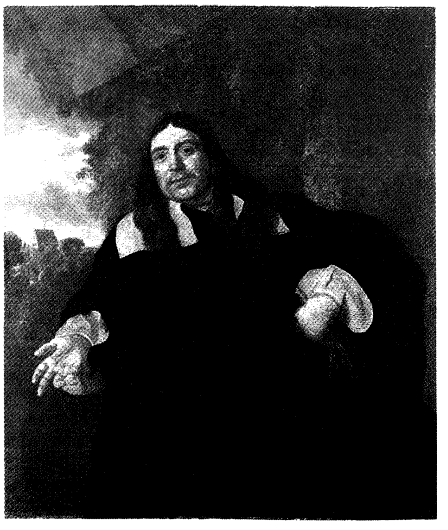
Following a foreign ministers' meeting in Helsinki in July 1973, committees met in Geneva to draft an agreement, a process that lasted from September 1973 to July 1975. The principal interest of the U.S.S.R. was in gaining international recognition for the postwar status quo in Europe through guarantees of the inviolability of frontiers and noninterference in the internal affairs of states. The West saw the conference as an opportunity to press forward on such issues as respect for human rights, expansion of contacts between East and West, freedom to travel, and the free flow of information across borders. The Final Act, signed at a summit meeting in Helsinki, reflected both viewpoints. At the behest of several Mediterranean countries, it also contained a section on security and cooperation in the Mediterranean.

The guarantees of human rights and freedoms contained in the Accords, particularly the Basket III provisions on cooperation in humanitarian and informational matters, proved to be a continuing source of East–West contention, especially as the era of U.S.–Soviet détente gave way to a period of increasing strain in the late 1970s. Soviet crackdowns on internal dissent prompted Western spokesmen to accuse the U.S.S.R. of having entered into the human rights portions of the Accords in bad faith, while the Soviets insisted that these were purely internal matters. Helsinki monitoring committees formed within the Soviet bloc countries to check progress in implementing the Accords were largely suppressed.

Debate at the first Helsinki review conference, held in Belgrade in 1977–78 under the provisions of the Final Act, centred on human rights issues, but the Concluding Document contained no further commitments in the human rights field. At the second review conference, which opened in Madrid in 1980, discussion shifted to security affairs, including a proposed conference on disarmament in Europe and "confidence-building measures," such as notification to other countries of military manoeuvres.

Helsion Island (Pacific Ocean): *see* Wake Island.

Helst, Bartholomeus van der (b. *c.* 1613, Haarlem, Neth.—d. Dec. 16, 1670, Amsterdam), Baroque painter who was one of the leading portrait painters of Amsterdam in the mid-17th century.



Van der Helst, self-portrait, oil on canvas, 1662; in the Kunsthalle, Hamburg, Ger.

By courtesy of the Kunsthalle, Hamburg, Ger.

Helst's first known picture, "Four Regents of the Walenweeshuis" (1637; Amsterdam, Walenweeshuis Orphanage), is closely related to the work of Nicolaes Eliasz., generally assumed to have been his master. Success came rapidly to Helst, bringing influential sitters and important commissions to him at an early age. In 1642 he painted the Amsterdam burgomaster Andries Bicker and his wife and son, and in 1643 he completed a great portrait group, "The Company of Captain Roelof Bicker and Lieutenant Blaeuw," which formed part of the same scheme of decoration as Rembrandt's "Nightwatch."

Helstein, Ralph (b. Dec. 11, 1908, Duluth, Minn., U.S.—d. Feb. 14, 1985, Chicago), U.S. labour union official, who was president of the United Packinghouse Workers of America (UPWA) from 1946 to 1968.

Helstein graduated from the University of Minnesota in 1929 and received his law degree there in 1934. He immediately took a position as a labour compliance officer with the federal government, overseeing enforcement of the labour codes in the National Recovery Act.

From 1936 to 1943 Helstein practiced law in Minneapolis, but from 1939 on he was deeply involved in union activities. It was in 1939 that he became general counsel to the Minnesota Industrial Union Council (part of the Congress of Industrial Organizations, or CIO), and he stayed there for three years until offered a similar post with the UPWA in 1942. By 1946 he was president of the union.

As UPWA president, Helstein won members a guaranteed work week and improved working conditions. And despite a prolonged and largely unsuccessful strike against most of the principal U.S. meatpacking companies in 1948, the UPWA increased membership during Helstein's tenure. By 1946 Helstein was also serving on the CIO executive board, and he later became a vice-president of the AFL-CIO, serving until 1969. A year earlier, the UPWA merged with the Amalgamated Meat Cutters and Butcher Workmen of North America (AMCBWNA), and Helstein became a vice-president as well as special counsel of the new organization. In 1968–69 he retired from his various union positions, but he was elected president emeritus of the AMCBWNA. During the 1970s Helstein was frequently involved in liberal-left political activities.

Helston, parish (town), Kerrier district, county of Cornwall and Isles of Scilly, England. In the 13th century Helston, lying in the extreme southwest of England, was western Cornwall's most important town, having a harbour on the River Cober, which now extends into Loo Pool. The Cober drains into Mounts Bay of the Atlantic Ocean. In the Elizabethan era Helston was one of the four Cornish stannary (tinworking) towns. Pop. (1981 prelim.) 10,741.

Helvetian Stage, major division of middle Miocene rocks and time (the Miocene Epoch began about 23,700,000 years ago and lasted about 18,400,000 years). The Helvetian Stage, which precedes the Tortonian Stage and follows the Burdigalian Stage, was named for exposures in Switzerland (Latin Helvetia); important deposits from this stage are found in France as well.

The Swiss Helvetian is distinguished by the frequently clayey nature of its sediments and by its distinctive fauna, whereas shelly beds predominate in France. Commonly shared fossil animals, especially mollusks, enable rocks throughout the world to be correlated with the Helvetian Stage.

Helvetic Confession, either of two confessions of faith officially adopted by the Reformed Church in Switzerland. The First Helvetic Confession (also called the Second Confession of Basel) was composed in 1536 by Heinrich Bullinger and other Swiss delegates, assisted by Martin Bucer of Strasbourg. It was the first Reformed creed of national authority, although it was sometimes criticized as being too Lutheran.

In 1562 Bullinger wrote a lengthy theological statement of 30 articles, which he later revised and attached to his will. This document became known as the Second Helvetic Confession and was published in 1566 as the official creed of the Swiss cantons. It was also adopted in the Palatinate and was recognized in Scotland (1566), Hungary (1567), France (1571), and Poland (1578). Also favourably received in Holland and England, it was subsequently recognized as one of the most authoritative statements of Reformed theology.

The Second Helvetic Confession discussed the ancient dogmas of the Trinity and Christology and those beliefs emphasized by the Reformation: Scripture as the sole norm of belief, and condemnation of the use of images in worship, law, gospel, and faith. It also discussed the Reformed doctrines of Providence, predestination, the church, ministry, and sacraments, and it condemned ancient and contemporary heresies.

Helvetic Republic, French RÉPUBLIQUE HELVÉTIQUE, republic constituting the greater part of Switzerland, founded on March 29, 1798, after the country had been conquered by Revolutionary France. It excluded both Geneva, which was annexed to France (April 1798), and the three provinces of Valtellina, Chiavenna, and Bormio, which went to the Italian Cisalpine Republic. In 1802 Austrian Frickthal was added to the republic, and Valais was detached and made into an independent republic (later, in 1810, annexed to France). The Helvetic Republic was recognized in the Franco-Austrian Treaty of Lunéville (1801).

The government was patterned after that of the Directory in France. So many factional disputes arose that delegates from the republic called on Napoleon Bonaparte to mediate. He promptly dictated the Act of Mediation (Sept. 30, 1802; amplified on Feb. 19, 1803), which substituted a new Swiss Confederation for the Helvetic Republic, forcing it into close association with France.

Helvetii, a Celtic people who, under pressure from Germanic peoples in the 2nd century BC, migrated from southern Germany into what is now northern Switzerland. In 61 BC, still pressed upon by the Germans, the Helvetii under Orgetorix decided to migrate to western Gaul; more than 250,000 of them embarked in March 58 BC. Julius Caesar, then governor of Gaul, refused them entry and followed them up the Saone, where he defeated them near Bibracte (*q.v.*). The rump of the Helvetian force returned to Switzerland.

Under Augustus their territory formed part of Gallia Belgica. The capital at Aventicum (Avenches) became a Roman colony, and the baths at Aquae Helveticae (Baden, Switz.) attracted many visitors. Under the empire the Helvetii manned the Roman frontier forts against the Alamanni but yielded to their traditional enemies by the mid-5th century. The name Helvetia or Confederatio Helvetica survives as an official name of Switzerland.

Helvétius, Claude-Adrien (b. Jan. 26, 1715, Paris—d. Dec. 26, 1771, Voré, Collines des Perches, Fr.), philosopher, controversialist, and wealthy host to the Enlightenment group of French thinkers known as Philosophes. He is remembered for his hedonistic emphasis on physical sensation, his attack on the religious foundations of ethics, and his extravagant educational theory.

Helvétius, the son of the Queen's chief physician, was made farmer general (a revenue office) at the Queen's request in 1738. In 1751 he married, resigned his post, and retired to his lands at Voré. There he wrote the poem *Le Bonheur* ("Happiness"), published posthumously with an account of his life and works by the Marquis de Saint-Lambert (1772), and his celebrated philosophical work *De l'esprit* (1758; "On the Mind"), which immediately became notorious. For its attack on all forms of morality based on religion it aroused formidable opposition, particularly from the son of Louis XV, the dauphin Louis, though it was published openly with the benefit of royal privilege. The Sorbonne condemned it, and it was ordered burned in public. This, the gravest crisis the Philosophes had known, led Voltaire to claim that the book was commonplace, obscure, and in error. Also, Jean-Jacques Rousseau declared that the very benevolence of the author gave the lie to his principles. Helvétius was called to recant, and he thrice made retractions of the book. Publication of the famous Philosophes' *Encyclopédie* was suspended, and works by others, including Voltaire, also were burned.

Conveniently, Helvétius visited England in 1764 and, on invitation of Frederick II the Great, went to Berlin in 1765. On his return to France the same year the Philosophes were once again in favour, and Helvétius spent the rest of his life at Voré.

Helvétius held that all men are equally capable of learning, a belief that led him to argue against Rousseau's work on education, *Émile,* and to claim in *De L'homme* (1772) that education's possibilities for solving human problems were unlimited.

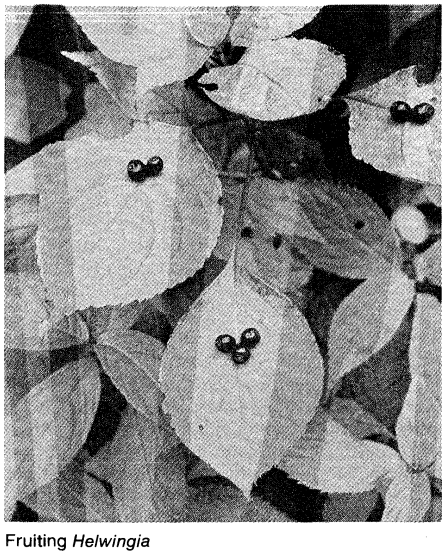
Helvidius Priscus (d. between AD 70 and 79), a Roman Stoic who forcefully upheld his principle that the emperor should act only with the consent of the Senate.

Though the son of a centurion, he rose to the Senate in the reign of Nero and became praetor in AD 70. Later his uncompromising freedom of speech brought him into conflict with the emperor Vespasian, perhaps because he opposed dynastic succession, and he was put to death.

Helvius Cinna, Gaius: *see* Cinna, Gaius Helvius.

Helwan (Egypt): *see* Ḥulwān.

Helwingia, genus of three species of shrubs, constituting the family Helwingiaceae, native to the Himalayas and eastern Asia. All have simple leaves and an unusual manner of flower growth. The plants are dioecious (male and female flowers on separate plants), and the flowers appear to arise directly from the leaves, the stems of the flowers being joined to the midribs of the leaves. The male flowers are clustered in a group; the female flowers are solitary or few.



Fruiting *Helwingia*
Shunji Watari—EB Inc.

Consult the INDEX *first*

Helwys, Thomas (b. *c.* 1550—d. *c.* 1616), English Puritan leader, member of a Separatist group that emigrated to Amsterdam (1608), where he helped organize the first Baptist church.

Returning to England (1611/12) to witness to his belief in adult Baptism and greater individual moral responsibility (against extreme Calvinist predestination), Helwys established the first General Baptist congregation in London. He was imprisoned for advocating universal religious tolerance and the independence of the church from state control.

Hélyot, Hippolyte, original name PIERRE HÉLYOT (b. January 1660, Paris—d. Jan. 5, 1716, Paris), French historian and Franciscan monk whose greatest work provides the definitive and most detailed source of information on Roman Catholic religious orders and lay congregations up to the end of the 17th century.

After entering the Franciscan convent of Picpus in Paris in 1683, Hélyot was sent twice to Rome. Later, when he was appointed secretary of his order, his travels in France enabled him to gather the materials for his extensive *Histoire des ordres monastiques, religieux et militaires, et des congrégations séculières de l'un et de l'autre sexe,* 8 vol. (1714–19). Although Hélyot lived to write only five volumes, the remainder of the history was completed by his colleague, Père Maximilien Bullot. Hélyot also wrote several essays, including the *Idée du Christ mourant* (1695; "Concept of the Dying Christ").

Hemacandra, also called HEMACANDRA SŪRI, SOMACANDRA, or CAṄGADEVA, original name CANDRADEVA (b. 1088, Dhandhuka, Gujarāt, India—d. 1172, Gujarāt), Jaina sage and Indian author who gained privileges for his religion from Siddharāja Jayasiṃha, one of the greatest kings of Gujarāt. With his eloquence and vast erudition, Hemacandra succeeded in converting the successor king Kumārapāla, thus firmly entrenching Jainism in Gujarāt for all time.

As with the birth accounts of many Indian pundits, Hemacandra's birth is said to have been attended by omens and supernatural occurrences. His mother had 14 dreams foretelling the birth of a wondrous son. When the child was taken to a Jaina temple, the priest Devacandra noticed he had numerous auspicious signs on his person and convinced the parents to let him teach the boy.

Candradeva was ordained in 1110, changing his name to Somacandra. In 1125 he became an adviser to King Kumārapāla and wrote the *Arhannīti* ("Jaina Politics"). A prodigious writer, he produced Sanskrit and Prākrit grammars, textbooks on practically every branch of Indian philosophy and science, and several poems, including the *Triṣaṣṭiśalākāpuruṣacarita* ("Lives of the 63 Great Personages"), an epic in Sanskrit picturing the history of the world as envisioned by Jaina philosophers. He was also a logician. His works have become classics, setting new and higher standards for Sanskrit learning.

The Jaina thread of doctrine weaves itself through all his writings. When he was at last considered to have attained the rank of *ācārya* (teacher), he changed his name to Hemacandra. At the end of his life, in accordance with Jaina tradition, he fasted to death.

hemangioma, also spelled HAEMANGIOMA, a congenital, benign tumour, made up of newformed blood vessels of the skin. There are three main types.

Capillary hemangioma, also called nevus flammeus or port-wine stain, is a common skin lesion resulting from abnormal local aggregation of capillaries, the smallest blood vessels. The stain-like lesion is smooth surfaced, not elevated, and well demarcated. It is pink to dark bluish-red. It varies in size and shape and is seen most frequently on the back of the head or neck and less frequently on the forehead and about the eyes. There is no satisfactory treatment, but the lesion usually becomes less noticeable and sometimes disappears as the skin thickens with age.

Immature hemangioma, also called hemangioma simplex or strawberry mark, is a common reddish nubbin on the skin, constituted of aggregations of dilated small blood vessels, which may or may not occur singly. If not already present at birth, it becomes noticeable within the first few weeks of life. The lesion first enlarges to some degree, reaching its maximum size by the age of six months or so, and occasionally becomes ulcerated; but it usually recedes after the first year of life. Spontaneous complete involution of the lesion occurs in practically all cases, normally taking place in early childhood. Treatment is rarely necessary.

Cavernous hemangioma, a rare, red-blue, raised tumour, is constituted of rather large blood vessels enclosed within a framework of connective and fatty tissues. Although most often associated with the skin, it is also sometimes found in mucous membranes, the brain, and the viscera. In all cases, it is present fully developed at birth; it is rarely malignant and increases in size only to the same extent as that of the body part involved. There is no satisfactory treatment. For cosmetic purposes, surgery, if feasible, may be considered.

Hemans, Felicia Dorothea, *née* BROWNE (b. Sept. 25, 1793, Liverpool—d. May 16, 1835, Dublin), English poet who owed the immense popularity of her poems to a talent for treating Romantic themes—nature, the picturesque, childhood innocence, travels abroad, liberty, the heroic—with a fluency that sweeps the reader along, avoiding difficulty of thought or expression. Turning aside from life's darker aspects, she made Romanticism easy and respectable. *Poems* (1808), written when she was between 8 and 13, was the first of a series of

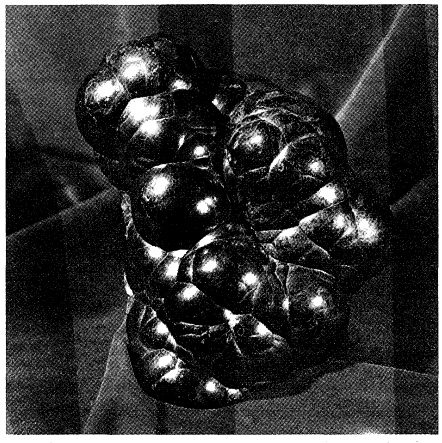
Felicia Hemans, detail from an engraving by W. Holl after a portrait by W.E. West (1788–1857)
The Mansell Collection

24 volumes of verse; from 1816 to 1834 one or more appeared almost every year.

At 19 she married Capt. Alfred Hemans, but they separated seven years later; her prolific

output helped to support her five children. She became a literary celebrity, admired by such famous older writers as William Wordsworth and Sir Walter Scott. Often diffuse and sentimental, she is at her best in her shorter pieces, notably "The Landing of the Pilgrim Fathers," "Dirge," and the well-known "Casabianca" ("The boy stood on the burning deck. . . .").

hematite, also spelled HAEMATITE (from the Greek word for "blood," in allusion to its red colour), heavy and relatively hard oxide mineral, ferric oxide (Fe_2O_3), that constitutes the most important iron ore because of its high iron content (70 percent) and its abundance. Many of the various forms of hematite have separate names. The steel-gray crystals and



Kidney ore, a compact variety of hematite, from the county of Cumbria in northwestern England
Floyd R. Getsinger—EB Inc.

coarse-grained varieties have a brilliant metallic lustre and are known as specular iron ore; thin scaly types are called micaceous hematite. Much hematite occurs in a soft, fine-grained, earthy form called red ochre or ruddle. Intermediate between these types are compact varieties, often with a reniform surface (kidney ore) or a fibrous structure (pencil ore). Red ochre is used as a paint pigment; a purified form, rouge, is used to polish plate glass.

The most important deposits of hematite are sedimentary in origin; the world's largest production (nearly 75,000,000 tons of hematite annually) comes from a sedimentary deposit: the Lake Superior district in North America. Other important deposits include Minas Gerais, Braz. (where the hematite occurs in metamorphosed sediments); Cerro Bolívar, Venezuela; Labrador; and Quebec. Hematite is found as an accessory mineral in many igneous rocks; commonly as a weathering product of siderite, magnetite, and other iron minerals; and almost universally as a pigmenting agent of sedimentary and other rocks. For detailed physical properties, *see* oxide mineral (table).

hematocrit, also spelled HAEMATOCRIT, diagnostic procedure for the analysis of blood. The name is also used for the apparatus used in this procedure and for the results of the analysis. In the procedure, an anticoagulant is added to a blood sample held in a calibrated tube. The tube is allowed to stand for one hour, after which the sedimentation rate (how rapidly blood cells settle out from plasma) is determined. Most acute generalized and some local infections raise the rate. A raised sedimentation rate may be among the first signs of an otherwise hidden disease.

In the second phase of the procedure, the tube is centrifuged so that its contents separate into three layers—packed red blood cells at the bottom, a reddish-gray layer of white blood cells and platelets in the middle, and plasma at the top. The depths of these layers are indicative of health or disease: the red blood cell layer is abnormally thick in the disease polycythemia and too thin in iron-deficiency anemia; white blood cells are too abundant in leukemia, and plasma is deep yellow in jaundice (often caused by liver disease). The hematocrit is among the most commonly used of all laboratory diagnostic procedures.

hematology, also spelled HAEMATOLOGY, branch of medical science concerned with the nature, function, and diseases of the blood. The first step toward scientific knowledge of the composition of the blood was taken in the 17th century by a Dutch microscopist, Antonie van Leeuwenhoek, who, using a primitive, single-lens microscope, observed red corpuscles and compared their size with that of a grain of sand. In the 18th century an English physiologist, William Hewson, amplified the description of the red corpuscles, studied the lymphatic system, and demonstrated the role of fibrin in the clotting of blood. The 19th century saw the recognition of bone marrow as the site of blood-cell formation and the clinical description of pernicious anemia, leukemia, and a number of other disorders of the blood. The introduction of a method of staining blood inaugurated the morphologic phase of the science.

In the first quarter of the 20th century the changes in the morphology of the blood in disease engaged the attention of most students. The century opened with the discovery of the blood groups O, A, B, and AB, which made possible the transfusion of blood from one person to another without the serious ill effects that ensue when incompatible blood is given. The study of the anemias gained impetus from the introduction of the hematocrit, a centrifuge for determining the volume of red corpuscles in the blood as compared with the volume of plasma, and the introduction, in 1932, of a simple method of measuring the volume and hemoglobin content of these cells. (Hemoglobin is the substance in the red cells that transports oxygen to the tissues.)

Another era in hematology, which has been called the physiologic phase, began about 1920 with the systematic investigation of the role of food substances in the production of red blood cells. This led to discovery of the beneficial effects of liver extract in treating pernicious anemia and, ultimately, to the discovery of vitamin B_{12}, the anti-anemic principle of liver. Parallel discoveries in nutrition, biochemistry, and the use of heavy and radioactive isotopes helped to show how hemoglobin is produced and aided in the recognition of changes that take place in disease.

After World War II the field of hematology broadened. Hematological studies of sickle-cell anemia revealed that variation in a normal protein at the molecular level can be the underlying cause of a whole chain of clinical and laboratory abnormalities characterizing a disease. Simultaneous advances in techniques of protein and enzyme chemistry permitted recognition of a large number of disorders of hemoglobin synthesis the existence of which had not been suspected before. These were shown to be under genetic control. The work on heritable anemias, in particular, provided anthropologists with important genetic markers.

Other research since World War II has made use of electron microscopy and advances in biochemistry to explore the role of radiation, various chemical agents, and viruses in leukemia and the lymphomas, to investigate more closely the structural changes involved in the synthesis of blood cells, and to study blood platelets and the process of coagulation.

hematopoiesis: *see* blood cell formation.

hematuria, also spelled HAEMATURIA, presence of blood in the urine, an indication of injury or disease of the kidney or some other structure of the urinary tract; in males blood in the urine can also come from the reproductive tract. The blood may become apparent during urination or only upon microscopic examination. Rarely, blood may appear in the urine in the absence of genito-urinary disease. Such instances may result from transfusion of incompatible blood, from severe burns, from abnormal blood conditions in which the red blood cells are broken down, or from blackwater fever (a complication of malaria).

Blood in the urine ordinarily comes from the urethra, the bladder, or the kidneys. When the urethra is involved, the blood appears at the start of urination and is bright red. The urethra may bleed because of physical injuries, obstructions, infections, or strictures (abnormally narrow sections). Blood coming from the bladder may contain clots and usually appears toward the end of urination. Such bleeding is usually caused by stones or tumours in the bladder. In persons who are tuberculous, blood may come from ulcers in the bladder wall. In even rarer cases, a vein in the bladder wall may distend and rupture, causing hemorrhages. Parasites such as blood flukes may burrow into the bladder wall and cause bleeding.

Renal (kidney) bleeding can be produced by a number of disorders, including ruptured blood vessels, tumours, renal obstructions, kidney stones, chemical irritants (*e.g.,* carbon tetrachloride, lead compounds, and ethylene glycol), and infections and inflammation of the kidney (*e.g.,* Bright's disease, pyelonephritis). In some cases there may be excessive bleeding from the kidneys with no apparent cause. Hematuria unaccompanied by pain is ordinarily regarded as due to a tumour in the urinary tract until proved otherwise.

Hembyze, Jan van, Hembyze also spelled IMBIZE (b. July 9, 1513, Ghent, Flanders—d. Aug. 4, 1584, Ghent), Calvinist leader who overthrew Ghent's Roman Catholic-dominated government (1577) during the Netherlands' struggle for freedom from Spanish control.

Supported by Francis van de Kuthulle, lord of Ryhove, and the leading Calvinist preacher, Petrus Dathenus, Hembyze led some 2,000 troops and Calvinist townspeople in battle against their Catholic neighbours on Oct. 28, 1577. He arrested Philip de Croy, duke of Aerschot, the stadholder of Flanders, as well as Ghent's several Catholic magistrates, and replaced them with 18 Calvinists, with himself as mayor. Encouraged by Hembyze, the Calvinist townspeople pillaged churches, destroyed religious statues, and burned six monks to death. William I, prince of Orange, the most important political leader in the Netherlands, supported these actions.

In 1578, however, when Hembyze attempted to suppress Catholicism completely, the Prince, who was a moderate Calvinist and had guaranteed religious toleration to Catholics and Calvinists alike, opposed him. In December 1578 the Prince, with the support of Lord Ryhove, forced Hembyze to lift restrictions against Catholic worship. In March 1579, however, Hembyze, supported by the radical Calvinist elector John Casimir of the Palatinate (now in Germany), again instituted a policy of harsh discrimination. As a result, the Prince invaded Ghent (August 1579), and Hembyze fled to the Palatinate, where he remained in exile until August 1583. At that time, while the Roman Catholic duke of Parma was defeating the Calvinist army and regaining control of Flanders for Spain, Hembyze returned to Ghent and was elected mayor of the town. Then, upon the interception of letters between him and Parma, a conspiracy to turn Ghent and the surrounding countryside over to Spanish (Catholic) control

was discovered. Hembyze was arrested, tried, and executed for treasonous conduct. His sudden actions in favour of Spain, in view of the imminent capture of the town by Spanish forces, which occurred later in 1584, appear to have been motivated by his desire to remain mayor.

Hemel Hempstead, new town, Dacorum district, county of Hertfordshire, England, on the northwestern periphery of London. The first charter was granted in 1539. The new town, one of eight designed by British planners to accommodate London's overspill population, has been grafted on to the old market town since 1947.

Landscaping has been assisted by the presence of the picturesque River Gade. Major new offices and papermaking, electrical, and light engineering industries have contributed to its rapid growth. Pop. (1981) 76,954.

Hemerken, Thomas: *see* Thomas à Kempis.

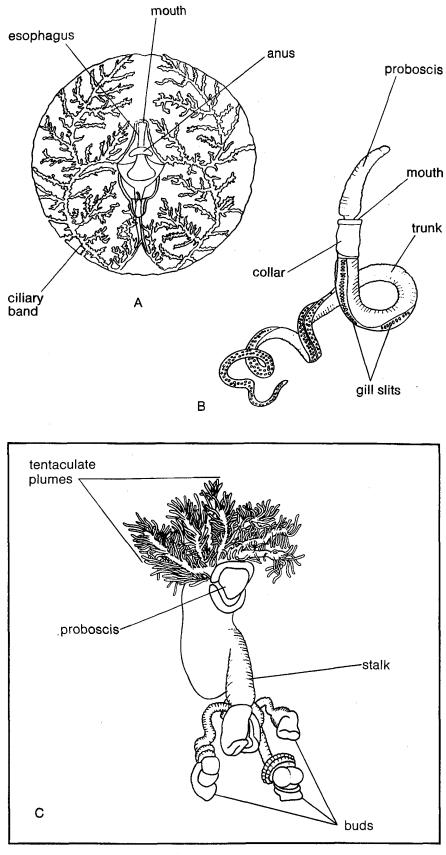
Hemery, David (Peter) (b. July 18, 1944, Cirencester, Gloucestershire, Eng.), English hurdler who held the 400-metre-hurdles world record of 48.1 sec (1968–72). In 1969 he was made a Member of the Order of the British Empire.

His father's work took the family to the United States, where Henry attended school, graduating from Boston University in 1969. He competed with the British team in the 1966 Commonwealth Games at Kingston, Jamaica, winning the 110-metre hurdles. In the 1968 Olympic Games, competing on the British team at Mexico City, he won the gold medal and set his world record for the 400-metre hurdles. In the 1972 Olympic Games at Munich, he won the bronze medal, after which he retired from international competition and turned professional. He wrote an autobiography, *Another Hurdle* (1976), and later coached track in the United States.

hemicellulose, any of a group of complex carbohydrates that, with other carbohydrates (*e.g.,* pectins), surround the cellulose fibres of plant cells. The most common hemicelluloses contain xylans (many molecules of the five-carbon sugar xylose linked together), a uronic acid (*i.e.,* sugar acid), and arabinose (another five-carbon sugar). Hemicelluloses have no chemical relationship to cellulose.

hemichordate, any of a group of wormlike marine invertebrates closely related to the chordates and sometimes considered to constitute a phylum, Hemichordata. The term Hemichordata—from the Greek *hemi,* meaning "half," and *chorde,* meaning "string," thus, "half-chordate"—was first proposed because the buccal diverticulum, a tubular outgrowth from the mouth cavity forward into the proboscis, or "snout," resembled a rudimentary notochord—the dorsal, or back-side, supporting axis of the more primitive vertebrates. This theory has since been rejected, however, because it has been determined that the diverticulum bears little resemblance in origin and function to the vertebrate notochord. Although the hemichordates are sometimes given phylum rank, some authorities place the group at various other taxonomic levels with the other so-called protochordates.

The Hemichordata consist of three classes: Enteropneusta, Pterobranchia, and Planctosphaeroidea. Enteropneusta, or acornworms, are solitary, wormlike, bilaterally symmetrical animals, often brilliantly coloured. They are known as acornworms because of the appearance of the proboscis and collar. Pterobranchia are minute, colonial, tube-building forms. Planctosphaeroidea are known only from a few floating larvae. Enteropneusts are common in the intertidal zones from the White Sea and Greenland south to New Zealand and the Cape of Good Hope; they are found offshore to depths of 400 metres (about 1,300 feet) or more. They vary in size from a few centimetres long (*Saccoglossus pygmaeus* of the North Sea) to two metres (about seven feet) or more (*Balanoglossus gigas* of Brazilian coastal waters).



Body plans of representative hemichordates
(A) *Planctosphaera,* (B) acorn worm (*Dolichoglossus kowalewskii*), and (C) *Cephalodiscus*

By courtesy of (C) C. Burdon-Jones; others from (A) P.A. Meglitsch, *Invertebrate Zoology,* copyright © 1967 by Oxford University Press, Inc., reproduced by permission, (B) L.A. Borradaile and F.A. Potts, *Invertebrata,* 4th ed. (1967), Cambridge University Press

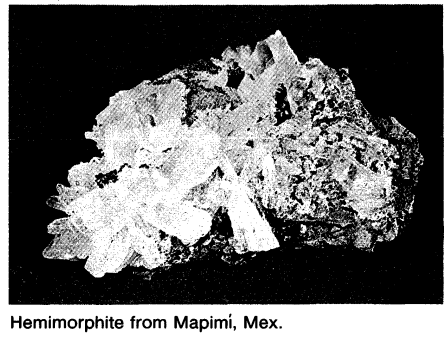
The adult hemichordate is distinguished by the division of its body and body cavities, or coeloms, into three basic parts: the proboscis, collar, and trunk. A central nervous system is absent, but there is a concentration of nerve tissue in the collar, which is linked with a nervous system in the epidermis, or outer covering. The circulatory system usually includes a contractile heartlike vesicle, blood vessels, and sinuses. The pharynx may be perforated by numerous paired gill slits, or they may be absent.

The second region of the body, the collar, may bear two or more tentacle-like plumes, which may have a double row of ciliated tentacles well supplied with secretory cells. The tentacles are special adaptations for feeding on particles suspended in the water. The network of nerve cells and fibres lying within the epidermis is linked with two main nerve tracts that lie dorsally median (*i.e.,* toward the body midline on the upper side) and ventrally median (on the lower side). The dorsal side of the collar has a neurochord formed by an inpocketing of the epidermis; it may have a central lumen, or cavity, that opens to the exterior anteriorly and posteriorly, or it may have a series of lacunae, or spaces. The neurochord contains large nerve cells, extensions of which reach almost to the tip of the proboscis and into the ventral nerve cord. These cells probably facilitate rapid responses such as abrupt contractions of the anterior trunk when the proboscis is touched. The general body surface is innervated by a primitive receptor system, which consists of scattered sensory cells. There is no well-defined centre of stimuli and responses.

All hemichordates are filter feeders, extracting minute animals and plants that drift in the water. Acornworms trap such organisms on their proboscis, whereas pterobranchs use their tentacles. The *Planctosphaera* larvae, which occur on the ocean surface, trap the microscopic organisms in currents created by the movement of bands of tiny hairlike processes called cilia. Many hemichordates have a larval stage in their life cycle; the larva is called a tornaria.

The hemichordates have remained a general primitive group, at a low level of evolution, closely linked with the echinoderms (*e.g.,* starfish, sea urchins) and sharing with them and the other protochordate groups a sessile (*i.e.,* fixed to a surface) or semi-sessile ancestor, which was bilaterally symmetrical and had a tripartite body and coelom. The comparatively simple larval development of the Hemichordata suggests that they have deviated less from the ancestral stock than have echinoderms or protochordates. *See also* acornworm; pterobranch.

hemimorphite, one of two minerals formerly called calamine in the U.S., a white silicate mineral that is an important zinc ore. A secondary mineral formed from the alteration of



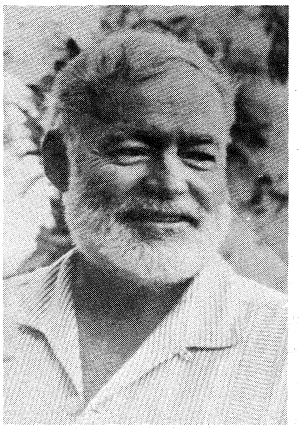
Hemimorphite from Mapimí, Mex.
Floyd R. Getsinger—EB Inc.

sphalerite, it is a hydrated basic zinc silicate, $Zn_4Si_2O_7(OH)_2 \cdot H_2O$. It is associated with other zinc ores in veins and beds in limestone and occurs in many zinc mines throughout the world. Well-crystallized, sheaflike specimens have been found in Siberia; Romania; Sardinia; Belgium; and New Jersey and Montana in the United States. For detailed physical properties, *see* silicate mineral (table).

Heminge, John, Heminge also spelled HEMING, HEMMINGE OR HEMMINGS (b. *c.* 1556—d. Oct. 10, 1630, London), British actor who, with Henry Condell, prepared and oversaw the First Folio (1623) of Shakespeare's work.

Heminge was an important and prosperous member of the theatrical company that eventually became the King's Men in 1603, apparently serving as business manager for more than 25 years. He was one of the original proprietors of the Globe and Blackfriars theatres. Along with Henry Condell and Richard Burbage, Heminge was closely associated with Shakespeare throughout his career. The three are listed among the 26 principal actors in his plays, and he left them token remembrances in his will. In their prefatory letters of dedication to the First Folio, Heminge and Condell make it clear that the book was in part a gesture of love and respect toward their dead friend.

Hemingway, Ernest (Miller) (b. July 21, 1899, Oak Park, Ill., U.S.—d. July 2, 1961, Ketchum, Idaho), American novelist and short-story writer, awarded the Nobel Prize for Literature in 1954. He was noted both for



Hemingway, photograph by Yousuf Karsh, 1959

By courtesy of Mary Hemingway; photograph, © Karsh—Woodfin Camp and Associates

the intense masculinity of his writing and for his adventurous and widely publicized life.

The first son of Clarence Edmonds Hemingway, a doctor of medicine who was devoted to hunting and fishing, and Grace Hall Hemingway, whose interests were artistic, Ernest Miller Hemingway was born in a suburb of Chicago. His life and career were to combine the divergent predilections of his parents, but the same life and career can be seen in large part as an unending rebellion against the prudery and conventionalism of both father and mother and the place of his birth. He was educated in the public schools and began to write in high school, where he was active and outstanding. But in his work he rejected Oak Park and what it stood for; as many of his short stories were later to indicate, the parts of his boyhood that mattered most were summers spent with his family on Walloon Lake in upper Michigan. On graduation from high school in 1917, impatient for a less sheltered environment, he did not enter college but went to Kansas City, where he was employed as a reporter for the *Star,* a leading newspaper of the time, which gave him valuable vocational training. Repeatedly rejected for military service because of a defective eye, he managed to enter World War I as an ambulance driver for the American Red Cross. On July 8, 1918, not yet 19 years old, he was injured on the Austro-Italian front at Fossalta di Piave. Decorated for heroism and hospitalized in Milan, he fell in love with a Red Cross nurse, Agnes von Kurowsky, who declined to marry him. These were experiences he was never to forget.

After recuperating at his home and in Michigan, Hemingway renewed his efforts at writing, for a while worked at odd jobs in Chicago, married Hadley Richardson, and sailed for France as a foreign correspondent for the *Toronto Star.* Advised and encouraged by other American writers in Paris—F. Scott Fitzgerald, Gertrude Stein, Ezra Pound—he began to see his nonjournalistic work appear in print there, and in 1925 his first important book, a collection of stories called *In Our Time,* was published in New York. The following year he published *The Sun Also Rises,* a novel with which he scored his first solid success. A pessimistic but sparkling book, it deals with a group of aimless expatriates in France and Spain—members of the postwar "lost generation," a phrase that Hemingway scorned while making it famous. This work also introduced him to the limelight, which he both craved and resented for the rest of his life.

The writing of books occupied him for most of the postwar years. Meanwhile, however, his first marriage, which produced a son, John, had failed, and he had married Pauline Pfeiffer, who was to bear his other two children, Patrick and Gregory. Based in Paris, he had also travelled widely for the skiing, bullfighting, fishing, or hunting that by then had become part of his life and formed the background for much of his writing. His position as a master of short fiction had been advanced by *Men Without Women* in 1927 and thoroughly established with *Winner Take Nothing* in 1933. At least in the public view, however, the novel *A Farewell to Arms* (1929) overshadowed both. Reaching back to his experience as a young soldier in Italy, he developed a grim but lyrical novel of great power, fusing love story with war story.

Many critics argue that by this stage Hemingway had done all of his best writing. The judgment is too harsh, but it is true that his success from this time on was mixed with unaccustomed failure and that his books were to appear less frequently. He once confessed that if he had spent less time hunting and fishing he might have written more. To these diversions might be added both his attraction to war, which was to absorb whole years of his life, and an energetic pursuit of personal enjoyment, for which he had an enormous capacity. Although he eventually drew on many of his adventures for books, he was at least as avid for the experience as for the literary use to which he might put it. His love of Spain and his passion for bullfighting resulted in *Death in the Afternoon* (1932), a learned study of a spectacle he saw more as tragic ceremony than as sport. Similarly, an African safari resulted in *Green Hills of Africa* (1935), an account of big-game hunting. Mostly for the fishing, he bought a house in Key West, Fla. Lured by the idea of catching the great marlin in the Gulf Stream of Cuba, he also bought his own fishing boat, "Pilar." A minor novel of 1937 called *To Have and Have Not* is set in and near Key West during the economic depression. Hemingway had now become concerned with social problems.

By now Spain was in the midst of civil war. Still deeply attached to that country, Hemingway made four trips there, once more a correspondent. He raised money for the Loyalists, who supported the government of the republic against the uprising of General Franco, and wrote a play called *The Fifth Column* (1938), set in besieged Madrid. As in many of his books, the protagonist of the play is based on the author, and his mistress on the writer and journalist Martha Gellhorn, whom Hemingway married when his divorce became final. Following his last visit to the Spanish war he purchased Finca Vigía (Lookout Farm), an unpretentious estate outside Havana, Cuba, and went with his bride to cover another war—the Japanese invasion of China.

The harvest of his considerable experience of Spain in war and peace was the novel *For Whom the Bell Tolls* (1940), the most successful of all his books as measured in sales. A substantial and often impressive work, it deals with a volunteer American guerrilla in the Spanish war who blows up a strategic bridge near Segovia in an attack that he knows is doomed to fail and in which he is left to die. All of his life Hemingway was fascinated by war—in *A Farewell to Arms* he focussed on its pointlessness, in *For Whom the Bell Tolls* on the comradeship it creates—and he was soon to become involved in World War II. For a long time he had bitterly predicted that the Spanish Civil War was a prelude to it. After he returned to Cuba he established what he called the Crook Factory, an informal but officially approved counterintelligence organization designed to deal with the influx of German spies in Cuba and with submarines off its coast. Also approved was a second plan, under which he outfitted his boat, "Pilar," in such a way as to attract U-boats, which he and his crew might then destroy. He managed both operations efficiently, but before long he was disappointed at scoring no significant victories; and to get closer to the actual fighting he made his way to London, once again a journalist. He flew several missions with the Royal Air Force and crossed the English Channel with American troops on D-Day (June 6, 1944). Attaching himself to the 22nd Regiment of the 4th Infantry Division, he saw a good deal of action in Normandy and in the Battle of the Bulge. He also participated in the liberation of Paris and, although ostensibly a newsman, he impressed professional soldiers not only as a man of courage in battle but also as a real expert in military matters, guerrilla activities, and intelligence collection in particular.

Following the war in Europe, Hemingway returned to his home in Cuba, and, his third marriage having gone the way of the others, he married his fourth wife—Mary Welsh, herself a correspondent whom he had met in London and with whom he was to spend the rest of his life. Established in Cuba at the Finca, where he began to work seriously again, they travelled widely, including one trip to Africa where they made a safari and were injured in two plane crashes. Soon after (in 1953), he received the Pulitzer Prize in fiction for a short, heroic novel—about an old Cuban fisherman who hooks and boats a giant marlin only to lose it to sharks—called *The Old Man and the Sea* (1952). This book, which played a role in gaining for him the Nobel Prize for Literature in 1954, was as enthusiastically praised as his previous novel, *Across the River and into the Trees* (1950), the story of a professional army officer who dies while on leave in Venice, had been damned.

By 1960 Fidel Castro's revolution in Cuba had driven Hemingway from his Finca. He had purchased another house in Ketchum, Idaho, and tried to lead his life and do his work as before. For a while he succeeded, but, anxiety-ridden and depressed, he was twice hospitalized at the Mayo Clinic in Rochester, Minn., where he received electroshock treatments. Two days after his return to the house in Ketchum, he took his life with a shotgun.

He left behind, however, a substantial amount of manuscript, some which has been published. *A Moveable Feast,* the memoir of his apprentice days in Paris, was issued in 1964. *Islands in the Stream,* three closely related novellas growing directly out of his peacetime memories of the Caribbean island of Bimini, of wartime Havana, and of searching for U-boats off Cuba, appeared in 1970.

A consummately contradictory man, Hemingway was witty, cheerful, irascible, by turns generous and selfish, expansive, and egocentric. Hedonistic and dedicated, in love with life and yet by his own admission obsessed with death, an inveterate sportsman and omnivorous reader, hard-drinking and early-rising, uninhibited, intricate, powerful, and damaged, he was himself a personification of the courage—which in a famous phrase he defined as "grace under pressure"—that mercilessly deserted him in the end.

Hemingway achieved a fame surpassed by few, if any, American authors of the 20th century. The virile nature of his writing, which attempted to re-create the exact physical sensations he experienced in big-game hunting, bullfighting, and warfare, in fact masked an aesthetic sensibility of great delicacy. A celebrity long before he reached middle age, his popularity has been validated by serious critical opinion. (P.Y.)

MAJOR WORKS. *Novels. The Sun Also Rises* (1926; English title, *Fiesta,* 1927); *A Farewell to Arms* (1929); *To Have and Have Not* (1937); *For Whom the Bell Tolls* (1940); *Across the River and into the Trees* (1950); *The Old Man and the Sea* (1952); *Islands in the Stream* (1970).

Short stories. In Our Time (1925); *Men Without Women* (1927); *Winner Take Nothing* (1933).

Other works. Death in the Afternoon (1932), on bullfighting; *The Green Hills of Africa* (1935), on big-game hunting; *The Fifth Column and the First Forty-Nine Stories* (1938), a play published with collected short stories; *A Moveable Feast* (1964), sketches of his early life in Paris; *Eighty-eight Poems* (1979), edited by C.J. Meyer and others.

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hemiplegia (Greek: "half stroke"), paralysis of one side of the body caused by injury to the corticospinal (pyramidal) tracts of the central nervous system. The corticospinal and associated motor tracts extend from the cerebral cortex to the lower end of the spinal cord, and their injury may be due to blood vessel disease, wounds, tumours, or abscesses. The location of the injury can usually be deduced from the particular parts paralyzed and the other effects (*e.g.,* speech defect) observed. *See also* paralysis.

hemipode (Greek: "half foot"), generally any bird of the suborder Turnices (order Gruiformes), which includes the plain wanderer (*q.v.*; family Pedionomidae), the button quail, and the lark quail (family Turnicidae), but especially *Turnix* species, such as the Andalusian hemipode, or striped button quail, *T. sylvatica* (*see* button quail). With the exception of the collared hemipode, also called plains wanderer, hemipodes lack the hind toe (hallux), having only three toes; hence the name hemipode.

hemlock, any of 10 species of coniferous evergreen trees comprising the genus *Tsuga* of the family Pinaceae, native to North America and

Eastern hemlock (*Tsuga canadensis*)
Grant Heilman—EB Inc.

Central and eastern Asia. Some are important timber trees, and many are popular ornamentals. Other plants commonly called hemlock include ground hemlock (*see* yew) and poison hemlock and water hemlock (*qq.v.*), plants of the family Apiaceae.

A true hemlock is a tall tree with purplish- or reddish-brown bark, slender horizontal or drooping branches, and short, blunt leaves that grow from woody cushion-like structures on the twigs. The small cones hang from the branch tips and retain their scales when they fall. Each scale bears two winged seeds. The eastern hemlock (*Tsuga canadensis*) of North America, also called Canadian hemlock and hemlock spruce, usually is 18 to 30 metres (about 60 to 100 feet) tall and 1.2 m (4 ft) in diameter. Its dark-green leaves have grooves on the upper surface and two white bands on the lower surface. The bark contains tannin, used in the tanning industry; and the soft, coarse-grained, splintery wood is used in construction and in the manufacture of boxes. Many varieties are used in ornamental plantings. The western hemlock (*T. heterophylla*), also known as hemlock fir and Prince Albert's fir, is a timber tree often 60 m (200 ft) tall, with a trunk 1.8 to 3 m (6 to 10 ft) in diameter. Siebold's hemlock (*T. sieboldii*) and the Japanese hemlock (*T. diversifolia*), both native to Japan, are grown as ornamentals in North America and Europe.

Hemminge, John: *see* Heminge, John.

hemochromatosis, also spelled HAEMOCHROMATOSIS, also called IRON STORAGE DISEASE, or BRONZE DIABETES, inborn metabolic defect characterized by an increased absorption of iron, which accumulates in body tissues. The clinical manifestations include skin pigmentation, diabetes, enlargement of the spleen and liver, heart failure, and general weakness and lassitude.

In males, the symptoms are usually noted after 35 years of age, and in females, after menopause, when iron is no longer lost through menstruation and pregnancy. Treatment consists of the removal of blood at regular intervals to decrease the concentration of body iron.

hemochromogen, also spelled HAEMOCHROMOGEN, compound of the iron-containing pigment heme with a protein or other substance. The hemochromogens include hemoglobin, found in red blood cells, and the cytochromes, which are widely distributed compounds important to oxidation processes in animals and plants.

More specifically, hemochromogen may refer to a derivative of hemoglobin in which heme is combined with a globin modified by the action of a strong alkali. This compound is useful in determining whether a stain is blood because it can be formed from an old blood stain and because, of all blood pigments, it can be identified in the greatest dilution.

hemoglobin, also spelled HAEMOGLOBIN, protein in the blood of many animals—in the red blood cells (erythrocytes) of vertebrates—that transports oxygen to the tissues. Hemoglobin forms an unstable, reversible bond with oxygen; in the oxygenated state it is called oxyhemoglobin and is bright red; in the reduced state it is purple-blue. Asphyxiation occurs when the blood contains an excess of substances (*e.g.,* carbon monoxide) with which hemoglobin forms semipermanent or permanent compounds instead of reversible bonds with oxygen.

Hemoglobin develops in cells in the bone marrow that become red blood cells. When red cells die, hemoglobin is broken up: iron is salvaged, transported to the bone marrow by proteins called transferrins, and used again in the production of new red blood cells; the remainder of the hemoglobin forms the basis of a chemical called bilirubin that is excreted into the bile, eventually to reach the intestine, where its end product gives the feces their characteristic yellow-brown colour.

Each hemoglobin molecule is made up of four heme groups surrounding a globin group, forming a tetrahedral structure. Heme, which accounts for only 4 percent of the weight of the molecule, contains all the iron and gives a red colour to the molecule. Globin consists of two linked pairs of polypeptide chains. The development of each chain is controlled at a separate genetic locus. The amino acid sequences in these chains have been fully worked out; single or multiple substitutions along the chains result in abnormal hemoglobins.

Study of abnormal hemoglobins has provided much information on the evolution and history of man. Hemoglobin S, for example, is found in cases of sickle-cell anemia, a severe, hereditary form of anemia in which the cells become crescent-shaped when oxygen is lacking (*see* sickle-cell trait and sickle-cell anemia). The sickling trait is found almost exclusively in blacks of the African geographical race, among whom, in certain parts of Africa, it may reach high frequencies. Other hemoglobin variants occur in various parts of the world and help scholars to trace past migrations of man and to study genetic relationships among contiguous and separated populations. *See also* erythrocyte.

hemoglobinopathy, also spelled HAEMOGLOBINOPATHY, any of a group of disorders caused by the presence of abnormal hemoglobin in the red blood cells. Abnormal-hemoglobin disorders occur geographically throughout the Old World in a beltlike area roughly the same as that of malaria. The presence of abnormal hemoglobin in moderate amounts may constitute a selective advantage in that it provides some protection from the lethal effects of malaria, thereby allowing more persons to reach reproductive age. The most important of the hemoglobinopathies are the sickle-cell trait and sickle-cell anemia (*q.v.*) and thalassemia (*q.v.*). Hemoglobin C (Hb C) is relatively common among African blacks living north of the Niger River and is found in 2–3 percent of U.S. blacks. Hemoglobin C disease (occurring when the abnormal Hb C gene is inherited from both parents) produces such symptoms and signs as vague pain, jaundice, enlarged spleen, mild to moderate anemia, and some hemorrhaging. Life span of the individual, however, is normal, and the disease is much milder than the sickle-cell anemia found in the same geographical range. It is possible that Hb C is gradually replacing Hb S (abnormal hemoglobin of sickle-cell anemia) by a process of selection; Hb C does not produce early mortality in homozygotes (persons with two genes for Hb C), as does sickle-cell anemia, yet Hb C may afford some protection from malaria.

Hemoglobin D is found mainly in people of the European (Caucasoid) race, but it also occurs in those of the African (Negroid) race. Hemoglobin D disease (two genes for Hb D) may produce mild hemolytic anemia. Hemoglobin E is widespread in Southeast Asia, being found especially among Thais, Cambodians, and Burmese; hemoglobin E disease (two genes for Hb E) may result in a mild microcytic (small red blood cell) anemia. Hemoglobin E–thalassemia disease (one gene for Hb E, one gene for thalassemia) is severe and clinically closely resembles thalassemia major. Hemoglobin H, found in many groups in the Old World (*e.g.,* Chinese, Thais, Malayans, Greeks, Italians), has almost always been identified in combination with thalassemia; symptoms resemble those of thalassemia.

Many other abnormal hemoglobins—such as types G, J, K, L, N, O, P, Q, and variants of Hb A (normal hemoglobin) and Hb F (fetal hemoglobin)—are known but typically do not produce clinical manifestations.

hemoglobinuria, malarial (disease): *see* blackwater fever.

hemolysis, also spelled HAEMOLYSIS, breakdown or destruction of red blood cells so that the contained hemoglobin is freed into the surrounding medium. Antibody (lysin) attaches to the red cell but cannot cause bursting in the

absence of a normal blood component called complement. Apart from normal breakdown of aged red blood cells, hemolysis is abnormal in the living but may be caused by inherited defects in the blood cells (*e.g.,* hereditary spherocytosis, thalassemia), by chemicals, venoms, the toxic products of microorganisms, transfusion of the wrong blood type, or Rh incompatibility of fetal and maternal blood, a condition called erythroblastosis fetalis. It is a major finding in hemolytic anemia.

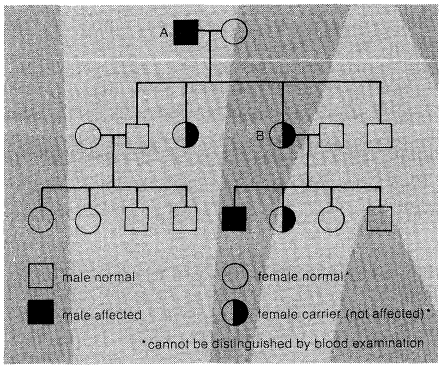
Hemolysis may be produced in the laboratory by various physical agents (heat, freezing, flooding with water, sound); in certain situations it is used as a specific laboratory test for antigen–antibody reactions. Hemolysis caused by physical agents is rare in the living because of body buffering systems; but in the disease paroxysmal cold hemoglobinuria, exposure to cold causes self-produced hemolyzing agents to destroy the individual's own red cells.

hemolytic disease of the newborn: *see* erythroblastosis fetalis.

Hémon, Louis (b. Oct. 12, 1880, Brest, Fr.—d. July 8, 1913, near Chapleau, Ont., Can.), French author of *Maria Chapdelaine,* the best known novel of French-Canadian pioneer life.

After a few years in England as a journalist and sportswriter, Hémon went to Canada in 1911 and, while working as a farmhand, completed *Maria Chapdelaine.* The book is a realistic presentation of the struggle of men and women faced with the inhospitable soil and climate of the Lake St. John area in Quebec. Though there was some resentment over Hémon's failure to idealize French-Canadian life, the book soon became a model for Canadian regionalist writers. Initially serialized in a Paris magazine, *Le Temps* (1914), the novel appeared in book form in 1915, went through many editions, and was translated into all the major languages. Hémon did not live to see its success: he was killed in a train accident before it was published. In 1980, after many years of work, Nicole Deschamps published a new edition of *Maria Chapdelaine* based on Hémon's original manuscript.

hemophilia, also spelled HAEMOPHILIA, hereditary bleeding disorder caused by a deficiency of a substance necessary for blood clotting. In the classical form of hemophilia, the missing substance is factor VIII, or antihemophilic globulin (AHG). The transmission of this condition is characteristically sex-linked, being expressed mostly only in males



Transmission of hemophilia
(A) Mating of affected hemophilic man and normal woman—all sons normal, all daughters carriers; (B) mating of carrier woman and normal man—half of sons normal and half affected; half of daughters carriers, half normal

but transmitted solely by females; sons of a hemophilic male are normal, but daughters, although outwardly normal, may transmit the trait as an overt defect to half their sons and as a recessive or hidden trait to half their daughters (*see* chart).

The incidence of hemophilia tends to be familial; its existence in certain royal families of Europe is well known. The increased tendency to bleeding usually becomes noticeable early in life and may lead to severe anemia or even death. Large bruises of the skin and soft tissue are often seen, usually following injury so trivial as to be unnoticed. There may also be bleeding in the mouth, nose, and gastrointestinal tract. After childhood, hemorrhages in the joints—notably the knees, ankles, and elbows—are frequent, resulting in swelling and impaired function.

Persons with hemophilia are ordinarily advised to avoid activities that might expose them to bodily injury. The management of bleeding episodes includes the local application of hemostatic agents, such as thrombin, and the transfusion of fresh blood (antihemophilic activity rapidly decreases in stored blood) when hemorrhage is excessive. Various commercial preparations containing antihemophilic concentrates from normal blood are also available.

Hemophilia may also be attributed to a deficiency of plasma thromboplastin component (PTC), or factor IX, and of plasma thromboplastin antecedent (PTA); PTC deficiency (also called Christmas disease and hemophilia B) is clinically indistinguishable from classical hemophilia, whereas PTA deficiency may be transmitted by both males and females and is found in both sexes.

hemopoiesis: *see* blood cell formation.

hemorrhagic telangiectasia: *see* Osler-Rendu-Weber disease.

hemorrhoid, also spelled HAEMORRHOID, also called PILE, mass formed by distension of the network of veins under the mucous membrane that lines the anal channel or under the skin lining the external portion of the anus. A form of varicose vein, a hemorrhoid may develop from anal infection or from increase in intra-abdominal pressure, such as occurs during pregnancy, while lifting a heavy object, or while straining at stool. It may be a complication of chronic liver disease or tumours. The weakness in the vessel wall that permits the defect to develop may be inherited.

Mild hemorrhoids may be treated by such methods as the use of suppositories, nonirritating laxatives, and baths. If clots have formed, or in the presence of other complications, the hemorrhoids may be removed surgically.

hemothorax, also spelled HAEMOTHORAX, collection of a bloody fluid in the pleural cavity, between the membrane lining the thoracic cage and the membrane covering the lung. Hemothorax may result from injury, especially when there has been damage to the larger blood vessels of the chest wall.

In addition to blood, air may also be present in the pleural cavity (pneumothorax), in which case the condition is named hemopneumothorax. This may lead to occult bleeding, a type of internal hemorrhage in which large amounts of blood may be lost.

hemp (species *Cannabis sativa*), plant of the family Cannabaceae and its fibre, one of the bast fibre group. The plant is also grown for its seed, which contains about 30 percent oil, and for the narcotic drugs marijuana and hashish derived from its leaves and blossoms.

Hemp originated in central Asia, and its cultivation for fibre, recorded in China as early as 2800 BC, was practiced in the Mediterranean countries of Europe early in the Christian era, spreading throughout the rest of Europe during the European Middle Ages. In the New World it was planted in Chile in the 1500s and a century later in North America.

Hemp, growing in temperate zones, is an annual cultivated from seed, reaching a height of up to 5 m (16 feet). Crops cultivated for fibre are densely sowed and produce plants averaging 2 to 3 m tall with almost no branching. Plants grown for oilseed or drugs, planted further apart, are shorter and many-

Hemp (*Cannabis sativa*)
John Kohout from Root Resources—EB Inc.

branched. The slender stalks are hollow except at the tip and base. The leaves are compound with palmate shape, and the flowers are small and greenish yellow. Seed-producing flowers form elongate, spikelike clusters growing on the pistillate, or female, plants; pollen-producing flowers form many-branched clusters on staminate, or male, plants.

Crops grow best in sandy loam with good drainage and require average monthly rainfall of at least 65 mm (2.5 inches) throughout the growing season. Maximum yield and quality are obtained by harvesting soon after the plants reach maturity, indicated by the full blossoms and freely shedding pollen of the male plants. Although sometimes pulled up by hand, plants are more often cut off about 2 to 3 cm above the ground.

Fibres are obtained by subjecting the stalks to a series of operations—including retting, drying, and crushing—and a shaking process that completes separation from the woody portion, releasing the long, fairly straight fibre called line. The fibre strands, usually more than 1.8 m long, are composed of individual cells, cylindrical in shape, with an irregular surface. The fibre, longer and less flexible than flax, is usually yellowish, greenish, or a dark brown or gray colour and, because it is not easily bleached to sufficiently light shades, is rarely dyed. It is strong and durable and is used for cordage—including twine, yarn, rope, cable, and string—and for artificial sponges and such coarse fabrics as sacking and canvas. In Italy some hemp receives special care in processing, producing whitish colour and attractive lustre, and is used to make fabric similar to linen. Although other plant fibres used for cordage have been incorrectly called hemp, only the hemp plant yields true hemp.

The oil obtained from hempseed can be used to make paints, varnishes, soaps, and edible oil; but the seed's chief commercial use has been for caged-bird feed. Hemp is grown primarily for fibre in most countries. Leading producers include India, the Soviet Union, Romania, China, Hungary, Poland, Turkey, and Yugoslavia. The largest importers are

Italy, the United Kingdom, Belgium, Germany, and France.

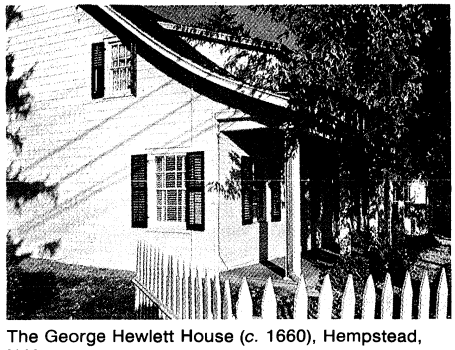
hemp dogbane (plant): *see* Indian hemp.

Hempel, Carl Gustav (b. Jan. 8, 1905, Oranienburg, Ger.), German-born U.S. philosopher, formerly a member of the Berlin school of logical positivism, a group that viewed logical and mathematical statements as revealing only the basic structure of language, but not essentially descriptive of the physical world.

With the growth of Nazi power in Germany, Hempel emigrated to the United States and taught at Yale (1948–55) and Princeton (from 1955) universities. While probing the nature of theoretical science, Hempel advanced the precision of sociological concepts.

His English writings include *Fundamentals of Concept Formation in Empirical Science* (1952) and *Philosophy of Natural Science* (1966).

Hempstead, town (township), Nassau County, New York, U.S., occupying 128 sq mi (332 sq km) in the west central part of Long Island and comprising 22 incorporated villages, the city of Long Beach (*q.v.*), and 34 unincorporated communities. The land tract



The George Hewlett House (*c.* 1660), Hempstead, N.Y.

Milt and Joan Mann from CameraMann

was purchased from the Indians in 1643 by John Carman and the Rev. Robert Fordham from Stamford, Conn., and the original settlement (now Hempstead village) was named for Hemel Hempstead in Hertfordshire, Eng. The town was part of Queens County from 1683 until Nassau County was established in 1899. After the American Revolution, opposing sympathies led to its division into North Hempstead (*q.v.*) and South Hempstead. The latter was renamed Hempstead in 1801. It is dotted with colonial landmarks, including Cooper Field (where the Duke's Laws Convention of 1665 was held); St. George's Church (chartered by George II in 1735, rebuilt 1822) and Christ's First Presbyterian Church (1644, rebuilt 1846) in Hempstead village; the George Hewlett House (*c.* 1660) on East Rockaway Road; and Rock Hall (1767) in Lawrence. Hempstead's rural character changed after the introduction of the trolley car in the 1900s and the arrival of the Long Island Rail Road. Hofstra University was founded in Hempstead village in 1935. There was rapid urban development after World War II, manufactures became well diversified, and industrial parks were developed at Roosevelt Field and Inwood.

Mitchel Field, near Garden City, has played a significant role in the town's development since the War of 1812, serving as army training grounds until World War II, when it became an air base (closed 1961). Hempstead Plain, surrounding Garden City and Roosevelt Field, became a centre of pioneer aviation activity; it was here that Glenn Curtiss demonstrated his "Gold Bug" airplane, where Lindbergh began his solo flight to Paris (1927), and where James Doolittle made the first "blind" flight (1929).

The Nassau County Charter of 1936 preserved the rights of existing incorporated villages but denied unincorporated communities the right to incorporate. Larger villages (some of which overlap with North Hempstead) are Valley Stream (Inc. 1925), Rockville Centre (1893; seat of Molloy College [1955]), Floral Park (1908), Freeport (1892), Garden City (*q.v.*; 1919), Hempstead village (1853), and Lynbrook (1911). Unincorporated communities include Baldwin, Uniondale, Levittown (*q.v.*), Roosevelt, Merrick, Elmont, Franklin Square, East Meadow, Oceanside, and Wantagh. Sports events are held at nearby Nassau Veterans Memorial Coliseum. Pop. (1970) 801,592; (1980) 738,517.

hen-and-chickens, also called HEN-AND-CHICKS, any of a number of succulent plants of the genera *Echeveria* (*q.v.*) and *Sempervivum*, the latter commonly known as houseleek (*q.v.*).

henbane (*Hyoscyamus niger*), any plant of the family Solanaceae (*q.v.*), indigenous to Great Britain and found growing wild in waste places and on rubbish heaps. It also occurs in central and southern Europe and in western Asia extending to India and Siberia, and has long been naturalized in the United States. There are two forms of the plant, an annual and a biennial. The annual grows during the summer to a height of 30 to 60 centimetres (1 to 2 feet) and then flowers and sets seed. The biennial produces during the first season only a tuft of basal leaves, which disappear in winter, leaving underground a thick fleshy root, from the crown of which arises in spring a branched flowering stem, usually much taller and more vigorous than the flowering stems of the annual plants. The whole henbane plant has a powerful, nauseous odour.

Commercial henbane, which consists of the dried leaves of *Hyoscyamus niger* and sometimes of *H. muticus,* of Egypt, yields three dangerous drugs: atropine (*q.v.*), hyoscyamine, and scopolamine (*q.v.*). The major sources of supply of these leaves are Hungary, the U.S.S.R., Egypt, and the United States, all of which grow it commercially. In France another species of henbane, *H. albus,* is used for the same purpose.

The leaves of *H. niger* are used in illicit preparations of smoking mixtures and, in India, as a beverage. The seeds, which contain more alkaloid than the foliage, have also been used in India as a remedy for toothache. Medical use of henbane is complicated by the fact that the leaves contain varying amounts of the narcotics listed above. The isolated and purified drugs derived from henbane, particularly the biennial forms, are valuable remedies for spasmodic muscular contractions, nervous irritation, and hysteria.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Henbury Craters, group of 13 meteorite craters in a desert area 8 mi (13 km) west-southwest of Henbury, Northern Territory, central Australia, within the Henbury Meteorite Conservation Park. The craters, recognized in 1931, lie in an area of 0.5 sq mi (1.25 sq km) and are distributed in a scattering ellipse typical of a cluster fall of meteorites. The largest crater (thought to be a coalescence of two smaller craters) is 733 ft (217 m) long, 366 ft wide, and 50 ft deep. The others range from 30 to 266 ft in diameter. The larger craters contain rock flour and fused silica glass.

Meteoritic fragments found in the area show evidence of having been heated to about 1,562° F (850° C), indicating the occurrence of an explosion; it is thought that the three largest craters were formed by explosions while the rest are impact craters. The fragments are composed of nickel–iron; the extensive decay of some indicates great age.

Hench, Philip Showalter (b. Feb. 28, 1896, Pittsburgh—d. March 30, 1965, Ocho Rios, Jam.), U.S. physician who with Edward C. Kendall in 1948 successfully applied an adrenal hormone (later known as cortisone) in the treatment of rheumatoid arthri-

Hench

Archiv fur Kunst und Geschichte, Berlin

tis. With Kendall and Tadeus Reichstein of Switzerland, Hench received the Nobel Prize for Physiology or Medicine in 1950 for discoveries concerning hormones of the adrenal cortex, their structure and biological effects.

Working at the Mayo Clinic, Rochester, Minn., Hench noticed that during pregnancy and in the presence of jaundice the severe pain of arthritis may decrease and even disappear. In search of the anti-arthritic substance he and Kendall studied endocrinologic factors in rheumatic diseases. This work led to their use of cortisone and of ACTH (adrenocorticotropic hormone), a hormone of the pituitary gland, in alleviation of rheumatoid arthritis.

Henderson, city, seat of Henderson County, northwestern Kentucky, U.S., on the Ohio River, 7 mi (11 km) south of Evansville, Ind. The townsite, around Red Banks (settled 1784) was laid out in 1797 by the Transylvania Land Company and named for its promoter, Richard Henderson. Originally a farming settlement, its economy has become evenly balanced among industry, agriculture (corn, soybeans, livestock, tobacco), oil, and coal.

John James Audubon, the artist-ornithologist, operated a general store there from 1810 to 1819 and is commemorated by the Audubon Memorial Museum and State Park, 1 mi north. Henderson Community College, a branch of the University of Kentucky, was opened in 1960. Nearby James C. Ellis Park and Audubon Raceway offer summer thoroughbred and harness racing. Inc. town, 1810; city, 1867. Pop. (1980) 24,834.

Henderson, city, Clark County, southeastern Nevada, U.S., midway between Las Vegas and Boulder City. It was established in 1942 in the desert below Clark Mountain to provide housing for the employees of a government-constructed magnesium plant and was named for U.S. Sen. Charles Belknap Henderson (1873–1954). Inactivated at the close of World War II when the plant was closed, the project was later bought by the state and the magnesium-producing facilities were taken over by private companies.

Henderson is now Nevada's chief industrial centre, producing titanium and heavy chemicals for commercial and defense needs. Hoover Dam and Lake Mead National Recreational Area are to the east. Inc. 1953. Pop. (1970) 16,395; (1980) 24,363.

Henderson, city, seat (1881) of Vance County, northern North Carolina, U.S. The area was settled by Germans, Scots, and Scots-

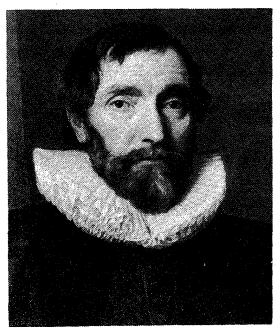
Irish in 1713, and the town was laid out in 1840 and named for Chief Justice Leonard Henderson of the state's Supreme Court.

Tobacco is the major crop in the area, but the economic base has widened, with dairying, livestock raising, and feed growing increasingly important. Industries include the manufacture of textiles, processed foods, and glass containers. Kerr Reservoir, part of the development of the Roanoke River Basin, is 6 mi (10 km) north. Inc. 1841; reincorporated 1913. Pop. (1980) 13,522.

Henderson, Alexander (b. 1583?, Creich, Fife, Scot.—d. Aug. 19, 1646, Edinburgh), Scottish Presbyterian clergyman primarily responsible for the preservation of the presbyterian form of church government in Scotland, who was influential in the defeat of the English king Charles I during the Civil War of 1642–51.

In 1612 Henderson was nearly prevented from assuming duties in Leuchars, Fife, by parishioners who were angered by his intransigence and unorthodoxy. Henderson soon adjusted to standard Presbyterian practice, however, and his pastorate remained uneventful for the next 25 years. Only through an ecclesiastical dispute in 1637 did he emerge from his role as a quiet, efficient country minister. Because he refused to procure copies for his parish of the newly issued book of canons (1636) and of a subsequent book of worship imposed by Charles I, he was summoned to Edinburgh. There he boldly defended his disobedience and gained recognition as a leader. Henderson was largely responsible for the resistance that found expression in the National Covenant of 1638, a Presbyterian statement that led to a general assembly of churchmen in Glasgow later that year.

Henderson furthered his reputation as a leader by his conduct as moderator of the



Alexander Henderson, detail from a portrait attributed to Sir Anthony Van Dyck, *c.* 1641

By courtesy of Peter Morris; photograph, Scottish National Portrait Gallery, Edinburgh

assembly and was soon transferred to Edinburgh. He became the major figure in the negotiations following the two Bishops' Wars, in which native Scottish bishops vied with English loyalists for control of the Church of Scotland. At the onset of the first war, he wrote the pamphlet *Instructions for a Defensive Arms* (1638), a justification of the people's right to self-defense. Charles I lost his struggle to subordinate the Scottish Church to that of England, and in 1641 the presbyterian system was made secure in Scotland. For the next two years Henderson occupied himself with reorganization of the restored church.

With the outbreak of civil war in England in 1642, Henderson led the great majority of Scotsmen to side with the English Parliament against the King. Through the Solemn League and Covenant of 1643, the Scots committed military support on behalf of Parliament and won representation in the English assembly of Westminster, a religious body that advised Parliament. This assembly was commissioned to reconstitute church rule in the British Isles. With the Scottish clergymen Samuel Rutherford, Robert Baillie, and George Gillespie, Henderson engaged in preaching and propagandizing for the Church of Scotland in the Westminster Assembly.

Second only to John Knox (*c.* 1514–72) as a leader in the reformed Church of Scotland, Henderson was the author of numerous tracts, most effective among them being *The Bishops' Doom* (1638) and *The Government and Order of the Church of Scotland* (1641), composed for the assembly at Westminster.

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Henderson, Arthur (b. Sept. 13, 1863, Glasgow—d. Oct. 20, 1935, London), one of the chief organizers of the British Labour Party, secretary of state for foreign affairs from June 1929 to August 1931, and winner in 1934 of the Nobel Prize for Peace.

Arthur Henderson, 1931

BBC Hulton Picture Library

An iron molder at Robert Stephenson's locomotive works and foundry in Newcastle upon Tyne, Northumberland, Henderson became secretary of the Newcastle local of the Ironfounders' Union, served as a Liberal Party member of the municipal councils of Newcastle, Darlington, and Durham, and in 1903 was elected mayor of Darlington. Later that year he was sent to the House of Commons as a Labour Party member from Barnard Castle Division, Durham, in what was the first electoral victory of a Labourite over candidates from both the Conservative and Liberal parties. Although never an outstanding orator, he was chief party whip in the Commons in 1914, 1921–23, and 1925–27. In 1908–10 and 1914–17 he was chairman of the Labour Party, and from 1911 to 1934 he held the more demanding office of party secretary.

In August 1914 Henderson, with the majority of the Labour members of the Commons, expressed support for the British effort in World War I. He thereupon took over the party's parliamentary leadership from Ramsay MacDonald, who then headed the Labourites' pacifist minority. In H.H. Asquith's wartime coalition government of May 1915–December 1916, Henderson first was president of the Board of Education and later became paymaster general and governmental adviser on labour matters. When David Lloyd George succeeded Asquith, Henderson, who had lined up Labour behind the new prime minister, became a minister without portfolio in the five-man war Cabinet. In the summer of 1917 he visited Russia and accepted the plan of Aleksandr Kerensky's revolutionary provisional government for an international Socialist conference in Stockholm. At first Lloyd George seemed to favour the idea, but he later changed his mind and Henderson resigned from the Cabinet (August 12).

During 1918 Henderson devoted his energies to the party secretaryship. With the Socialist reformer Sidney Webb he largely wrote the party constitution, which made Labour for the first time an avowed Socialist party with effective constituency organizations. Six years later, when Labour held power for the first time (January–November 1924), Henderson served as home secretary under MacDonald.

As foreign secretary in MacDonald's second Labour ministry, he strongly supported the League of Nations, and in May 1931 he was chosen to head the World Disarmament Conference, which was to meet in Geneva intermittently from February 1932. He resigned as foreign secretary when MacDonald formed a national coalition government in August 1931. By that time he was fully occupied with disarmament work (for which he was to receive the Nobel Prize). His last important service was performed in July 1933, when he visited Paris, Rome, Berlin, Prague, and Munich (where he met Adolf Hitler) to promote an armament limitation plan.

Arthur Henderson, by Mary Agnes Hamilton, was published in 1938.

Henderson, (James) Fletcher (b. Dec. 18, 1898, Cuthbert, Ga., U.S.—d. Dec. 29, 1952, New York City), U.S. pianist and a pioneer of large jazz orchestras.

Like Duke Ellington, he was untypical of his black contemporaries in being conventionally educated, having majored in chemistry and mathematics at Atlanta University, Ga. On arrival in New York City in 1920 for graduate work, he drifted into professional music and became a bandleader in 1923, continuing intermittently until two years before his death. For much of that period a place in his band was an accolade for black musicians, from Louis Armstrong and Coleman Hawkins to Roy Eldridge and Chu Berry.

Henderson is important as the first orchestrator to use written arrangements without puncturing the spirit of improvisation. By using sections of the orchestra contrapuntally and as an amplified backdrop to the soloist, he paved the way for the regimented jazz and dance orchestras of the 1930s. He played an important part in the success of one of the most famous of them, the Benny Goodman orchestra, by becoming Goodman's staff orchestrator.

Henderson, Lawrence Joseph (b. June 3, 1878, Lynn, Mass., U.S.—d. Feb. 10, 1942, Cambridge), U.S. biochemist, who discovered the chemical means by which acid–base equilibria are maintained in nature.

Henderson spent most of his career at Harvard Medical School (1904–42), where he was professor of biological chemistry (1919–34)

Lawrence Henderson

By courtesy of Harvard University Archives; photograph, Fabian Bachrach

and chemistry (1934–42). Soon after his arrival there he began investigating how acid–base neutrality is maintained in body fluids. He found that the formation of carbonic acid from carbon dioxide and water in the presence of the salt of the acid (bicarbonates) is the only naturally occurring system, with the

exception of phosphate solutions, that maintains a neutral acid–base equilibrium. Chemical systems of this sort, which maintain a specific acid–base equilibrium in body fluids, despite the addition of acids or bases resulting from physiological processes, are known as physiological buffers. The chemical expression developed by Henderson, and modified by the Danish biochemist Karl Hasselbach, to describe these systems, now known as the Henderson–Hasselbach Equation, is of fundamental importance to biochemistry.

Henderson wrote two philosophical works, *The Fitness of the Environment* (1913) and *The Order of Nature* (1917), in which he argued that the planet's natural environment is perfectly suited for the development of life. Furthermore, he felt that "unique physical properties of matter" made a steadily increasing variety of chemical interactions inevitable; thus, chemical evolution, the creation of life, and biological evolution proceed by design and not accidentally. Henderson also wrote *Blood, A Study in General Physiology* (1928).

Henderson, Sir Nevile Meyrick (b. June 10, 1882, Horsham, Sussex, Eng.—d. Dec. 30, 1942, London), British ambassador in Berlin (1937–39) who was closely associated with Prime Minister Neville Chamberlain's policy of appeasement toward Nazi Germany. Some observers believed that he was more influential in implementing the appeasement policy than Chamberlain himself.

Henderson joined the diplomatic service in 1905, serving as minister in Egypt (1924–28), France (1928–29), and Yugoslavia (1929–35). Promoted to ambassador to Argentina in 1935, he was transferred in 1937 to Germany. In Berlin he worked under severe nervous strain and was seriously ill in the winter of 1938. He was knighted in 1932 and made a privy councillor in 1937.

Partly because he had little respect for the European policy of France after World War I, Henderson was inclined to favour the German claims set forth by Hitler to justify Nazi aggression. He further believed it was neither his nor the British government's proper role to criticize the government to which he was accredited. He also was friendly with several Nazi leaders, especially Hermann Göring. Evidently disbelieving that Hitler wished to rule all Europe, he supported the Munich Agreement of Sept. 30, 1938, but was disillusioned by the German invasion of Czechoslovakia in March 1939. During the summer of 1939 he tried repeatedly to dissuade Hitler from attacking Poland and precipitating a war with Britain and France. On the outbreak of war he returned to England and declined further office because of ill health.

Henderson published his own account of the final prewar phase of Nazi aggression in *Failure of a Mission* (1940). His autobiography, *Water Under the Bridges,* was published posthumously in 1945.

Henderson, Robert (Scots poet): *see* Henryson, Robert.

Henderson, Thomas (b. Dec. 28, 1798, Dundee, Angus, Scot.—d. Nov. 23, 1844, Edinburgh), Scots astronomer who, as royal astronomer at the Cape of Good Hope (1831–33), was the first to measure the parallax of a star (Alpha Centauri). He withheld the announcement of his findings until 1839, a few months after both Friedrich Bessel and Friedrich Struve had received credit for first measuring stellar parallaxes.

Henderson was elected a fellow of the Royal Astronomical Society (1832), the Royal Society of Edinburgh (1834), and the Royal Society of London (1840). Upon his return from the Cape of Good Hope in 1834, he was appointed the first Astronomer Royal of Scotland, professor of astronomy at the University of Edinburgh, and director of Calton Hill Observatory.

Hendricks, Thomas A(ndrews) (b. Sept. 7, 1819, near Zanesville, Ohio, U.S.—d. Nov. 25, 1885, Indianapolis, Ind.), long-term U.S. Democratic political leader and vice president under Pres. Grover Cleveland in 1885.

Hendricks, admitted to the bar in 1843, began his public career as a representative (1848) in the Indiana legislature. He served

Hendricks
By courtesy of the Library of Congress, Washington, D.C.

in the U.S. Congress (1851–55), as commissioner of the U.S. General Land Office (1855–59), in the U.S. Senate (1863–69), and as governor of Indiana (1873–77). He was loyal to the Union but opposed many aspects of the Republican-dominated military effort in the U.S. Civil War (1861–65) and the Radical Reconstruction program for the South afterward. He favoured leniency toward the white supremacists in the South and opposed all legislation aimed at assisting freedmen, either politically or economically.

From 1863 until his death Hendricks was prominent in national Democratic politics. He was the vice presidential nominee, with Samuel J. Tilden, in the disputed election of 1876, losing by the decision of a special Electoral Commission. Nominated again in 1884, he was finally elected (with Cleveland) but died less than nine months after his inauguration.

Hendrik (Dutch personal name): *see under* Henry.

Hendrix, Jimi, byname of JAMES MARSHALL HENDRIX (b. Nov. 27, 1942, Seattle, Wash., U.S.—d. Sept. 18, 1970, London), U.S. blues and rock guitarist known for his innovative playing of the electric guitar and as a symbol of the 1960s youth counterculture.

Hendrix was of mixed black and Cherokee ancestry. He taught himself to play the guitar and while in high school joined a rhythm and blues band that performed locally. From 1962 to 1965 he travelled throughout the United States as a lead guitarist for several rhythm and blues artists. In 1966, while leading his own band in Greenwich Village in New York City, where he had attracted a small following, Hendrix was "discovered" by British rock musician Chas Chandler, who took him to London and introduced him to Noel Redding, a bass player, and Mitch Mitchell, a drummer. Together they formed the group called The Jimi Hendrix Experience. With this group Hendrix rapidly became popular in Europe, and his reputation preceded his return to the United States. His sensational appearance at the Monterey (Calif.) International Pop Festival in 1967 and the success of his album *Are You Experienced?* (1967) lifted him to instant rock stardom. Another album, *Electric Ladyland* (1968), was one of the most influential rock records of the 1960s. Hendrix died during his third European tour of complications resulting from an apparently accidental overdose of barbiturates.

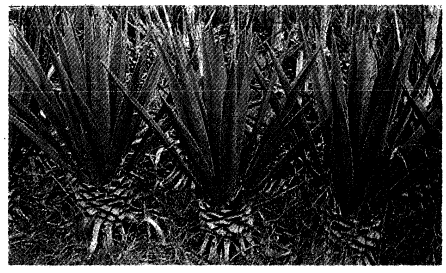
Hendrix was essentially an outstanding blues guitarist working in a rock idiom. The melodic lines of his extended solos were alternately ragged, soaring, or rhythmically driving , while his phrasing was augmented by the use of extremely high volume and electronic distortion. His playing had a sensuous, exotic quality that was original and instantly recognizable.

Henegouwen (Belgium): *see* Hainaut.

henequen (*Agave fourcroydes*), plant of the family agave (Agavaceae) and its fibre, third in importance among the leaf fibre (*q.v.*) group. Varieties of *A. fourcroydes* include *ixtli, longifolia, minima,* and *rigida.* The henequen plant is native to Mexico, where it has been a source of textile fibre since pre-Columbian times. It was introduced to Cuba in the 19th century, becoming the country's chief fibre crop by the 1920s. The fibre is sometimes referred to as Yucatan, or Cuban, sisal.

The plant stalk, growing to 6 feet (1.8 metres) in the wild state, averages about 3 feet (0.9 metres) under cultivation. Its grayish green, lance-shaped leaves, up to 6 feet long and 4–6 inches (10–15 centimetres) wide at the widest point, grow directly from the stalk, forming a dense rosette, and are edged with thorns. The flower stalk, reaching a height of 20 feet (6 metres), bears greenish white flowers about 3 inches (7.6 centimetres) across and with an unpleasant odour. Henequen plants yield about 25 leaves annually from about the 5th through the 16th year after planting. As they reach their full length the outer leaves are cut off close to the stalk. The fibre is freed by machine decortication, which crushes the leaf between rollers and scrapes the resulting pulp from the fibre. The fibre strands are washed, dried in the sun, and brushed.

The lustrous, white or yellow fibre strands average about 4 to 5 feet (1.2 to 1.5 metres) in length; they have fairly good strength, an



Henequen (*Agave fourcroydes*)
Harrison Forman

ability to stretch, and fair resistance to deterioration from microorganisms found in saltwater. Henequen fibre is made into twines used in agriculture and shipping and is also made into rope. Coarse henequen-fibre fabrics, produced locally, are employed in such products as bags, hammocks, and shoe soles. Mexico is the only important producer.

Heng-yang, formerly (until 1912) HENG-CHOU, Pinyin HENGYANG, or HENGZHOU, city in south central Hunan Province (*sheng*), China. A county-level municipality (*shih*), it is the administrative centre of Heng-yang Prefecture (*ti-ch'ü*). Heng-yang is situated on the west bank of the Hsiang Chiang (river) some 110 mi (180 km) south of Ch'ang-sha, just south of the confluence of the Hsiang Chiang and its tributaries, the Lei Shui (river) and the Cheng Shui.

Heng-yang has been a communication centre since early times, being on the ancient post road from Ch'ang-sha into Kwangtung Province established at the end of the 3rd century BC. In about AD 224 Lin-ch'eng County was established there, and in 257 it became the seat of Heng-yang Commandery. In 589 the commandery became the prefecture of Heng-chou, and the county changed its name

from Lin-ch'eng to Heng-yang Hsien. In Ming times (1368–1644) it became a superior prefecture, Heng-chou Fu. The prefecture was abolished in 1912, and Heng-yang returned to county status. In 1949, however, it was made a municipality.

Before World War II, Heng-chou was already a regional city of some importance, and its importance increased with the completion in 1936 of the Han-k'ou–Canton railway. With the outbreak of the Sino-Japanese War in 1937, Heng-yang became the seat of the Kuomintang (Nationalist Party) military government in southern Hunan, and its population was swollen by many refugees from Ch'ang-sha and northern Hunan. Many small industries were set up, including some small ironworks, and by 1944 the city was said to have had a population of close to half a million. In that year the Japanese army captured Heng-yang. In the fighting the city was severely damaged.

Heng-yang, which has always been a regional commercial centre, is today a major rail junction, with rail lines leading south to Canton and southwest to Kuei-lin and other places in Kwangsi Chuang Autonomous Region. Although the Hsiang Chiang still carries some traffic, most of the area's exports go by rail. The southern Hunan region of which Heng-yang is the centre, has, at least since the 8th century, been a mining district, producing coal, lead and zinc, tungsten, tin, and sulfur. Heng-yang has smelters for zinc and lead and large plants producing mining machinery and equipment, chemicals (including fertilizer), and farm and irrigation equipment.

Heng-yang has traditionally been a centre of learning, having an academy that traces its origins to the 9th century. It also has ancient Buddhist temples and many ancient monuments. Pop. (1980 UN est.) 507,000.

Henga (people): *see* Tumbuka.

Hengelo, *gemeente* (municipality), Overijssel *provincie* (province), eastern Netherlands, on the Twente Canal. Formerly a small agricultural village, it shared in the rapid industrial growth of the Twente district. It has textile, metallurgical, and electrical engineering industries; salt production is also important.

Hengelo is a rail junction and has a state agricultural school and cattle market. Badly damaged in World War II, the town has been rebuilt. Twickel Castle (1347) is 3 mi (5 km) west. Pop. (1983 est.) 76,532; Enschede-Hengelo metropolitan area, 247,759.

Hengist and Horsa, Hengist also spelled HENGEST (respectively d. *c.* 488; d. 455?), brothers and legendary leaders of the first Anglo-Saxon settlers in Britain who went there, according to the English historian and theologian Bede, to fight for the British king Vortigern against the Picts between AD 446 and 454. The brothers are said to have been Jutes and sons of one Wihtgils. The Anglo-Saxon Chronicle says that they landed at Ebbsfleet, Kent, and that Horsa was killed at Aegelsthrep (possibly Aylesford, Kent) in 455. Bede mentions a monument to him in east Kent; Horstead, near Aylesford, may be named for him. The Chronicle says that Hengist began to reign in 455 and that he fought against the Britons; it implies that Hengist died in 488. The historic kings of Kent traced their direct descent from Hengist, although the Kentish royal house was known as Oiscingas, from Hengist's son Oeric, surnamed Oisc (or Aesc), who is said to have reigned alone from 488 to 512.

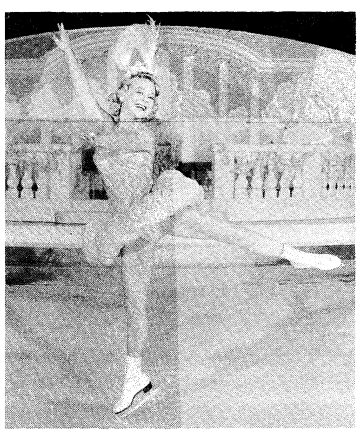
Hengist may perhaps be identified with the hero of this name mentioned in the epic poem *Beowulf* in connection with a tribe called Eotan (probably Jutes).

Hengstenberg, Ernst Wilhelm (b. Oct. 20, 1802, Fröndenberg, Prussia—d. May 28, 1869, Berlin), German theologian who defended Lutheran orthodoxy against the rationalism pervading the Protestant churches and particularly the theological faculties of his day.

Hengstenberg studied at Bonn and at Berlin, where he was professor of theology most of his life. In 1827 he founded the *Evangelische Kirchen-Zeitung*, which he edited for more than 40 years. This journal campaigned against the "unbelief" and indifference of the state churches, extolled the Lutheran doctrine as defined during the Reformation, and served as a rallying point for conservatism, both theological and political.

He defended orthodoxy also by his many biblical commentaries, chiefly on the Old Testament, and by his *Christologie des Alten Testaments* (3 vol., 1829–35; "Christology of the Old Testament"). These works opposed the growing reliance upon historical-critical interpretation and followed the traditional method of reading the Old Testament as a Christian book filled with prophecies of the Messiah fulfilled by the coming of Christ. Hengstenberg's influence was extended to Great Britain and the U.S. through his books, most of which were translated into English during his lifetime.

Henie, Sonja (b. April 8, 1912, Kristiania, Nor.—d. Oct. 12, 1969, in an airplane en route to Oslo), Norwegian-born U.S. figure skater who won the world amateur championship for women 10 consecutive years (1927–36) and three gold medals in the Winter Olympic Games of 1928, 1932, and 1936. An astute businesswoman, she subsequently achieved financial success as a professional ice skater and as a motion-picture actress.



Sonja Henie
Pictorial Parade—EB Inc.

Trained in ballet, Henie incorporated some of its manoeuvres into figure skating; she was largely responsible for converting a predictable series of colourless exercises into a spectacular and popular exhibition. Having turned professional after her Olympic triumph in 1936, she toured Europe and the Americas as the star of the *Hollywood Ice Revues,* and for a time (1951–52) she acted as producer of her ice shows. During the early years of her film career (10 motion pictures, 1937–45) she was one of the leading box-office attractions in the motion-picture industry.

In 1941 Henie, who was twice married to U.S. citizens, herself became a citizen of the United States. In her later years she was noted as a collector and patron of modern art. With her third husband, the Norwegian shipowner Niels Onstad, she established (1968) the Sonja Henies og Niels Onstads Stiftelser, centre for modern art, at Blommenholm, near Oslo.

Henle, Friedrich Gustav Jacob (b. July 15?, 1809, Fürth, Bavaria—d. May 13, 1885, Göttingen, Ger.), German pathologist, one of history's outstanding anatomists, whose influence on the development of histology is comparable to the effect on gross anatomy of the work of the Renaissance master Andreas Vesalius.

While a student of the German physiologist Johannes Müller at the universities of Bonn (M.D., 1832) and Berlin (1832–34), Henle published the first descriptions of the structure and distribution of human epithelial tissue and of the fine structures of the eye and brain. In his paper "Von den Miasmen und Contagien und von den miasmatisch-contagiösen Krankheiten" (1840; "On Miasmas and Contagions and on the Miasmatic-Contagious Diseases"), he embraced the unpopular microorganism theory of contagion put forth by the Renaissance forerunner of modern epidemiology, Girolamo Fracastoro, stating, "The material of contagions is not only an organic but a *living* one and is indeed endowed with a life of its own, which is, in relation to the diseased body, a *parasitic organism.*" Henle had observed microorganisms in the excretions of diseased animals but was not able to prove that they were a direct cause of the disease.

While professor of anatomy (1840–44) at the University of Zürich, he published his *Allgemeine Anatomie* (1841; "Comprehensive Anatomy"), the first systematic treatise of histology, followed by the *Handbuch der rationellen Pathologie,* 2 vol. (1846–53; "Handbook of Rational Pathology"), written while he was professor of anatomy and pathology at the University of Heidelberg (1844–52). The *Handbuch,* describing diseased organs in relation to their normal physiological functions, represents the beginning of modern pathology. Among his students at the University of Göttingen (1852–85) was Robert Koch, who brought Henle's belief in a germ theory to fruition.

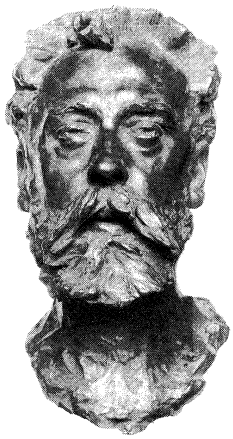
Henlein, Konrad (b. May 6, 1898, Maffersdorf bei Reichenberg, Bohemia, Austria-Hungary—d. May 10, 1945, Plzeň, Czech.), Sudeten-German politician who agitated for German annexation of the Czechoslovak Sudeten area and in World War II held administrative posts in Nazi-occupied Czechoslovakia.

Henlein, educated at a commercial academy, became a bank clerk and later a gymnastics instructor. He was head of the German gymnastics movement (Deutsche Turnbewegung) in Czechoslovakia from 1923 until 1933, when he appeared as leader of the Sudeten-German Home Front (Sudetendeutsche Heimatfront), which became the second strongest party in the Czech chamber in 1935. On April 24, 1938, he unavailingly demanded autonomy for the Sudeten-German areas. He visited Adolf Hitler on September 1 and two weeks later, when a revolt broke out in the Sudetenland and martial law was ordered, presented the Czech government with an ultimatum for the withdrawal of that order. The Czech government having ignored his ultimatum, he issued a proclamation demanding the cession of the Sudeten-German territory to Germany; the government suspended his party for treasonable activities; Henlein fled to Germany to escape arrest and established a Sudeten-German "Free Corps," which engaged in skirmishes along the frontier as the German–Czech crisis approached its climax. On Oct. 1, 1938, after the four-power conference at Munich had ceded the Sudeten-German areas to Germany, Henlein was appointed by the German government commissioner (Reichskommissar) for the Sudeten-German territory, later regional party leader (Gauleiter and Reichsstatthalter) of Sudetenland. At the end of World War II, he committed suicide while in Allied custody.

Henle's loop (anatomy): *see* loop of Henle.

Henley, William Ernest (b. Aug. 23, 1849, Gloucester, Gloucestershire, Eng.—d. July 11,

1903, Woking, near London), British poet, critic, and editor who in his journals introduced the early work of many of the great English writers of the 1890s.



Henley, bust by Auguste Rodin, 1886; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

As a child Henley contracted a tubercular disease that later necessitated the amputation of one foot. His other leg was saved only through the skill and radical new methods of the surgeon Joseph Lister, whom he sought out in Edinburgh. Forced to stay in an infirmary in Edinburgh for 20 months (1873–75), he began writing free-verse impressionistic poems about hospital life that established his poetic reputation. These were included in *A Book of Verses* (1888). Dating from the same period is his most popular poem, "Invictus" (1875), which concludes with the lines "I am the master of my fate;/I am the captain of my soul." The rest of his best known work is contained in *London Voluntaries* (1893) and *In Hospital* (1903).

Henley's long, close friendship with Robert Louis Stevenson began in 1874 when he was still a patient, and Stevenson based part of the character of Long John Silver in *Treasure Island* on his crippled, hearty friend.

Restored to active life, Henley earned his living as an editor, the most brilliant of his journals being the *Scots Observer* of Edinburgh, of which he became editor in 1889. The journal was transferred to London in 1891 and became the *National Observer.* Though conservative in its political outlook, it was liberal in its literary taste and published the early work of Hardy, Shaw, Wells, Barrie, and Kipling. As an editor and critic, Henley was remembered by young writers as a benevolent bully, generous in his promotion and encouragement of unknown talents and fierce in his attacks on unmerited reputations. Henley also edited, with T.F. Henderson, the centenary edition (1896–97) of the poems of Robert Burns, which is still valuable. His biographical preface, in its reaction against the tendency of earlier biographers to idealize Burns, exaggerates the wild side of Burns's character. His later years were saddened by his estrangement from Stevenson (from 1888) and by the death of his daughter, an only child born after 10 years of marriage. He was severely criticized for a "debunking" article on Stevenson written after Stevenson's death.

Henley-on-Thames, parish (town), South Oxfordshire district, county of Oxfordshire, England, on the left bank of the River Thames. It lies at the foot of the Chiltern Hills, where the river is crossed by a fine stone bridge (1786).

The old town (incorporated 1526) has a medieval church and a wide market street. Georgian buildings are also well represented. The old town serves as the shopping centre of the modern riverside resort and residential town, which is especially famous as a rowing centre. The Henley Royal Regatta, which dates from 1839, is visited annually in July by international oarsmen. Pop. (1981 prelim.) 10,976.

Henley Royal Regatta, annual four-day series of rowing races held the first week in July on the River Thames, at Henley-on-Thames, Oxfordshire, Eng. The regatta was established in 1839; and in 1851 Prince Albert became its patron and gave the event its "royal" prefix. The regulation distance for the races is 1 mile 550 yards (2,100 metres). Probably the most significant of the traditional Henley races are the Grand Challenge Cup, the oldest (established in 1839), which usually attracts the world's finest eights (crews using eight oars); and the Diamond Challenge Sculls (1844), one of the world's top single sculls events (one man, two oars). There are several other events, for various types of crews, most of which are open to entries from anywhere in the world.

The American Rowing Association, founded in 1902 to stimulate intercollegiate competition in the U.S., ends its season each year with a regatta at the regulation Henley distance, alternately at Philadelphia and Boston, that has become known as the American Henley. A similar event called the Royal Canadian Henley has been held annually at St. Catharines, Ont., since 1903 (at various sites earlier to 1880). An Australian Henley at Melbourne was first held in 1904.

For winners of the Diamond Challenge Sculls and Grand Challenge Cup since 1920, *see* Sporting Record: *Rowing.*

Henne am Rhyn, Otto (b. Aug. 26, 1828, Sankt Gallen, Switz.—d. May 1, 1914, Weiz, Styria, Austria-Hungary), journalist and historian whose comprehensive universal cultural history was a major contribution to the development of the German Kulturgeschichte (History of Civilization) school.

After studying at the Swiss universities of Bern and Geneva, he taught German, geography, and history at the local school at Sankt Gallen (1857–59), later serving as an administrator of his canton and as its archivist. In 1872 he went to Leipzig to edit the *Freimaurerzeitung* ("Freemason News") and in 1879 returned to Switzerland as editor of the *Neue Zürcher Zeitung.*

His greatest work is considered to be the *Allgemeine Kulturgeschichte,* 8 vol. (1877–1908; "Universal History of Civilization") from earliest times to the closing years of the 19th century. His other major book is the *Kulturgeschichte des deutschen Volkes,* 2 vol. (1903; "Cultural History of the German People"). He also wrote cultural histories of the Swiss people, of Judaism, of the Crusades, and of the role of women in history. His publications were a forceful challenge to the traditional emphasis on political and military themes in German historiography.

Hennebique, François (b. 1842, Neuville-Saint-Vaast, Fr.—d. 1921, Paris), French engineer who devised the technique of construction with reinforced concrete.

At the Paris Exposition of 1867, Hennebique saw Joseph Monier's tubs and tanks built of concrete reinforced with wire mesh and was stimulated to seek a way to apply this new material to building construction. He began with reinforced-concrete floor slabs in 1879 and progressed to a complete building system, patented in 1892, employing structural beams of concrete reinforced with stirrups and longitudinal bars designed to resist the tensile forces against which ordinary concrete was weak. Within a few years he had perfected a system, still in general use, for reinforcing columns, beams, and floors, which he demonstrated in the construction of an apartment building in Paris.

Hennepin, Louis (b. May 12, 1626, Ath, Belg.—d. after 1701, Rome?), Franciscan missionary who, with the celebrated explorer René Robert Cavelier, sieur de La Salle, penetrated the Great Lakes in 1679 to the region of Illinois and wrote the first published description of the country.

He joined the Récollet Order of Friars Minor, Béthune, Fr., and in 1675 went to Canada with La Salle, whose chaplain he became in 1678. Together they reached the site of Peoria, Ill. (January 1680), where they established Fort-Crèvecoeur. La Salle then returned to Fort Frontenac (at Kingston, Ont.) for supplies, while Hennepin and the remainder of the party explored the upper Mississippi River. In April they were captured by Sioux Indians, whom they accompanied on several hunting expeditions, during the course of which they reached what Hennepin named the Falls of St. Anthony (site of Minneapolis, Minn.). Hennepin was rescued by the French voyageur Daniel Greysolon, sieur Dulhut, in July 1680. Returning to France in 1682, he wrote a full account of his exploits, *Description de la Louisiane* (1683), later revised as *Nouvelle découverte d'un très grand pays situé dans l'Amérique* (1697; "New Discovery of a Very Large Country Situated in America"), in which he claimed to have explored the Mississippi to its mouth. This bold assumption was, however, soon discredited. Hennepin spent his final years in obscurity, being last heard of in a Roman monastery in 1701.

Henner, Jean-Jacques (b. March 5, 1829, Bernwiller, Fr.—d. July 23, 1905, Paris), French painter, best known for his sensuous pictures of nymphs and naiads in vague landscape settings and of idealized, almost symbolist, heads of young women and girls. He also painted a number of portraits in a straightforward naturalistic manner.

Henner studied at Strasbourg and at the École des Beaux-Arts in Paris under Michel Drolling. In 1858 he won the Prix de Rome and spent the years 1859–65 in Italy where the chiaroscuro, colour, and sentiment of the paintings of Correggio and Giorgione made a lasting impression on him. Henner, one of the most successful artists of his day, exhibited regularly at the Paris Salons, but at the time of his death his reputation had begun to decline.

Hennig, Willi (b. April 20, 1913, Dürrhennersdorf, Saxony, Ger.—d. Nov. 5, 1976, Ludwigsburg, W.Ger.), German zoologist recognized as the leading proponent of the cladistic school of phylogenetic systematics.

According to this school of thought, taxonomic classifications should reflect exclusively, so far as possible, genealogical relationships. In effect, organisms would be classified into groups strictly on the basis of the historical sequences by which they descended from a common ancestor. This represents a significant divergence from evolutionary systematics, the traditional school of thought which holds that taxonomic classifications ought to be based on genetic as well as genealogical affinities. Hennig defined the fundamentals of the new approach in his *Grundzüge einer Theorie des phylogenetischen Systematik* (1950; *Phylogenetic Systematics,* 1979) and sought to show that it integrated the methods and aims of biology with those of such disciplines as paleontology, geology, and biogeography (*i.e.,* the study of the distribution and dispersal of organisms).

Hennig received a Ph.D. in zoology from the University of Leipzig in 1947 and then conducted extensive research on the larvae of Diptera (the insect order that includes flies, mosquitoes, and gnats) at the German Entomological Institute in East Berlin. He pub-

lished the results of his work in a monograph entitled *Larvenformen der Dipteren* (1952; "Dipterous Larvae"), which became the standard work on the subject. He later extended his studies on dipterans to include those species of the order found in New Zealand, which afforded him the opportunity to apply the principles of cladistic classification to the findings of biogeography. In 1961 Hennig resigned from the institute, where he had served as head of the department of systematic entomology since 1949, in protest of East Germany's erection of the Berlin Wall. Two years later, after having moved to West Germany, he was appointed director of phylogenetic research at the State Museum of Natural History in Stuttgart.

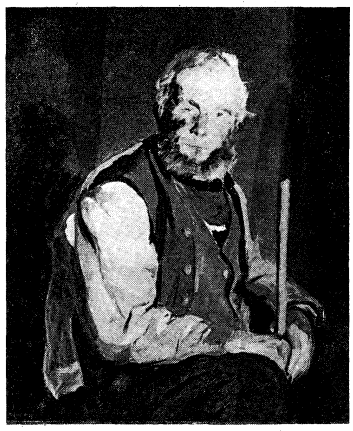
henogamy, the custom by which one, and only one, member of a family is permitted to marry. The classic example is that of the patrilineal Nambūdiri Brahmans of Malabār in Tamil Nadu, India; among them, only eldest sons were permitted to marry Nambūdiri women and have legitimate children. The custom is concerned with the need to keep property intact and to limit the number of legitimate heirs, but it is also buttressed by religious teachings and belief in reincarnation.

The term henogamy is sometimes extended to cover situations in which one member of the family is required to marry according to rules that are not binding on other members of the family. Among the matrilineal Garos and some other Indian groups, the youngest daughter had a special position with regard to inheritance and succession; she had to marry a specific relative, whereas elder daughters were free to make their own arrangements.

Henri (French personal name): *see under* Henry, except as below.

Henri, Robert (b. June 25, 1865, Cincinnati, Ohio, U.S.—d. July 12, 1929, New York City), urban realist painter, a leader of the Ashcan School and one of the most influential teachers of art in the United States.

Henri studied at the Pennsylvania Academy of the Fine Arts, Philadelphia, and at the École des Beaux-Arts in Paris. On returning to the United States in 1891 he became an instructor at the Women's School of Design



"Himself," oil painting by Robert Henri, 1913; in the Art Institute of Chicago

By courtesy of the Art Institute of Chicago

in Philadelphia. His vigorous ideas attracted a group of young illustrators for the Philadelphia press: John Sloan, Everett Shinn, George Luks, and William J. Glackens. With these artists, he later formed the group that came to be known as The Eight (*see* Eight, The). From 1898 to 1900 he was again in Paris and exhibited at the Salon. He then settled in New York City, where in 1908 The Eight mounted their single joint exhibition before being absorbed into the larger Ashcan School. Henri also exhibited at the 1913 Armory Show.

During an extremely active life as an artist, Henri exercised considerable influence as a portrait painter. From 1915 to 1928 he taught at the Art Students League, New York City. Henri's book, *The Art Spirit* (1923), embodying his conception of art as an expression of love for life, maintained a continuing popularity among artists and art students.

A painting such as "Himself" (1913) reveals his facile brushwork, lively colours, and his ability to catch fleeting gestures and expressions.

But he affected American art more through his teaching than through his painting. He was instrumental in turning the young American painters of his time away from academic eclecticism toward an acceptance of the rich, real life of the modern city as the proper subject of art.

Henri Pittier National Park, also called RANCHO GRANDE NATIONAL PARK, park in the Cordillera de la Costa, Aragua state, Venezuela, occupying an area of 350 sq mi (900 sq km) between Lago (lake) de Valencia and the Caribbean. It was established in 1937, largely through the efforts of Henri Pittier, a Venezuelan naturalist, who convinced his government that the destruction of mountain forests would create droughts in the Aragua Valley and hasten the drying up of Lago de Valencia, Venezuela's largest natural inland lake. Much of the park is covered with primeval rain forest.

Henrician Articles, Polish ARTYKULY HENRYKOWSKIE (1573), statement of the rights and privileges of the Polish gentry (*szlachta*) that all elected kings of Poland, beginning with Henry of Valois (elected May 11, 1573), were obliged to confirm and that severely limited the authority of the Polish monarchy. After King Sigismund II Augustus died (July 1572), Henry of Valois, duc d'Anjou and the future Henry III of France, emerged as the favourite candidate for election to the Polish throne. The Polish Protestants, however, feared that the Roman Catholic Henry, who had been partly responsible for the slaughter of French Protestants during the Massacre of St. Bartholomew's Day (Aug. 23–24, 1572), would institute repressive measures against them if he were elected king of Poland. They therefore demanded that the Polish nobility, assembled for the election of a king, explicitly define the constitutional limits of royal power before choosing the new monarch.

The resulting statement, known as the Henrician Articles, provided that the king convoke the Polish Sejm (legislature) every two years and between sessions regularly hold council with a rotating group of senators, chosen by the Sejm. The articles reserved for the Sejm the right to choose the king's successor as well as his bride and also restricted the king's power over the army and legislation. In addition, the king was obliged to confirm the Compact of Warsaw (Jan. 28, 1573), which guaranteed religious liberty in Poland. The articles also stated that if the king did not fulfill his obligations and honour the Henrician Articles, the gentry would automatically be absolved from its allegiance to him.

The Henrician Articles remained the fundamental law of Poland until 1795.

Henrietta Anne OF ENGLAND, French HENRIETTE-ANNE D'ANGLETERRE (b. June 16, 1644, Exeter, Devon, Eng.—d. June 30, 1670, Saint-Cloud, Fr.), English princess and duchesse d'Orléans, a notable figure at the court of her brother-in-law King Louis XIV of France.

The youngest child of England's King Charles I (beheaded 1649), she was reared as an exile by her mother, Henrietta Maria, in Paris. Her brother Charles II was restored to the English throne in 1660, and on March 30, 1661, Henrietta was married to Philippe de France, duc d'Orléans, the homosexual brother of Louis XIV. Since her husband ignored her, Henrietta had a brief affair with the King and then formed a liaison with Armand de Gramont, comte de Guiche. In 1670 she went to England and played a vital role in the secret negotiations with Charles II that led to the Treaty of Dover, allying England and France against the Dutch. Shortly after returning to France she died suddenly. It was generally believed that she had been poisoned by one of her husband's friends, but historians have concluded that she died of natural causes, perhaps of a ruptured appendix. Marie-Louise, one of her two surviving daughters by Orléans, became the wife of King Charles II of Spain; the other, Anne-Marie, eventually queen of Sardinia, is the ancestress of the 19th- and 20th-century Jacobite pretenders to the throne of England.

Henrietta Maria, French HENRIETTE-MARIE (b. Nov. 25, 1609, Paris—d. Sept. 10, 1669, Château de Colombes, near Paris), French wife of King Charles I of England and mother of Kings Charles II and James II. By openly

Henrietta Maria, detail of an oil painting after Sir Anthony Van Dyck; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

practicing Roman Catholicism at court, she alienated many of Charles's subjects, but during the first part of the English Civil War she displayed courage and determination in mustering support for the King's cause.

Henrietta Maria was the daughter of King Henry IV of France and Marie de Médicis. Throughout her childhood she was surrounded by political intrigue; her father was assassinated six months after her birth, and when she was seven her mother was banished from Paris. In 1625, at the age of 15, she was married to Charles. At first the insolence with which she was treated by Charles's favourite, George Villiers, 1st duke of Buckingham, severely strained her relationship with the King, but after the assassination of Buckingham (August 1628) Charles fell in love with his wife. She was a patron of drama and generally presided over a colourful court.

As the Civil War approached, Henrietta Maria began to meddle in politics. She sought without success to instigate a military coup to overthrow the Parliamentarians, and her efforts to enlist support for the King from the Pope, the French, and the Dutch infuriated many Englishmen. When war broke out in August 1642, she was in the Netherlands raising funds for her husband. She landed at Bridlington, Yorkshire, in February 1643 and set about reinvigorating the Royalist cause in northern England. Deterioration of the Royalist position caused her to flee to France in July 1644, and she never again saw her husband, who was executed by order of Parliament in 1649.

In Paris she settled for a time in the Louvre and later in the Palais Royal, but she played little further part in politics. An attempt to convert her youngest son, Henry, duke of

Gloucester, to Roman Catholicism alienated her from her eldest son, Prince Charles (the future Charles II). She founded a convent at Chaillot where she spent much time. After the Restoration she visited England (October 1660) and was granted a pension of £60,000 a year. She paid two further visits to England but was not comfortable there and finally returned to France in 1665. A biography is Quentin Bone's *Henrietta Maria* (1972).

Henrique (Portuguese personal name): *see under* Henry.

Henrique de Carvalho (Angola): *see* Saurimo.

Henry, name of rulers grouped below by country and indicated by the symbol •.

Foreign-language equivalents:

French	Henri
German	Heinrich
Italian	Enrico
Portuguese	Henrique
Spanish	Enrique

AUSTRIA

• **Henry II Jasomirgott** (b. *c.* 1114—d. Jan. 13, 1177, Vienna), the first duke of Austria, a member of the House of Babenberg who increased the dynasty's power in Austria by obtaining the Privilegium Minus (a grant of special privileges and a reduction of obligations toward the empire) from the Holy Roman emperor Frederick I Barbarossa when Austria was raised to a duchy.

Henry II Jasomirgott, detail from an engraving by Karl Mahlknecht

By courtesy of the Bild-Archiv, Osterreichische Nationalbibliothek, Vienna

Henry received the rank of count palatine from the German king Conrad III, his half brother, in 1140, and, after the death of his brother Leopold IV in 1141, he was granted the margravate of Austria in fief. In 1142 Conrad negotiated Henry's marriage with Gertrude, widow of Henry the Proud, the Welf duke of Bavaria and Saxony, and in 1143 Henry was granted the duchy of Bavaria.

On Gertrude's death in April of that year, Henry the Lion, son of Henry the Proud, resumed the Welf claim to Bavaria. Conrad III supported Henry Jasomirgott's cause, but Frederick I Barbarossa, who became German king in 1152, sided with Henry the Lion and in 1154 awarded Bavaria to him. Henry Jasomirgott (who, in the meantime, had married the Byzantine princess Theodora) refused to cede the duchy.

A compromise was reached in 1156, when, in return for the surrender of Henry Jasomirgott's claim to Bavaria, Austria was raised to the status of a duchy, and, in addition, the ducal house of Austria (by the terms of the Privilegium Minus) was granted a number of special privileges. These included succession in either the male or the female line and the right of the duke to appoint his own successor if there was no heir. In addition, the Austrian duke was obliged to attend diets only when they were held in Bavaria and was liable for military service only in campaigns against Austria's neighbours.

BAVARIA

• **Henry IV:** *see* Henry II (Germany/Holy Roman Empire).

• **Henry VI:** *see* Henry III (Germany/Holy Roman Empire).

• **Henry VIII:** *see* Henry IV (Germany/Holy Roman Empire).

• **Henry X,** byname HENRY THE PROUD, German HEINRICH DER STOLZE (b. *c.* 1108—d. Oct. 20, 1139, Quedlinburg, Saxony), margrave of Tuscany, duke of Saxony (as Henry II), and duke of Bavaria, a member of the Welf dynasty, whose policies helped to launch the feud between the Welf and the Hohenstaufen dynasties that was to influence German politics for more than a century.

Henry X, detail from an engraving

By courtesy of the Staatliche Graphische Sammlung, Munich

Upon his father's death in 1126 Henry became duke of Bavaria as Henry X. In May 1127 he married Gertrude, daughter and heiress of the German king (later Holy Roman emperor) Lothair III. Henry at once joined the war against the Hohenstaufens, who had challenged Lothair's right to the German crown. He played an important part in the capture of Speyer in 1130. After peace was made with the Hohenstaufens (1135), Henry accompanied Lothair to Italy as commander of part of the German army.

When Lothair died in December 1137 Henry, as his son-in-law, inherited the duchy of Saxony. But with the election of the Hohenstaufen Conrad III as German king in March 1138, a conflict arose. Conrad, on the pretext that it was unlawful for two duchies to be held by the same person, refused to invest Henry with the Saxon duchy. After attempts at a settlement failed, Henry was placed under the ban of the empire in July 1138 and deprived of Saxony and, shortly thereafter, of Bavaria as well.

Civil war soon broke out in both duchies. Although driven out of Bavaria, Henry succeeded in conquering Saxony. He then assembled an army at Quedlinburg for the purpose of reconquering Bavaria, but he suddenly became ill and died. He was succeeded by his son Henry the Lion.

• **Henry XII:** *see* Henry III.

BRUNSWICK-WOLFENBÜTTEL

• **Henry II,** byname HENRY THE YOUNGER, German HEINRICH DER JÜNGERE (b. Nov. 10, 1489—d. June 11, 1568), duke of Brunswick-Wolfenbüttel, one of the leading Roman Catholic princes attempting to stem the Reformation in Germany.

Always a loyal supporter of the Habsburg emperors, Henry tried to restore Roman Catholicism in his realm but was defeated by John Frederick I the Magnanimous of Saxony and Philip the Magnanimous, landgrave of Hesse,

Henry II, engraving by Heinrich Ulrich

Archiv fur Kunst und Geschichte, West Berlin

and finally driven from his duchy. Reestablished after the emperor Charles V's victory over the Protestant Schmalkaldic League in 1547, Henry continued his earlier efforts but with little success. He defeated the Protestant Albert II Alcibiades of Kulmbach-Bayreuth at the Battle of Sievershausen (1553) but lost his two oldest Roman Catholic sons. The later years of Henry's reign were marred by the conflict with his Lutheran heir Julius, duke of Brunswick-Wolfenbüttel, to whom he eventually became reconciled, showing a certain degree of tolerance to the new religion.

CONSTANTINOPLE

• **Henry,** byname HENRY OF HAINAUT, or OF FLANDERS, French HENRI DE HAINAUT, or DE FLANDRE (b. *c.* 1174, Valenciennes, Hainaut—d. June 11, 1216, Thessalonica, Macedonia), second and most able of the Latin emperors of Constantinople, who reigned from 1206 to 1216 and consolidated the power of the new empire.

Son of Baldwin V, count of Hainaut, and younger brother of Baldwin I, the first Latin emperor, Henry began the conquest of Asia Minor in 1204 and was on the point of crushing the Byzantine loyalist leader Theodore I Lascaris when a Bulgarian invasion of Thrace necessitated his return to Europe. After the death of Baldwin at the hands of Kaloyan, the Bulgarian tsar, in 1205, he served as regent and was made emperor of Romania, as the Latin empire was known, in August 1206. Henry defeated the Bulgars in Europe and between 1209 and 1211 held the forces of Theodore Lascaris at bay. In 1214 he forced Theodore, who had made himself emperor at Nicaea, to sign a treaty at Nymphaeum defining the borders of their two realms and ceding the northwestern portions of Asia Minor to Henry. He also made an alliance through marriage with the Bulgarian tsar Boril. Thus, through diplomacy he was able to ensure the security of the Latin empire. An enlightened ruler, he strove to reconcile his Greek subjects to what they regarded as the disgrace of Latin rule, though the excesses of the Latin churchmen made this virtually impossible. His refusal to cede Greek church lands to the papacy caused a dispute with Pope Innocent III.

Henry died, possibly poisoned, in the 10th year of his reign and was succeeded by Peter of Courtenay. No capable rulers followed Henry, and the Latin empire quickly declined.

ENGLAND

• **Henry I,** byname HENRY BEAUCLERC (Good Scholar), French HENRI BEAUCLERC (b. 1069, Selby, Yorkshire, Eng.—d. Dec. 1, 1135, Lyons-la-Forêt, Normandy), youngest and ablest of William I the Conqueror's sons, who as king of England (1100–35) strengthened the crown's executive powers and, like his father, also ruled Normandy (from 1106).

Reign. Henry was crowned at Westminster, on Aug. 5, 1100, three days after his brother, King William II, William the Conqueror's

Henry I, miniature from a 14th-century manuscript; in the British Library (Cottonian Claud D11 45 B)

By courtesy of the trustees of the British Library

second son, had been killed in a hunting accident. Duke Robert Curthose, the eldest of the three brothers, who by feudal custom had succeeded to his father's inheritance, Normandy, was returning from the First Crusade and could not assert his own claim to the English throne until the following year. The succession was precarious, however, because a number of wealthy Anglo-Norman barons supported Duke Robert, and Henry moved quickly to gain all the backing he could. He issued an ingenious Charter of Liberties, which purported to end capricious taxes, confiscations of church revenues, and other abuses of his predecessor. By his marriage with Matilda, a Scottish princess of the old Anglo-Saxon royal line, he established the foundations for peaceable relations with the Scots and support from the English. And he recalled St. Anselm, the scholarly archbishop of Canterbury whom his brother, William II, had banished.

When Robert Curthose finally invaded England in 1101, several of the greatest barons defected to him. But Henry, supported by a number of his barons, most of the Anglo-Saxons, and St. Anselm, worked out an amicable settlement with the invaders. Robert relinquished his claim to England, receiving in return Henry's own territories in Normandy and a large annuity.

Although a crusading hero, Robert was a self-indulgent, vacillating ruler who allowed Normandy to slip into chaos. Norman churchmen who fled to England urged Henry to conquer and pacify the duchy and thus provided moral grounds for Henry's ambition to reunify his father's realm at his brother's expense. Paving his way with bribes to Norman barons and agreements with neighbouring princes, in 1106 Henry routed Robert's army at Tinchebrai in southwestern Normandy and captured Robert, holding him prisoner for life.

Between 1104 and 1106 Henry had been in the uncomfortable position of posing, in Normandy, as a champion of the church while fighting with his own archbishop of Canterbury. St. Anselm had returned from exile in 1100 dedicated to reforms of Pope Paschal II, which were designed to make the church independent of secular sovereigns. Following papal bans against lay lords investing churchmen with their lands and against churchmen rendering homage to laymen, Anselm refused to consecrate bishops whom Henry had invested and declined to do homage to Henry himself. Henry regarded bishoprics and abbeys not only as spiritual offices but as great sources of wealth. Since in many cases they owed the crown military services, he was anxious to maintain the feudal bond between the bishops and the crown.

Ultimately, the issues of ecclesiastical homage and lay investiture forced Anselm into a second exile. After numerous letters and threats between king, pope, and archbishop, a compromise was concluded shortly before the Battle of Tinchebrai and was ratified in London in 1107. Henry relinquished his right to invest churchmen while Anselm submitted on the question of homage. With the London settlement and the English victory at Tinchebrai, the Anglo-Norman state was reunified and at peace.

In the years following, Henry married his daughter Matilda (also called Maud) to Emperor Henry V of Germany and groomed his only legitimate son, William, as his successor. Henry's right to Normandy was challenged by William Clito, son of the captive Robert Curthose, and Henry was obliged to repel two major assaults against eastern Normandy by William Clito's supporters: Louis VI of France, Count Fulk of Anjou, and the restless Norman barons who detested Henry's ubiquitous officials and high taxes. By 1120, however, the barons had submitted, Henry's son had married into the Angevin house, and Louis VI—defeated in battle—had concluded a definitive peace.

The settlement was shattered in November 1120, when Henry's son perished in a shipwreck of the "White Ship," destroying Henry's succession plans. After Queen Matilda's death in 1118, he married Adelaide of Louvain in 1121, but this union proved childless. On Emperor Henry V's death in 1125, Henry summoned the empress Matilda back to England and made his barons do homage to her as his heir. In 1128 Matilda married Geoffrey Plantagenet, heir to the county of Anjou, and in 1133 she bore him her first son, the future king Henry II. When Henry I died at Lyons-la-Forêt in eastern Normandy, his favourite nephew, Stephen of Blois, disregarding Matilda's right of succession, seized the English throne. Matilda's subsequent invasion of England unleashed a bitter civil war that ended with King Stephen's death and Henry II's unopposed accession in 1154.

Assessment. Henry I was a skillful, intelligent monarch who achieved peace in England, relative stability in Normandy, and notable administrative advances on both sides of the Channel. Under Henry, the Anglo-Norman state his father had created was reunited. Royal justices began making systematic tours of the English shires, but, although his administrative policies were highly efficient, they were not infrequently regarded as oppressive. His reign marked a significant advance from the informal, personal monarchy of former times toward the bureaucratized state that lay in the future. It also marked a shift from the wide-ranging imperialism of earlier Norman leaders to consolidation and internal development. In the generations before Henry's accession, Norman dukes, magnates, and adventurers had conquered southern Italy, Sicily, Antioch, and England. Henry won his major battles but preferred diplomacy or bribery to the risks of the battlefield. Subduing Normandy in 1106, he contented himself with keeping domestic peace, defending his Anglo-Norman state against rebellion and invasion, and making alliances with neighbouring princes. (C.W.Ho.)

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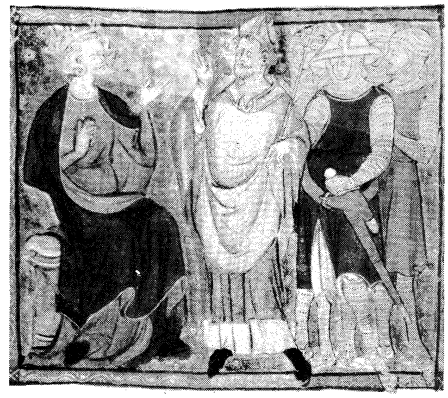
• **Henry II,** byname HENRY OF ANJOU, HENRY PLANTAGENET, HENRY FITZEMPRESS, or HENRY CURTMANTLE (Short Mantle) (b. 1133, Le Mans, Maine—d. July 6, 1189, near Tours), duke of Normandy (from 1150), count of Anjou (from 1151), duke of Aquitaine (from 1152), and king of England (from 1154), who greatly expanded his Anglo-French domains and strengthened the royal administration in England. His quarrels with Thomas Becket, archbishop of Canterbury, and with members



Henry II, (left), disputing with Thomas Becket (centre), miniature from a 14th-century manuscript; in the British Library (Cotton MS. Claudius D.ii)

By courtesy of the trustees of the British Library

of his family (his wife, Eleanor of Aquitaine, and such sons as Richard the Lion-Heart and John Lackland) ultimately brought about his defeat.

Early Life. After receiving a good literary education, part of it in England, Henry became duke of Normandy in 1150 and count of Anjou on the death of his father, Geoffrey Plantagenet, in 1151. Although the claim of his mother, Matilda, daughter of Henry I, to the English crown had been set aside by her cousin, King Stephen, in 1152, Henry advanced his fortunes by marrying the beautiful and talented Eleanor, recently divorced from King Louis VII of France, who brought with her hand the lordship of Aquitaine. Henry invaded England in 1153, and King Stephen agreed to accept him as coadjutor and heir. When Stephen died the following year Henry succeeded without opposition, thus becoming lord of territories stretching from Scotland to the Pyrenees.

The young king lacked visible majesty. Of stocky build, with freckled face, close-cut tawny hair, and gray eyes, he dressed carelessly and grew to be bulky; but his personality commanded attention and drew men to his service. He could be a good companion, with ready repartee in a jostling crowd, but he displayed at times the ungovernable temper of a furious animal and could be heartless and ruthless when necessary. Restless, impetuous, always on the move, regardless of the convenience of others, he was at ease with scholars, and his administrative decrees were the work of a cool realist. In his long reign of 34 years he spent an aggregate of only 14 in England.

Reign. His career may be considered in three aspects: the defense and enlargement of his dominions, the involvement in two lengthy and disastrous personal quarrels, and his lasting administrative and judicial reforms.

His territories are often called the Angevin Empire. This is a misnomer, for Henry's sovereignty rested upon various titles, and there was no institutional or legal bond between different regions. Some, indeed, were under the feudal overlordship of the king of France. By conquest, through diplomacy, and through the marriages of two of his sons, he gained acknowledged possession of what is now the west of France from the northernmost part of Normandy to the Pyrenees, near Carcassonne. During his reign, the dynastic marriages of three daughters gave him political influence in Germany, Castile, and Sicily. His continental dominions brought him into contact with Louis VII of France, the German

emperor Frederick I (Barbarossa), and, for much of the reign, Pope Alexander III. With Louis the relationship was ambiguous. Henry had taken Louis's former wife and her rich heritage. He subsequently acquired the Vexin in Normandy by the premature marriage of his son Henry to Louis's daughter, and during much of his reign he was attempting to outfight or outwit the French king, who, for his part, gave shelter and comfort to Henry's enemy, Thomas Becket, the archbishop of Canterbury. The feud with Louis implied friendly relations with Germany, where Henry was helped by his mother's first marriage to the emperor Henry V but hindered by Frederick's maintenance of an antipope, the outcome of a disputed papal election in 1159. Louis supported Alexander III, whose case was strong, and Henry became arbiter of European opinion. Though acknowledging Alexander, he continued throughout the Becket controversy to threaten transferrence of allegiance to Frederick's antipope, thus impeding Alexander's freedom of action.

Early in his reign Henry obtained from Malcolm III of Scotland homage and the restoration of Northumberland, Cumberland, and Westmorland, and later in the reign (1174) homage was exacted from William the Lion, Malcolm's brother and successor. In 1157 Henry invaded Wales and received homage, though without conquest. In Ireland, reputedly bestowed upon him by Pope Adrian IV, Henry allowed an expedition of barons from South Wales to establish Anglo-Norman supremacy in Leinster (1169), which the King himself extended in 1171.

His remarkable achievements were impaired, however, by the stresses caused by a dispute with Becket and by discords in his own family.

The quarrel with Becket, Henry's trusted and successful chancellor (1154–62), broke out soon after Becket's election to the archbishopric of Canterbury (May 1162; *see* Becket, Thomas). It led to a complete severance of relations and to the Archbishop's voluntary exile. Besides disrupting the public life of the church, this situation embroiled Henry with Louis VII and Alexander III; and, though it seemingly did little to hamper Henry's activities, the time and service spent in negotiations and embassies was considerable, and the tragic denouement in Becket's murder earned for Henry a good deal of damaging opprobrium.

More dangerous were the domestic quarrels, which thwarted Henry's plans and even endangered his life and which finally brought him down in sorrow and shame.

Throughout his adult life Henry's sexual morality was lax; but his relations with Eleanor, 11 years his senior, were for long tolerably harmonious, and, between 1153 and 1167, she bore him eight children. Of these, the four sons who survived infancy—Henry, Geoffrey, Richard, and John—repaid his genuine affection with resentment toward their father and discord among themselves. None was blameless, but the cause of the quarrels was principally Henry's policy of dividing his dominions among his sons while reserving real authority for himself. In 1170 he crowned his eldest son, Henry, as co-regent with himself; but in fact the young king had no powers and resented his nonentity, and in 1173 he opposed his father's proposal to find territories for the favoured John (Lackland) at the expense of Geoffrey. Richard joined the protest of the others and was supported by Eleanor. There was a general revolt of the baronage in England and Normandy, supported by Louis VII in France and William the Lion in Scotland. Henry's prestige was at a low ebb after the murder of Becket and recent taxation, but he reacted energetically, settled matters in Normandy and Brittany, and crossed to England, where fighting had continued for a year. On July 12, 1174, he did public penance at Canterbury. The next day the King of Scots was taken at Alnwick, and three weeks later Henry had suppressed the rebellion in England. His sons were pardoned, but Eleanor was kept in custody until her husband died.

A second rebellion flared up in 1181 with a quarrel between his sons Henry and Richard over the government of Aquitaine, but young Henry died in 1183. In 1184 Richard quarrelled with John, who had been ordered to take Aquitaine off his hands. Matters were eased by the death of Geoffrey (1186), but the King's attempt to find an inheritance for John led to a coalition against him of Richard and the young Philip II Augustus, who had succeeded his father, Louis VII, as king of France. Henry was defeated and forced to give way, and news that John also had joined his enemies hastened the King's death near Tours in 1189.

In striking contrast to the checkered pattern of Henry's wars and schemes, his governance of England displays a careful and successful adaptation of means to a single end—the control of a realm served by the best administration in Europe. This success was obscured for contemporaries and later historians by the varied and often dramatic interest of political and personal events, and not until the 19th century—when the study of the public records began and when legal history was illuminated by the British jurist Frederic William Maitland and his followers—did the administrative genius of Henry and his servants appear in its true light.

At the beginning of his reign Henry found England in disorder, with royal authority ruined by civil war and the violence of feudal magnates. His first task was to crush the unruly elements and restore firm government, using the existing institutions of government, with which the Anglo-Norman monarchy was well provided. Among these was the King's council of barons, with its inner group of ministers who were both judges and accountants and who sat at the Exchequer, into which the taxes and dues of the shires were paid by the King's local representative, the sheriff (shire-reeve). The council contained an unusually able group of men—some of them were great barons, such as Richard de Lucy and Robert de Beaumont, earl of Leicester; others included civil servants, such as Nigel, bishop of Ely, Richard Fitzneale, and his son, Richard of Ilchester. Henry took a personal interest in the technique of the Exchequer, which was described at length for posterity in the celebrated *Dialogus de scaccario,* whose composition seemed to Maitland "one of the most wonderful things of Henry's wonderful reign." How far these royal servants were responsible for the innovations of the reign cannot be known, though the development in practice continued steadily, even during the King's long absences abroad.

In the early months of the reign the King, using his energetic and versatile chancellor Becket, beat down the recalcitrant barons and their castles and began to restore order to the country and to the various forms of justice. It was thus, a few years later, that he came into conflict with the bishops, then led by Becket, over the alleged right of clerics to be tried for crime by an ecclesiastical court. A result of this was the celebrated collection of decrees—the Constitutions of Clarendon (1164)—which professed to reassert the ancestral rights of the King over the church in such matters as clerical immunity, appointment of bishops, custody of vacant sees, excommunication, and appeals to Rome. The Archbishop, after an initial compliance, refused to accept these, and they were throughout the controversy a block to an agreement. The quarrel touched what was to be the King's chief concern—the country's judicial system.

Anglo-Saxon England had two courts of justice—that of the hundred, a division of the shire, for petty offenses, and that of the shire, presided over by the sheriff. The feudal regime introduced by the Normans added courts of the manor and of the honour (a complex of estates). Above all stood the royal right to set up courts for important pleas and to hear, either in person or through his ministers, any appeal. Arrest was a local responsibility, usually hard upon a flagrant crime. A doubt of guilt was settled by ordeal by battle; the accused in the shire underwent tests held to reveal God's judgment. Two developments had come in since William the Conqueror's day: the occasional mission of royal justices into the shires and the occasional use of a jury of local notables as fact finders in cases of land tenure.

Henry's first comprehensive program was the Assize of Clarendon (1166), in which the procedure of criminal justice was established; 12 "lawful" men of every hundred, and four of every village, acting as a "jury of presentment," were bound to declare on oath whether any local man was a robber or murderer. Trial of those accused was reserved to the King's justices, and prisons for those awaiting trial were to be erected at the King's expense. This provided a system of criminal investigation for the whole country, with a reasonable verdict probable because the firm accusation of the jury entailed exile even if the ordeal acquitted the accused. In feudal courts the trial by battle could be avoided by the establishment of a concord, or fine. This system presupposed regular visits by the King's justices on circuit (or, in the technical phrase, "on eyre"), and these tours became part of the administration of the country. The justices formed three groups: one on tour, one "on the bench" at Westminster, and one with the King when the court was out of London. Those at Westminster dealt with private pleas and cases sent up from the justices on eyre.

Equally effective were the "possessory assizes." In the feudal world, especially in times of turmoil, violent ejections and usurpations were common, with consequent vendettas and violence. Pleas brought to feudal courts could be delayed or altogether frustrated. As a remedy Henry established the possessory writ, an order from the Exchequer, directing the sheriff to convene a sworn local jury at petty assize to establish the fact of dispossession, whereupon the sheriff had to reinstate the defendant pending a subsequent trial at the grand assize to establish the rights of the case. This was the writ of Novel Disseisin (*i.e.,* recent dispossession). This writ was returnable; if the sheriff failed to achieve reinstatement, he had to summon the defendant to appear before the King's justices and himself be present with the writ. A similar writ of Mort d'Ancestor decided whether the ancestor of a plaintiff had in fact possessed the estate, whereas that of Darrein Presentment (*i.e.,* last presentation) decided who in fact had last presented a parson to a particular benefice. All these writs gave rapid and clear verdicts subject to later revision. The fees enriched the treasury, and recourse to the courts both extended the King's control and discouraged irregular self-help. Two other practices developed by Henry became permanent. One was scutage, the commutation of military service for a money payment; the other was the obligation, put on all free men with a property qualification by the Assize of Arms (1181), to possess arms suitable to their station.

The ministers who engaged upon these reforms took a fully professional interest in the business they handled, as may be seen in Fitzneale's writing on the Exchequer and that of the chief justiciar, Ranulf de Glanville, on the laws of England; and many of the expedients adopted by the King may have been suggested by them. In any case, the long-term

results were very great. By the multiplication of a class of experts in finance and law Henry did much to establish two great professions, and the location of a permanent court at Westminster and the character of its business settled for England (and for much of the English-speaking world) that common law, not Roman law, would rule the courts and that London, and not an academy, would be its principal nursery. Moreover, Henry's decrees ensured that the judge-and-jury combination would become normal and that the jury would gradually supplant ordeal and battle as being responsible for the verdict. Finally, the increasing use of scutage, and the availability of the royal courts for private suits, were effective agents in molding the feudal monarchy into a monarchical bureaucracy before the appearance of Parliament.

Significance. Henry II lived in an age of biographers and letter writers of genius. John of Salisbury, Thomas Becket, Giraldus Cambrensis, Walter Map, Peter of Blois, and others knew him well and left their impressions. All agreed on his outstanding ability and striking personality and also recorded his errors and aspects of his character that appear contradictory, whereas modern historians agree upon the difficulty of reconciling its main features. Without deep religious or moral conviction, Henry nevertheless was respected by three contemporary saints, Aelred of Rievaulx, Gilbert of Sempringham, and Hugh of Lincoln. Normally an approachable and faithful friend and master, he could behave with unreasonable inhumanity. His conduct and aims were always self-centred, but he was neither a tyrant nor an odious egoist. Both as man and ruler he lacked the stamp of greatness that marked Alfred the Great and William the Conqueror. He seemed also to lack wisdom and serenity; and he had no comprehensive view of the country's interest, no ideals of kingship, no sympathetic care for his people. But if his reign is to be judged by its consequences for England, it undoubtedly stands high in importance, and Henry, as its mainspring, appears among the most notable of English kings.

(M.D.K.)

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• **Henry (III):** *see* Henry the Young King.

• **Henry III** (b. Oct. 1, 1207, Winchester, Hampshire, Eng.—d. Nov. 16, 1272, London), king of England from 1216 to 1272. In the 24 years (1234–58) during which he had effective control of the government, he displayed such indifference to tradition that the barons finally forced him to agree to a series of major reforms, the Provisions of Oxford (1258).

The elder son and heir of King John (ruled 1199–1216), Henry was nine years old when his father died. At that time London and much of eastern England were in the hands of rebel barons led by Prince Louis (later King Louis VIII of France), son of the French king Philip II Augustus. A council of regency presided over by the venerable William Marshal, 1st earl of Pembroke, was formed to

Seal of Henry III, showing the King enthroned; in the British Museum

By courtesy of the trustees of the British Museum

rule for Henry; by 1217 the rebels had been defeated and Louis forced to withdraw from England. After Pembroke's death in 1219 Hubert de Burgh ran the government until he was dismissed by Henry in 1232. Two ambitious Frenchmen, Peter des Roches and Peter des Rivaux, then dominated Henry's regime until the barons brought about their expulsion in 1234. That event marked the beginning of Henry's personal rule.

Although Henry was charitable and cultured, he lacked the ability to rule effectively. In diplomatic and military affairs he proved to be arrogant yet cowardly, ambitious yet impractical. The breach between the King and his barons began as early as 1237, when the barons expressed outrage at the influence exercised over the government by Henry's Savoyard relatives. The marriage arranged (1238) by Henry between his sister, Eleanor, and his brilliant young French favourite, Simon de Montfort, earl of Leicester, increased foreign influence and further aroused the nobility's hostility. In 1242 Henry's Lusignan half brothers involved him in a costly and disastrous military venture in France. The barons then began to demand a voice in selecting Henry's counsellors, but the King repeatedly rejected their proposal. Finally, in 1254 Henry made a serious blunder. He concluded an agreement with Pope Innocent IV (pope 1243–54), offering to finance papal wars in Sicily if the Pope would grant his infant son, Edmund, the Sicilian crown. Four years later Pope Alexander IV (pope 1254–61) threatened to excommunicate Henry for failing to meet this financial obligation. Henry appealed to the barons for funds, but they agreed to cooperate only if he would accept far-reaching reforms. These measures, the Provisions of Oxford, provided for the creation of a 15-member privy council, selected (indirectly) by the barons, to advise the King and oversee the entire administration. The barons, however, soon quarrelled among themselves, and Henry seized the opportunity to renounce the Provisions (1261). In April 1264 Montfort, who had emerged as Henry's major baronial opponent, raised a rebellion; the following month he defeated and captured the King and his eldest son, Edward, at the Battle of Lewes (May 14, 1264), Sussex. Montfort ruled England in Henry's name until he was defeated and killed by Edward at the Battle of Evesham, Worcestershire, in August 1265. Henry, weak and senile, then allowed Edward to take charge of the government. After the King's death, Edward ascended the throne as King Edward I.

• **Henry IV,** also called (1377–97) EARL OF DERBY, or (1397–99) DUKE OF HEREFORD, byname HENRY BOLINGBROKE, or HENRY OF LANCASTER (b. April ? 1366, Bolingbroke Castle, Lincolnshire, Eng.—d. March 20, 1413, London), king of England from 1399 to 1413, the first of three 15th-century monarchs from the House of Lancaster. He gained the crown by usurpation and successfully consolidated his power in the face of repeated uprisings of powerful nobles. At the same time he was unable to overcome the fiscal and administrative weaknesses that contributed to the eventual downfall of the Lancastrian dynasty.

Henry was the eldest surviving son of John of Gaunt, duke of Lancaster, by his first wife, Blanche. Before becoming king he was known as Henry Bolingbroke, and he received from his cousin the titles earl of Derby (1377) and duke of Hereford (1397). During the opening years of the reign of King Richard II (ruled 1377–99), Henry remained in the background while his father ran the government. When Gaunt departed for an expedition to Spain in 1386, Henry entered politics as an opponent

Henry IV, detail of a manuscript illumination from Froissart's *Chronicles* 15th century; in the British Library (Harleian MS. 4380)

By courtesy of the trustees of the British Library

of the crown. He and Thomas Mowbray (later 1st duke of Norfolk) became the younger members of the group of five opposition leaders—known as the lords appellants—who in 1387–89 outlawed Richard's closest associates and forced the King to submit to their domination. Richard had just regained the upper hand when Gaunt returned to reconcile the King to his enemies. Bolingbroke then went on crusades into Lithuania (1390) and Prussia (1392). Meanwhile, Richard had not forgiven his past enmity. In 1398 the King took advantage of a quarrel between Bolingbroke and Norfolk to banish both men from the kingdom. The seizure of the Lancastrian estates by the crown upon John of Gaunt's death (February 1399) deprived Henry of his inheritance and gave him an excuse to invade England (July 1399) as a champion of the nobility. Richard surrendered to him in August; Bolingbroke's reign as King Henry IV began when Richard abdicated on Sept. 30, 1399.

Henry IV used his descent from King Henry III (ruled 1216–72) to justify his usurpation of the throne. Nevertheless, this claim did not convince those magnates who aspired to assert their authority at the crown's expense. During the first five years of his reign, Henry was attacked by a formidable array of domestic and foreign enemies. He quashed a conspiracy of Richard's supporters in January 1400. Eight months later the Welsh landowner Owen Glendower raised a national rebellion against oppressive English rule in Wales. Henry led a number of fruitless expeditions into Wales from 1400 to 1405, but his son, Prince Henry,

had greater success in reasserting royal control over the region. Meanwhile, Glendower encouraged domestic resistance to Henry's rule by allying with the powerful Percy family—Henry Percy, earl of Northumberland, and his son Sir Henry Percy, called Hotspur. Hotspur's brief uprising, the most serious challenge faced by Henry during his reign, ended when the King's forces killed the rebel in battle near Shrewsbury, Shropshire, in July 1403. In 1405 Henry had Thomas Mowbray, duke of Norfolk, and Richard Scrope, archbishop of York, executed for conspiring with Northumberland to raise another rebellion. Although the worst of Henry's political troubles were over, he then began to suffer from an affliction that his contemporaries believed to be leprosy—it may have been congenital syphilis. A quickly suppressed insurrection, led by Northumberland in 1408, was the last armed challenge to Henry's authority. Throughout these years the King had to combat border incursions by the Scots and ward off conflict with the French, who aided the Welsh rebels in 1405–06.

To finance these military activities, Henry was forced to rely on parliamentary grants. From 1401 to 1406 Parliament repeatedly accused him of fiscal mismanagement and gradually acquired certain precedent-setting powers over royal expenditures and appointments. As Henry's health deteriorated, a power struggle developed within his administration between his favourite, Thomas Arundel, archbishop of Canterbury, and a faction headed by Henry's Beaufort half brothers and Prince Henry. The latter group ousted Arundel from the chancellorship early in 1410, but they, in turn, fell from power in 1411. Henry then made an alliance with the French faction that was waging war against the Prince's Burgundian friends. As a consequence, tension between Henry and the Prince was high when Henry became totally incapacitated late in 1412. He died several months later, and the Prince succeeded as King Henry V.

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• **Henry V** (b. Sept. 16?, 1387, Monmouth, Monmouthshire, Wales—d. Aug. 31, 1422, Bois de Vincennes, Fr.), king of England (1413–22) of the House of Lancaster, son of Henry IV. As victor of the Battle of Agincourt (1415, in the Hundred Years' War with France), he made England one of the strongest kingdoms in Europe.

Henry V, painting by an unknown artist; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Early Life. Henry was the eldest son of Henry, earl of Derby (afterward Henry IV), by Mary de Bohun. On his father's exile in 1398, Richard II took the boy into his own charge, treated him kindly, and knighted him in 1399. Henry's uncle, Henry Beaufort, bishop of Winchester, seems to have been responsible for his training, and, despite his early entry into public life, he was well educated by the standards of his time. He grew up fond of music and reading and became the first English king who could both read and write with ease in the vernacular tongue. On Oct. 15, 1399, after his father had become king, Henry was created earl of Chester, duke of Cornwall, and prince of Wales, and soon afterward, duke of Aquitaine and Lancaster. From October 1400 the administration of Wales was conducted in his name, and in 1403 he took over actual command of the war against the Welsh rebels, a struggle that absorbed much of his restless energy until 1408. Thereafter he began to demand a voice in government and a place on the council, in opposition to his ailing father and Thomas Arundel, archbishop of Canterbury. The stories of Prince Henry's reckless and dissolute youth, immortalized by Shakespeare, and of the sudden change that overtook him when he became king, have been traced back to within 20 years of his death and cannot be dismissed as pure fabrication. This does not involve accepting them in the exaggerated versions of the Elizabethan playwrights, to which the known facts of his conduct in war and council provide a general contradiction. Probably they represent no more than the natural ebullience of a young man whose energies found insufficient constructive outlet. The most famous incident, his quarrel with the chief justice, Sir William Gascoigne, was a Tudor invention, first related in 1531.

Henry succeeded his father on March 21, 1413. In the early years of his reign his position was threatened by an abortive Lollard rising (January 1414) and by a conspiracy (July 1415) of Richard of York, earl of Cambridge, and Henry, Lord Scrope of Masham, in favour of Edmund Mortimer, earl of March. On each occasion Henry was forewarned and the opposition was suppressed without mercy. Neither incident long distracted him from his chief concern: his ambitious policy toward France. Not content with a demand for possession of Aquitaine and other lands ceded by the French at the Treaty of Calais (1360), he also laid claim to Normandy, Touraine, and Maine (the former Angevin holdings) and to parts of France that had never been in English hands. Although such demands were unlikely to be conceded even by the distracted government of France under King Charles VI, Henry seems to have convinced himself that his claims were just and not a merely cynical cover for calculated aggression. Yet if "the way of justice" failed, he was ready to turn to "the way of force"; and warlike preparations were well advanced long before the negotiations with Charles, initiated during the reign of Richard II, were finally broken off in June 1415.

The French Wars. Henry V's true genius is revealed in the planning and execution of his subsequent campaigns for the conquest of France. Before hostilities began, his diplomatic skill was exerted in an effort to secure the support or at least the neutrality of John the Fearless, duke of Burgundy. His attempts to deprive France of maritime assistance show an awareness of the importance of sea power unusual in medieval kings, and after the Battle of the Seine (August 1416), England's naval mastery of the Channel was not seriously disputed. At home, Henry turned to the systematic financing of his projected invasion, partly through large-scale borrowing, partly through parliamentary taxation, the generosity of which reflects his success in arousing national enthusiasm for the war. Henry began the struggle with the wholehearted support of the magnates and the backing of a united nation. His military strategy was conceived with equal ability. It stands in marked contrast with the haphazard and spasmodic operations of the English in France in the previous century. His main objective, to which the winning of battles was largely irrelevant, was the systematic reduction of the great towns and fortresses of northern France. These, kept as headquarters of permanent English garrisons, would become focal points for the subjection of the surrounding countryside; behind the soldiers were to come administrators and tax collectors, who would make the war pay for itself. Despite the forethought and grasp this plan displayed, its execution took longer than Henry had anticipated. It absorbed his energies for seven years and brought him to an early grave.

His first campaign brought the capture of Harfleur (September 1415) and the great victory of Agincourt (Oct. 25, 1415). This resounding triumph made Henry the diplomatic arbiter of Europe: it won him a visit (1416) from the Holy Roman emperor Sigismund, with whom he made a treaty of alliance at Canterbury (1416) and whose influence was used to detach Genoa from its naval alliance with France. The cooperation of the two rulers led directly to the ending of the papal schism through the election of Martin V (1417), an objective that Henry had much at heart. Thereafter he returned to the long, grim war of sieges and the gradual conquest of Normandy. Rouen, the capital of northern France, surrendered in January 1419, and the murder of Duke John of Burgundy in September 1419 brought him the Burgundian alliance. These successes forced the French to agree to the Treaty of Troyes on May 21, 1420. Henry was recognized as heir to the French throne and regent of France, and Catherine, the daughter of Charles, was married to him on June 2. He was now at the height of his power: but his triumph was short-lived. His health grew worse at the sieges of Melun and Meaux, and he died of camp fever at the château of Vincennes in 1422.

Character and ability. Henry's character is by no means wholly admirable. Hard and domineering, he was intolerant of opposition and could be ruthless and cruel in pursuit of his policy. His lack of chivalrous qualities deprives him of any claim to be regarded as "the typical medieval hero." Yet contemporaries united in praising his love of justice, and even French writers of his own day admired him as a brave, loyal, and upright man, an honourable fighter, and a commanding personality in whom there was little of the mean and the paltry. Although personally lacking in warmth, he had the capacity to inspire devotion in others, and he possessed high qualities of leadership. His piety was genuine, and on his deathbed he expressed a last wish that he might live to rebuild the walls of Jerusalem in a new crusade. In respect of ability, he must rank high among English kings. His achievement was remarkable: it has been rightly observed that "he found a nation weak and drifting and after nine years left it dominant in Europe." The tragedy of his reign was that he used his great gifts not for constructive reform at home but to commit his country to a dubious foreign war. His premature death made success abroad unlikely and condemned England to a long, difficult minority rule by his successor. (C.D.R.)

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sion of France (1947) and *The Fifteenth Century, 1399–1485* (1961), critical of Henry's achievements; H.F. Hutchinson, *Henry V* (1967), a popular account, mostly about the French War; C.T. Allmand, *Henry V* (1968), a useful, short, modern reappraisal; R.A. Newhall, *The English Conquest of Normandy, 1416–1424* (1924), the best assessment of Henry V as a soldier.

• **Henry VI** (b. Dec. 6, 1421, Windsor, Berkshire, Eng.—d. May 21/22, 1471, London), king of England from 1422 to 1461 and from 1470 to 1471, a pious and studious recluse whose incapacity for government was one of the causes of the Wars of the Roses.

Henry VI, oil painting by an unknown artist; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Henry succeeded his father, Henry V, on Sept. 1, 1422, and on the death (Oct. 21, 1422) of his maternal grandfather, the French king Charles VI, Henry was proclaimed king of France in accordance with the terms of a treaty made after Henry V's French victories.

Henry's minority was never officially ended, but from 1437 he was considered old enough to rule for himself, and his personality became a vital factor. There is evidence that he had been a headstrong and unruly boy, but he later became concerned only with religious observances and the planning of his educational foundations (Eton College in 1440–41, King's College, Cambridge, in 1441). Home politics were dominated by the rivalries of a series of overpowerful ministers—Humphrey, duke of Gloucester; Henry, Cardinal Beaufort; and William de la Pole, duke of Suffolk. After Suffolk's fall (1449) the contenders for power were the Lancastrian Edmund Beaufort, duke of Somerset, and Richard, duke of York, a cousin of the King whose claim to the throne, by strict primogeniture, was better than Henry's. Meanwhile, the English hold on France was steadily eroded; despite a truce—as part of which Henry married (April 1445) Margaret of Anjou, a niece of the French queen—Maine and Normandy were lost and by 1453 so were the remaining English-held lands in Guyenne.

Henry had a period of insanity (July 1453–December 1454), during which York was lord protector, but his hopes of ultimately succeeding Henry were shattered by the birth of Edward, prince of Wales, on Oct. 13, 1453. A return to power of Somerset in 1455 made war inevitable, and although he was killed at the first Battle of St. Albans (May 1455), Queen Margaret gradually undermined York's ascendancy, and fighting was renewed in 1459. After the Yorkists had captured Henry at Northampton (July 1460), it was agreed that Henry should remain king but recognize York, and not his own son Edward, as heir to the throne. Although York was killed at Wakefield (Dec. 30, 1460), and Henry was recaptured by the Lancastrians at the second Battle of St. Albans (Feb. 17, 1461), York's heir was proclaimed king as Edward IV in London on March 4. Routed at Towton in Yorkshire (March 29), Henry fled with his wife and son to Scotland, returning to England in 1464 to support an unsuccessful Lancastrian rising. He was eventually captured (July 1465) near Clitheroe in Lancashire and imprisoned in the Tower of London. A quarrel between Edward IV and Richard Neville, earl of Warwick, led Warwick to restore Henry to the throne in October 1470, and Edward fled abroad. But he soon returned, defeated and killed Warwick, and destroyed Queen Margaret's forces at Tewkesbury (May 4, 1471). The death of Prince Edward in that battle sealed Henry's fate, and he was murdered in the Tower of London soon afterward.

• **Henry VII,** also called (1457–85) HENRY TUDOR, EARL OF RICHMOND (b. Jan. 28, 1457, Pembroke Castle, Pembrokeshire, Wales—d. April 21, 1509, Richmond, Surrey, Eng.), king of England (1485–1509), who succeeded in ending the Wars of the Roses between the houses of Lancaster and York and founded the Tudor dynasty.

Early life. Henry, son of Edmund Tudor, earl of Richmond, and Margaret Beaufort, was born nearly three months after his father's death. His father was the son of Owen Tudor, a Welsh squire, and Catherine of France, the widow of King Henry V. His mother was the great-granddaughter of John of Gaunt, duke of Lancaster, whose children by Catherine Swynford were born before he married her. Henry IV had confirmed Richard II's legitimation (1397) of the children of this union but had specifically excluded the Beauforts from any claim to the throne (1407). Henry Tudor's claim to the throne was, therefore, weak and of no importance until the deaths in 1471 of Henry VI's only son, Edward, of his own two remaining kinsmen of the Beaufort line, and of Henry VI himself, which suddenly made Henry Tudor the sole surviving male with any ancestral claim to the House of Lancaster.

Henry VII, painting by an unknown artist, 1505; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

As his mother was only 14 when he was born and soon married again, Henry was brought up by his uncle Jasper Tudor, earl of Pembroke. When the Lancastrian cause crashed to disaster at the Battle of Tewkesbury (May 1471), Jasper took the boy out of the country and sought refuge in the duchy of Brittany. The House of York then appeared so firmly established that Henry seemed likely to remain in exile for the rest of his life. The usurpation of Richard III (1483), however, split the Yorkist party and gave Henry his opportunity. His first chance came in 1483 when his aid was sought to rally Lancastrians in support of the rebellion of Henry Stafford, duke of Buckingham, but that revolt was defeated before Henry could land in England. To unite the opponents of Richard III, Henry had promised to marry Elizabeth of York, eldest daughter of Edward IV; and the coalition of Yorkists and Lancastrians continued, helped by French support, since Richard III talked of invading France. In 1485 Henry landed at Milford Haven in Wales and advanced toward London. Thanks largely to the desertion of his stepfather, Lord Stanley, to him, he defeated and slew Richard III at the Battle of Bosworth on Aug. 22, 1485. Claiming the throne by just title of inheritance and by the judgment of God in battle, he was crowned on October 30 and secured parliamentary recognition of his title early in November. Having established his claim to be king in his own right, he married Elizabeth of York on Jan. 18, 1486.

Yorkist plots. Henry's throne, however, was far from secure. Many influential Yorkists had been dispossessed and disappointed by the change of regime, and there had been so many reversals of fortune within living memory that the decision of Bosworth did not appear necessarily final. Yorkist malcontents had strength in the north of England and in Ireland and had a powerful ally in Richard III's sister Margaret, dowager duchess of Burgundy. All the powers of Europe doubted Henry's ability to survive, and most were willing to shelter claimants against him. Hence, the King was plagued with conspiracies until nearly the end of his reign.

The first rising, that of Lord Lovell, Richard III's chamberlain, in 1486 was ill prepared and unimportant; but in 1487 came the much more serious revolt of Lambert Simnel. Claiming to be Edward, earl of Warwick, the son of Richard III's elder brother, George, duke of Clarence, he had the formidable support of John de la Pole, earl of Lincoln, Richard III's heir designate, of many Irish chieftains, and of 2,000 German mercenaries paid for by Margaret of Burgundy. The rebels were defeated (June 1487) in a hard-fought battle at Stoke (East Stoke, near Newark in Nottinghamshire), where the doubtful loyalty of some of the royal troops was reminiscent of Richard III's difficulties at Bosworth. Henry, recognizing that Simnel had been a mere dupe, employed him in the royal kitchens.

Then in 1491 appeared a still more serious menace: Perkin Warbeck, coached by Margaret to impersonate Richard, the younger son of Edward IV. Supported at one time or another by France, by Maximilian I of Austria, regent of the Netherlands (Holy Roman emperor from 1493), by James IV of Scotland, and by powerful men in both Ireland and England, Perkin three times invaded England before he was captured at Beaulieu in Hampshire in 1497. Henry was also worried by the treason of Edmund de la Pole, earl of Suffolk, the eldest surviving son of Edward IV's sister Elizabeth, who fled to the Netherlands (1499) and was supported by Maximilian. Doubtless the plotters were encouraged by the deaths of Henry's sons in 1500 and 1502, and of his wife in 1503. It was not until 1506, when he imprisoned Suffolk in the Tower of London, that Henry could at last feel safe. When he died, his only surviving son, Henry VIII, succeeded him without a breath of opposition.

Foreign policy. In the early years of his reign, in a vain attempt to prevent the incorporation of the duchy of Brittany into France, Henry found himself drawn along with Spain and the Holy Roman emperor into a war against France. But he realized that war was

a hazardous activity for one whose crown was both impoverished and insecure, and in 1492 he made peace with France on terms that brought him recognition of his dynasty and a handsome pension. Thereafter, French preoccupation with adventures in Italy made peaceful relations possible, but the support that Maximilian and James IV gave to Warbeck led to sharp quarrels with the Netherlands and Scotland. The economic importance of England for the Netherlands enabled Henry to induce Maximilian and the Netherlands to abandon the pretender in 1496 and to conclude a treaty of peace and freer trade (the Intercursus Magnus).

With Scotland the long tradition of hostility was harder to overcome; but Henry eventually succeeded in concluding in 1499 a treaty of peace, followed in 1502 by a treaty for the marriage of James IV to Henry's daughter Margaret. James's consent to the match may have been fostered by the arrival in England of Catherine of Aragon for her marriage with Prince Arthur in 1501. Spain had recently sprung into the first rank of European powers, so a marriage alliance with Spain enhanced the prestige of the Tudor dynasty, and the fact that in 1501 the Spanish monarchs allowed the marriage to take place is a tribute to the growing strength of the Tudor regime in the eyes of the European powers.

After Arthur's death in 1502, Henry was in a strong position to insist on the marriage of Catherine to his surviving son, Henry (later King Henry VIII), since he had possession both of Catherine's person and of half her dowry, and Spain needed English support against France. Indeed, in these last years of his reign, Henry had gained such confidence in his position that he indulged in some wild schemes of matrimonial diplomacy. But the caution of a lifetime kept him from involvement in war, and his foreign policy as a whole must not be judged by such late aberrations. He had used his diplomacy not only to safeguard the dynasty but to enrich his country, using every opportunity to promote English trade by making commercial treaties. He made his country so prosperous and powerful that he was able to betroth his daughter Mary to the archduke Charles (afterward Emperor Charles V), the greatest match of the age.

Government and administration. In home affairs Henry achieved striking results largely by traditional methods. Like Edward IV, Henry saw that the crown must be able to display both splendour and power when occasion required. This necessitated wealth, which would also free the king from embarrassing dependence on Parliament and creditors. Solvency could be sought by economy in expenditure, such as avoidance of war and promotion of efficiency in administration, and by increasing the revenue. To increase his income from customs dues, Henry tried to encourage exports, protect home industries, help English shipping by the time-honoured method of a navigation act to ensure that English goods were carried in English ships, and find new markets by assisting John Cabot and his sons in their voyages of discovery. More fruitful was the vigorous assertion of royal fiscal rights, such as legal fees, fines and amercements, and feudal dues. This was largely achieved by continuing Yorkist methods in ordering most of the royal revenue to be paid into the chamber of the household, administered by able and energetic servants and supervised by the king himself, instead of into the royal exchequer, hidebound by tradition. So efficient and ruthless were Henry's financial methods that he left a fortune to his successor and a legacy of hatred for some of his financial ministers.

In restoring order after the civil wars, Henry used more traditional methods than was once thought. Like the Yorkist kings, he made use of a large council, presided over by himself, in which lawyers, clerics, and lesser gentry were active members. Sitting as the Court of Star Chamber, the council dealt with judicial matters, but less than was formerly thought. Nearly all the heavy fines levied for the illegal retaining of armed men toward the end of his reign were imposed in the Court of King's Bench and by the justices of assize. Special arrangements were made for hearing poor men's causes in the council and for trying to promote better order in Wales and the North by setting up special councils there; and more powers were entrusted to the justices of the peace. The King, moreover, could not destroy the institution of retainers since he depended on them for much of his army and society regarded them as natural adjuncts of rank. So Henry's government was conservative, as it was in its relations with Parliament and with the church.

Character. The whole of Henry's youth had been spent in conditions of adversity, often in danger of betrayal and death, and usually in a state of poverty. These experiences, together with the uncertainties of his reign, taught him to be secretive and wary, to subordinate his passions and affections to calculation and policy, to be always patient and vigilant. There is evidence that he was interested in scholarship, that he could be affable and gracious, and that he disliked bloodshed and severity; but all these emotions had to give way to the needs of survival. The extant portraits and descriptions suggest a tired and anxious-looking man, with small blue eyes, bad teeth, and thin white hair. His experiences and needs had also made him acquisitive, a trait that increased with age and success, and one that was opportune for both the crown and the realm. (A.R.M./Ed.)

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• **Henry VIII** (b. June 28, 1491, Greenwich, near London—d. Jan. 28, 1547, London), king of England (1509–47), who presided over the beginnings of the English Renaissance and the English Reformation. His six wives were, successively, Catherine of Aragon (the mother of the future queen Mary I), Anne Boleyn (the mother of the future queen Elizabeth I), Jane Seymour (the mother of Henry's successor, Edward VI), Anne of Cleves, Catherine Howard, and Catherine Parr.

Accession to the throne. Henry was the second son of Henry VII, first of the Tudor line, and Elizabeth, daughter of Edward IV, first king of the short-lived line of York. When his elder brother, Arthur, died in 1502, Henry became the heir to the throne; of all the Tudor monarchs, he alone spent his childhood in calm expectation of the crown, which helped give an assurance of majesty and righteousness to his willful, ebullient character. He excelled in book learning as well as in the physical exercises of an aristocratic society, and, when in 1509 he ascended the throne, great things were expected of him. Six feet tall, powerfully built, and a tireless athlete, huntsman, and dancer, he promised England the joys of spring after the long winter of Henry VII's reign.

Henry and his ministers exploited the dislike inspired by his father's energetic pursuit of

Henry VIII, detail of a painting by Hans Holbein the Younger, *c.* 1538; in the collection of the Duke of Rutland

By courtesy of the Duke of Rutland; photograph by the Royal Academy of Arts, London

royal rights by sacrificing, without a thought, some of the unpopular institutions and some of the men that had served his predecessor. Yet the unpopular means for governing the realm soon reappeared because they were necessary. Soon after his accession, Henry married Catherine of Aragon, Arthur's widow, and the attendant lavish entertainments ate into the modest royal reserves.

More serious was Henry's determination to engage in military adventure. Europe was being kept on the boil by rivalries between the French and Spanish kingdoms, mostly over Italian claims; and, against the advice of his older councillors, Henry in 1512 joined his father-in-law, Ferdinand II of Aragon, against France and ostensibly in support of a threatened pope, to whom the devout king for a long time paid almost slavish respect.

Henry himself displayed no military talent, but a real victory was won by the Earl of Surrey at Flodden (1513) against a Scottish invasion. Despite the obvious pointlessness of the fighting, the appearance of success was popular. Moreover, in Thomas Wolsey, who organized his first campaign in France, Henry discovered his first outstanding minister. By 1515 Wolsey was archbishop of York, lord chancellor of England, and a cardinal of the church; more important, he was the King's good friend, to whom was gladly left the active conduct of affairs. Henry never altogether abandoned the positive tasks of kingship and often interfered in business; though the world might think that England was ruled by the Cardinal, the King himself knew that he possessed perfect control any time he cared to assert it, and Wolsey only rarely mistook the world's opinion for the right one.

Nevertheless, the years from 1515 to 1527 were marked by Wolsey's ascendancy, and his initiatives set the scene. The Cardinal had some occasional ambition for the papal tiara, and this Henry supported; Wolsey at Rome would have been a powerful card in English

hands. In fact, there was never any chance of this happening, any more than there was of Henry's election to the imperial crown, briefly mooted in 1519 when the emperor Maximilian I died, to be succeeded by his grandson Charles V. That event altered the European situation. In Charles, the crowns of Spain, Burgundy (with the Netherlands), and Austria were united in an overwhelming complex of power that reduced all the dynasties of Europe, with the exception of France, to an inferior position. From 1521, Henry became an outpost of Charles V's imperial power, which at Pavia (1525), for the moment, destroyed the rival power of France. Wolsey's attempt to reverse alliances at this unpropitious moment brought reprisals against the vital English cloth trade with the Netherlands and lost the advantages that alliance with the victor of Pavia might have had. It provoked a serious reaction in England, and Henry concluded that Wolsey's usefulness might be coming to an end.

Loss of popularity. While the greatness of England in Europe was being shown up as a sham, the regime was also losing popularity at home. The fanciful expectations of the early days could not, of course, endure; some measure of reality was bound to intrude. As it was, journalists and writers continued to be full of hope for a king who, from 1517, commanded the services of a new councillor, Sir Thomas More, one of the outstanding minds of the day. But More soon discovered that Henry found it easy to keep his enjoyment of learned conversation apart from the conduct of policy. Nothing for the moment could dent Wolsey's strength, and this had serious drawbacks for the King, who supported him. The country was showing increasing signs of its discontent, and Wolsey's efforts to remedy grievances only exasperated men of influence without bringing satisfaction to the poor. Feelings came to the boil in the years 1523–24. Although he disliked Parliaments, Wolsey had to agree to the calling of one in 1523, but the taxes voted were well below what was required. Next year, the attempt to levy a special tax led to such fierce resistance that Henry rescinded it, he and the Cardinal both trying to take the credit for the remission of what they had been jointly responsible for imposing. While he had Wolsey to take the blame, Henry could afford such fiascoes; the Cardinal could not. By 1527 a government policy that, though seemingly Wolsey's, was really the King's was facing bankruptcy; ineffective abroad, unpopular at home, it made the regime look as empty of positive purpose as in fact it was.

At this point, the King entered affairs unmistakably and spectacularly. Among his failures so far had been his or Catherine's inability to provide a male heir to the throne; several stillbirths and early deaths had left only a girl, the princess Mary (born in 1516), to carry on the line, and no one relished the thought of a female succession with all the dynastic and political uncertainties it would bring. Being the man he was, Henry could not suppose the fault to be his. His rapidly growing aversion to Catherine was augmented by his infatuation with one of the ladies of the court, Anne Boleyn, the sister of one of his earlier mistresses. Henry was no profligate; indeed, he had a strong streak of prudery, but he sought the occasional relief from marriage to a worthy but ailing wife to which princes have generally been held entitled. In Anne he met his match; this 20-year-old girl, brought up in a tough school of courtly intrigue, would be more than a king's mistress. It took Henry, who in any case needed to marry her if the expected issue was to solve the succession problem, some six years to achieve their joint purpose. Inadvertently, he provoked a revolution.

From 1527 Henry pursued what became known as "the King's great matter": his divorce from Catherine. He convinced himself that his first marriage had been against the divine law; that is, against the biblical injunction (Lev.) forbidding marriage with a brother's widow. The deaths of the children proved God's judgment on the union. With his characteristic readiness to convert his own desires into the law of God, Henry rapidly assured himself that he was living in mortal sin with Catherine and must find relief if he was again to become acceptable to God. He appealed to Rome for a declaration of annulment. Popes had usually obliged kings in such matters, but Henry had picked both his time and his case badly. He was asking Pope Clement VII to help him discard the Emperor's aunt, but Clement, the Emperor's prisoner in 1527–28, never thereafter dared resist Charles, whose powerful feelings of familial honour and public prestige barred any concession to Henry's wishes. Moreover, the Pope's reluctance was increased by the fact that he was being asked to declare illegal an earlier exercise of papal power—which had licensed Henry's marriage to his brother's widow—of a kind that brought a good deal of money to the papal coffers.

Thus Henry's attempts to solve his dilemma in the accepted legal way were doomed from the start. Wolsey, in a worse dilemma, since only success in the impossible could keep him in power, obtained a trial of the case in England, but this was frustrated by his fellow judge, Cardinal Campeggio, on orders from Rome (1529). Within weeks, Wolsey was ousted, but his disappearance solved nothing, and the councillors who succeeded him could offer little help to their king, who knew only what he wanted, not how to get it.

The chancellorship went to Thomas More, who had told Henry that he did not approve of the divorce and who wished to devote himself to a fight against Lutheran heresy. Confusion was the keynote of policy for some three years, while the King dithered between hope that Rome might yet be forced to let the formal trial of his first marriage take place in England and stirrings of a more radical nature—to reject Rome outright. But, though he occasionally talked of doing just that, neither he nor anyone else knew how to convert talk into action.

The Breach with Rome. Action called for a revolution, and the revolution required a man who could conceive and execute it. That man was Thomas Cromwell, who, in April 1532, won control of the council and thereafter remained in command for some eight years. The revolution consisted of the decision that the English Church should separate from Rome, becoming effectively a spiritual department of state under the rule of the king as God's deputy on earth. The revolution that he had not intended gave the King his wish: in January 1533 he married Anne Boleyn; in May a new archbishop, Thomas Cranmer, presided over the formality of a trial that declared the first marriage annulled; in September the princess Elizabeth was born. The Pope retaliated with a sentence of excommunication; it troubled no one.

The supreme headship on earth over the Church of England, though he had not sought it, represented Henry's major achievement. It had very wide ranging consequences, but those that immediately concerned the King were two. In the first place, the new title consolidated his own concept of kingship, his conviction that (as he once said) he had no superior on earth. It rounded off the majestic image of divinely instituted royal rule that it was Henry's constant ambition to present to an awed and obedient world. But, in the second place, it created a real personal problem for the King: earlier, in his book *Assertio septem sacramentorum adversus Martinum Lutherum* (1521), he had attacked Luther and had expressed a profound devotion to the papacy and had been rewarded with the title of Defender of the Faith. Now he had turned against the Pope; his act was equal to encouraging the Protestant Reformation, a thing attractive to Cranmer and Cromwell (and perhaps Anne Boleyn), but not to Henry, who despised Luther. The religion of the newly independent church was for its head to settle: for the rest of his life, Henry, who prided himself on his theological learnings, was to give much time and thought to the nature of the true religion. With the exception of the papal primacy, he never gave up the main tenets of the faith in which he had grown up, but he changed his mind on details and arrived at an amalgam of his own in which transubstantiation and clerical celibacy mingled with radical views about the worldly authority of the church and man's ability to seek salvation without the aid of priests.

Domestic reforms. Cromwell's decade, the 1530s, was the only period of the reign during which a coherent body of policies was purposefully carried through. Cromwell's work greatly enlarged Henry's power, especially by transferring to the crown the wealth of the monasteries, dissolved in 1536–40, and new clerical taxes; but it also, more explicitly than ever, subjected the King to the law and to the legislative supremacy of Parliament. Since Henry knew how to work with parliaments, the immediate effect was to make him appear more dominant than ever and to give to his reign a spurious air of autocracy—spurious because in fact the rule of law remained to control the sovereign's mere will. The appearance of autocracy was misleadingly emphasized by the fact that all revolutions have their victims. As heads rolled, the King's earlier reputation as a champion of light and learning was permanently buried under his enduring fame as a man of blood. Old friends such as More, refusing to accept the new order, fell before the onslaught, as did some 50 other men caught by the treason laws. Between 1538 and 1541 the families of Pole and Courtenay were destroyed by the axe for treasons linked with efforts abroad to reverse the course of events in England but mainly because they could claim royal blood and represented a dynastic danger to the unprolific Tudor line.

The King now embarked on the series of matrimonial adventures that made him appear both a monster and a laughingstock. He soon tired of Anne, who failed to produce a male heir; in 1536 she was executed, with other members of the court, for alleged treasonable adultery. Catherine of Aragon, rejected but unbowed, had died a little earlier. Henry immediately married Jane Seymour, who bore him his son Edward but died in childbirth (1537). The next three years were filled with attempts to replace her, and the bride chosen was Anne, sister of the Duke of Cleves, a pawn in Cromwell's policy for a northern European alliance against dangers from France and the Emperor. But Henry hated the first sight of her and at once demanded his freedom, an end achieved by a quick divorce.

Physical and mental decline. The Cleves fiasco destroyed Cromwell; it enabled his many enemies to turn the King against him, and in July 1540 his head fell on the scaffold. Henry had by now become truly dangerous: always secretive and suspicious, now he was beginning to show paranoiac tendencies. Convinced that he controlled everyone, he was in fact readily manipulated by those who knew how to feed his suspicions and pander to his self-righteousness. Full of experience—the oldest king in Europe—and increasingly competent in the routine of rule, he lacked the comprehensive vision and large spirit that would have made him a great man. His temperamental deficiencies were aggravated by what he regarded as his undeserved misfortunes and by ill health; he grew enormously fat. His mind did not weaken, but he grew restless, peevish,

and totally unpredictable; often melancholy and depressed, he was usually out of sorts and always out of patience. In 1540–42 he briefly renewed his youth in marriage to the 20-year-old Catherine Howard, whose folly in continuing her promiscuity, even as queen, brought her to the block. The blow finished Henry. Thereafter, he was really a sad and bitter old man, and, though he married once more, to find a measure of peace with the calm and obedient Catherine Parr, his physical ruin was complete.

But he was still the king and, from Cromwell's fall (which he regretted too late), the only maker of policy. Policy in the hands of a sick, unhappy, violent man was not likely to be either sensible or prosperous, and so it proved. Left to himself, Henry concentrated on keeping the realm united, despite the growing strife between the religious factions, and on keeping before the world his own image as the glorious monarch of the age. The first resulted in frequent explosions against the ingratitude of his subjects and against his councillors. The second brought him back to his first love—war and conquest, the sport of kings.

In 1542 the Emperor and the King of France resumed hostilities. After a pretense of independence, Henry again joined the former: the Scots promptly joined the French. The Scots were routed at Solway Moss (1542), and their king died soon after: this opened the possibility of subjugating that country permanently by means of a marriage alliance between the infant heirs to the two thrones. But the Scottish dream quickly collapsed as Henry's crude handling of that nation gave control to a pro-French party, determined to resist even an alliance with England; physical conquest was beyond the King's means. Henry personally managed both the war and the subsequent negotiations, and he displayed amazing energy for so sick a man. But energy is not the same thing as competence. The war proved ruinous. Money had to be raised by selling off the monastic lands, which had brought a good income; the desperate expedient of debasing the coinage, though it brought temporary succour, led to a violent inflation that made things worse. Yet, even after the Emperor made peace with France (1544), Henry would not let go until two years later.

As the year 1546 drew to a close, it was apparent to all observers that the King had not long to live. Not that it was clear to the man most concerned; he continued as before, lamenting religious dissension, attending to the business of government, continuing the pretense of deathless majesty, destroying the powerful Howard family, whom he suspected of plotting to control his successor. Conscious almost to the very end, he died on Jan. 28, 1547. He left the realm feeling bereft and the government the more bewildered because, to the last, he had refused to make full arrangements for the rule of a boy king.

Assessment. Immediately and ever since, the impact of that overpowering personality maintained the achievement of which he himself was proudest: Henry VIII has always seemed the very embodiment of true monarchy. Even his evil deeds, never forgotten, have been somehow amalgamated into a memory of greatness. He gave his nation what it wanted: a visible symbol of its nationhood. He also had done something toward giving it a better government, a useful navy, a start on religious reform and social improvement. But he was not a great man in any sense. Although a leader in every fibre of his being, he little understood where he was leading his nation. But, if he was neither statesman nor prophet, he also was neither the blood-stained monster of one tradition nor the rowdy bon vivant of another. Cold, self-centred, ungiving, forever suspicious of the ways of the world, he could not live down to the second stereotype; despite a ruthlessness fed by self-righteousness, he never took the pleasure in killing required of the first. Simply, he never understood why the life of so well-meaning a man should have been beset by so many unmerited troubles.

(G.R.E./Ed.)

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• Henry (IX): *see* York, Henry Stuart, cardinal duke of.

France

• Henry I (b. *c.* 1008—d. Aug. 2, 1060, Vitry-aux-Loges, Fr.), king of France from 1026 to 1060 whose reign was marked by struggles against rebellious vassals.

The son of Robert II the Pious and grandson of Hugh Capet, founder of the Capetian dynasty, Henry was anointed king at Reims (1026) in his father's lifetime, following the death of his elder brother Hugh. His mother, Constance, however, favoured his younger brother Robert for the throne, and civil war broke out on King Robert II's death (1031). The younger Robert was given Burgundy in 1032, after Henry had sought refuge with Robert, duke of Normandy. From 1033 to 1043 Henry struggled with his feudatories, notably Eudes of Blois and his brother Robert. In 1055, as the result of an agreement made by Robert II, the county of Sens came to the crown as the sole gain of the reign.

Henry helped William of Normandy (the future William I of England) to quell his rebellious vassals at the Battle of Val-aux-Dunes (or Val-ès-Dunes; 1047), but was thereafter usually at war with him—a notable defeat for the King being that at Varaville (1058). Henry tried to resist papal interference but could not prevent Pope Leo IX from holding a council at Reims (1049). Philip, the elder son of Henry's marriage to a Russian princess, was crowned in 1059.

• Henry II, also called (until 1547) DUC (duke) D'ORLÉANS (b. March 31, 1519, Saint-Germain-en-Laye, near Paris—d. July 10, 1559, Paris), king of France from 1547 to 1559, a competent administrator whose extreme repression of Protestants within his kingdom helped to drive his country to civil war.

Henry II, portrait by François Clouet, 1559; in the Pitti Gallery, Florence

Anderson—Giraudon from Art Resource/EB Inc.

The second son of Francis I and Claude of France, Henry was sent with his brother Francis, the dauphin, as a hostage to Spain in 1526 and did not return to France until 1530, after the conclusion of the Peace of Cambrai. When the Dauphin died in 1536, Henry became heir to the throne. Strong differences between Henry and his father were accentuated by the rivalry between Henry's mistress, Diane de Poitiers, and the King's, Anne, duchesse d'Étampes, as well as by Henry's continuing support of the constable Anne de Montmorency, who had lost favour with the crown.

Upon accession, Henry undertook administrative reforms. The functions of the different sections of the king's council became more specialized; the commissaries sent into the provinces "to exercise the king's orders" were the forerunners of the *intendants;* and intermediary tribunals were established between the local justices and the *parlements* (high courts). In foreign affairs Henry continued his father's warfare against the Holy Roman emperor Charles V. He signed the Treaty of Chambord in 1552 with the German Protestant princes, promising them troops and subsidies; in return, they agreed to France's taking the bishoprics of Metz, Toul, and Verdun. Though Henry made a truce with Charles in 1556, war was soon resumed when a French expedition was sent into Italy under François, duc de Guise (1557). The Spanish in the Netherlands, however, besieged Saint-Quentin in Picardy, and Montmorency was defeated in an attempt to relieve the town. After Guise had somewhat improved the situation by taking Calais, Guînes, and Thionville, the financial difficulties of both France and Spain and Henry's desire to fight Protestantism in France led to the Peace of Cateau-Cambrésis (1559).

A bigoted Catholic, Henry was rigorous in the repression of Protestantism. In 1547 he created the Chambre Ardente in the Parlement of Paris for trying heretics.

The Peace of Cateau-Cambrésis was to be cemented by the marriages of Henry's daughters Elizabeth and Margaret to Philip II of Spain and to Emmanuel Philibert of Savoy, respectively. In a tournament during the festivities, Henry was hit in the head by a lance of Gabriel, comte de Montgomery, captain of the Scottish guard, and died 10 days later. He left a large and illustrious family by his marriage to Catherine de Médicis: the future kings Francis II, Charles IX, and Henry III and François, duc d'Alençon and later duc d'Anjou; in addition to Elizabeth and Margaret (Margaret married Henry of Navarre in 1572) he had another daughter by Catherine—Claude, who married Charles III the Great, duke of Lorraine. One of his natural children was Diane de France, who was legitimatized.

Articles are alphabetized word by word, not letter by letter

• Henry III, also called (until 1574) DUC (duke) D'ANJOU (b. Sept. 19, 1551, Fontainebleau, Fr.—d. Aug. 2, 1589, Saint-Cloud), king of France from 1574, under whose reign the prolonged crisis of the Wars of Religion was made worse by dynastic rivalries arising because the male line of the Valois dynasty was going to die out with him.

The third son of Henry II and Catherine de Médicis, Henry was at first entitled duc d'Anjou. Given command of the royal army against the Huguenots during the reign of his brother, Charles IX, he defeated two Huguenot leaders, the Prince de Condé (Louis I de Bourbon) at Jarnac in March 1569 and Gaspard de Coligny at Moncontour in October of that year. Henry was Catherine's favourite son, much to Charles's chagrin, and she used her influence to advance his fortunes. In 1572 she presented him as a candidate for the vacant throne of

Henry III, drawing by F. Quesnel, *c.* 1588; in the Bibliothèque Nationale, Paris

Giraudon—Art Resource/EB Inc.

Poland, to which he was finally elected in May 1573. In May 1574, however, Charles died, and Henry abandoned Poland and was crowned at Reims on Feb. 13, 1575. He was married two days later to Louise de Vaudémont, a princess of the House of Lorraine. The marriage proved childless.

The French Wars of Religion (1562–98) continued during Henry III's reign. Henry resumed the war against the Huguenots, but the Estates-General, meeting at Blois in 1576, was weary of Henry's extravagance and refused to grant him the necessary subsidies. The Peace of Bergerac (1577) ended the hostilities temporarily; the Huguenots lost some of their liberties by the Edict of Poitiers, and the Catholic Holy League was dissolved. In 1584, however, the Roman Catholics were alarmed when the Huguenot leader, Henry of Navarre (the future Henry IV), became heir to the throne on the death of Henry III's brother François, and the League was revived under the leadership of Henri, 3rd duc de Guise.

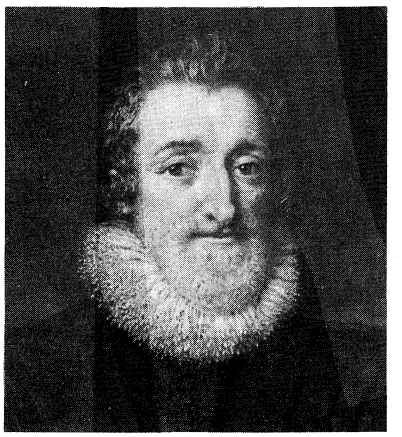
Henry III, acting on his mother's advice, tried to placate the League by revoking past edicts that had granted toleration to the Huguenots, but its members regarded him as a lukewarm defender of the faith and tried to depose him. A rising of the people of Paris, a League stronghold, on May 12, 1588 (the Estates-Day of the Barricades), caused the King to flee to Chartres. In December 1588 he took advantage of a meeting of the Estates-General at Blois to have the Duc de Guise and his brother Louis, the cardinal of Lorraine, assassinated. This, of course, exacerbated the League's hostility, and Henry III was compelled to ally himself with Henry of Navarre. Together they laid siege to Paris, but on Aug. 1, 1589, Jacques Clément, a fanatical Jacobin friar, gained admission to the King's presence and stabbed him. Before he died, Henry, who left no issue, acknowledged Henry of Navarre as his heir.

Henry III was more attentive to the trappings of power than to its substance; and he lost the sympathy of powerful elements by his aloofness at court and by the favours he conferred upon his *mignons,* a small group of handsome young men with whom he indulged in questionable excesses. Above all he was so extravagant as virtually to bankrupt his kingdom.

• **Henry IV,** also called (until 1572) PRINCE DE BÉARN, byname HENRY OF NAVARRE, or OF BOURBON, French HENRI DE NAVARRE, or DE BOURBON (b. Dec. 13, 1553, Pau, Béarn, Navarre—d. May 14, 1610, Paris), king of Navarre (as Henry III, 1572–89) and first Bourbon king of France (1589–1610) who, at the end of the Wars of Religion, abjured Protestantism and converted to Roman Catholicism (1593) in order to win Paris and reunify France. With the aid of such ministers as the Duc de Sully, he brought new prosperity to France.

Prince of Béarn. Henry de Bourbon-Navarre was the son of Antoine de Bourbon, duc de Vendôme, and Jeanne d'Albret, queen of Navarre from 1555. Henry, through his father, was in the sole legitimate line of descent from the Capetian kings of France. It was scarcely to be expected, however, that he would one day succeed to the throne of France, since Catherine de Médicis had already borne three sons to the reigning king, Henry II, and would soon bear him a fourth. Prince Henry spent most of his early childhood in Béarn. From 1561 to 1567 he lived with his second cousins, the children of the King of France, among whom was his future wife Marguerite.

The religious crisis between Roman Catholic and Protestant forces was then coming to a head, leading to a long period of civil war. Antoine de Bourbon temporarily allied himself with the Protestants but changed sides and was mortally wounded in battle against them.



Henry IV, detail of a painting by Frans Pourbus the Younger; in the Louvre, Paris

Giraudon—Art Resource/EB Inc.

Henry's mother, Jeanne d'Albret, held firm and announced her Calvinism on Christmas 1560.

Henry had just turned 13 when his mother brought him back to Béarn. At a crucial age in his intellectual development, he was brought up in the strict principles of Protestantism. About the same time he began his military education. In the autumn of 1567, he served as nominal head of a punitive expedition launched against the rebellious Catholic gentry of lower Navarre, which ended in an easy victory. Less than a year later Jeanne d'Albret, who had remained neutral during the first two religious wars, readily entered the third. She proceeded to La Rochelle, where she put her son into the charge of her brother-in-law Louis I de Bourbon, prince of Condé, who was leader of the Protestant (Huguenot) forces.

The Protestants were surprised and defeated near Jarnac on March 13, 1569, by the duc d'Anjou, the future Henry III, and Condé was killed. Jeanne d'Albret immediately hastened to the scene and proclaimed her son head of the army, though actual command was exercised by Gaspard de Coligny, from whom Henry would receive his military education. Henry and his cousin, Henri, the young prince of Condé, were present on October 3 at the Battle of Moncontour, when the Protestants were again defeated. Coligny, however, forbade Henry to draw his sword.

The 16-year-old general received his baptism of fire near Arnay-le-Duc on June 26, 1570, when he led the first charge of the Huguenot cavalry. The long campaign through the ravaged provinces, extending from Poitou to the heart of Burgundy, forged in him the soldierly spirit that he would retain throughout his life and made him reflect on the disaster that had befallen the kingdom.

King of Navarre. Peace was concluded in August 1570, and a very liberal edict was granted the Protestants. Many persons, including Catherine de Médicis, hoped the civil war had come to an end. In order to strengthen the peace, the Queen sought to arrange a marriage between Prince Henry and her daughter, Marguerite de Valois, a project that had first been considered during Henry II's lifetime, when the future couple were still children. After difficult negotiations, which lasted until the spring of 1572, the Queen Mother and the Queen of Navarre reached an agreement. The latter, who preceded her son to Paris, had scarcely arrived when she died June 9 of a respiratory illness. Prince Henry thereby became king of Navarre and sovereign lord of Béarn. He and Marguerite exchanged vows August 18 before the main portal of Notre Dame, but only Marguerite attended mass with the royal family.

On August 24 came the St. Bartholomew's Day Massacre, in which thousands of French Protestants were cut down by royal forces. The marriage was publicly styled the "scarlet nuptials" because of the bloodshed. Ordered by his brother-in-law Charles IX to abjure his Protestant faith, Henry yielded. His conversion was obviously of dubious sincerity, and he was therefore held for three and a half years at the courts of Charles IX and then Henry III. Careful to restrain his impatience, he hid his forceful personality from his detainers. The wily Catherine de Médicis was deceived along with everyone else, and it was with her secret consent that her son-in-law escaped from court.

Once free, the Prince displayed his sharp intellect and political acumen in his role as protector of the Protestant churches. His common sense—one of his outstanding traits, except in love affairs—manifested itself when civil war broke out anew at the end of 1576. The Huguenots fared badly, and Henry, evaluating the situation, was able to persuade his coreligionists to give up the struggle and accept the Treaty of Bergerac on Sept. 17, 1577, despite the sacrifices it imposed on them.

In the meantime, Catherine de Médicis went to Guyenne to return Marguerite to her husband, who had left her with alacrity, and, more important, to seek a lasting peace. While this subject was being negotiated at Nérac, Henry learned that the Catholics had seized the Château de La Réole on the Garonne. His response, a crushing surprise attack on Fleurance, revealed him to be a born military leader. In the spring of 1580, after five days of furious street fighting, which delighted him, he subdued Cahors, emerging from battle "all blood and powder," in his own words. When his town of Mont-de-Marsan was not returned to him, he stormed it by night in 1583.

War and politics were not enough, however, for this restless man, and Henry enjoyed romantic as well as territorial conquests. In the summer of 1583, he began a love affair that lasted for several years with Corisande d'Andouins, comtesse de Guiche; a member of the highest nobility of Béarn, she was a young and beautiful widow, saluted by the essayist Michel de Montaigne as "the great Corisande."

Heir presumptive to the throne. On the death of Henry III's brother, François, duc d'Anjou, in 1584, Henry de Bourbon-Navarre became the heir presumptive to the throne of France. He was irrevocably opposed, however, by the militant Catholics of the Holy League, who were unwilling to accept a Protestant king, and by the Pope, who excommunicated him and declared him devoid of any right to inherit the crown. Headed by Henri, duc de Guise, and his brothers, the League claimed to be the defender of the ancestral faith of France, but its increasing reliance on Span-

ish support rapidly became a serious threat to French independence. Henry III lacked the strength to contain the League's overwhelming influence.

The King of Navarre himself could rely only on the grudging support—peppered with shrewd demands—of Elizabeth of England and on the distant German Protestant princes. In France, in addition to the Huguenots, a few enlightened and liberal Catholics, such as Montaigne, supported him. Ultimately he could depend only on himself. In this crucial episode of French history, in which the very independence of the nation was at stake, Henry's activity was the essential factor. Although too prone in peace to neglect public affairs for private pleasure, he was an unrivalled leader in times of peril. Quick to grasp the significance of every situation, he was equally prompt to act, and victory was invariably the reward of his bold swiftness. He was not a brilliant strategist but had the ability to inspire men to action, as much by his own example as by the spoken or written word. Four centuries later, his notes and speeches still have the impact and clarity of a clarion call.

The military situation drew and held Henry within an extended radius of his base at La Rochelle. Though this town was a symbol of Protestant resistance, as well as a fortress, its extreme religious atmosphere could not keep Henry away from amorous escapades.

In the fall of 1587, the outcome of the war hinged on the impending encounter between Henry and the army of the French king Henry III, who came increasingly under the influence of the League. He placed another brother-in-law, Anne, duc de Joyeuse, in command of the army. The battle took place on October 20 on the outskirts of Coutras about 30 miles northeast of Bordeaux. Joyeuse and his troops were killed. The significance of the event was more political than military, for two of the young Catholic stepbrothers of the Prince of Condé had fought with the King of Navarre.

It became clear that the struggle, initially a religious conflict, had become dynastic and national when the League accepted the daughter of Philip II of Spain and Elisabeth de Valois as the next ruler of France. Henry III had the merit to grasp the full meaning of the situation for the future of France and, after long hesitation, had the Duc de Guise assassinated. The logic of the events left him with no choice but reconciliation with the King of Navarre, which took place April 30, 1589.

Their united forces laid siege to Paris on July 30, but on August 1 Henry III, the last of the Valois, was stabbed in his headquarters at Saint-Cloud. He died the next day, after staunchly proclaiming the head of the House of Bourbon, first prince of the blood, as his successor in accordance with dynastic law.

Henry IV. Henry IV was now king of France, but it would take him nine years to conquer his kingdom. Many of the Catholic gentry who had remained loyal to Henry III deserted him, and his army was growing exhausted. He had to withdraw from the outskirts of Paris. A few weeks after his accession, he fought Charles de Lorraine, duc de Mayenne, in sight of the Château d'Arques in Normandy. Mayenne, who had become head of the League on the death of his brother Guise, suffered a more serious defeat at Ivry on March 14, 1590. It was at Ivry that Henry IV issued his famous call to his troops: "If your cornets fail you, rally to my white plume—you will find it on the path to honour and victory!" He was unable to break the resistance of the capital, however, despite the terrible famine that came in the wake of his long siege. He then laid siege to Chartres, which capitulated April 10, 1591. During the siege of Chartres, Henry IV became involved with Gabrielle d'Estrées, who of all his women was to exert the most influence over him.

Soon after Chartres, Henry IV captured Noyon, but he could not conquer Rouen. The war dragged on interminably, and the King realized that it had to be ended at any cost. After long hesitation, he abjured Calvinism on July 25, 1593, in the basilica of Saint-Denis, the sepulchre of the kings of France.

Though many remained unconvinced of his sincerity, the monarch's conversion still brought quick results. Important towns, notably Orléans and Lyon, submitted in growing numbers. Reims remained loyal to the League; so the King was crowned at Chartres on Feb. 27, 1594. The conversion removed all legitimate pretext for resistance, and on March 22 he finally entered Paris. Whether or not he made the comment attributed to him—"Paris is well worth a mass!"—he went, amid cheers, to hear the Te Deum at Notre Dame. He was, as he wrote, "in his triumphal chariot."

During the spring and summer, many League towns hastened to acknowledge royal authority. Laon, however, submitted only after a difficult siege. Even after Pope Clement VIII removed the ban of excommunication from Henry IV on Sept. 17, 1595, Brittany remained in the hands of Philippe-Emmanuel de Lorraine, duc de Mercoeur, the younger brother of Guise and Mayenne.

Brittany was held by the League only through Spanish support. In order to bring this situation to an end, the King had declared war on Philip II in January 1595. On June 5 at Fontaine-Française in Burgundy, he overwhelmed the Spanish cavalry. In return, Philip II's forces seized Cambrai and then Calais and Ardres. Henry succeeded, after a six-month siege, in taking La Fére, but, on the night of March 11–12, 1597, panic swept Paris, for Spain had taken Amiens by surprise.

Henry quickly responded to the situation, exclaiming, "Enough of being king of France, it is time to be king of Navarre!" He lacked both men and money but was able to raise both as if by a miracle; as one of his chief ministers, Nicolas de Neufville, seigneur de Villeroy, wrote in a private letter, "The king has enough courage for everyone." He succeeded in forcing the Spaniards to surrender Amiens on September 19, and the treaty between France and Spain was concluded at Vervins on May 2, 1598. Spain kept Cambrai, which was not returned to France until 1677.

Henry also prepared to unseat the Duc de Mercoeur in Brittany. He was able to come to a bloodless agreement by arranging a marriage between Françoise de Lorraine and César de Vendôme, the eldest of his two sons by Gabrielle d'Estrées; at that time César was about four years old. The high point of Henry IV's visit to Brittany was at Nantes, where Gabrielle gave birth to a daughter, and, on April 13, 1598, Henry signed the famous edict bearing the name of the city. The Edict of Nantes proclaimed freedom of conscience and granted many places of worship and nearly a hundred places of refuge to the Protestants.

Henry IV had united the kingdom and achieved peace at home and abroad. During the remainder of his brief reign, he devoted himself to healing France's wounds. He faced the risk of having his work undone, however, should he die without leaving a universally accepted successor. Blinded by an unlucky passion and exploited by the coterie that had gathered around Gabrielle, Henry nearly married his mistress, which would have made César, the son of their double adultery, heir to the crown of Saint Louis. Such an act could not have failed to provoke a war of succession when the King died. Gabrielle's death in childbirth on April 10, 1599, however, removed all reason for Pope Clement VIII's reluctance to annul the marriage of Henry IV and Marguerite de Valois. The annulment made it possible for the King to marry the princess of Tuscany, Marie de Médicis, in October 1600, despite the protests of his new mistress, Henriette d'Entragues. Continuing his effort to unify the kingdom, Henry went on to subdue Charles-Emmanuel, duc de Savoie, forcing him to cede Bresse and Bugey to France. The new queen gave birth on Sept. 27, 1601, to the Dauphin, the future Louis XIII, and eventually to four other children. Henriette d'Entragues, Jacqueline de Bueil, and Charlotte des Essarts also bore him many children.

Even after unification of the kingdom, Henry IV's reign was not tranquil. More than a century of impassioned religious conflict had torn France asunder, and peace was not to be easily regained. There was more than one attempt on Henry's life. In December 1594, Jean Châtel wounded the King with a dagger. Châtel was tortured, and his crime was used as a pretext to expel the Jesuits from the kingdom. The regicide attempts were born of the still-widespread belief that, behind the mask of his hypocritical conversion, Henry intended to ensure the triumph of heresy.

Nonetheless, France flourished anew. Maximilien de Béthune, duc de Sully, the most renowned of Henry's councillors, reorganized the national finances, stabilized the economy, and the country prospered. The groundwork was laid for the splendour of the next two reigns. Although Henry IV never became a sedentary or reflective man, his remarkable political insight enabled him to govern efficiently. His interest in maritime and colonial expansion led him to support Samuel de Champlain's exploration in Canada.

Henry's folly in affairs of the heart continued to stand in contrast to his wisdom in affairs of state. He finally grew tired of the scheming Henriette d'Entragues, now marquise de Verneuil, or perhaps he was motivated by a predilection for young girls: at the age of 55, he became infatuated with Charlotte de Montmorency, then 15 years old, the daughter of his friend the constable of France. Henry conceived of marrying Charlotte to his cousin the young Condé, Henri II, who was supposedly not interested in women. Once married, however, the Prince prevented the King from seeing his wife by taking her to Brussels, the capital of the Spanish Netherlands. Henry IV became furious. The argument made by many historians that the war he then prepared to launch against the Habsburgs had its cause in this unfortunate love affair is, however, unconvincing. Difficulties had arisen with the Clèves–Jülich succession. After some hesitation, Henry finally decided on a military expedition to expel the imperial troops from Jülich. He had long decided on May 19, 1610, as the date of his departure to take command of the army of the east, one of three armies he had formed for this expedition to the Rhine. Early on the afternoon of May 14, he entered his coach with the intention of visiting the ailing Sully. The coach had not gone far from the Louvre when a traffic congestion in the narrow rue de la Ferronnerie obliged the coachman to slow down. Suddenly a certain François Ravaillac, a fanatic, dashed out, leaped onto Henry's carriage, and stabbed the King twice with a long knife. Too often misunderstood during his lifetime, his tragic end seemed finally to have opened the eyes of his people. They soon bestowed on him the appellation Henry the Great. (R.Ri.)

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(1971), a brilliant and lively evocation of the personality and of the great events of his life and reign; and that of Roland Mousnier, *L'Assassinat d'Henri IV, 14 mai 1610* (1964). The writings of Henry himself are instructive in the *Recueil des lettres missives de Henri IV,* 9 vol. (1843–76), by M. Berger de Xivrey (finished by J. Guadet), and the numerous documents of the same nature that have followed and continued since the last quarter of the 19th century. Little has been published on Henry IV in English; however, Hesketh Pearson, *Henry of Navarre: The King Who Dared* (British title, *Henry of Navarre: His Life;* 1963), is of interest, as is Desmond Seward, *The First Bourbon: Henri IV, King of France and Navarre* (1971).

GERMANY/HOLY ROMAN EMPIRE

• **Henry I,** also called HENRY THE FOWLER, German HEINRICH DER VOGLER (b. *c.* 876—d. July 2, 936, Memleben, Saxony), German king and founder of the Saxon dynasty (918–1024) who strengthened the East Frankish, or German, army, encouraged the growth of towns, brought Lotharingia (Lorraine) back under German control (925), and secured German borders against pagan incursions.

The son of Otto the Illustrious, the Liudolfing duke of Saxony, Henry became duke at his father's death (912). His first marriage to Hatheburg, daughter of Erwin, count of Merseburg, was declared invalid because she had become a nun after her first husband's death. He married Matilda, daughter of Dietrich, count of Westphalia, in 909; their eldest son ruled as the Holy Roman emperor Otto I the Great (936–973).

Although at war (912–915) with Conrad I of Franconia (German king, 903–918) over title to lands in Thuringia, Henry received Conrad's deathbed designation as heir to the throne. He was elected king of Germany (May 919) by nobles of Saxony and Franconia, two of the four most influential duchies; the other two important duchies, Swabia and Bavaria, did not recognize him as king.

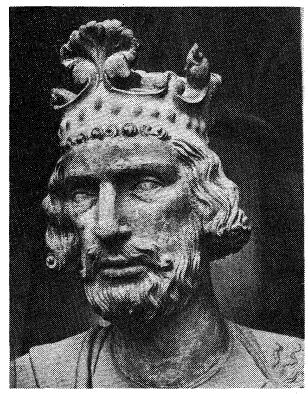
Henry considered Germany a confederation of duchies rather than a nation. Having complete authority in Saxony and nominal sovereignty in Franconia, he sought to bring Swabia and Bavaria into the confederation. Forcing the submission of Burchard, duke of Swabia (919), he allowed the Duke to retain control over the civil administration of the duchy. On the basis of an election by Bavarian and East Frankish nobles (919), Arnulf, duke of Bavaria, also claimed the throne. In 921, after two military campaigns, the King forced Arnulf to submit and relinquish his claim to the throne, though the Duke retained complete internal control of Bavaria.

Henry defeated Giselbert, king of Lotharingia, in 925, and that region, which had become independent of Germany in 910, was brought back under German control. Giselbert, who was recognized as duke of Lotharingia, married the King's daughter Gerberga in 928.

When the Magyars, barbarian warriors from Hungary, invaded Germany in 924, Henry agreed to pay tribute to them and return a captured Magyar chief in exchange for a nine-year (924–933) cession of raids on German territory. During these years the King built fortified towns and trained the cavalry force he used to defeat various Slavic tribes; he conquered the Hevelli at Brandenburg and the Daleminzi at Meissen in 928 and suppressed a rebellion in Bohemia in 929. The King refused to pay more tribute when the nine-year truce ended in 933. He used his seasoned cavalry to destroy the Magyars, who had resumed their raids, at Riade on March 15, 933, and ended their threat to the German countryside. The King's last campaign, an invasion of Denmark (934), added the territory of Schleswig to the German state.

The story that Henry received the surname Fowler because he was laying bird snares when informed of his election as king is probably a myth.

• **Henry II,** also called SAINT HENRY, German SANKT HEINRICH (b. May 6, 973, Albach?, Bavaria—d. July 13, 1024, Pfalz Grona, near Göttingen, Saxony; canonized 1146; feast day July 15, in Archdiocese of Bamberg July 13), duke of Bavaria (as Henry IV, 995–1005),



Henry II, detail from a statue, *c.* 1235; from a portal in the Bamberg cathedral, Germany

Foto Marburg—Art Resource/EB Inc.

German king (from 1002), and Holy Roman emperor (1014–24), last of the Saxon dynasty of emperors. He was canonized by Pope Eugenius III, more than 100 years after his death, in response to church-inspired legends. He was, in fact, far from saintly, but there is some truth in the legends concerning his religious character. Together with Henry III, he was the great architect of cooperation between church and state, following a policy inaugurated by Charlemagne and promoted by Otto I the Great (Holy Roman emperor 962–973). His canonization is sometimes justified on the grounds that he was a great representative of the medieval German priestly kings.

Henry II became king of Germany in 1002 and Holy Roman emperor in 1014. His father, Henry II the Quarrelsome, duke of Bavaria, having been in rebellion against two preceding German kings, was forced to spend long years in exile from Bavaria. The younger Henry found refuge with Bishop Abraham of Freising and was later educated at the Cathedral School of Hildesheim. As he was exposed thus to strong church influence in his youth, religion influenced him strongly. Contemporaries observed an ironic trait in his character and were also impressed by his ability to intersperse his speeches with biblical quotations. Though devoted to church ritual and personal prayer, he was a tenacious and realistic politician, not adverse to alliances with heathen powers. Usually in poor health, he yet performed for 22 years the office of the itinerant king, riding on horseback through his dominions to judge and compose feuds, pursue rebels, and extend the power of the crown.

After the death of King Otto III in January 1002, Henry, aware of strong opposition to his succession, captured the royal insignia which were in the keeping of the dead king's companions. At Otto's funeral the majority of the princes declared against Henry, and only in June, with the assistance of Archbishop Willigis of Mainz, did Henry secure both election and coronation. It took another year before his recognition was final.

Henry turned his first attention to the east and made war against Polish king Bolesław I the Brave. After a successful campaign, he marched into northern Italy to subdue Arduin of Ivrea, who had styled himself king of Italy. His sudden interference led to bitter fighting and atrocities, and although Henry was crowned king in Pavia on May 15, 1004, he returned home, without defeating Arduin, to pursue his campaigns against Bolesław. In 1003 Henry had made a pact with the Liutitian tribe against the Christian Bolesław, and allowed them to resist German missionaries east of the Elbe. Henry was more interested in political power than in spreading Christianity. Supported by his tribal allies, he waged several campaigns against Poland, until in 1018, at Bautzen, he made a lasting compromise peace.

Sensitive to tradition and anxious to be crowned emperor, Henry decided in late 1013 on another expedition to Italy. He marched straight to Rome, where he was crowned by Pope Benedict VIII, on Feb. 14, 1014. By May he was back in Germany, seeking to fulfill his duties to Italy by charging German officials with the administration of the country. He even convened an Italian imperial court at Strassburg in 1019. In 1020 Pope Benedict visited him in Germany and begged him to put in another appearance in Italy to fight the Greeks in the south and protect the papacy against the Lombard princes. Henry reluctantly responded the following year, fighting both Greeks and Lombards successfully; but he withdrew at the first opportunity.

Henry's main interest and success were concentrated on the consolidation of a peaceful royal regime in Germany. He spent much time and energy in elaborating the so-called Ottonian system of government. Inaugurated by Otto I, this system was based upon the principle that the lands and the authority of the bishops ought to be at the disposal of the king. Henry made generous grants to the bishops and, by adding to their territorial holdings, helped to establish them as secular rulers as well as ecclesiastical princes. He freely availed himself of the royal right to appoint faithful followers to these bishoprics. He insisted on episcopal celibacy—to make sure that on the death of a bishop the see would not fall into the hands of the bishop's children. In this way, he managed to create a stable body of supporters who made him more and more independent of rebellious nobles and ambitious members of his own family.

His greatest achievement was the foundation of the new bishopric of Bamberg. The upper region of the Main River was poorly populated, and Henry set aside large tracts of personal property to establish the new bishopric, much against the wishes of the Bishop of Würzburg in the middle Main region. He obtained the consent of other bishops at a synod in Frankfurt in late 1007. The new bishop was consecrated on Henry's birthday in 1012. In 1020 Bamberg was visited by the Pope, and it quickly developed into a splendid cathedral town where contemporary scholastic culture and art, as well as piety, found the support of Henry and his queen, Cunegunda.

During the last years of his reign Henry planned, in concert with Pope Benedict VIII, an ecclesiastical reform council at Pavia to seal the system of ecclesiastico-political order he had perfected in Germany. But he died suddenly in July 1024, before this could be done. (P.Mu.)

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• **Henry III** (b. Oct. 28, 1017—d. Oct. 5, 1056, Pfalz Bodfeld, near Goslar, Saxony), duke of Bavaria (as Henry VI, 1027–41), duke of Swabia (as Henry I, 1038–45), German

king (from 1039), and Holy Roman emperor (1046–56), member of the Salian dynasty. He was a powerful advocate of the Cluniac reform movement that sought to purify the Western Church in the 11th century, the last emperor able to dominate the papacy.

Youth and marriage. Henry was the son of the emperor Conrad II and Gisela of Swabia. He was more thoroughly trained for his office

Henry III, between two abbots, miniature from his gospel, c. 1040; in the Universitätsbibliothek, Bremen, Ger. (Ms. b. 21)

By courtesy of the Universitatsbibliothek, Bremen, Ger.

than almost any other crown prince before or after. With the Emperor's approval, Gisela had taken charge of his upbringing, and she saw to it that he was educated by a number of tutors and acquired an interest in literature.

In 1036 Henry married Gunhilda (Kunigunde), the young daughter of King Canute of England, Denmark, and Sweden. Because her father had died shortly before, the union with this frail and ailing girl brought with it no political advantages. She died in 1038, and the emperor Conrad died the following year.

His 22-year-old successor as German king resembled him in appearance. From his mother Henry inherited much, especially her strong inclination to piety and church services. His accession to the throne, unlike that of his two predecessors, did not lead to civic unrest, but his reign was burdensome from the beginning. Probably over questions of principle, the self-willed emperor quarrelled with the aging Gisela during her last years.

He devoted his energies above all to the contemporary movement to bring an end to war among Christian princes, although his own policies were not always pacific. In possession of the duchies of Franconia, Bavaria, Swabia, and Carinthia, he had attempted to carry on his father's policy of supremacy in the east and, in fact, attained sovereignty over Bohemia and Moravia.

It may have been at this time that Henry, prematurely believing he had reached the zenith of his power, displayed openly, as if it were a matter of governmental policy, his leanings toward the clerical-reform party. Intending to re-create a theocratic age like that of Charlemagne, he failed to realize that this could be done only as long as the papacy was powerless.

Still a childless widower, he married Agnes, the daughter of William V of Aquitaine and Poitou, in 1043. The match must have been intended primarily to cement peace in the west and to assure imperial sovereignty over Burgundy and Italy, and Agnes' total devotion to the church reform advocated by the Cluniac monasteries probably confirmed Henry in his decision to take her for his wife. In November 1050 she bore him a son, who later became the emperor Henry IV. There followed another boy, Conrad, and three daughters. What Henry still lacked was the highest honour—his coronation as emperor at the hands of the pope.

Control of the papacy. When Henry reached Rome in 1046, three rivals were claiming the papacy. Henry wanted a pacified Italy, in which German supremacy was uncontested, and he wanted to receive the imperial crown from unsullied hands. He convoked a synod at Sutri, which, at his bidding, elected as the new pope a German, Suidger, bishop of Bamberg, who was inaugurated as Clement II. On the same day the new pope crowned the imperial couple.

Rome became an imperial city, and the control over the church—*i.e.*, the decisive vote in future conclaves—passed into the hands of the German king. In succeeding years Henry made use of this right to appoint a pope three more times. When the Normans were beginning their conquest of Calabria, Henry did not intervene to any extent in southern Italy; instead he left this problem to Pope Leo IX, who was defeated by the Normans.

Believing that the basis of his power was secure, the Emperor expected to be as successful with his internal projects as he had been in foreign affairs; but this was not to be the case. He could not carry out his ecclesiastical reforms in Germany or its neighbouring territories because he was virtually without friends among the clergy. He was increasingly opposed by the Scandinavian Church and by that of the Saxons. Also, he had to contend during most of his reign with Godfrey II, duke of Upper Lorraine, whom he repeatedly pardoned instead of disciplining.

There was unrest everywhere. In 1054–55, dukes Conrad of Bavaria and Welf III of Carinthia attempted to overthrow Henry's rule through a widely spread conspiracy, and only their demise saved him from great trouble. Conrad, who had fled to Hungary, managed to subvert that country to such an extent that German influence remained permanently weakened. Although resistance against him stiffened with time, Henry continued to rule with moderation. Perhaps because he was aware of a lessening of his powers, his actions became haphazard. Instead of holding on to duchies that he had inherited, he entrusted them to others; but he chose badly and seldom acted decisively against his disloyal feudatories. He no longer inspired fear in his opponents—the Saxon and south German lay nobility, the alliance between Lorraine and Tuscany, the increasingly independent papacy, and the adventure-seeking Normans.

Opponents of the Emperor's policy thought it was excessively indulgent toward the church and hostile toward the lay princes. Some of this criticism was voiced among the ranks of the ecclesiastical reformers. Matters had come to such an impasse that Henry no longer pleased anyone. His demands on the people to support his military strength were heavy from the beginning, and his revenues from inheritances and confiscations were also considerable. If the empire's basic wealth did not increase in his reign, it was because he used it to fulfill the demands of his clerical friends, even as he bestowed duchies on lay nobles in order to appease them. It is not surprising that, under these circumstances, he was compelled to find other sources of revenue by seeking credits, foreclosing mortgages, and looking after the interests of his treasury when conferring high imperial offices or church benefices. The abolition of simony (the sale of church offices) was difficult even for as high-principled a ruler as Henry, and, as a result, his enemies accused him of greed. According to some sources, in his old age Henry was rumoured to have become "untrue to himself" and inaccessible to the common people; he was reported to have refused to grant a judicial hearing to "the poor." In contrast, in the early years of his reign, he could not be praised enough for his zeal in the administration of justice.

Disintegration of the empire. His change of personality may have resulted from the blunders and failures of his rule. After 1046 this man, shaped partly by religious ideals and partly by the harsh realities of political life, saw all his gains being swept away: northeastern Germany, Hungary, southern Italy, and Lorraine. Even the part of his work that he considered his very own, church reform, began to turn against him. A high priest among men, who did penance even while ruthlessly persecuting and even hanging heretics, Henry learned at the end of his days that clemency, goodness, and earthly justice do not necessarily benefit a prince.

On the other hand, it may have been a physical disease that changed Henry. In 1045 he was so tortured with illness that negotiations concerning the succession were begun. The bad tidings from all corners of the empire must have complicated his condition. In September 1056 he fell sick in his favourite residence, the imperial palace at Bodfeld near Goslar, and, having assured the succession of his son Henry, he died in October.

(H.L.M.)

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• **Henry IV** (b. Nov. 11, 1050, Goslar?, Saxony—d. Aug. 7, 1106, Liège, Lorraine), duke of Bavaria (as Henry VIII, 1055–61), German king (from 1054), and Holy Roman emperor (1084–1105/06), who engaged in a long struggle with Hildebrand (Pope Gregory VII) on the question of lay investiture (*see* Investiture Controversy), eventually drawing excommunication on himself and doing penance at Canossa (1077). His last years were spent countering the rebellion of his sons Conrad and Henry (the future Henry V).

Early years. Henry's father, Henry III, had retained a firm hold on the church and had resolved a schism in Rome (1046), opening new activities for the reformers. At Easter 1051, the boy was baptized after the German princes had taken an oath of fidelity and obedience at Christmas 1050. On July 17, 1053, he was elected king at Tribur (modern Trebur, in Germany) on condition that he would be a just king. In 1054 he was crowned king in Aix-la-Chapelle (modern Aachen, in Germany), and the following year he became engaged to Bertha, daughter of the Margrave of Turin. When the Emperor died in October 1056, at the age of 39, succession to the throne and survival of the dynasty were assured. The princes of the realm raised no objection when nominal government was handed over to the six-year-old boy, for whom his pious and unworldly mother became regent. Yet the early death of Henry III was the beginning of a fateful change that marked all of his son's reign. In his will, the late emperor had appointed Pope Victor II as counsellor to the Empress,

Henry IV, illumination from the manuscript *Ekkehardi historia, c.* 1113; in possession of Corpus Christi College, Cambridge

By courtesy of the Master and Fellows of Corpus Christi College, Cambridge; photograph, Courtauld Institute of Art, London

and the Pope solved some of the conflicts between the princes and the imperial court that had endangered peace in the empire.

After Victor's early death (1057), however, the politically inept empress committed a number of decisive mistakes. On her own, and without the benefit of the advice of a permanent group of counsellors, she readily yielded to various influences. She turned over the duchy of Bavaria, which Henry III had given to his son in 1055, to the Saxon count Otto of Nordheim, thus depriving the king of an important foundation of his power. She gave the duchy of Swabia to Count Rudolf of Rheinfelden—who married her daughter—and the duchy of Carinthia to Count Berthold of Zähringen; both of them eventually became opponents of Henry IV. The death of the Emperor also marked the disruption of German influence in Italy and of the close relationship between the king and the reform popes. Their independence soon became apparent in the elections of Stephen IX and Nicholas II, which were not influenced (as under Henry III) by the German court; in the new procedure for the election of the popes (1059); and in the defensive alliance with the Normans in southern Italy. This alliance was necessary for the popes as an effective protection against the Romans and was not directed against the German king. Yet the Normans were considered usurpers and enemies of the Holy Roman Empire; the pact thus resulted in strained relations between the Pope and the German court, and these strains were aggravated by papal claims and disciplinary action taken by Nicholas II against German bishops. While the German king had so far been known as a supporter of the reformers, the Empress now imprudently entered into an alliance with Italian opponents of church reform and brought about the election of Cadalus, bishop of Parma, as antipope (Honorius II) against the reigning pope, Alexander II, who had been elected by the reformers. But since she did not give effective support to Honorius, Alexander was able to prevail. Her unwise church policy was matched by an obscurely motivated submissive policy at home, which, by unwarranted cession of holdings of the crown, weakened the material foundations of the king's power and, in addition, encouraged the rapacity of the nobles. Increasing discontent reached a climax in a conspiracy of the princes led by Anno, archbishop of Cologne, in April 1062. During a court assembly in Kaiserswerth he kidnapped the young king and had him brought to Cologne by ship. Henry's attempt to escape by jumping into the Rhine failed. Agnes resigned as regent and the government was taken over by Anno, who settled the conflict with the church by recognizing Alexander II (1064). Anno was, however, too dominating and inflexible a man to win Henry's confidence, so that Adalbert, archbishop of Bremen, granting more freedom to the lascivious young king, gained increasing and finally sole influence. But he used it for such unscrupulous personal enrichment that Henry, who was declared of age in 1065, had to ban him from court early in 1066. This incident marks the beginning of the King's own rule, for which he was badly prepared. Repeated changes in the government of the empire had an unsettling effect on the boy king and had, moreover, prevented him from being given a regular education. The selfishness of his tutors, the dissolute character of his companions, and the traumatic experience of his kidnapping had produced a lack of moral stability during his years of puberty. In addition, his love of power, typical of all the rulers of his dynasty, contributed to conduct often characterized by recklessness and indiscretion.

In 1069, after three years of marriage, he suddenly announced his intention of divorcing his wife, Bertha. Following protests by high church dignitaries, he dropped his plan, but his mercurial behaviour incurred the displeasure of the reformers. At the same time he was faced with domestic difficulties that were to harass him throughout his reign. After his mother had freely dispensed of lands during her regency, he began to increase the royal possessions in the Harz Mountains and to protect them by castles, which he handed over to Swabian ministerials (higher civil servants directly responsible to the crown). Peasants and nobles in Saxony were stirred up by the ruthless repossession of former royal rights that had long ago been appropriated by nobility or had become obsolete and by the high-handed and severe measures of the foreign ministerials. Henry tried to stop the unrest by imprisoning Magnus, the duke of Saxony, and by depriving the widely respected Otto of Bavaria of his duchy, after having unjustly accused him of plotting the murder of the King (1070). Then a rebellion broke out among the Saxons, which in 1073 spread so rapidly that Henry had to escape to Worms. After negotiations with Welf IV, the new duke (as Welf I) of Bavaria, and with Rudolf, the duke of Swabia, Henry was forced to grant immunity to the rebels in 1073 and had to agree to the razing of the royal Harz Castle in the final peace treaty in February 1074. When the peasants, destroying the castle, also desecrated the church and the tomb of one of the King's sons, Henry declared the peace broken. This incident assured him of support from all over the empire, and in June 1075 he won an overwhelming victory that resulted in the surrender of the Saxons. It also forced the princes at Christmas to confirm on oath the succession of his one-year-old son, Conrad.

Role in investiture contflict. This rebellion affected relations between Henry and the Pope. In Milan a popular party, the Patarines, dedicated to reforming the city's corrupt higher clergy, elected its own archbishop, who was recognized by the Pope. When Henry countered by having his own nominee consecrated by the Lombard bishops, Alexander II excommunicated the bishops. Henry did not yield, and it was not until the Saxon rebellion that he was ready to negotiate. In 1073 he humbly asked the new pope, Gregory VII, to settle the Milan problem. The King having thus renounced his right of investiture, a Roman synod, called to strengthen the Patarine movement, forbade any lay investiture in Milan; henceforward Gregory regarded Henry as his ally in questions of church reform. When planning a crusade, he even put the defense of the Roman Church into the King's hands. But after defeating the Saxons, Henry considered himself strong enough to cancel his agreements with the Pope and to nominate his court chaplain as archbishop of Milan. The violation of the agreement on investiture called into question the King's trustworthiness, and the Pope sent him a letter warning him of the melancholy fate of King Saul (after breaking with his church in the person of the prophet Samuel) but offering negotiations on the investiture problem. Instead of accepting the offer, which arrived at his court on Jan. 1, 1076, Henry, on the same day, deposed the Pope and persuaded an assembly of 26 bishops, hastily called to Worms, to refuse obedience to the Pope. By this impulsive reaction he turned the problem of investiture in Milan, which could have been solved by negotiations, into a fundamental dispute on the relations between church and state. Gregory replied by excommunicating Henry and absolving the King's subjects from their oaths of allegiance. Such action equalled dethronement. Many bishops who had taken part in the Worms assembly and had subsequently been excommunicated now surrendered to the Pope, and immediately the King was also faced with the newly aroused opposition of the nobility. In October 1076 the princes discussed the election of a new king in Tribur. It was only by promising to seek absolution from the ban within a year that Henry could reach a postponement of the election. The final decision was to be taken at an assembly to be called at Augsburg to which the Pope was also invited. But Henry secretly travelled to northern Italy and in Canossa did penance before Gregory VII, whereupon he was readmitted to the church. For the moment it was a political success for the King because the opposition had been deprived of all canonical arguments. Yet, Canossa meant a change. By doing penance Henry had admitted the legality of the Pope's measures and had given up the king's traditional position of authority equal or even superior to that of the church. The relations between church and state were changed forever.

The princes, however, considered Canossa a breach of the original agreement providing for an assembly at Augsburg and declared Henry dethroned. In his stead, they elected Rudolf, duke of Swabia, in March 1077, whereupon Henry confiscated the duchies of Bavaria and Swabia on behalf of the crown. He received support from the peasants and citizens of these duchies, whereas Rudolf relied mainly on the Saxons. Gregory watched the indecisive struggle between Henry and Rudolf for almost three years until he resolved to bring about a decision for the sake of continued church reform in Germany. At a synod in March 1080, he prohibited investiture, excommunicated and dethroned Henry again, and recognized Rudolf. The reasons for this act of excommunication were not as valid as those advanced in 1077, and many nobles who had so far favoured the Pope turned against him because they thought the prohibition of investiture infringed upon their rights as patrons of churches and monasteries. Henry now succeeded in deposing Gregory and in nominating Guibert, archbishop of Ravenna, as pope at a synod in Brixen (Bressanone). When the opposition of the princes was crippled by the death of Rudolf in October 1080, Henry, freed of the threat of enemies to the rear, went to Italy to seek a military decision in his struggle with the church. After attacking Rome

in vain in 1081 and 1082, he conquered the city in March 1084. Guibert was enthroned as Clement III and crowned Henry emperor on March 31, 1084. Gregory, the legitimate pope, fled to Salerno, where he died on May 25, 1085. A number of cardinals joined Clement, and, feeling that he had won a complete victory, the Emperor returned to Germany. In May 1087 he had his son Conrad crowned king. The Saxons now made peace with him. Further, Henry replaced bishops who did not join Clement with others loyal to the King.

Later crises in Italy and Germany. The escape and death of Gregory VII and the presence of Clement III in Rome caused a crisis in the reform movement of the church, from which, however, it quickly recovered under the pontificate of Urban II (1088–1099). The marriage, arranged by Urban in 1089, of the 17-year-old Welf V of Bavaria with the 43-year-old countess Matilda of Tuscany, a zealous adherent of the cause of reform in the church, allied Henry's opponents in southern Germany and Italy. Henry was forced to invade Italy once more in 1090, but, after initial success, his defeat in 1092 resulted in the uprisings in Lombardy; and the rebellion of his son Conrad, who was crowned king of Italy by the Lombards, led to general rebellion. The Emperor found himself cut off from Germany and besieged in a corner of northeastern Italy. In addition, his second wife, Praxedis of Kiev, whom he had married in 1089 after the death of Bertha in 1087, left him, bringing serious charges against him. It was not until Welf V separated from Matilda, in 1095, and his father, the deposed Welf IV, was once more granted Bavaria as a fief, in 1096, that Henry was able to return to Germany (1097).

In Germany sympathy for reform and the papacy no longer excluded loyalty to the Emperor. Gradually Henry was able to consolidate his authority so that in May 1098 the princes elected his second son, Henry V, king in place of the disloyal Conrad. But peace with the Pope, which was necessary for a complete consolidation of authority, was a goal that remained unattainable. At first a settlement was impossible because of Henry's support for Clement III, who had died in 1100. Paschal II (1099–1118), a follower of the reformist policies of Gregory VII, was unwilling to conclude an agreement with Henry. Finally, the Emperor declared that he would go on a crusade if his excommunication were removed. To prepare for the crusade, he forbade all feuds among the great nobles of the empire for four years (1103). But unrest started again when reconciliation with the church did not materialize and the nobles thought the Emperor was restricting their rights in favour of his son. Henry V feared a controversy with the princes. In alliance with Bavarian nobles he revolted against the Emperor in 1104 to secure his throne by sacrificing his father. The Emperor escaped to Cologne, but when he went to Mainz his son imprisoned him and on Dec. 31, 1105, extorted his apparently voluntary abdication. Henry IV, however, was not yet prepared to give up. He fled to Liège and with the Lotharingians defeated Henry V's army near Visé on March 22, 1106. Henry IV suddenly died in Liège on August 7. His body was transferred to Speyer but remained there in an unconsecrated chapel before being buried in the family vault in 1111.

Assessment. Judgment of Henry by his contemporaries differed according to the parties to which they belonged. His opponents considered the tall, handsome king a tyrant—the crafty head of heresy—whose death they cheered because it seemed to usher in a new age. His friends praised him as a pious, gentle, and intelligent ruler, a patron of the arts and sciences, who surrounded himself with religious scholars and who, in his sense of law and justice, was the embodiment of the ideal king. In his attempt to preserve the traditional rights of the crown, Henry IV was only partially successful, for while he strengthened the king's position against the nobles by gaining the support of the peasants, the citizens, and the ministerials, his continuing battles with the reforming church over investiture ultimately weakened royal influence over the papacy.

(F.-J.Se.)

BIBLIOGRAPHY. No critical biography has appeared. For the King's dispute with the Pope, see K.F. Morrison, "Canossa: A Revision," *Traditio,* 18:121–148 (1962). Contemporary research and a full bibliography may be found in B. Gebhardt and H. Grundmann (eds.), *Handbuch der deutschen Geschichte,* 9th rev. ed., vol. 1 (1970). See also the *Cambridge Medieval History,* vol. 5 (1964).

• **Henry V** (b. Aug. 11, 1086 [not Nov. 8, 1081]—d. May 23, 1125, Utrecht, Friesland), German king (from 1099) and Holy Roman emperor (1111–25), last of the Salian dynasty. He restored virtual peace in the empire and was generally successful in wars with Flanders, Bohemia, Hungary, and Poland. As son of Henry IV, he continued his father's Investiture Controversy (*q.v.*) with the papacy.

Henry was the second son of Henry IV and his first wife, Bertha of Turin. After his father became emperor, Henry's elder brother, Conrad, was elected German king; Henry succeeded him after Conrad had rebelled unsuccessfully against his father, being crowned on Jan. 6, 1099. In 1104, in the conflict between the papacy and his father, he sided with the Bavarians and Saxons against his father. As a promoter of church reform willing to compromise with the papacy, he had the support of the church. He took his father prisoner and forced him to abdicate (Dec. 31, 1105) but was not certain of his throne until his father's death on Aug. 7, 1106. He had already sent messengers to Pope Paschal II inviting him to come to Germany; he was prepared to reach a settlement provided the Pope granted him full rights of investiture of bishops. The Pope rejected this condition. Henry was still able to consolidate his rule in Germany. Campaigns against Hungary (1108) and Poland (1109) failed, but Henry reasserted German lordship over Bohemia in 1110. In 1110 he became betrothed to Matilda, daughter of Henry I of England, marrying her in 1114.

Henry V (left) receiving the imperial insignia from Pope Paschal II at Rome, April 13, 1111, illumination from a German manuscript, *c.* 1114–25; in the possession of Corpus Christi College, Cambridge

By courtesy of the Master and Fellows of Corpus Christi College, Cambridge; photograph, Courtauld Institute of Art, London

An understanding with the Pope in the controversy over investiture was essential to Henry. The church possessed not only spiritual rights but secular rights as well. Henry journeyed to Rome in 1110 and again demanded the right of investiture. The Pope was willing to command the German churches to give back all lands and rights received from the crown if Henry would renounce the right to investiture, a bargain that was acceptable to Henry but not to the German bishops and princes. Henry then imprisoned the Pope, forcing him to grant the right of investiture. On April 13, 1111, the Pope crowned him emperor in St. Peter's. In the satisfaction that he had achieved what Henry IV had not, he arranged a memorial ceremony for his father in Speyer on Aug. 7, 1111.

In Germany, Henry V followed his father's policy of favouring the class of civil servants known as *ministeriales* and also the towns, thus provoking the antagonism of the princes. Rebellion soon broke out; Archbishop Adalbert of Mainz fomented unrest in the upper Rhineland, and the revolt of Lothair of Supplinburg (later to become king as Lothair III and emperor as Lothair II) in Saxony ended in 1115 in a severe defeat for Henry.

There was also strong opposition to Henry within the church. While the Pope kept to his agreement with Henry, a council in Rome declared the privilege granted to Henry invalid. Papal legates in Germany pronounced Henry's excommunication, and consequently he lost the support of the German bishops. Despite this, he went to Italy in 1116 to take possession of the inheritance of Matilda of Tuscany, who had died in 1115. Further negotiations with the Curia over the investiture question were without success. When, in 1118, Pope Gelasius II was elected successor to Paschal II, Henry set up an antipope, Gregory VIII, but the move failed. Henry was called back from Italy in 1118 by an ultimatum from the German princes, who threatened to dethrone him. He was forced to make political concessions. When Gelasius II's successor, Calixtus II, offered to negotiate with him, Henry was prepared to drop his demand for full rights of investiture, but these negotiations failed. As his domestic difficulties increased, the princes finally took the initiative and negotiated the Concordat of Worms (1122). The King had to renounce the right to invest the bishops with ring and crozier and to accede to their canonical election, while the Pope granted the King the right to be present at the election, the right to a deciding voice if the election was indecisive, and the right to enfeoff the elected bishop with the temporalities of his see. This arrangement, however, applied only to Germany, whereas in Italy and in Burgundy the enfeoffment was to follow consecration and would therefore be a pure formality.

Henry's subsequent struggle with the princes and, especially, with Lothair was without success. At the same time he became involved in the conflict between the English and the French. The death of the successor to the English throne had made Matilda, Henry's wife, the heiress and created the prospect of a German-English empire. Henry therefore supported his father-in-law in his conflict with France but could achieve nothing militarily. Henry died childless. His successor was his former enemy Lothair III, duke of Saxony, who was elected king largely through the efforts of the church.

As a ruler, Henry V showed political skill, but his reach exceeded his grasp. He had dethroned his father by allying himself with the princes and presenting himself as a champion of the church's rights. Once in power, he took up his father's cause but was unable to force

the church to grant him his demands. The settlement of 1122, which secured the King's influence over the German church, was brought about mainly by the German princes. By intervening in the conflict between the King and the church, they won a victory for themselves against the King, a fact that dominated the subsequent history of Germany. (F.-J.Se.)

BIBLIOGRAPHY. There is no really critical biography of Henry V. A summary of contemporary research and a full bibliography may be found in B. Gebhardt and H. Grundmann, *Handbuch der deutschen Geschichte,* vol. 1 (1970). See also *The Cambridge Medieval History,* vol. 5 (1964).

• **Henry VI** (b. autumn 1165, Nijmegen, Neth.—d. Sept. 28, 1197, Messina, Italy), German king and Holy Roman emperor of the Hohenstaufen dynasty who increased his power and that of his dynasty by his acquisition of the kingdom of Sicily through his marriage to Constance I, posthumous daughter of the Sicilian king Roger II. Although Henry failed in his objective of making the German crown hereditary, like the Sicilian crown, his son Frederick II, who became king of Sicily immediately after Henry VI's death, was subsequently elected Holy Roman emperor.

A son of the emperor Frederick I Barbarossa, Henry was chosen German king at Bamberg in June 1169 and crowned at Aachen in August of that year. He was married to Constance,

Henry VI, detail of a miniature from the manuscript *Book in Honour of Augustus* by Petrus de Ebulo, *c.* 1195–97; in the Burgerbibliothek Bern (Cod. 120, f. 107)

By courtesy of the Burgerbibliothek Bern, Switzerland

who was 11 years older than he, in January 1186 in Milan. On the departure of Frederick I for the Holy Land on a crusade at Easter 1189, Henry took over the government of the empire. In 1189–90 he suppressed a revolt of Henry the Lion, former duke of Bavaria and Saxony.

In November 1189, William II of Sicily died, leaving his father's half sister Constance heiress to the Sicilian kingdom, then consisting of the island of Sicily and the southern part of the Italian peninsula. After the death of Frederick I on crusade in June 1190, Henry VI made peace with Henry the Lion and proceeded to Italy, where he was crowned emperor by Pope Celestine III in April 1191.

Meanwhile in Sicily a nationalist party unwilling to be governed by a German emperor chose Tancred, an illegitimate son of Constance's brother Roger, as king of Sicily. After his coronation, Henry, determined to conquer the Sicilian kingdom, besieged Naples. But when Henry the Lion, aided by others, once again revolted, Henry was forced to raise the siege (August 1191) and return to Germany. The Emperor's position was soon strengthened, however, by the imprisonment of King Richard I of England by Leopold V, duke of Austria, in December 1192. When the Duke turned the English king over to Henry in the following February, Richard, in order to obtain his release, agreed to surrender his kingdom to the Emperor, receive it back as a fief, and pay a ransom of 100,000 silver marks as well as an additional 50,000 marks in lieu of helping Henry conquer the Sicilian kingdom.

Henry the Lion came to terms with the Emperor in March 1194, and Henry VI was then free to turn his attention to Sicily. He had already, in January 1194, concluded the Treaty of Vercelli with the towns of Lombardy, thus ensuring their loyalty. His task was also made easier by the death in February 1194 of Tancred, who left as his heir a mere boy, William III. Thus, when Henry went to Italy in May 1194, he met with little resistance. He entered Palermo on November 20 and was crowned king of Sicily on December 25.

In the winter of 1195–96, Henry induced about 50 princes to agree to make the succession to the crown of the Holy Roman Empire hereditary, and at the Diet of Würzburg (April 1196) a majority voted for it. A minority, however, continued to oppose it, and at the Diet of Erfurt (October 1196) this opposition was increased. Finally, Henry had to be content with the election of his son Frederick as German king in the customary way in December.

In 1197, when Henry was in southern Italy preparing a crusade, a rebellion against his rule broke out in the Sicilian kingdom, which was put down with savage cruelty. In the same year Henry died of malaria at Messina.

BIBLIOGRAPHY. H. Bloch, *Forschungen zur Politik Kaiser Heinrichs VI* (1892); J. Haller, *Heinrich VI* (1915); E. Perels, *Der Erbreichsplan Heinrichs VI* (1927).

• **Henry (VII)** (b. 1211, Sicily—d. Feb. 12, 1242, Martirano, Calabria, Kingdom of Sicily), German king (from 1220), son of the Holy Roman emperor Frederick II.

After apparently spending most of his youth in Germany, Henry was crowned king of Sicily in 1212 and made duke of Swabia in 1216. Pope Innocent III had favoured his coronation as king of Sicily in the hope that the union of Sicily with the empire would be dissolved, and he had obtained a promise from Frederick to this effect. Nevertheless, Henry was chosen king of the Romans, or German king, at Frankfurt in April 1220 and crowned at Aix-la-Chapelle (modern Aachen, Ger.) on May 8, 1222, by his guardian Engelbert, archbishop of Cologne. The murder of Engelbert in 1225 was followed by an increase of disorder in Germany, and relations between Frederick and his son began to be strained. In 1231 Henry refused to appear at the diet at Ravenna and opposed the privileges granted by Frederick to the princes at Worms. In 1232 he submitted to his father, but in 1233 he issued a manifesto to the princes, and in 1234 raised the standard of revolt at Boppard. He succeeded in forming an alliance with the Lombards in December 1234, but his few supporters fell away when the Emperor reached Germany in 1235, and, after a vain attack on Worms, Henry submitted and was kept for some time as a prisoner in Germany. His formal deposition as German king was not considered necessary, because he had broken the oath taken in 1232. (He is usually not reckoned among the German kings.) He was removed to San Felice in Apulia and afterward to a prison at Martirano in Calabria, where he died, probably by his own hand.

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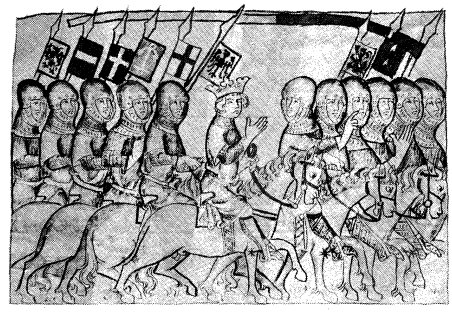
• **Henry VII** (b. *c.* 1269/74, Valenciennes, Hainaut—d. Aug. 24, 1313, Buonconvento, near Siena, Italy), count of Luxembourg (as Henry IV), German king (from 1308), and Holy Roman emperor (from 1312) who strengthened the position of his family by obtaining the throne of Bohemia for his son. He failed, however, in his attempt to bind Italy firmly to the empire.

Henry succeeded his father, Henry III, as count of Luxembourg in 1288. He was chosen German king in November 1308 at Frankfurt and was crowned at Aachen the following January, becoming the first German king of the House of Luxembourg.



Henry VII (centre) on his march through Italy in 1311, illumination from a manuscript, *c.* 1320–40; in the Staatsarchiv, Koblenz

Foto Marburg—Art Resource/EB Inc.

Bohemia was acquired through the Bohemian princess Elizabeth, who, in exchange for imperial assistance in her attempt to seize the throne of Bohemia from her brother-in-law Henry of Carinthia, offered her hand in marriage to Henry's son John of Luxembourg. Following their marriage on Aug. 30, 1310, the couple set out for Bohemia, accompanied by a German–Bohemian army, which captured Prague on Dec. 19, 1310, and installed John as king of Bohemia.

Meanwhile, Henry journeyed to Italy, assuming the Lombard crown in Milan in January 1311. The cities of Piedmont and Lombardy submitted to him, and, in accordance with his proclaimed program of peace and impartial justice, he reconciled the warring factions and restored the exiles to their homes. But because most of them were pro-imperial Ghibellines, suspicion and discontent were aroused among the Florentines and their Guelf (anti-imperialist) allies in Tuscany and Romagna. Disorders broke out in February 1311 and led to the revolt of Brescia (May 1311), which Henry was not able to subdue until September.

Early in May 1312 Henry entered Rome, where he found part of the city held against him by the troops of Robert, the Angevin king of Naples. He was, nevertheless, crowned emperor on June 29 by cardinals nominated by the Pope for that purpose.

In August Henry left Rome on a campaign against the Guelf forces of Tuscany. Although he subdued a number of Tuscan towns, he failed to take Florence, the leading Guelf city in Tuscany. After spending some time in Pisa (which was friendly to his cause), he left that city in August 1313 on an expedition against Naples. On the way, after an unsuccessful attempt to capture the city of Siena, he was stricken ill with fever and died. He was buried in the cathedral of Pisa. Two biographies are F. Schneider's *Kaiser Heinrich VII,* 3 vol. (1924–28), and *Heinrich VII, Dantes Kaiser* (1940).

HAITI

• **Henry I:** *see* Christophe, Henry.

LUXEMBOURG

• **Henry V:** *see* Henry VII (Germany/Holy Roman Empire).

NAVARRE

• **Henry I,** byname HENRY THE FAT, Spanish ENRIQUE EL GORDO, French HENRI LE GROS

(b. *c.* 1210—d. July 22, 1274, Pamplona, Navarre), king of Navarre (1270–74) and count (as Henry III) of Champagne. Henry was the youngest son of Theobald I of Navarre by Margaret of Foix. He succeeded his eldest brother, Theobald II (Thibaut V), in both kingdom and countship in December 1270. By his marriage (1269) to Blanche, daughter of Robert I of Artois and niece of Louis IX of France, he had one daughter, Joan, whom, by the Convention of Bonlieu (Nov. 30, 1273), he promised to one of the two sons of Edward I of England, Henry and Alfonso. This would have led to a union of his dominions with English Gascony, but it came to nothing. King Henry died in 1274; both the English princes died in the next decade, and Joan was married in 1284 to the future Philip IV of France.

• **Henry II** (b. April 1503, Sangüesa, Navarre—d. May 29, 1555, Hagetmau, Fr.), king of Navarre from 1516 who for the rest of his life attempted by force and negotiation to regain territories of his kingdom that had been lost by his parents, Catherine de Foix and Jean d'Albret, in 1514.

In February 1516, when his mother died, Henry fell heir to the House of Albret claim; and in 1521, supported by French forces, he invaded Navarre but suffered crushing defeat. Henry fought with Francis I of France (1525) in Italy, was captured with him, but escaped. Two years later he married Francis' sister Margaret of Angoulême; their daughter Jeanne became the mother of the future Henry IV of France. Emperor Charles V (who was also Charles I of Spain) in 1530 voluntarily ceded Henry the small section of Navarre north of the Pyrenees, but negotiations for the remainder failed. Henry was, however, accorded rulership of the southwestern French region of Guyenne by Francis.

• **Henry III:** *see* Henry IV (France).

Portugal

• **Henry,** byname HENRY THE CARDINAL-KING, Portuguese HENRIQUE O CARDEAL-REI (b. Jan. 31, 1512, Lisbon—d. Jan. 31, 1580, Almeirim, Port.), king of Portugal and Roman Catholic ecclesiastic whose brief reign (1578–80) was dominated by the problem of succession. His failure to decisively designate a successor left the Portuguese throne at his death prey to its Spanish claimant, King Philip II.

Henry, son of Manuel I, chose a career in the church and became, successively, archbishop of Braga (1534), Évora (1540), and Lisbon (1564), attaining the rank of cardinal in 1545. For a time he headed the Portuguese Inquisition. He also became a staunch supporter of the Society of Jesus and founded the Jesuit university in Évora (1558).

Henry served as regent until 1568 in the latter part of the minority of his grandnephew Sebastian (reigned 1557–78). After Sebastian's death in a disastrous defeat by the Moors at Alcazarquivir (Battle of the Three Kings), the aged, celibate Henry was named king. Unable to resolve the succession question, he named five governors to act as regents on his death. Spanish occupation eight months later put Philip on the throne.

Saxony

• **Henry II:** *see* Henry X (Bavaria).

• **Henry III,** byname HENRY THE LION, German HEINRICH DER LÖWE (b. 1129/30—d. Aug. 6, 1195, Brunswick, Saxony), duke of Saxony (1142–80) and of Bavaria (as Henry XII, 1156–80), a strong supporter of the emperor Frederick I Barbarossa. Henry spent his early years recovering his ancestral lands of Saxony (1142) and Bavaria (1154–56), thereafter founding the city of Munich (1157), enhancing the position of Lübeck, and greatly extending his territories. He broke with Frederick in 1176 and in consequence was deprived of most of his lands and was exiled twice (1181–85; 1189–90).

Henry III, detail of a sandstone figure from his tomb, 1227; in the Cathedral of St. Blasius, Brunswick

Foto Marburg—Art Resource/EB Inc.

Early years. Henry the Lion was the only son of Henry the Proud, duke of Saxony and Bavaria, and Gertrude, the daughter of the Holy Roman emperor Lothair III. In May 1142 he recovered Saxony, one of the two duchies of which his father had been divested by Conrad III, the first Hohenstaufen German king. In 1147 Henry laid claim to Bavaria, which Conrad III had granted to Henry II Jasomirgott, margrave of Austria, and in 1151 he tried in vain to take possession of the duchy. In 1147 or 1148 he married Clementia, the daughter of Conrad, duke of Zähringen, but this marriage was dissolved in 1162.

When Frederick I Barbarossa of Hohenstaufen, his cousin, was elected king of Germany in 1152, the Hohenstaufen made peace with the rival dynasty of the Welfs, of which Henry was a member. In 1154 Frederick granted Henry the right to invest the bishops of the new bishoprics beyond the Elbe and also recognized his territorial claims to Bavaria. In September 1156 Henry secured possession of the Duchy of Bavaria; Austria was subsequently separated from Bavaria and was given to Henry Jasomirgott and elevated into its own duchy.

Alliance with Frederick Barbarossa. Henry, in turn, for 20 years supported Frederick Barbarossa. He accompanied him with a large army on his first Italian campaign (1154/55) and, after Frederick's coronation as emperor, suppressed a rising of the Romans. In 1157 he took part in Frederick's expedition against the Poles. During Frederick's second Italian campaign, Henry provided valuable assistance to the Emperor at the siege of Crema in 1160 and in the war against the Milanese cities in 1161.

One year after recovering Bavaria, Henry laid the foundations of the city of Munich by establishing a new market on the Isar River. But his main effort was directed toward expanding the Duchy of Saxony, especially in the lands beyond the Elbe. In 1159 he refounded the city of Lübeck on territory he had taken from Adolf II, count of Holstein, who had first founded Lübeck in 1143. By treaties with the merchants of Gotland and the princes of Sweden and Novgorod, he considerably enhanced Lübeck's position as a commercial centre. In 1160 the bishopric of Oldenburg was also transferred to that city. From 1158 on Henry had subdued the Slavic Obodrites in several expeditions, extending his power all over Mecklenburg and thus opening the way for its Christianization and colonization.

In 1160 Schwerin became the seat of the bishopric of Mecklenburg and was granted the privileges of a city. Even the princes of western Pomerania temporarily acknowledged Henry's feudal sovereignty. When Valdemar I, king of Denmark, conquered the island of Rügen, in the Baltic Sea, a long, drawn-out struggle broke out between him and Henry that lasted until 1171, when the dispute was settled and Henry's daughter married Valdemar's son.

In those years Henry also consolidated his position in Saxony by seizing the properties of several extinct dynasties without regard to the hereditary claims of other families. He made Brunswick his capital, and, in front of the castle he had built, he erected the statue of a lion as a symbol of his family and a sign of his sovereignty. But Henry's arrogant nature and his propensity for aggrandizement evoked growing opposition. Beginning in the middle 1150s, several Saxon princes entered into alliances against him. Ten years later, a great coalition led by Albert I the Bear, margrave of Brandenburg, and the Archbishop of Cologne posed a serious threat to him. It was only after the Emperor intervened in 1168 that peace was restored in Saxony.

At that time, Henry was at the zenith of his power. In early 1168 he married Matilda, the daughter of Henry II of England, and soon afterward was sent to France and England as ambassador of Frederick I on a mission to arrange an armistice between both nations. In 1172 he went on a pilgrimage to Jerusalem with a large following and was received with great ceremony by the Byzantine emperor Manuel I Comnenus at Constantinople (now Istanbul).

When in 1176 Frederick Barbarossa asked for support against the Lombard cities in northern Italy, Henry's price for aiding the Emperor was the important imperial city of Goslar, together with its silver mines. But Frederick refused to cede it, and his old alliance with Henry came to an end.

Henry's decline. When fighting broke out again in Saxony in 1177, Frederick, after his return to Germany in 1178, instituted proceedings based on the charge of the Saxon nobles against Henry for breach of the king's peace. Henry, who had refused to answer the charges in the king's court, was deprived of his two duchies and of all imperial fiefs, in 1180. The Emperor then proceeded to break up Henry's former domain. In the same year the Saxon duchy was divided into two parts. The lands of the two bishoprics of Cologne and Paderborn were given to the Archbishop of Cologne as the new Duchy of Westphalia; the eastern part of Saxony was given as a fief to a son of Albert the Bear of Brandenburg. The Duchy of Bavaria was granted to an ally of Frederick's, Otto von Wittelsbach.

Henry was at first able to maintain his position against Barbarossa in northern Saxony, but in the summer of 1181 he had to submit. Allowed to retain his hereditary lands of Brunswick and Lüneburg, he was exiled for several years to the court of his father-in-law, Henry II of England. On his return in 1185 he tried to regain his influence in Saxony. For his refusal to participate in the Third Crusade or to renounce his claims to Saxony, he was again banished, in 1189, rejoining Henry II in Normandy.

After Frederick Barbarossa's death in 1190, Henry returned once more to Saxony. King Henry VI of Germany now took the field against him but made peace with him at Fulda in July 1190. After Henry the Lion renewed the fighting during Henry VI's campaign in Italy, the Emperor and Henry became reconciled at a meeting in 1194. The following year Henry the Lion died in Brunswick; he was

buried in the cathedral he had built there, at the side of his wife. (K.J.)

BIBLIOGRAPHY. Karl Jordan, *Henry the Lion* (1986), examines both his political dealings and his role as a patron of learning and art. Peter Munz, *Frederick Barbarossa: A Study in Medieval Politics* (1969), describes the political situation of Henry's time.

Sicily

• **Henry:** *see* Henry VI *under* Henry (Germany/Holy Roman Empire).

Spain: Castile

• **Henry I** (b. 1203—d. June 6, 1217, Palencia, Castile [Spain]), king of Castile from 1214 to 1217.

Henry was the son of Alfonso VIII of Castile and his wife Eleanor, daughter of Henry II of England, after whom he was named. He was killed, while still a boy, by the fall of a tile from a roof. Sovereignty over Castile was then assumed by Alfonso VIII's cousin, Alfonso IX, king of Leon.

• **Henry II,** also called (until 1369) ENRIQUE, CONDE (count) DE TRASTÁMARA, byname HENRY OF TRASTÁMARA, or HENRY THE FRATRICIDE, or THE BASTARD, Spanish ENRIQUE DE TRASTÁMARA, or ENRIQUE EL FRATRICIDA, or EL BASTARDO, or EL DE LAS MERCEDES ("He of the Largesse") (b. 1333—d. May 29, 1379, Burgos, Castile [Spain]), king of Castile from 1369, founder of the house of Trastámara, which lasted until 1504.

The illegitimate son of Alfonso XI of Castile, Henry rebelled against his younger half brother, Peter I (Peter the Cruel), invaded Castile with French aid in 1366, and was crowned king at Burgos. Peter sought English aid, and Henry was routed by Edward the Black Prince at Najera (April 3, 1367). He obtained more French aid and captured Peter, whom he murdered on March 23, 1369.

The legitimist claim was upheld in Galicia, in Portugal, which he invaded; and he also had to defend himself against England's John of Gaunt, who had married Peter's daughter. He crushed opposition and rewarded his adherents. He introduced from France the hereditary titles of duke and marquess, with entailed estates, creating the class of grandees from his relatives and supporters; he thereby gained the title of *El de las Mercedes.*

Consult the INDEX *first*

• **Henry III,** byname HENRY THE SUFFERER, Spanish ENRIQUE EL DOLIENTE (b. Oct. 4, 1379, Burgos, Castile [Spain]—d. 1406, Toledo), king of Castile from 1390 to 1406. Though unable to take the field because of illness, he jealously preserved royal power through the royal council, the Audiencia (supreme court), and the *corregidores* (magistrates). During his minority, the anti-Jewish riots of Seville and other places produced the large class of *conversos* (converts).

The son of John I, Henry bore the title of Prince of Asturias, which from then on designated the heir apparent. His marriage to Catherine of Lancaster, granddaughter of Peter I, ended the dynastic rift and consolidated the house of Trastámara.

Henry succeeded as a boy of 11; and, under a regency, the Jewish communities were sacked as a result of fanatical preaching. He assumed power at 14, restored control over the royal council and courts, and imposed order. He curbed the Cortes (parliament), relying on legists. He resumed the struggle with Portugal (1396–98) and made a favourable truce, but he was unable to lead his troops and appointed his younger brother Ferdinand to campaign against Granada. He sent emissaries to the court of Timur (Tamerlane), the central Asian emperor and ruler of Persia, and licensed Jean de Béthencourt to conquer and colonize the Canary Islands.

Henry III died young, leaving an heir, John II, less than two years old, and dividing the regency in an elaborate testament between his widow and his brother.

• **Henry IV,** byname HENRY THE IMPOTENT, or THE LIBERAL, Spanish ENRIQUE EL IMPOTENTE, or EL LIBERAL (b. Jan. 25, 1425, Valladolid, Castile [Spain]—d. Dec. 11, 1474, Madrid), king of Castile from 1454 to 1474, whose reign, though at first promising, became chaotic.

Henry's weak father, John II, was entirely under the control of his constable, Álvaro de Luna, who gave the young Henry a separate court at Segovia, hoping to control him. Instead, Henry became the tool of other cliques, who eventually overthrew and executed Luna. In 1464 Henry reconquered Gibraltar from the Muslims, but his nobles fell into warring factions.

Henry IV's first marriage was childless and ended in divorce. He then married a Portuguese princess Joana, who bore a daughter, Juana (La Beltraneja). One faction recognized Henry's younger half brother Alfonso, deposing Henry in effigy in the "Farce of Avila." But Alfonso died, and Henry vacillated about the claim of his infant daughter. His rivals then recognized his half sister, Isabella (the future Isabella I), who without Henry's knowledge or consent married the heir to the throne of Aragon, Ferdinand (the future Ferdinand II); the two would one day rule a united Spain as Ferdinand and Isabella.

Although much that was published about Henry IV may be discounted as propaganda, he suffered from the quarrels of his favourites, Juan Pacheco, Marqués de Villena, and Beltran de la Cueva, and their inability to maintain order.

Swabia

• **Henry I:** *see* Henry III *under* Henry (Germany/Holy Roman Empire).

henry, unit of either self-inductance or mutual inductance, abbreviated h (or hy), and named for the American physicist Joseph Henry. One henry is the value of self-inductance in a closed circuit or coil in which one volt is produced by a variation of the inducing current of one ampere per second. One henry is also the value of the mutual inductance of two coils arranged such that an electromotive force of one volt is induced in one if the current in the other is changing at a rate of one ampere per second. *See* inductance.

Henry, SAINT: *see* Henry II *under* Henry (Germany/Holy Roman Empire).

Henry BEAUCLERC: *see* Henry I *under* Henry (England).

Henry BOLINGBROKE: *see* Henry IV *under* Henry (England).

Henry CURTMANTLE: *see* Henry II *under* Henry (England).

Henry FITZEMPRESS: *see* Henry II *under* Henry (England).

Henry FITZHENRY: *see* Henry the Young King.

Henry OF ANJOU: *see* Henry II *under* Henry (England).

Henry OF BLOIS (b. *c.* 1099—d. Aug. 8, 1171, Winchester, Hampshire, Eng.), bishop of Winchester (from 1129) and papal legate in England (1139–43), who was largely instrumental in having his brother Stephen recognized as king of England (1135).

Henry was the fourth son of Stephen, count of Blois and Chartres, and of Adela, daughter of William I the Conqueror. As a younger son of a royal family, he received high ecclesiastical office: he was abbot of Glastonbury (from 1126) and bishop of Winchester, the richest see in England. The hostility of St. Bernard of Clairvaux denied Henry the archbishopric of Canterbury (1136), but as papal legate he had powers superior to those of the archbishop, Theobald. During the civil war for the English crown between his brother Stephen and his cousin Matilda, Henry transferred his allegiance to Matilda (1141) but soon quarreled with her and returned to Stephen. After his retirement from English politics (1154), he went to France, where he reorganized the finances of the abbey of Cluny. Henry was a capable soldier and a patron of the arts as well as a churchman.

Henry OF BOURBON: *see* Henry IV *under* Henry (France).

Henry OF FLANDERS: *see* Henry *under* Henry (Constantinople).

Henry OF GHENT, French HENRI DE GAND, byname DOCTOR SOLEMNIS ("Exalted Teacher") (b. *c.* 1217, Ghent, Flanders [now in Belgium]—d. June 29, 1293, Tournai), Scholastic philosopher and theologian, one of the most illustrious teachers of his time, who was a great adversary of St. Thomas Aquinas and whose controversial writings influenced his contemporaries and followers, particularly postmedieval Platonists.

After studying at Tournai, where he became a canon in 1267, he studied theology at Paris; there, from 1276 (when he was archdeacon of Bruges) to 1292 he became famous as a lecturer. In 1278 he was archdeacon of Tournai and was a member of the commission that drafted the famous condemnation (1277) of Averroism (after the interpretation of Aristotle by the Muslim philosopher Averroës). His violent opposition (1282–90) to the mendicant orders led to his being censured in 1290 by Cardinal Benedict Caetani, later Pope Boniface VIII. Among the several councils that he attended were those of Lyon (1274), Cologne, and Compiègne, Fr.

Henry was an eclectic, neither Aristotelian nor Augustinian. He taught that matter could be created by God to exist independent of form. He denied a real distinction between essence and existence and between the soul and its faculties. A voluntarist, he regarded reason as being related to will as servant to master and declared that conscience is entirely in the will, being a choice of the will that never disagrees with right reason.

Henry has been generally neglected by historians because of the inaccessibility of his works. Significant for the development of ethical theory in the European Middle Ages, however, is the fact that the great British philosopher John Duns Scotus devoted much of his energy to answering Henry's arguments. Despite attacks from other eminent thinkers, such as William of Ockham and Durandus of Saint-Pourçain, Henry's writings were widely read between the 14th and 18th century. During the 16th century the Servites erroneously adopted him as their official doctor.

Henry OF HAINAUT: *see* Henry *under* Henry (Constantinople).

Henry OF LANCASTER: *see* Henry IV *under* Henry (England).

Henry OF NAVARRE: *see* Henry IV *under* Henry (France).

Henry OF OATLANDS: *see* Gloucester, Henry Stuart, Duke of.

Henry OF TRASTÁMARA: *see* Henry II *under* Henry (Spain: Castile).

Henry PLANTAGENET: *see* Henry II *under* Henry (England).

Henry RASPE (b. *c.* 1202—d. Feb. 16, 1247, Wartburg Castle, Thuringia), landgrave of Thuringia (1227–47) and German anti-king (1246–47) who was used by Pope Innocent IV in an attempt to oust the Hohenstaufen dynasty from Germany.

On the death of his elder brother Landgrave Louis IV, in 1227, Henry seized power (thus excluding his nephew Hermann II from the succession) and banished Louis's widow, St. Elizabeth, from the Thuringian court. In 1236 he assisted the Holy Roman emperor Frederick II (who had tolerated Henry's usurpation of power in Thuringia) in crushing the rebellion of Frederick II, duke of Austria, of the Babenberg dynasty; he was also one of the 11 princes who elected the Emperor's son Conrad IV as German king at Vienna in 1237.

In 1238, however, relations between Henry and the Emperor were weakened by Henry's marriage to Gertrude, sister of the childless Frederick of Austria. When the Emperor was excommunicated in March 1239, Henry considered deserting him, but he was persuaded by Siegfried, archbishop of Mainz, who was at that time a supporter of the Emperor, to remain loyal to the imperial cause. Henry was himself consequently excommunicated in the spring of 1240.

In 1242 the Emperor appointed Henry one of his vice regents in Germany, but Henry made no attempt to discharge his duties, and two years later he deserted the Emperor's cause. At the request of the Pope (who had ordered the deposition of Conrad IV) he was elected German king in May 1246 by an assembly of ecclesiastical princes.

Henry defeated Conrad near Frankfurt in August 1246, primarily because of treachery in the ranks of Conrad's army. In the winter of 1246–47 Henry mounted an attempt to conquer Swabia, the key to Hohenstaufen power in Germany. In January 1247 he besieged Ulm but failed to capture the city. His health was adversely affected by the rigours of the winter campaign, and he died the following month.

Henry SUSO (German mystic): *see* Suso, Heinrich.

Henry THE BASTARD: *see* Henry II *under* Henry (Spain: Castile).

Henry THE CARDINAL-KING: *see* Henry *under* Henry (Portugal).

Henry THE FAT: *see* Henry I *under* Henry (Navarre).

Henry THE FOWLER: *see* Henry I *under* Henry (Germany/Holy Roman Empire).

Henry THE FRATRICIDE: *see* Henry II *under* Henry (Spain: Castile).

Henry THE IMPOTENT: *see* Henry IV *under* Henry (Spain: Castile).

Henry THE LIBERAL: *see* Henry IV *under* Henry (Spain: Castile).

Henry THE LION: *see* Henry III *under* Henry (Saxony).

Henry THE MINSTREL (fl. 1470–92): *see* Harry the Minstrel.

Henry THE NAVIGATOR, Portuguese HENRIQUE O NAVEGADOR, byname of HENRIQUE, INFANTE (prince) DE PORTUGAL, DUQUE (duke) DE VISEU, SENHOR (lord) DA COVILHÃ (b. March 4, 1394, Porto, Port.—d. Nov. 13, 1460, Vila do Infante, near Sagres), Portuguese prince noted for his patronage of voyages of discovery among the Madeira Islands and along the western coast of Africa. Under his auspices, the sailing vessel known as the Portuguese caravel was developed, the techniques of cartography were advanced, navigational instruments were improved, and commerce by sea was vastly stimulated. He was also the designer of a grand strategy—not to be brought to fulfillment until after his death—whereby Christian Europe outflanked the power of Islām by establishing contact with Africa south of the Sahara and with Asia.

Henry the Navigator, detail of a triptych attributed to Nuno Gonçalves, *c.* 1465–70; in the Museu Nacional de Arte Antiga, Lisbon

By courtesy of the Museu Nacional de Arte Antiga, Lisbon

Early life. Henry was the third son of King John I and Philippa of Lancaster, the daughter of John of Gaunt of England. Henry and his older brothers, the princes of Duarte and Pedro, were educated under the supervision of their parents; they were taught soldiering, statecraft, and the appreciation of literature.

The starting point of Henry's career was the capture of the Moroccan city of Ceuta in 1415. According to Henry's enthusiastic biographer, Gomes Eanes de Zurara, the three princes persuaded their still-vigorous father to undertake a campaign that would enable them to win their knightly spurs in genuine combat instead of in the mock warfare of a tournament. King John consented and, with Ceuta in mind, began military preparations, meanwhile spreading rumours of another destination, in order to lull the Moroccan city into a feeling of false security.

Although a plague swept Portugal and claimed the Queen as a victim, the army sailed in July 1415. King John found Ceuta unprepared, as he had hoped, and its capture unexpectedly easy. Though Zurara later claimed the principal role in the victory for Henry, it would seem that the experienced soldier-king actually directed the operation. That Henry distinguished himself, however, is indicated by his immediate appointment as governor of Ceuta, which did not require his permanent residence there but obligated him to see that it was adequately defended.

An emergency arose in 1418, when the Muslim rulers of Fez (Fès) in Morocco and the kingdom of Granada in Spain joined in an attempt to retake the city. Henry hastened to the rescue with reinforcements but on arrival found that the Portuguese garrison had beaten off the assailants. He then proposed to attack Granada, despite reminders that this would antagonize the kingdom of Castile, on whose threshold it lay. But his father, who had spent years fighting the attempts of the Castilians to annex Portugal, wanted peace with them and sent peremptory orders to return home.

As governor of Ceuta, Henry always had ships at his command and by 1418 had begun to sponsor voyages in a small way. In that year, two squires of his, João Gonçalves Zarco and Tristão Vaz Teixeira, rediscovered the islands of Porto Santo near Madeira and a little later Madeira itself, both of which had been visited by Genoese in the previous century.

Upon his return to Portugal, Henry had been made duke of Viseu and lord of Covilhã. In 1419 he retired from the court and became governor of the Algarve, the southernmost province of Portugal. There, on the rocky promontory of Sagres, at the southwestern tip of Portugal, he founded a small court of his own, to which he attracted seamen, cartographers, astronomers, shipbuilders, and instrument makers.

In 1420, at the age of 26, he was made grand master of the Order of Christ, the supreme order sponsored by the pope, which had replaced the crusading order of the Templars in Portugal. While this did not oblige him to take religious vows, it did oblige him to dedicate himself to a chaste and ascetic life. (He had, however, not always refrained from worldly pleasures; as a young man he had fathered an illegitimate daughter.) The funds made available through the order largely financed his great enterprise of discovery, which also had as its object the conversion of the pagans to Christianity. It was for this reason that all of Henry's ships bore a red cross on their sails.

Sponsorship of expeditions. From 1420 onward he began to dispatch expeditions from the nearby port of Lagos, first with the aim of discovering more of the Moroccan Atlantic coast and later—when he began to think in terms of continents—with the aim of discovering the southerly route to India, in order to introduce Christianity there and to foster commerce. Little is known of the Prince's private life in the 1420s. Duarte and Pedro both married, but Henry remained single to the end of his life.

When Duarte succeeded King John in 1433, he did not hesitate to lecture and reprove Henry for such shortcomings as extravagance, unmethodical habits, failure to keep promises, and lack of scruples in the raising of money. This rebuke is not supported by the traditional account of the Navigator as a lofty, ascetic person, indifferent to all but religion and the furtherance of his mission of discovery.

Henry unquestionably was also—although in a different way—influenced by his older and perhaps more brilliant brother, Prince Pedro. In 1425 Pedro set out on a long tour of Europe on which he visited England, Flanders, Germany, Hungary, and the principalities of Moldavia and Walachia (now Romania) before returning home through Italy, Aragon, and Castile. In eastern Europe he was close enough to Ottoman Turkey to appreciate the Muslim danger. The travels stimulated his interest in geography, which was further whetted in Italy, the home of most European travellers to distant parts. From Italy Pedro brought home to Portugal, in 1428, a copy of Marco Polo's travels that he had translated for Prince Henry's benefit.

During the five years of his brother Duarte's reign, Henry was able to persuade his captains to venture farther down the African coast. The most important achievement was the rounding of Cape Bojador by Gil Eanes in 1434, overcoming a superstition that had previously deterred seamen. During the next years, Henry's captains pushed southward somewhat beyond the Rio de Oro. They also began the colonization of the recently discovered Azores, through the orders of both Henry and Pedro.

In 1437 Henry and his younger brother, Fernando, gained Duarte's reluctant consent for an expedition against Tangier. Ceuta had proved an economic liability, and they believed that possession of the neighbouring city would both insure Ceuta's safety and provide a source of revenue. Pedro opposed the undertaking as he felt it meant deviation from Portugal's true mission, which to him was prosecution of further discovery. Henry and

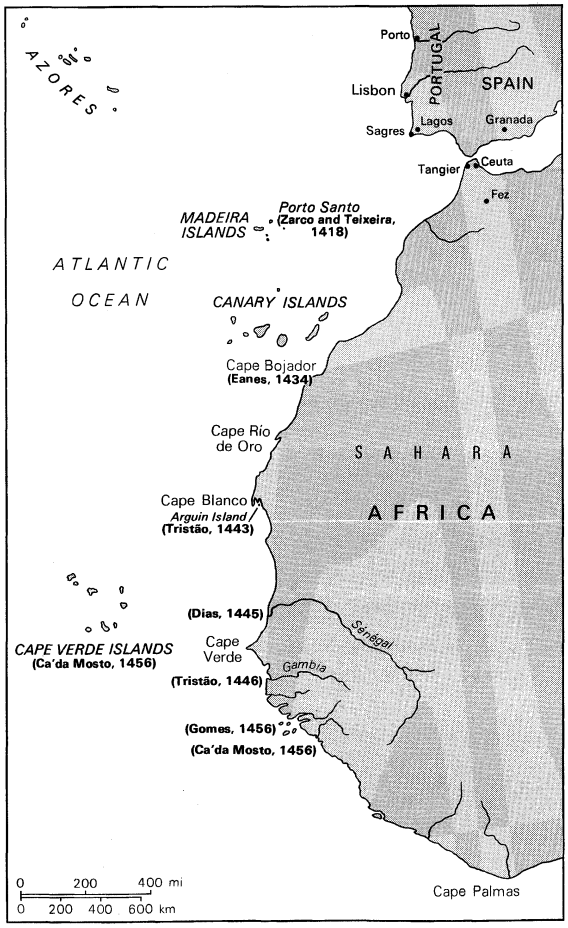
Fernando nevertheless attacked Tangier and met with disaster; Henry had shown poor generalship and mismanaged the enterprise. The Portuguese army would have been unable to reembark had not Fernando been left as hostage. Henry offered himself as hostage, but as the army refused to lose its commander, Fernando remained in captivity to later die of ill treatment at Fez in 1443.

King Duarte died in 1438, shortly before Henry's return. His heir, Afonso V, was only six at the time, and Pedro assumed the regency over the bitter opposition of the boy's mother, Leonor of Aragon, who hated her brother-in-law and would willingly have accepted Henry. But Henry had no wish to govern Portugal and attempted unsuccessfully to bring about peace in the family. He felt satisfied with Pedro as regent and for himself wished only to return to Sagres and resume his maritime work. The Queen Mother somewhat eased matters by leaving the country, and for most of the next decade Pedro and Henry worked in harmony, though their illegitimate half brother, Afonso, count of Barcelos, dissatisfied with his inferior position in the family, attempted to sow discord and eventually succeeded.

During these years, Henry's mission of discovery, encouraged and aided by the regent, progressed rapidly. One of his immediate aims was to find an African gold supply—the existence of which he is thought to have learned from the Moors of Ceuta—to strengthen the Portuguese economy and to make the voyages pay for themselves. In 1441 a caravel returned from the West African coast with some gold dust and slaves, thus silencing the growing criticism that Henry was wasting money on a profitless enterprise. One of Henry's voyagers, Dinis Dias, in 1445 reached the mouth of the Sénégal (then taken for a branch of the Nile); and a year later Nuño Tristão, another of Henry's captains, sighted the Gambia River. By 1448 the trade in slaves to Portugal had become sufficiently extensive for Henry to order the building of a fort and warehouse on Arguin Island; this installation was, in fact, the first European trading post established overseas.

Afonso V attained his legal majority at the age of 14 in 1446. His embittered mother had meanwhile died in Castile, and although the young king presently married Pedro's daughter, Isabel, his relations with the regent were nonetheless bad. Afonso of Barcelos now came to work on the boy's susceptible mind. His task was rendered easier by the obvious reluctance with which Pedro turned full power over to the youth, whose weaknesses were already apparent.

Henry, who wished only to be a peacemaker, left Sagres and tried, unsuccessfully, to establish harmony between his brother Pedro and his nephew King Afonso. Armed conflict between the two became inevitable, and Henry in the end felt obliged to side with the King, though he remained as much as possible in the background. He took no part in a skirmish at Alfarrobeira in May 1449, in which Pedro was killed by a chance shot from a crossbowman. There is reason to believe that after this sad termination of the family feud, Henry wished to go into exile at Ceuta and spend his remaining days fighting Moors but that the King refused him permission. A historian writing 50 years later gave the impression that Henry had deserted his brother when he might have saved him. Henry's biographer, Zurara, on the other hand, declared that his hero did everything possible to prevent Pedro's death and promised to explain the circumstances further in later writings; but if he did so, the account is lost.



Areas reached by explorers under the sponsorship of Henry the Navigator

Final maritime ventures. After Alfarrobeira, Henry spent most of his time at Sagres, though he did not altogether abandon public life. He was accorded by the King the sole right to send ships to visit and trade with the Guinea coast of Africa. He appeared occasionally at the Lisbon court and in 1450 helped arrange for the marriage of the King's sister to the emperor Frederick III. During most of his last decade, Henry concentrated on the sponsorship of voyages. These accomplished only minor discoveries as the Prince now seemed mainly interested in trade with the regions already contacted. The last two important mariners sent out by Henry were the Venetian Alvise Ca' da Mosto (Cadamosto) and the Portuguese Diogo Gomes, who between them discovered several of the Cape Verde Islands.

The farthest point south along the African coast reached during Henry's lifetime is generally considered to have been Sierra Leone, though one piece of evidence suggests that his seamen progressed to Cape Palmas (off the Ivory Coast), some 400 miles beyond. So great was his investment in exploration that, despite his great revenues, Henry died heavily in debt.

Afonso V had small interest in discovery but great zeal for crusading and knight-errantry. Resuming the old attempt at Moroccan conquest, he led an expedition in 1458 against Alcácer Ceguer (now Ksar es-Shrhir), in which Henry accompanied him. The Prince, now 64, did well in the fighting, and, when the town capitulated, Afonso left the surrender terms to his uncle, who showed remarkable leniency. Henry lived for two years after his return from Alcácer Ceguer.

The surname Navigator, applied by the English to the Prince, though seldom by Portuguese writers, is a misnomer as he himself never embarked on voyages of discovery. His fame rests primarily on his patronage of navigators, for which he is rightly regarded as the initiator of the great age of discovery and the European thrust towards world dominion.

(C.E.No.)

BIBLIOGRAPHY. Although Gomes Eanes de Zurara is no longer considered an infallible authority on Prince Henry, his narrative of the discoveries, trans. as *Chronicle of the Discovery and Conquest of Guinea* by C.R. Beazley and E. Prestage (1896), is still the best. Lives of Henry in English include: R.H. Major, *The Life of Prince Henry of Portugal, Surnamed the Navigator* (1868, reprinted 1967); E.D.S. Bradford, *A Wind from the North: The Life of Henry the Navigator* (1960), and John Ure, *Prince Henry the Navigator* (1977). E. Prestage, *The Portuguese Pioneers* (1933, reprinted 1966), though dealing with all Portuguese discovery, offers much useful information on Henry's life.

Henry THE SUFFERER: *see* Henry III *under* Henry (Spain: Castile).

Henry THE YOUNG KING, also called HENRY FITZHENRY (b. Feb. 28, 1155, London—d. June 11, 1183, Martel, Quercy, Fr.), second son of King Henry II of England by Eleanor of Aquitaine; he was regarded, after the death of his elder brother, William, in 1156, as his father's successor in England, Normandy, and Anjou.

In 1158 Henry, only three years of age, was betrothed to Margaret, daughter of Louis VII of France and his second wife, on condition that Margaret's dowry would be the Vexin, the border region between Normandy (then held by England) and France. Henry II took advantage of Pope Alexander III's political difficulties to secure the Pope's permission for the children to be married in 1160. On June 14, 1170, the young Henry was crowned king (theoretically to rule in association with his father) at Westminster by Archbishop Roger

of York. York's officiation, usurping a prerogative of the archbishop of Canterbury, exacerbated the dispute between the latter, namely, Thomas Becket, and Henry II, which ended with Becket's murder six months later. Crowned again on Aug. 27, 1172 (this time with Margaret), the Young King received no share of his father's power. (He was nevertheless called by contemporaries and by certain later chroniclers King Henry III.)

With his mother and his brothers Richard (the future Richard I) and Geoffrey, he nearly overthrew Henry II in 1173. Forgiven for this revolt, he intrigued further against his father with Louis VII. In 1182–83 he waged war against Richard over Poitou, and he was preparing to fight Richard again when he died in France of dysentery.

The Young King was so popular that the people of Le Mans and Rouen almost went to war for the custody of his body, and in his mother's hereditary lands he was immortalized in the "Lament for the Young King" by the troubadour Bertran de Born.

Henry THE YOUNGER: *see* Henry II *under* Henry (Brunswick-Wolfenbüttel).

Henry, Alice (b. March 21, 1857, Richmond, Tasmania, Australia—d. Feb. 14, 1943, Melbourne), Australian journalist who promoted trade unionism, women's suffrage, and social reform in Australia and the United States.

In 1884 Henry began a 20-year career writing for the *Melbourne Argus* and the *Australasian* and also lectured throughout the country on labour problems, juvenile reform, and women's rights. In 1906 she went to the United States, where she lectured on Australian reform movements. She joined the Chicago Women's Trade Union League, and from 1911 to 1915 she edited its publication, *Life and Labor*. Henry worked for the extension of the league in the United States and is credited with bringing an international perspective to the women's trade union movement.

Henry, Cape, promontory at the southern entrance to Chesapeake Bay, on the Atlantic coast of the city of Virginia Beach, southeastern Virginia, U.S. Cape Henry Memorial, a stone cross put up by the Daughters of the American Colonists in 1935, marks the site of the landing on April 26, 1607, of the first permanent English settlers in America who named the cape for Henry, prince of Wales, and ascended the James River in their three small ships ("Goodspeed," "Sarah Constant," and "Discovery") to settle Jamestown (*q.v.*). The memorial, part of Colonial National Historical Park, is surrounded by Fort Story Military Reservation and Seashore State Park. The Old Lighthouse at the site was the first such structure in the U.S. (erected 1791–92); the nearby New Lighthouse (1879–81) has one of the world's most powerful lights (157 ft [48 m] above sea level), visible offshore for 20 miles (32 km).

Henry, Fort, in the American Civil War, strategic Confederate stronghold in Tennessee, the capture of which on Feb. 6, 1862, by Union naval forces under Commo. Andrew Hull Foote, opened a Northern invasion route along the Tennessee River. Fort Henry was a closed fieldwork on the Tennessee River, defended by 17 heavy guns, 100 artillerymen, and rifle pits held by 2,500 infantrymen. A combined land and naval assault had been planned, but Gen. Ulysses S. Grant's troops arrived too late to see action. After a short, fierce bombardment by four Union ironclad gunboats under Commodore Foote, Confederate Gen. Lloyd Tilghman and 78 surviving artillerymen surrendered; the 2,500 Confederate riflemen retreated to nearby Fort Donelson (*q.v.*).

Henry, Joseph (b. Dec. 17, 1797, Albany, N.Y., U.S.—d. May 13, 1878, Washington, D.C.), one of the first great American scientists after Benjamin Franklin. He aided Samuel F.B. Morse in the development of the telegraph and discovered several important principles of electricity, including self-induction, a phenomenon of primary importance in electronic circuitry.

Joseph Henry
By courtesy of the Smithsonian Institution, Washington, D.C.

While working with electromagnets at the Albany Academy (New York) in 1829, he made important design improvements. By insulating the wire instead of the iron core, he was able to wrap a large number of turns of wire around the core and thus greatly increase the power of the magnet. He made an electromagnet for Yale College that could support 2,086 pounds, a world record at the time. During these studies he first noticed the principle of self-induction (1832), three years after he devised and constructed the first electric motor.

Although Michael Faraday is given credit for discovering electromagnetic induction—the process of converting magnetism into electricity—because he was the first to publish (1831) his results, Henry had observed the phenomenon a year earlier.

In 1831 Henry built and successfully operated, over a distance of one mile (1.6 kilometres), a telegraph of his own design. He became professor of natural philosophy at the College of New Jersey (later Princeton University) in 1832. Continuing his researches, he discovered the laws upon which the transformer is based. He also found that currents could be induced at a distance and in one case magnetized a needle by utilizing a lightning flash eight miles away. This experiment was apparently the first use of radio waves across a distance. By using a thermogalvanometer, a heat-detection device, he showed that sunspots radiate less heat than the general solar surface.

In 1846 Henry became the first secretary of the Smithsonian Institution, Washington, D.C., where he organized and supported a corps of volunteer weather observers. The success of the Smithsonian meteorological work led to the creation of the U.S. Weather Bureau (later Service). One of Lincoln's chief technical advisers during the U.S. Civil War, he was a primary organizer of the National Academy of Science and its second president. In 1893 his name was given to the standard electrical unit of inductive resistance, the henry.

Henry, O., pseudonym of WILLIAM SYDNEY PORTER (b. Sept. 11, 1862, Greensboro, N.C., U.S.—d. June 5, 1910, New York City), U.S. short-story writer whose tales romanticized the commonplace—in particular the life of ordinary people in New York City. His stories expressed the effect of coincidence on character through humour, grim or ironic, and often had surprise endings, a device that became identified with his name and cost him critical favour when its vogue had passed.

Porter attended a school taught by his aunt, then clerked in his uncle's drugstore. In 1882 he went to Texas, where he worked on a ranch, in a general land office, and later as teller in the First National Bank in Austin. He began writing sketches at about the time of his marriage to Athol Estes in 1887, and in 1894 he started a humorous weekly, *The Rolling Stone*. When that venture failed, Porter joined the *Houston Post* as reporter, columnist, and occasional cartoonist.

In February 1896 he was indicted for embezzlement of bank funds. Friends aided his flight to Honduras. News of his wife's fatal illness, however, brought him back to Austin, and lenient authorities did not press his case until after her death. When convicted, Porter received the lightest sentence possible and in 1898 he entered the penitentiary at Columbus, Ohio; his sentence was shortened to three years and three months for good behaviour. As night druggist in the prison hospital, he could write to earn money for support of his daughter Margaret. His stories of adventure in the southwest U.S. and Central America were immediately popular with magazine readers, and when he emerged from prison W.S. Porter had become O. Henry.

In 1902 O. Henry arrived in New York—his "Bagdad on the Subway." From December 1903 to January 1906 he produced a story a week for the New York *World*, writing

O. Henry
AP/Wide World Photos

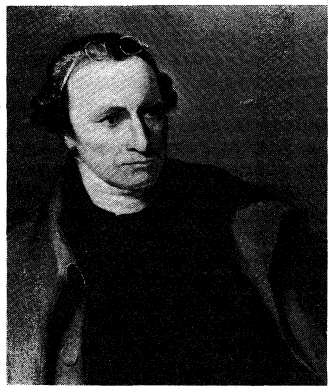
also for magazines. His first book, *Cabbages and Kings* (1904), depicted fantastic characters against exotic Honduran backgrounds. Both *The Four Million* (1906) and *The Trimmed Lamp* (1907) explored the lives of the multitude of New York in their daily routines and searchings for romance and adventure. *Heart of the West* (1907) presented accurate and fascinating tales of the Texas range.

Then in rapid succession came *The Voice of the City* (1908), *The Gentle Grafter* (1908), *Roads of Destiny* (1909), *Options* (1909), *Strictly Business* (1910), and *Whirligigs* (1910). *Whirligigs* contains perhaps Porter's funniest story, "The Ransom of Red Chief."

Despite his popularity, O. Henry's final years were marred by ill-health, a desperate financial struggle, and alcoholism. A second marriage in 1907 was unhappy. After his death three more collected volumes appeared: *Sixes and Sevens* (1911), *Rolling Stones* (1912), and *Waifs and Strays* (1917). Later, seven fugitive stories and poems, *O. Henryana* (1920), *Letters to Lithopolis* (1922) and two collections of his early work on the *Houston Post, Postscripts* (1923), and *O. Henry Encore* (1939), were published. Foreign translations and adaptations for other art forms, including films and television, attest his universal application and appeal. Gerald Langford's biography, *Alias O. Henry*, was published in 1957.

Henry, Patrick (b. May 29 [May 18, old style], 1736, Studley, Va.—d. June 6, 1799, Red Hill, near Brookneal, Va., U.S.), brilliant orator and a major figure of the American Revolution, perhaps best known for his words "give me liberty or give me death," which he delivered in 1775. He was independent Virginia's first governor (serving 1776–79, 1784–86).

Patrick Henry was the son of John Henry, a well-educated Scotsman who served in the



Patrick Henry, detail of a portrait by Thomas Sully, 1815; in the Colonial Williamsburg Collection

By courtesy of the Colonial Williamsburg Collection

colony as a surveyor, colonel, and justice of the Hanover County Court. Before he was 10, Patrick received some rudimentary education in a local school, later reinforced by tutoring from his father, who was trained in the classics. As a youth, he failed twice in seven years as a storekeeper and once as a farmer; and during this period he increased his responsibilities by marriage, in 1754, to Sarah Shelton. The demands of a growing family spurred him to study for the practice of law, and in this profession he soon displayed remarkable ability. Within a few years after his admission to the bar in 1760 he had a large and profitable clientele. He was especially successful in criminal cases, where he made good use of his quick wit, his knowledge of human nature, and his forensic gifts.

Meanwhile, his oratorical genius had been revealed in the trial known as the Parson's Cause (1763). This suit grew out of the Virginia law, disallowed by King George III, that permitted payment of the Anglican clergy in money instead of tobacco when the tobacco crop was poor. Henry astonished the audience in the courtroom with his eloquence in invoking the doctrine of natural rights, the political theory that man is born with certain inalienable rights. Two years later, at the capitol in Williamsburg, where he had just been seated as a member of the House of Burgesses (the lower house of the colonial legislature), he delivered a speech opposing the British Stamp Act. The act was a revenue law requiring certain colonial publications and documents to bear a legal stamp. Henry offered a series of resolutions asserting the right of the colonies to legislate independently of the English Parliament, and he supported these resolutions with great eloquence. "Caesar had his Brutus, Charles the First his Cromwell, and George III . . ." Here he was interrupted by cries of "Treason! treason!" But he concluded, according to a likely version, ". . . may profit by their example. If *this* be treason, make the most of it."

During the next decade Henry was an influential leader in the radical opposition to the British government. He was a member of the first Virginia Committee of Correspondence, which aided intercolonial cooperation, and a delegate to the Continental congresses of 1774 and 1775. At the second Virginia Convention, on March 23, 1775, in St. John's Church, Richmond, he delivered the speech that assured his fame as one of the great advocates of liberty. Convinced that war with Great Britain was inevitable, he presented strong resolutions for equipping the Virginia militia to fight against the British and defended them in a fiery speech with the famed peroration, "I know not what course others may take, but as for me, give me liberty or give me death."

The resolutions passed, and Henry was appointed commander of the Virginia forces, but his actions were curbed by the Committee of Safety; in reaction, he resigned on Feb. 28, 1776. Henry served on the committee in the Virginia Convention of 1776 that drafted the first constitution for the state. He was elected governor the same year and was reelected in 1777 and 1778 for one-year terms, thereby serving continuously as long as the new constitution permitted. As wartime governor, he gave Gen. George Washington able support, and during his second term he authorized the expedition to invade the Illinois country under the leadership of George Rogers Clark.

After the death of his first wife, Henry married Dorothea Dandridge and retired to life on his estate in Henry County. He was recalled to public service as a leading member of the state legislature from 1780 to 1784 and again from 1787 to 1790. From 1784 to 1786 he served as governor. He declined to attend the Philadelphia Constitutional Convention of 1787 and in 1788 was the leading opponent of ratification of the U.S. Constitution at the Virginia Convention. This action, which has aroused much controversy ever since, resulted from his fear that the original document did not secure either the rights of the states or those of individuals, as well as from his suspicion that the North would abandon to Spain the vital right of navigation on the Mississippi River.

Henry was reconciled, however, to the new federal government, especially after the passage of the Bill of Rights, for which he was in great measure responsible. Because of family responsibilities and ill health, he declined a series of offers of high posts in the new federal government. In 1799, however, he consented to run again for the state legislature, where he wished to oppose the Kentucky and Virginia resolutions, which claimed that the states could determine the constitutionality of federal laws. During his successful electoral campaign, he made his last speech, a moving plea for American unity. He died at his home, Red Hill, before he was to have taken the seat. (R.D.M.)

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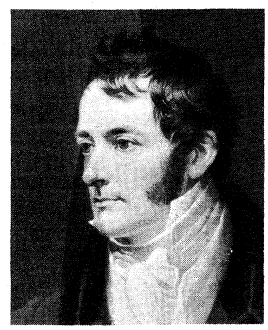
Henry, William (b. Dec. 12, 1775, Manchester—d. Sept. 2, 1836, Pendlebury, Lancashire, Eng.), English physician and chemist



William Henry, detail of an engraving by H. Cousins after a portrait by James Lonsdale

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

who in 1803 proposed what is now called Henry's law, which states that the amount of a gas absorbed by a liquid is in proportion to the pressure of the gas above the liquid, provided that no chemical action occurs.

Henry took his doctor of medicine degree at Edinburgh (1807). When ill health forced him to retire from medical practice, he turned to chemistry. He was awarded the Copley Medal in 1808 and the following year became a fellow of the Royal Society. His *Elements of Experimental Chemistry* went through 11 editions. He took his own life.

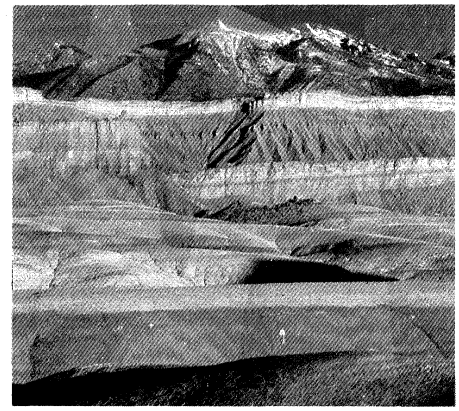
Henry IV style, French art and architecture during the reign of King Henry IV of France (1589–1610). Henry's chief contribution as patron of the arts was in the field of architecture. Although he made additions and improvements to many of his palaces, such as the Stable Court at Fontainebleau (1606–09), the thrust of his attention was directed toward the modernization and beautification of his capital. Henry was a practical man and the projects that he had constructed in Paris reflect this trait. Planned in 1603, the fashionable and much imitated residential Place Royale (now Place des Vosges) remains a monument to the King's competence and vision as an urban planner.

Earlier, in 1599, Henry had given orders that the construction of the Pont Neuf should be recommenced but simplified the original plans by discarding the triumphal arches and rows of little houses that had been projected. The Pont Neuf joins the right and left banks of the Seine and crosses the triangular tip of the Ile de la Cité. At this juncture he planned the Place Dauphine (begun 1607), consisting of many semidetached units having shops below and living quarters above. In the centre of the square was an expanse of open space. Thus, the Place Dauphine, one of the early masterpieces of modern town planning, is not a block of buildings but a public square that has been integrated into the total design of a city.

While the second school of Fontainebleau was active during his reign, "Henry IV style" does not refer to its style of painting but better describes the building projects that reflect the practicality and foresight of a man of grand concept who did not lose himself in detail.

Henry Draper Catalogue, listing of the positions, magnitudes, and spectral types of stars in all parts of the sky; with it began the present alphabetical system (*see* Harvard classification system) of classifying stars by spectral type. The catalog, named in honour of the U.S. astronomer Henry Draper and financed through an endowment by his widow, was compiled at the Harvard College Observatory under the direction of Edward Charles Pickering, mostly by Annie Jump Cannon and Antonia Caetana Maury. It was published first in a preliminary version in 1890, listing 10,000 stars, then in sections, from 1918 to 1924, listing 225,000. Extensions of the catalog have raised the number of stars included to about 400,000.

Henry Mountains, segment of the Colorado Plateau, extending for 40 mi (64 km) in a



Sleeping rainbow clay formations below the Henry Mountains, southern Utah

David Muench—EB Inc.

northwest–southeast direction across Garfield County, southern Utah, U.S., east of Escalante. Mt. Ellen, which ascends to 11,615 ft (3,540 m), is the highest point. Named for Joseph Henry (1797–1878), a great American scientist and the first secretary of the Smithsonian Institution, the mountains are well known by geologists as a classic example of laccolith (igneous [lava] uplift) mountains. The Glen Canyon National Recreation Area, located near the Colorado River, embraces part of the Henry range.

Henry's law, statement that the weight of a gas dissolved by a liquid is proportional to the pressure of the gas upon the liquid. The law, which was first formulated in 1803 by the English physician and chemist William Henry, holds only for dilute solutions and low gas pressures.

In a very dilute solution, a solute molecule will (with rare exceptions) have only solvent molecules as near neighbours, and the probability of escape of a particular solute molecule into the gas phase is expected to be independent of the total concentration of solute molecules. In this case the rate of escape of solute molecules will be proportional to their concentration in the solution, and solute will accumulate in the gas until the return rate is equal to the rate of escape. With a very dilute gas this return rate will be proportional to the partial pressure of solute. Thus, we expect that, for a solution very dilute in solute, in equilibrium with a gas at very low pressure, the gas pressure will be proportional to the amount of dissolved gas—the relation known as Henry's law. While the above argument is to be considered only suggestive, Henry's law is found experimentally to hold for all dilute solutions in which the molecular species is the same in the solution as in the gas. The most conspicuous apparent exception is the class of electrolytic solutions.

Henryson, Robert, Henryson also spelled HENDERSON (b. 1420/30?—d. *c.* 1506), Scottish poet, the finest of early fabulists in Britain. He is described on some early title pages as schoolmaster of Dunfermline—probably at the Benedictine abbey school—and he appears among the dead poets in William Dunbar's *Lament for the Makaris*, which was printed about 1508.

Henryson's longest work is *The Morall Fabillis of Esope the Phrygian, Compylit in Eloquent & Ornate Scottis*, a version of 13 fables based mainly on John Lydgate and William Caxton and running to more than 400 seven-line stanzas. The collection has a prologue, and each tale is adorned with a *moralitas*. Its virtue lies in the freshness of the narrative, in the sly humour and sympathy of Henryson's animal characterization, and in his miniatures of the Scottish countryside.

In *The Testament of Cresseid*, a narrative and "complaint" in 86 stanzas, Henryson completes the story of Chaucer's *Troilus and Criseyde*, giving a grim and tragic account of the faithless heroine's rejection by her lover Diomede and her decline into prostitution. The *Testament* is more than a splendid piece of rhetorical craftsmanship; blended with Henryson's unwavering concern for justice are an aesthetic attraction to the repulsive and grotesque and a refined sense of the variance of human love.

Among the shorter poems ascribed to Henryson are the lovely *Orpheus and Eurydice*, based on Boethius and akin to the *Testament* in mood and style; a *pastourelle, Robene and Makyne*, in which a traditional French genre assimilates the speech and humour of the Scottish peasantry; and a number of fine moral narratives and meditations.

Henschel, Sir (Isidor) George (b. Feb. 18, 1850, Breslau, Prussia—d. Sept. 10, 1934, Aviemore, Inverness, Scot.), singer, conductor, and composer, one of the leading English musicians of his day.

Henschel began his career as a pianist but later found considerable success as a baritone. He studied in Leipzig and Berlin and became a friend of Brahms. In 1877 he went to England, becoming a British citizen in 1890. He was first conductor of the Boston Symphony Orchestra (1881–84) and later conducted the Scottish Orchestra at Glasgow (1893–95). He was long active as a vocal recitalist and in England organized and conducted choral and orchestral concerts. His compositions include two operas, a Stabat Mater, a requiem mass, and songs. He wrote an autobiography, *Musings and Memories of a Musician* (1918). He was knighted in 1914.

Henschke, Alfred (Expressionist writer): *see* Klabund.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Henselt, Adolf von (b. May 9, 1814, Schwabach, Bavaria—d. Oct. 10, 1889, Warmbrunn, Silesia, Ger.), German pianist and composer, considered to be one of the greatest virtuosos of his time.

Henselt studied piano with Johann Hummel in Weimar and theory with Simon Sechter in Vienna. Following a concert tour in Germany (1836–37), he moved to St. Petersburg, where he became court pianist and an important teacher. He visited England in 1852 and 1867, but played only in private.

Henselt performed rarely in public. Mendelssohn declared that his specialty was "playing widespread chords, and that he went on all day stretching his fingers over arpeggios played prestissimo." As a pianist, Henselt is generally regarded as an important link between Hummel and Liszt. His compositions were mainly for piano, including a piano concerto, two sets of études, and a number of salon pieces. Although virtuosic in style, they do contain musical value.

Hensen, Victor (b. Feb. 10, 1835, Schleswig—d. April 5, 1924, Kiel, Ger.), physiologist who first used the name plankton to describe the organisms that live suspended in the sea (and in bodies of freshwater) and are important because practically all animal life in the sea is dependent on them, directly or indirectly.

Hensen was a professor at the University of Kiel from 1871 to 1911 and led a detailed survey of Atlantic plankton in 1899. He was also known for his work in embryology and in the anatomy and physiology of the sense organs, especially the ear; the cells of Hensen and the canal of Hensen, both in the internal ear, were named for him.

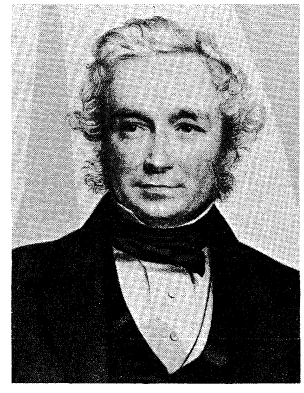
Henshaw, James Ene (b. 1924, Calabar, Nigeria), Nigerian playwright whose simple and popular plays treating various aspects of African culture and tradition have been widely read and acted in Nigeria. The general popularity of his plays has caused others to imitate his style.

A physician by profession, Henshaw was educated at Christ the King College, Onitsha, and received his medical degree from the National University of Ireland, Dublin, before taking up playwriting. One of his first plays, *The Jewels of the Shrine* (published in his collection *This Is Our Chance: Plays from West Africa*, 1957), won first prize in the All Nigeria Festival of the Arts in 1952. His second collection, *Children of the Goddess, and Other Plays* (1964), handled such themes as the inefficiency of a local village court because of the drunkenness of its members and the struggle between local authorities and missionaries over the propagation of Christianity in a 19th-century Nigerian village. *Medicine for Love: A Comedy in Three Acts* (1964) is a satire with serious overtones on such matters as a politician's attempt to bribe his way into power and his difficulties with the three prospective wives sent him by relatives. The comedy *Dinner for Promotion* (1967) centres on an ambitious young man, a newly rich businessman, and a quarrelsome sister-in-law. His *Enough Is Enough: A Play of the Nigerian Civil War* was produced in 1975.

Henslow, John Stevens (b. Feb. 6, 1796, Rochester, Kent, Eng.—d. May 16, 1861, Hitcham, Norfolk), British botanist, clergyman, and geologist who popularized botany at the University of Cambridge by introducing new methods of teaching the subject.

Henslow graduated from St. John's College at Cambridge in 1818 and then turned to natural history, making geological expeditions to the Isle of Wight and the Isle of Man with the English zoologist Adam Sedgwick, with whom he later established the Cambridge Philosophical Society (1821). In 1822 he was made professor of mineralogy at Cambridge, and in 1824 he was ordained. In 1827 he became professor of botany at Cambridge, where he introduced a teaching technique fostering independent discovery. His students were given plants and asked to examine and record the characteristics of the structures they found. This method, combined with unusual field trips, interesting lectures, and Henslow's natural enthusiasm, made botany one of the more popular subjects at the university and served as a source of inspiration to Charles Darwin, Henslow's favourite pupil and friend.

In order to persuade farmers to apply scientific methods to their operations, Henslow gave public lectures on the fermentation of manure and wrote newsletters for publication



Henslow, lithograph by T.H. Maguire, 1851

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

in local newspapers. During the potato famine (1845–46) in Ireland, he showed stricken farmers how to extract starch from rotten potatoes.

Henslow's publications include *A Catalogue of British Plants* (1829) and *The Principles of Descriptive and Physiological Botany* (1835).

Henslowe, Philip (b. *c.* 1550, Lindfield, Sussex, Eng.—d. Jan. 6, 1616, London), most important English theatre proprietor and manager of the Elizabethan age.

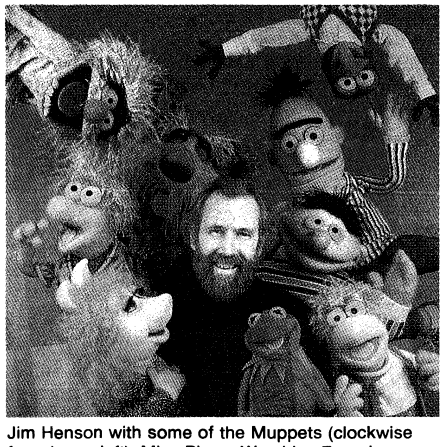
Henslowe had apparently settled in Southwark, London, before 1577. He married a wealthy widow and with her money became an owner of much Southwark property, including inns and lodging houses. He was variously interested in dyeing, starch making, and wood selling, as well as pawnbroking, moneylending, and theatrical enterprises. He was a churchwarden and held some minor court

offices, becoming a groom of the chamber. In 1587 Henslowe and a partner built the Rose Theatre on the Bankside near Southwark Bridge, and, under Henslowe's financial management, various companies acted there from 1592 to 1603. He had an interest in the suburban Newington Butts Theatre in 1594, and later in the Swan Theatre in the Paris Garden at the western end of the Bankside. The actor Edward Alleyn had married Henslowe's stepdaughter, and Henslowe and he presented bearbaiting and bullbaiting in an old arena near the Swan. In 1613 Henslowe built a new theatre, the Hope, designed for plays as well as bearbaiting, on this site. The most sumptuous of Henslowe's theatres was the Fortune, built just north of London for the Admiral's Men in 1600.

Henslowe's theatres gave the first productions of many important Elizabethan dramas; he was associated in one way or another with most of the famous playwrights for a quarter of a century, and his Admiral's Men were the chief rivals of William Shakespeare's company. Henslowe was a shrewd, crotchety man of business who kept a tight hand on his theatrical companies, his players, and his playwrights. Henslowe's famous *Diary,* one of the most important sources for the theatrical history of the time, is really a manuscript book of miscellaneous accounts and memoranda, playhouse receipts, payments to playwrights, loans or advances to players, payments for materials, costumes, and so on. It was edited (1904–08) by Sir Walter Gregg and was supplemented by *Henslowe Papers* (1907), also edited by Gregg.

Henson, Jim, byname of JAMES MAURY HENSON (b. Sept. 24, 1936, Greenville, Miss., U.S.—d. May 16, 1990, New York, N.Y.), American puppeteer, creator of the Muppets of television and motion pictures. He coined the term *Muppets* as a meld of "marionettes" and "puppets"; his characters and those of his assistants included such familiar figures as Kermit the Frog, Miss Piggy, Big Bird, and the Cookie Monster.

Though born in Mississippi, Henson grew up in Hyattsville, Md., a suburb of Washington, D.C., to which his father, a federal agronomist, had been assigned. As he entered college (the University of Maryland), Henson and his future wife, Jane Nebel, created a puppet show on a Washington television station and kept the job throughout their school years, developing the first Muppets (including Kermit) on a five-minute television program called "Sam and Friends." After graduation (A.B., 1960), Henson, along with his assistants, did television commercials and brief spots on various television shows. After the Children's Television Workshop's program "Sesame Street" began appearing on television in 1969, featuring the Muppets, Henson and his humanoid animals achieved extraordinary nationwide popularity.



Jim Henson with some of the Muppets (clockwise from lower left): Miss Piggy, Wembley Fraggle, Sprocket, Animal, Gonzo (upside down), Bert, Ernie, Gobo Fraggle, and Kermit

© 1978 Henson Associates

The "Muppet Show," which premiered in 1976 and was produced in England, gained an international audience (it was shown in some 100 countries) and was soon followed by the motion pictures *The Muppet Movie* (1979), *The Great Muppet Caper* (1981), and *The Muppets Take Manhattan* (1984). Henson also codirected *The Dark Crystal* (1981), directed *Labyrinth* (1986), and assisted on *The Witches* (1990), all animated films using puppetlike figures that were not Muppets. In 1981 a Muppets comic strip was syndicated, and *Muppet Magazine,* a quarterly publication for children, began appearing in 1982. An animated morning cartoon program on television, "Jim Henson's Muppet Babies," premiered in 1984, one year after "Fraggle Rock" began appearing on cable television channels. In 1990 the Walt Disney Company acquired Henson's company Henson Associates Inc., which owned a number of the Muppets. After the agreement was made but before it was concluded, Henson died suddenly of bacterial pneumonia at age 53.

Except in certain movie sequences using special effects, Henson's Muppets, made of sculptured foam rubber, plastic, and various fabrics, were either hand puppets or fully costumed persons (as in the case of Big Bird and Snuffleupagus). For the hand puppets, each head or arm was worked by one hand, so that if there was to be a head and two arms, there must be the hands of two Muppeteers. Complicated characterizations on rare occasions even required three Muppeteers. The voice of the Muppet was the voice of the person (or primary person) operating it.

Henson, Matthew Alexander (b. Aug. 8, 1866, Charles county, Md., U.S.—d. March 9, 1955, New York, N.Y.), American black explorer who accompanied Robert E. Peary on most of his expeditions, including that to the North Pole in 1909.

Orphaned as a youth, Henson went to sea at the age of 12 as a cabin boy on the sailing ship *Katie Hines.* Later, while working in a store in Washington, D.C., he met Peary, who hired him as a valet for his next expedition to Nicaragua (1888). Peary, impressed with Henson's ability and resourcefulness, employed him as an attendant on his seven subsequent expeditions to the Arctic (1891–92; 1893–95; 1896; 1897; 1898–1902; 1905–06; 1908–09). In 1909 Peary and Henson, accompanied by four Eskimos, became the first men to reach the North Pole, the rest of the crew having turned back earlier. Henson's account of the journey, *A Negro Explorer at the North Pole,* appeared in 1912. The following year, by order of President William Howard Taft, Henson was appointed a clerk in the U.S. Customs House in New York City, a post he held until his retirement in 1936. Henson received the Congressional medal awarded all members of the Peary expedition (1944).

Henzada, town, southwestern Myanmar (Burma). Henzada is situated along the Irrawaddy River opposite Tharrawaw, with which it is linked by ferry, at a point considered to be the head of the Irrawaddy's delta. It is a port for the rice and tobacco grown in the surrounding agricultural area and is connected by road and rail with Bassein and Yangon (Rangoon). It is also the site of an electric power station and an airfield. The area east of the town is a low-lying region protected by embankments along the Irrawaddy and is the site of a major irrigation scheme. Pop. (1970 est.) town, 85,000; (1983) township, 311,336.

Henze, Hans Werner (b. July 1, 1926, Gütersloh, Ger.), German composer whose operas, ballets, symphonies, and other works are marked by an individual and advanced style wrought within traditional forms.

Henze was a pupil of the noted German composer Wolfgang Fortner and of René Leibowitz, the leading French composer of 12-tone music. One of Henze's early works, the *Violin Concerto* (1947), demonstrated his mastery of 12-tone technique, which dominated his writing until 1956. His early works, up to his *Symphony No. 2* (1949), Henze considered simple, even primitive; they depended greatly upon the effectiveness of his melodies.

The opera *König Hirsch* (1956; *The Stag King*) marked the beginning of a second period, in which Henze shed serialism, revealing a freely inventive and eclectic style. This work showed Henze at maturity, though he was well-established already in 1952, when he won the Schumann Prize for his *Piano Concerto* and finished his second opera, *Boulevard Solitude.* In 1950–53 Henze was ballet adviser at the Wiesbaden State Theatre; there he received the impetus for much of his later ballet music, including *Ondine* (1956), a classical work incorporating jazz elements. Henze's operas have been widely performed; *Elegy for Young Lovers* and *Das Wundertheater* (*The Wonder Theatre*) were produced in New York City between 1965 and 1970. In his symphonies as well as his stage works, Henze revealed himself as eclectic in his choice of styles—several may be combined in a single work—and romantic in temperament. His *Sixth Symphony* (1969) for two chamber orchestras drew on both serialism (ordered series of notes, rhythms, etc.) and elements of traditional tonality utilizing microtonal intervals (smaller than a semitone), amplified instruments, and a large percussion section; it is representative of his works of the 1960s and early 1970s.

Henze

Christian Steiner

Henze took up residence in Italy in 1953. After embracing socialism in the mid-1960s, he expressed his new political affiliation in *Das Floss der "Medusa"* ("The Raft of the 'Medusa' "), a requiem for Che Guevara, and, in a return to operatic composition, *We Come to the River* (1976; in collaboration with Edward Bond). Henze's book *Essays* (1964) revealed him as a highly articulate spokesman for modern music, and *Music and Politics: Collected Writings 1953–81* (1982) examined his later belief that music should be politicized.

Hep (Egyptian god): *see* Apis.

heparin, anticoagulant drug that is used to prevent dangerous blood clots from forming during and after surgery and in various heart, lung, and circulatory disorders in which there is an increased risk of blood-clot formation. Heparin is a naturally occurring mixture of mucopolysaccharides and was discovered by W.H. Howell in 1922. It is present in the human body in tissues of the liver and lungs. Heparin was originally used to prevent the clotting of blood taken for laboratory tests. Its

use as a therapy for patients who already have a blood clot in a vein (venous thrombosis) began in the 1940s; low-dose heparin treatment to prevent blood clots from forming in patients who are at high risk for pulmonary embolisms and other clotting disorders was introduced in the early 1970s.

Heparin's biological activity depends on the presence of natural antithrombin, a substance in blood plasma that binds and deactivates serum clotting factors. Heparin accelerates the binding rate of antithrombin by a factor of 1,000, thus greatly reducing the blood's ability to clot. Heparin is poorly absorbed by the intestine and so must be given by injection. Most commercial heparin is obtained from cow lungs or pig intestines. Because of its anticlotting effect, the drug creates a significant risk of excessive bleeding; the latter is usually controlled by monitoring the dosage of heparin given and decreasing it if necessary.

hepatic vein, any of a group of veins that transports blood from the liver to the inferior vena cava, which carries the blood to the right atrium of the heart. In its ascent to the heart, the inferior vena cava passes along a groove in the posterior side of the liver, and it is there that the hepatic veins join it. The blood transported by the hepatic veins comes not only from the liver itself but also from most of the abdominal organs. This blood flows to the liver by way of the aportal vein.

hepatica, also called LIVERLEAF (genus *Hepatica*), any of about 10 species of small herbaceous plants of the buttercup family (Ranunculaceae) that grow in shady wooded areas of the North Temperate Zone.

The plants are stemless, low perennials with three-lobed leaves that remain green over winter. The flowers are purplish, lavender, blue,

Hepatica acutiloba
F.K. Anderson—EB Inc.

pink, or white and bloom early in the spring before new leaves appear on the plant.

The plants were once believed to have therapeutic value in the treatment of liver diseases. The common hepatica of eastern North America is *H. americana,* with silky hairy leaves and flowers. *H. nobilis,* a poisonous species common in much of Europe and North America, is sometimes used in herb medicines for the treatment of respiratory diseases.

hepatitis, inflammation of the liver. The disease occurs in several forms, some known to be caused by hepatitis viruses labeled A and B. A third and rarer kind of hepatitis is called non-A non-B hepatitis (or, alternatively, C hepatitis). Hepatitis A, also known as infectious hepatitis, is usually transmitted by the fecal-oral route through contaminated water and food. Hepatitis B, also known as serum hepatitis, is usually transmitted by injection but can also be transmitted sexually. Persons at high risk for hepatitis B include intravenous-drug abusers, homosexuals, hemophiliacs and other persons who receive blood transfusions, and medical and dental personnel. The A virus inhabits the digestive tract; the B virus is found in blood, serous body fluids, saliva, and semen.

Both strains of the virus resist heating, drying, and chlorination of water. The hepatitis A virus is shed in the feces and is usually transmitted in subsequent person-to-person contact and occasionally via contaminated food or water. Hepatitis B is a common hazard of blood transfusions or improperly sterilized needles and hypodermic syringes. Non-A non-B hepatitis is also spread mainly by blood transfusions. Hepatitis A has a relatively fast appearance; the symptoms show in 20 to 40 days after exposure; in hepatitis B, symptoms are not manifest until after an approximately 90-day incubation period. Once a person contracts the infectious hepatitis A, he subsequently becomes immune to this form; he may still be stricken with hepatitis B, however.

The acute symptomatic phase of hepatitis lasts from a few days to several weeks; the period of jaundice (yellow skin colouring) lasts for one to three weeks; and convalescence usually takes a few months. In the fatal forms of hepatitis, known as fulminant hepatitis, death can occur in less than 10 days or as long as six weeks after onset.

The typical hepatitis attack begins with fever, fatigue, and sometimes mild chills. Loss of appetite, headache, and muscle pains usually follow; and, in cigarette smokers, there is a distaste for tobacco. The upper abdomen may be painful, tender, and affected with muscle spasms. The liver itself becomes enlarged and tender, and the urine is discoloured with bile pigments. Shortly after jaundice appears, the fever usually leaves, but the symptoms of loss of appetite, nausea, vomiting, itching, and abdominal discomfort still persist and may even increase in intensity. During the convalescent phase there may be recurrent attacks of hepatitis symptoms. The affected person usually fatigues easily, experiences mild tenderness over the area of the liver, and is troubled by a general feeling of irritability, despondency, and lack of ambition.

Hepatitis A can be prevented by intravenous injections of gamma globulin that contains antibodies to the hepatitis A virus. The immunity thus conferred is not perfect, but the injection significantly reduces the severity of hepatitis A's course if the disease is contracted. A vaccine effective against hepatitis B was developed in the late 1970s. A new genetically engineered vaccine against hepatitis B was approved in 1986.

Hepatitis A and B produce the same changes in the liver tissues, with loss of functioning liver cells. During recovery there is nearly total regeneration of the lost tissue and a return of full liver function. Generally the fibrous scar tissue commonly seen in cirrhosis is not produced. In some parts of Africa and Asia, previous infection with hepatitis B is closely associated statistically with liver cancer.

Chronic hepatitis is not known to be viral in origin, although the type-A virus may be implicated. There are two varieties, persistent and active. The former may go undetected with no grave consequences; its symptoms are usually few and mild, and for practical purposes it is a benign condition requiring no medication or special treatment. There are two types of chronic active hepatitis, one of which (lupoid) usually attacks young women, while the type associated with the antigen HBsAg ordinarily appears in males. Symptoms of both include spidery lesions and striated markings on the skin, acne, and abnormal hair growth. Both varieties are extremely serious diseases that predispose an individual to cirrhosis and often lead to death from failure of liver cells.

Alcoholic hepatitis is an inflammation of the liver resulting from sustained excessive consumption of alcohol. The condition can be reversed by early treatment, including cessation or substantial reduction of alcohol consumption, but if untreated it eventuates in alcoholic cirrhosis.

hepatitis, canine viral: *see* canine viral hepatitis.

hepatolenticular degeneration (metabolic disorder): *see* Wilson's disease.

Hepatopsida (plant class): *see* liverwort.

Hepatu (Hurrian deity): *see* Hebat.

Hepburn, Francis Stewart: *see* Bothwell, Francis Stewart Hepburn, 5th Earl of.

Hepburn, James: *see* Bothwell, James Hepburn, 4th Earl of.

Hepburn, Katharine (b. Nov. 8, 1909, Hartford, Conn., U.S.), American stage and motion-picture actress, known as a spirited performer with a touch of Yankee eccentricity. She introduced into her roles a strength of character previously considered to be undesirable in Hollywood leading ladies. As an actress she was noted for her brisk upper-class New England accent and tomboyish beauty.

Hepburn attended Bryn Mawr College, Bryn Mawr, Pa. (1924–28), where she appeared in college productions. After making her professional stage debut in 1928 in Baltimore, she soon became a well-known Broadway performer. *A Bill of Divorcement* (1932), her first motion picture and the one that established her as a film star, was followed by memorable characterizations in such films as *Morning Glory* (1933), for which she won the Academy Award for best actress; *Little Women* (1933); *Alice Adams* (1935); and *Bringing Up Baby* (1938). Her Broadway stage success in Philip Barry's *The Philadelphia Story* (1939) was reprised in a film version in 1940 with Cary Grant and James Stewart.

Woman of the Year (1942) initiated Hepburn's famous screen partnership with Spencer Tracy, with whom she appeared in several other films, including *Keeper of the Flame* (1943), *Without Love* (1945), *The Sea of Grass*

Katharine Hepburn
Brown Brothers

(1946), *State of the Union* (1948), *Adam's Rib* (1949), *Pat and Mike* (1952), *Desk Set* (1957), and *Guess Who's Coming to Dinner* (1967), for which she won her second Academy Award. Her other memorable films are *The African Queen* (1951), *Long Day's Journey into Night* (1962), and *The Lion in Winter* (1968), for which she earned a third Academy Award. Among her later films are *A Delicate Balance* (1973) and *On Golden Pond* (1981), for which she won her fourth Academy Award.

Hepburn returned to Broadway in *As You Like It* (1950) and other Shakespearean roles in the 1950s. In 1969 she starred in a stage musical, *Coco,* based on the life of the Parisian couturière Gabrielle "Coco" Chanel. She ap-

peared also in the plays *A Matter of Gravity* (1976–78) and *West Side Waltz* (1981).

A two-hour documentary television program "Starring Katharine Hepburn" was shown in 1981. Biographical works include *The Films of Katharine Hepburn* (1971) by Homer Dickins, *Tracy and Hepburn: An Intimate Memoir* (1971) by Garson Kanin, *Kate: The Life of Katharine Hepburn* (1975, updated 1981) by Charles Higham, and *Hepburn: Hollywood Yankee* (1983) by Gary Carey.

Hephaestus, also spelled HEPHAISTOS, in Greek religion, the god of fire. Originally a deity of Asia Minor and the adjoining islands (in particular Lemnos), he had an important place of worship at the Lycian Olympus. Born lame, Hephaestus was cast from heaven in disgust by his mother, Hera, and again by his father, Zeus, after a family quarrel. His ill-matched consort was Aphrodite or Charis, the personification of Grace.

As god of fire, Hephaestus became the divine smith and patron of craftsmen; the natural volcanic or gaseous fires already connected with him were often considered to be his workshops. His cult reached Athens not later than about 600 BC (although it scarcely touched Greece proper) and arrived in Campania not long afterward. In art Hephaestus was generally represented as a middle-aged, bearded man, although occasionally a younger, beardless type is found. He usually wore a short, sleeveless tunic and a round, close-fitting cap on his unkempt hair. His Roman counterpart was Vulcan (*q.v.*).

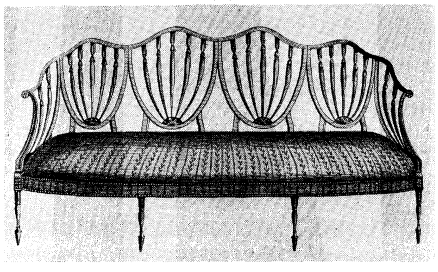
Hephaestus, Temple of: *see* Theseum.

Hephthalite, also spelled EPHTHALITE, member of a people important in the history of India and Persia during the 5th and 6th centuries AD. According to Chinese chronicles they were originally a tribe living to the north of the Great Wall and were known as Hoa or Hoa-tun. Elsewhere they were called White Huns or Hūṇas. They had no cities or system of writing, lived in felt tents, and practiced polyandry.

In the 5th and 6th centuries the Hephthalites repeatedly invaded Persia and India. In the middle of the 6th century under the attacks of the Turks they ceased to exist as a separate people and were probably absorbed in the surrounding population. Nothing is known of their language.

Hepplewhite, George (d. 1786, London), English cabinetmaker and furniture designer whose name is associated with a graceful style of Neoclassicism, a movement he helped to formulate in the decorative arts.

Little is known of Hepplewhite's life except that he was apprenticed to the English furniture maker Robert Gillow of Lancaster, went to London, and opened a shop there on Redcross Street. Other than his noting on a chair design that it had been "executed with good effect for the Prince of Wales," there is no other evidence to show that Hepplewhite's was a fashionable firm; furthermore, the royal accounts have no record of the chair. After his death his estate was administered by his widow, Alice, who carried on the business.



Design for a sofa by George Hepplewhite, engraving from his book, *The Cabinet-Maker and Upholsterer's Guide* (1788).

By courtesy of the Victoria and Albert Museum, London, Crown copyright reserved

Hepplewhite's style and reputation rest on his *Cabinet-Maker and Upholsterer's Guide* (1788), which contained nearly 300 designs for furniture and other furnishings. The plates in the *Guide* are unsigned, but 10 designs signed "Hepplewhite" or "Heppelwhite" are included in the *Cabinet-Maker's London Book of Prices* (1788). Pieces of furniture based on designs in the *Guide* are rare, and no piece can definitely be attributed to Hepplewhite's firm, nor can his personal responsibility for the designs be established. The *Guide* translated into simple yet elegant terms the more extravagant furniture of the Neoclassical style of the elegant but useful designs of Robert Adam.

Simplicity, elegance, and utility characterize the designs in the *Guide.* Many pieces were intended to be made in inlaid satinwood, others in mahogany or with japanned decoration. Chairs with straight tapered legs have shield-, heart-, and oval-shaped backs, incorporating urns, festoons, cornhusk chains, and other typical Neoclassical motifs. Upholstered settees of serpentine form, window seats with scrolled arms, and small square- and circular-topped inlaid tables and bookcases with delicate tracery in the glass doors also characterize the graceful Hepplewhite style. Three years after the *Guide* first appeared, Thomas Sheraton, an equally famous English Neoclassical designer, published *The Cabinet-Maker and Upholsterers' Drawing Book,* in which he writes slightingly of Hepplewhite in his preface, even though he probably borrowed from the *Guide.* Both Hepplewhite's and Sheraton's designs were interpreted by such eminent American cabinetmakers as Samuel McIntire and Duncan Phyfe.

heptachlor, insecticide closely related to chlordane (*q.v.*).

heptathlon, women's athletics competition in which contestants take part in seven different track-and-field events. The heptathlon replaced the women's pentathlon in the Olympic Games after 1981. The heptathlon consists of the 100-metre hurdles, shot put, high jump, 200-metre run, long (broad) jump, javelin throw, and 800-metre run. Competitors are scored for their performance in each event according to a table established by the International Amateur Athletic Federation.

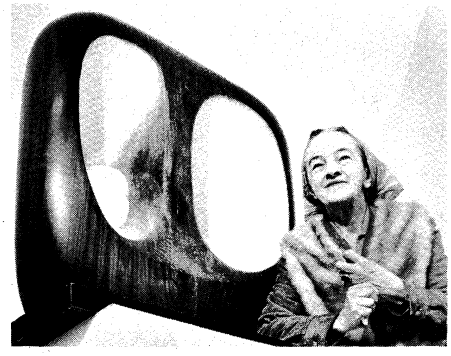
heptatonic scale, also called SEVEN-NOTE SCALE, or SEVEN-TONE SCALE, musical scale made up of seven different tones. The major and minor scales of Western art music are the most commonly known heptatonic scales, but different forms of seven-tone scales exist. Medieval church modes, each having its characteristic pattern of whole and half steps, used seven tones. Scales that resemble the medieval modes are found in some European folk music. In Java, many forms of the seven-tone *pelog* scale occur. Heptatonic scales can also be found in the music of black Africa and of some American Indians.

Hepworth, Dame (Jocelyn) Barbara (b. Jan. 10, 1903, Wakefield, Yorkshire, Eng.—d. May 20, 1975, St. Ives, Cornwall), sculptor whose works were among the earliest abstract sculptures produced in England. Her lyrical forms and feeling for material made her one of the most influential sculptors of the mid-20th century.

Fascinated from early childhood with natural forms and textures, Hepworth decided at the age of 15 to become a sculptor. She enrolled in the Leeds School of Art, where she befriended Henry Moore, then also a student. Their lifelong friendship and reciprocal influence was an important factor in the parallel development of their careers.

Her earliest works were naturalistic. Gradually, however, purely formal elements gained greater importance until, by the early 1930s, her sculpture was entirely abstract. Such abstractions as "Reclining Figure" (1932) are derived from rounded biomorphic forms and natural stones and seem to be the fruit of long weathering instead of hard work with a chisel. In 1933 she married (as her second husband; the first had been the sculptor John Skeaping) the English abstract painter Ben Nicholson, under whose influence she began also to make severe, geometrical pieces with straight edges and immaculate surfaces.

As Hepworth's sculpture matured during the late 1930s and '40s, she began to concentrate on the problem of the counterplay between mass and space in sculpture. Such pieces as "Wave" (1943–44; Mr. and Mrs. Ashley Havinden Collection, England) became increasingly open, hollowed out, and variously perforated, so that the interior space became as important as the mass surrounding it. The



Dame Barbara Hepworth, 1969

By courtesy of Gimpel Fils; photograph, J.S. Lewinski

practice, increasingly frequent in her mature pieces, of painting the works' concave interiors further heightened this effect, while the sculptural voids were accented and defined by strings stretched taut across their openings.

During the 1950s, Hepworth produced a notable experimental series called "Groups," clusters of small anthropomorphic forms in marble so thin that their translucence creates a magical sense of inner life. In the next decade she was commissioned to do a number of sculptures approximately 20 feet (6 m) high. Among the more successful of her works in this gigantic format is the geometrical "Four-Square (Walk Through)" (1966).

Hepworth was made a Dame Commander of the Order of the British Empire in 1965. She died in a fire in her home at St. Ives, Cornwall, which is now a museum housing many of her works.

Hera, in Greek religion, a daughter of the Titans Cronus and Rhea, sister-wife of Zeus, and queen of the Olympian gods. The Romans identified her with their own Juno (*q.v.*). Hera was worshiped throughout the Greek world and played an important part in Greek literature, appearing most frequently as the jealous and rancorous wife of Zeus and pursuing with vindictive hatred the heroines who were beloved by him. From early times Hera was believed to be the sole lawful wife of Zeus; she soon superseded Dione, who shared with him his ancient oracle at Dodona in Epirus.

Although one legend suggests that Zeus and Hera were originally earth or vegetation deities, this may not have been true. In general, Hera was worshiped in two main capacities: (1) as consort of Zeus and queen of heaven and (2) as goddess of marriage and of the life of women. The second sphere naturally made her the protectress of women in childbirth, and she bore the title of Eileithyia (*q.v.*), the birth goddess, at Argos and Athens. At Argos and Samos, however, Hera was even more than queen of heaven and marriage

goddess. She was patron of those cities, which gave her a position corresponding to that of Athena at Athens. Although her Argive ritual was markedly agricultural, she also had a celebration there called the Shield, and there was an armed procession in her honour at Samos.

Head of Hera, sculpture from the votive group in the Heraeum at Olympia; in the Archaeological Museum, Olympia, Greece

Foto Marburg

This conception resulted from the breadth of functions attributed to the patron deity of a Greek state: a city goddess must be chief in peace and war alike. The animal especially sacred to Hera was the cow. Her sacred bird was first the cuckoo, later the peacock. She was represented as a majestic and severe, though youthful, matron. *See also* Zeus.

Heracleides PONTICUS (b. *c.* 390 BC, Heraclea Pontica, Bithynia—d. after 322, Athens), Greek philosopher and astronomer who first suggested the rotation of the Earth, an idea that did not dominate astronomy until 1,800 years later. A pupil of Plato, who left the Academy temporarily in his charge, Heracleides is known to have correctly attributed the apparent motion of Mercury and Venus to their revolving around the Sun; whether he realized that the other planets did so is uncertain. He also taught some kind of atomism. His writings, all lost except for a few fragments, include literary criticism and works on musicology. He also studied trances, cosmological visions, prophecies, portents, and cataclysms, attempting to prove the existence of gods, divine retribution, and reincarnation. He thus exemplified the supranaturalistic tendencies of Platonism and anticipated some aspects of Neoplatonism.

Heracleitus, also spelled HERACLITUS (b. *c.* 540 BC, Ephesus, in Anatolia—d. *c.* 480), Greek philosopher remembered for his cosmology, in which fire forms the basic material principle of an orderly universe. Little is known about his life, and the one book he apparently wrote is lost. His views survive in the short fragments quoted and attributed to him by later authors.

Though he was primarily concerned with explanations of the world around him, Heracleitus also stressed the need for men to live together in social harmony. He complained that most men failed to comprehend the logos (Greek: "reason"), the universal principle through which all things are interrelated and all natural events occur, and thus lived like dreamers with a false view of the world. A significant manifestation of the logos, Heracleitus claimed, is the underlying connection between opposites. For example, health and disease define each other. Good and evil, hot and cold, and other opposites are similarly related. In addition, he noted that a single substance may be perceived in varied ways—seawater is both harmful (for men) and beneficial (for fishes). His understanding of the relation of opposites to each other enabled him to overcome the chaotic and divergent nature of the world, and he asserted that the world exists as a coherent system in which a change in one direction is ultimately balanced by a corresponding change in another. Between all things there is a hidden connection, so that those that are apparently "tending apart" are actually "being brought together."

Viewing fire as the essential material uniting all things, Heracleitus wrote that the world order is an "ever-living fire kindling in measures and being extinguished in measures." He extended the manifestations of fire to include not only fuel, flame, and smoke but also the ether in the upper atmosphere. Part of this air, or pure fire, "turns to" ocean, presumably as rain, and part of the ocean turns to earth. Simultaneously, equal masses of earth and sea everywhere are returning to the respective aspects of sea and fire. The resulting dynamic equilibrium maintains an orderly balance in the world. This persistence of unity despite change is illustrated by Heracleitus' famous analogy of life to a river: "Upon those who step into the same rivers different and ever different waters flow down." Plato later took this doctrine to mean that all things are in constant flux, regardless of how they appear to the senses.

Heracleitus was unpopular in his time and was frequently scorned by later biographers. His primary contribution lies in his apprehension of the formal unity of the world of experience.

Heracleon (fl. 2nd century AD), leader of the Italian school of Gnosticism, a dualistic doctrine of rival deities conceiving of salvation as an elitist enlightenment by secret knowledge, with fulfillment in the soul's eventual release from the body.

Diverging from his contemporaries Valentinus and Ptolemaeus, Heracleon sought a conservative expression of Gnosticism divested of radical oriental theories; accordingly, in the first known exegetical commentary on the Gospel According to St. John, he expounded with allegorical emphasis his central doctrine of the three levels of being: Christ as the incarnate form of a fallen spirit or demiurge representing the "psychic" level that is intermediate between the superior or "pneumatic" category (Greek: "spirit," comprising the "plenitude" of the Father) and the base level of the material world formed by the demigod of evil. Heracleon, moreover, commented on the Gnostic tradition of materializing their philosophical theory in their sacramental rites of initiation and in their interpretative use of early Christian literature.

Heracleonas (Byzantine emperor): *see* Heraclonas.

Heracles, Greek HERAKLES, Roman HERCULES, most famous Greco-Roman legendary hero. Behind his very complicated mythology there was probably a real man, perhaps a chieftain-vassal of the kingdom of Argos. Traditionally, however, Heracles was the son of Zeus and Alcmene (*see* Amphitryon), granddaughter of Perseus. Zeus swore that the next son born of the Perseid house should become ruler of Greece, but by a trick of Zeus's jealous wife, Hera, another child, the sickly Eurystheus, was born first and became king; when Heracles grew up, he had to serve him and also suffer the vengeful persecution of Hera. His first exploit, in fact, was the strangling of two serpents that she had sent to kill him in his cradle.

Later, Heracles waged a victorious war against

Heracles breaking the horns of the hind of Arcadia, flanked by Athena and Artemis, detail of a Greek vase painting, *c.* 540 BC; in the British Museum

By courtesy of the trustees of the British Museum; photograph, The Hamlyn Group Picture Library

the kingdom of Orchomenus in Boeotia and married Megara, one of the royal princesses. But he killed her and their children in a fit of madness sent by Hera and, consequently, was obliged to become the servant of Eurystheus. It was Eurystheus who imposed upon Heracles the famous Labours, later arranged in a cycle of 12, usually as follows: (1) the slaying of the Nemean lion, whose skin he thereafter wore; (2) the slaying of the nine-headed Hydra of Lerna; (3) the capture of the elusive hind (or stag) of Arcadia; (4) the capture of the wild boar of Mt. Erymanthus; (5) the cleansing, in a single day, of the cattle stables of King Augeas (*q.v.*) of Elis; (6) the shooting of the monstrous man-eating birds of the Stymphalian marshes; (7) the capture of the mad bull that terrorized the island of Crete; (8) the capture of the man-eating mares of King Diomedes of the Bistones; (9) the taking of the girdle of Hippolyte, queen of the Amazons; (10) the seizing of the cattle of the three-bodied giant Geryon, who ruled the island Erytheia (meaning Red) in the far west; (11) the bringing back of the golden apples kept at the world's end by the Hesperides; and (12) the fetching up from the lower world of the triple-headed dog Cerberus, guardian of its gates.

Having completed the Labours, Heracles undertook further enterprises, including warlike campaigns. He also successfully fought the river god Achelous for the hand of Deianeira. As he was taking her home, the Centaur Nessus tried to violate her, and Heracles shot him with one of his poisoned arrows. The Centaur, dying, told Deianeira to preserve the blood from his wound, for anyone wearing a garment rubbed with it would love her forever. Several years later Heracles fell in love with Iole, daughter of Eurytus, king of Oechalia. Deianeira, realizing that Iole was a dangerous rival, sent Heracles a garment smeared with the blood of Nessus. The blood proved to be a powerful poison instead, and Heracles died. His body was placed on a pyre on Mt. Oeta (modern Greek Oiti), his mortal part consumed and his divine part ascending to heaven. There he was reconciled to Hera and married Hebe.

In art and literature Heracles was represented as an enormously strong man of moderate height; a huge eater and drinker, very amorous, generally kindly but with occasional outbursts of brutal rage. His characteristic weapon was the bow but frequently also the club.

In Italy he was worshipped as a god of merchants and traders, although others also prayed to him for his characteristic gifts of good luck or rescue from danger.

Heraclius (b. *c.* 575, Cappadocia—d. Feb. 11, 641, Constantinople), Eastern Roman emperor (610–641) who reorganized and strengthened the imperial administration and the imperial armies but who, nevertheless, lost Syria, Palestine, Egypt, and Byzantine Mesopotamia to the Arab Muslims.

Heraclius was born in eastern Anatolia. His

Heraclius, gold coin; in the Dumbarton Oaks Research Library and Collection, Washington, D.C.
By courtesy of the Dumbarton Oaks Collection, Washington, D.C.

father, probably of Armenian descent, was governor of the Roman province of Africa when an appeal came from Constantinople to save the Eastern Roman Empire from the terror and incompetence of the emperor Phocas. The Governor equipped an expeditionary force and put his devout son, the blond and gray-eyed Heraclius, in command of it.

In October 610 Heraclius dropped anchor off Constantinople, deposed Phocas, and was crowned emperor of a crumbling state, occupied by invaders and wracked with internal dissension. Slavs swarmed over the Balkan Peninsula. The Persians occupied extensive parts of Anatolia. The Turkic Avars, who ruled over the Slavic and other tribes that occupied the region between the Don and the Alps, exacted tribute. With its economy disrupted, its administration disorganized, its army depleted and demoralized, its factions engaging in civil strife, its peasants enfeebled by excessive exactions, its religious dissenters alienated by persecution, and its authority challenged by a powerful aristocracy, the empire lacked the strength necessary to expel the invaders, and possibly even to survive.

In 614 the Persians conquered Syria and Palestine, taking Jerusalem and what was believed to be Christ's Cross, and in 619 occupied Egypt and Libya. In an effort to placate the Avars, Heraclius met them at Thracian Heraclea (617 or 619). They sought to capture him, and he rode madly back to Constantinople, hotly pursued. Overlooking their perfidy, he finally made peace with them and was free to take the offensive against the Persians.

In 622, clad as a penitent and bearing a sacred image of the Virgin, he left Constantinople, as prayers rose from its many sanctuaries for victory over the Persian Zoroastrians, the recovery of the Cross, and the reconquest of Jerusalem. He was, in effect, leading the first crusade. Indeed, in the ensuing hostilities, a pious poet contrasted the dancing girls in the Persian general's tent with the psalm singers in the Emperor's. In a brilliant campaign, he manoeuvred the Persians out of Anatolia and suggested a truce to the Persian monarch. This offer Khosrow II contemptuously rejected, referring to himself as beloved by the gods and master of the world, to Heraclius as his abject and imbecilic slave, and to Christ as incapable of saving the empire. Mindful of the propagandistic value of Khosrow's response, Heraclius made it public.

The next two years he devoted to campaigns in Armenia, the manpower of which was vital to the empire, and to a devastating invasion of Persia. In 625 Heraclius retired to Anatolia. He had encamped on the west bank of the Sarus River when the Persian forces appeared on the opposite bank. Many of his men rushed impetuously across the bridge and were ambushed and annihilated by the enemy.

Emerging from his tent, Heraclius saw the triumphant Persians crossing the bridge. The fate of the empire hung in the balance. Seizing his sword, he ran to the bridge and struck down the Persian leader. His soldiers closed rank behind him and beat back the foe.

In 626 the Persians advanced to the Bosporus, hoping to join the Avars in an assault on the land walls of Constantinople. But the Romans sank the primitive Avar fleet that was to transport Persian units across the Bosporus and repelled the unsupported Avar assault. Heraclius again invaded Persia and in December 627, after a march across the Armenian highlands into the Tigris plain, met the Persians near the ruins of Nineveh. There, astride his renowned war-horse, he killed three Persian generals in single combat, charged into enemy ranks at the head of his troops, killed the Persian commander, and scattered the Persian host.

A month later, Heraclius entered Dastagird with its stupendous treasure. Khosrow was overthrown by his son, with whom Heraclius made peace, demanding only the return of the Cross, the captives, and conquered Roman territory. Returning to Constantinople in triumph, he was hailed as a Moses, an Alexander, a Scipio. In 630 he personally restored the Cross to the Church of the Holy Sepulchre in Jerusalem.

Since the 4th century, when Roman emperors adopted Christianity, they had endeavoured to preserve uniform theological belief and, notably in Egypt, Syria, and Armenia, had persecuted those with differing Christological views. The animosities thus created had facilitated the Persian conquest, and Heraclius sought to conciliate the dissenters with the doctrine of Christ's single will (monothelitism). He failed.

It was already too late, however. United by Islām, the Arabs swept out of their arid homeland into Syria (634). Broken in body and spirit by disease, by long years of the cares of state, and by the wounds and emotions of 100 battles, Heraclius did not take personal command of the army, although the sight of him in battle armour would have inspired the troops and silenced the bickering generals. The Byzantines were defeated in a great battle on the Yarmuk (636). Soon, Syria and later Egypt fell to the Arabs. Heraclius returned northward, bearing the "holy wood," once the object of his greatest glory, now the companion of his deepest sorrow. Fearing water, he remained a year on the Asiatic bank of the Bosporus before summoning the courage to cross to Constantinople on a pontoon bridge with foliage hiding the water.

Heraclius' first wife, Eudocia, had died in 612. A year later, he had married his niece Martina, thus offending the religious scruples of many of his subjects, who viewed his second marriage as incestuous and Martina as accursed. It was apparently a happy marriage, Martina accompanying him on his campaigns and bearing him nine children. During his last years, Heraclius seems to have suffered from enlargement of the prostate gland, retention of urine, and a consequent inflammation. After violent spasms, he died in February 641, bequeathing the empire to his two elder sons, the consumptive Constantine III of his first marriage and Heracleonas, his son by Martina.

Although Heraclius possessed a deep Christian faith and attributed his successes to God, the once widely accepted view of him as an inspired visionary, who was capable of supreme but spasmodic efforts and wondrous achievements when acting under divine promptings, would appear to be false.

No doubt he was an inspiring military leader who fired his army with religious fervour and whose personal intrepidity, imaginative tactics, and constant concern for his men evoked their love and loyalty. But he was also a cautious and calculating strategist who did not hesitate to employ religion to serve his military ends. Thus, when in 623 his victorious soldiers wanted to penetrate deeper into Persia, contrary to his plan to retire, he referred the matter to God. After his troops had fasted and prayed three days, he opened the Bible in their presence, apparently at random, and read a passage that could be interpreted only as a divine command to withdraw. Moreover, even though he fostered the crusading spirit, he waged war in a less inhumane manner than most of his contemporaries. He did not enslave or massacre the inhabitants of conquered towns and he treated his prisoners of war well, releasing them rather than butchering them when he could not feed them. His mercy contrasted sharply with Khosrow's acerbity and probably hastened his victory in Persia.

As a statesman it is also difficult to think of him as merely a religious fanatic. Certainly he inspired an oppressed and hopeless people with a new spirit of faith, service, and self-sacrifice; but the man who restored a state that was sinking under the blows of internecine strife and foreign invasion and gave it the strength to withstand Islām's assaults for four centuries, perhaps even contributing to its survival until 1453, must have had a strong will, great organizing ability, exceptional conciliatory powers, and deep insight into the needs of both state and subjects. With a keen sense of reality, he adjusted the empire to the needs of the 7th century, departmentalizing the great state offices and replacing Latin with Greek as the official language.

Most scholars now agree that it was Heraclius who initiated the militarization of Anatolia, known as the theme (military district) system, which was further developed and extended by his successors. It placed the Anatolian provinces under military governors and provided land grants not only for frontier soldiers but also for soldiers and peasants in the interior, on condition of hereditary military service. The effects were revolutionary. A flexible defense developed in depth; a free, militarized peasantry arose; agriculture revived; and the state was relieved of much of the burden of soldiers' pay. Unruly mercenaries were largely replaced by native soldiers with a personal interest in protecting the empire. Indeed, during the four centuries that the theme system remained intact, the empire could be defeated but not conquered. Byzantium withstood Islām's fierce onslaughts and sheltered Europe's infant civilization. Yet there is no known record of the inception of the theme system, and it was rather because of his epic struggle against Persia and his recovery of wood believed to be from Christ's Cross that Heraclius became a hero of medieval legend.

(E.F.)

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Heraclius Constantine: *see* Constantine III *under* Constantine (Byzantine Empire).

Heraclonas, also spelled HERACLEONAS (b. 615—d. 641?), Byzantine emperor for a brief period in 641 who was accused, probably falsely, of complicity in the death of his half brother, Constantine III.

Heraclonas was the son of the Byzantine emperor Heraclius and his second wife, Martina. In 638, through his mother's influence, he obtained the title of augustus, and, after Heraclius' death, was proclaimed joint em-

peror with his half brother, Constantine III. The premature death of Constantine in May 641 left him sole ruler.

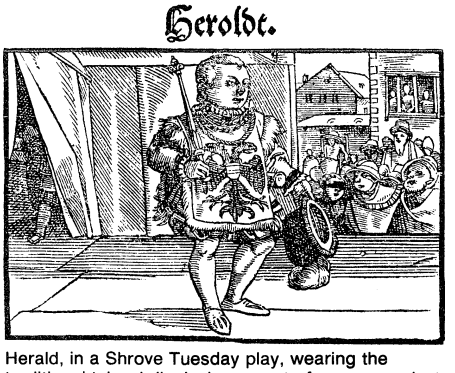
Although Constantine probably died of tuberculosis, rumours that he had been poisoned on the orders of Martina and Heraclonas led to a revolt and to the mutilation and banishment to Rhodes of the supposed offenders in September 641. Nothing is known of Heraclonas following that event.

Heraeum, in ancient Greece, a temple or sanctuary dedicated to Hera, queen of the Olympian gods. The most important of these was the Argive Heraeum, five miles (eight kilometres) northeast of Argos, Greece, where Hera's cult was established at an early date (*c.* 750 BC). A number of successive temples occupied that site, the last and best known of which was a limestone structure in the Doric order designed by the architect Eupolemos (423 BC). It housed a famous gold and ivory statue of the goddess by Polyclitus the Elder. Other major *heraea* were at Olympia and Samos in Greece, and at Lacinium, near Crotone (*q.v.*), in southern Italy. Only ruins of any of these sanctuaries survive.

Herakleion (Greece): *see* Iráklion.

Herakles (Greek mythology): *see* Heracles.

herald, originally, a medieval officer in charge of carrying messages to and from the commanders of opposing armies; in modern times, a professional authority on armorial history and genealogy. In the 12th century the herald's job consisted of formally announcing and conducting tournaments, including the proclamation of each joust and the name of each combatant. To carry out these duties it



Herald, in a Shrove Tuesday play, wearing the traditional tabard displaying a coat of arms; woodcut for "Spiel von der Kinderzucht" by J. Raser, Ensisheim, Austria (now France), 1574

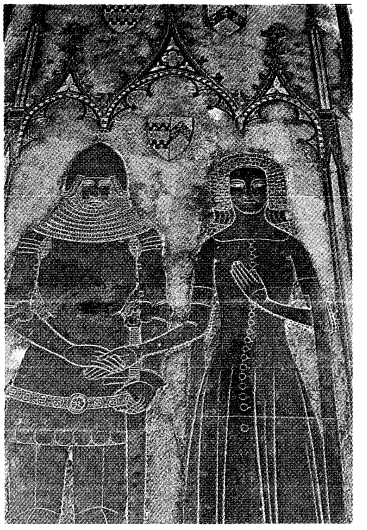
By courtesy of the Bibliothek der Universitat, Basel, Switz.

was essential that the herald be familiar with the family derivation and be able to recognize the arms of local nobles on sight. In the 14th century, heralds began to serve nobles on a more permanent basis and became associated with their names and houses. In the late 14th century the authority of the heralds was expanded. By the early 15th century the principal herald (king of arms) had become a commissioner for *nobilitas minor* ("minor nobility"); when the crown ceased to grant arms directly, its powers were delegated to the heralds as commissioners, with authority to issue letters patent. In the 16th and 17th centuries, heralds were called upon to carry out visitations at which men bearing arms were required to present proof of their right to do so.

There were heralds in Portugal, the Low Countries, Sweden, Ireland, and Scotland as well as in England, where heralds served not only the English nobles but also the great orders of knighthood; *e.g.,* the King of Arms of the Golden Fleece.

Heralds in both England and Scotland record arms and pedigrees, grant arms, take part in high ceremonial, and settle matters of precedence. There are, however, certain significant differences between Scottish and English heralds, as there are between Scottish and English heraldry. The Scottish heralds are still "familiar daylie servitors" of the crown. The Lord Lyon King of Arms is a great officer of state, the supreme officer of honour and counsel to the sovereign in all matters of armorial, genealogical, and ceremonial import. Within his power is everything that pertains to chiefship of name and arms and to changes of name by all bearers of arms. As controller of Her Majesty's Messengers at Arms, he is the head of the whole executive department of the law in Scotland. English kings of arms have less extensive powers, derived from the earl marshal, do not exercise judicial power, and cannot change names. Both English and Scottish heralds still wear the tabard, an official cape or coat with the royal arms of the United Kingdom emblazoned on it.

heraldic memorial, commemorative work of art decorated with the armorial bearings of the deceased. Nowhere is heraldry more effectively employed than in memorials, whether



Heraldic memorial of Sir John de la Pole and Joan Cobham, his wife *c.* 1380, detail of floor brass from a church at Chrishall, Essex, Eng.

Michael Holford

these take the form of stained-glass windows, effigies, monumental brasses, or memorials on church walls and in graveyards.

Two types of heraldic memorial are particularly noteworthy. The first is the stone slab customary on the continent of Europe. Achievements of arms (representations of shield, helmet, crest, mantling, and supporters) generally cover the slab, which also may bear a Gothic tracery design; the inscription either surrounds the edge of the slab or is placed above or beneath the arms. The second type of memorial is the hatchment (*q.v.*), in which England is particularly rich.

heraldry, all the activities of a herald, but primarily the art and science of armorial bearings, which is a herald's principal concern. The adoption of symbolic devices as a means of identification spread throughout the nobility of Europe in the 13th century and soon embraced corporations and institutions.

A brief treatment of heraldry follows. For full treatment, *see* MACROPAEDIA: Heraldry.

The principal vehicle for displaying the heraldic devices is the shield. The crest, a subsidiary device, emerged in the late 14th century; it was modelled onto the helm. In pictorial representations the shield, on which the arms are borne, is surmounted by helm and crest; the latter is usually placed within a wreath or coronet, or rests upon a chapeau (a crimson cap turned up with ermine). The type and position of the helm indicates the rank of the bearer. In the late 15th century great nobles, and later certain corporations, were accorded supporters, creatures on either side of their shields to support them. At the same time insignia were used with arms; the garter of the Order of the Garter surrounded the shield; peers placed their coronets above their shields; and later orders and decorations were shown below the shield. The whole display is called an achievement of arms.

In the design of arms a wide variety of symbols are used, depicted and arranged according to a series of conventions. Arms are hereditary; all male descendants of the first person to whom arms were granted or allowed bear the arms. Younger sons add small symbols, called marks of cadency, to their arms and crests. Arms are insignia of honour and so are protected by law. Today only the European monarchies, Ireland, Switzerland, South Africa, and Zimbabwe control the use of arms. In some countries there is non-noble or burgher heraldry, but this generally enjoys no protection.

Tinctures are hues used in heraldry, which are denoted colours, metals, and furs. The colours are gules (red), azure (blue), sable (black), vert (green), and purpure (purple). Rarely used are murrey (sanguine), tenné (an orange-tawny colour), and bleu celeste (sky blue). The metals are or (gold, often represented by yellow) and argent (silver, invariably depicted as white). The furs are ermine (black spots on white) and such variations as erminois (black spots on gold) and vair (small symbolic squirrel pellets), alternately white and blue.

The symbols used in heraldry are called charges. The principal charges are ordinaries—geometrical shapes such as the pale (a broad vertical strip), the fess (a horizontal strip), and the bend (a diagonal strip). Other charges are animate—beasts, monsters, humans, birds, fish, reptiles, and insects—or inanimate, which includes almost everything else.

The field, the background of the shield, is "charged" with the charges. It may be plain, patterned (checkered), semy (strewn with little charges), or divided by a line or lines following the direction of the ordinaries. A shield divided into halves vertically is per pale, horizontally, per fess, and diagonally, per bend (from upper right) or per bend sinister (from upper left). The dividing lines may be embattled (crenellated), wavy, or indented (zigzag). The top area of the field is the chief and the bottom the base. The shield is viewed as if being borne, so the viewer's left is the right, or dexter, and the viewer's right, the sinister. The top centre is the honour point, the middle centre the fess point, and the base centre the nombril point.

To describe an achievement is to blazon it. The terms of blazon are in general a mixture of English and old French. Blazon is based in conventions that make it terse and unequivocal. Charges always face dexter, for example, and three charges on a shield are placed two in chief and one in base unless otherwise blazoned. There are many such conventions. The basic rules of blazon are to describe, in this order, the field, the principal charge (often an ordinary), other charges, and charges on charges. Adjectives follow the nouns they qualify, the tincture coming last; a red rampant lion on a gold shield is blazoned "Or a lion rampant gules."

Badges, simple devices anciently used by nobles to mark their retainers and property, were displayed on their standards. They are now

granted to people and institutions who bear arms. Augmentations are additions to arms to commemorate and often reward doughty actions. Charles II, for example, rewarded many loyalists by the grants of augmentation of his royal insignia and badges.

Marshalling is correctly depicting an achievement of arms, particularly in connection with showing more than one coat on a shield. In marshalling, a married man impales the arms of his wife by placing the two coats side by side on one shield. If she is an heiress he places her arms on an inescutcheon, a small shield in the centre of his. An heiress may transmit her arms as a quartering to her descendants. Quartering is to divide the shield into four or more divisions by horizontal and vertical lines to accommodate the requisite number of inherited coats. A spinster bears her paternal arms in a lozenge (a diamond) with no crest. When married she uses the marital shield of arms only, and if widowed, she uses the marital arms on a lozenge. Certain officials, such as bishops and kings of arms, have arms appertaining to their office, which they impale to the dexter of their personal arms.

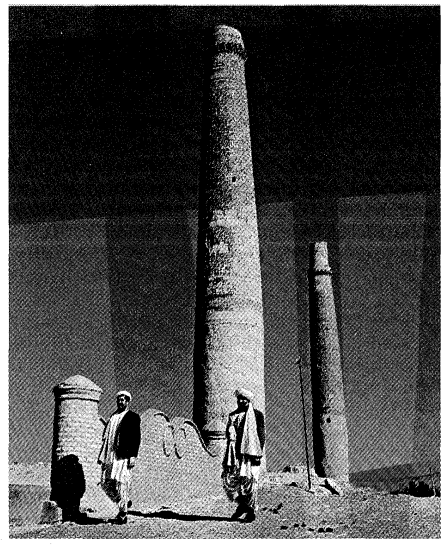
Herāt, also spelled HARĀT, *velāyat* (province) in western Afghanistan, 23,668 sq mi (61,301 sq km) in area, with its capital at Herāt city. It is bounded by Iran (west), by the Turkmen S.S.R. and the Afghan province of Bādghisāt (north), by Ghowr Province (east), and by Farāh Province (south). Herāt is relatively flat except in the east, where the western outliers of the Hindu Kush range penetrate; the largest of these is the Selseleh-ye Safīd Kūh (Paropamisus Range). The province is traversed from east to west by the Harīrūd (river), along which most of the people live in agricultural oases. The capital, located in the largest oasis, is a centre of Afghan trade with Iran and the U.S.S.R. and is connected by roads with the neighbouring provinces.

The region corresponding to modern Herāt province has been fought over by many foreign conquerors throughout history. The Macedonian Alexander the Great took it; later it was held by Parthians, Kushāns, Persians, and Hephthalites. In the 7th century Herāt fell to the Arabs, and it was conquered by the Mongols in the 13th century. Various other peoples contested its possession until its annexation by a unified Afghanistan in 1747. In 1980 a Soviet mechanized army division crossed the border from the Turkmen S.S.R. and passed through Herāt city en route to Qandahār city. Intermittent heavy fighting continued in Herāt province in the early 1980s.

The Harīrūd Valley is one of the nation's richest agricultural areas, producing grain, cotton, fruit, and other crops. The province is not entirely agricultural, however; petroleum is produced at Tīr Pol, in the west, and there is some light industry at Herāt city. The people of Herāt are mainly Tadzhiks and Durrānī Pashtuns in the oases, with semi-nomadic Dari-speaking peoples in the deserts and mountains. Pop. (1979 prelim.) settled pop. 769,111.

Herāt, also spelled HARĀT, capital of Herāt *velāyat* (province) in western Afghanistan, lying on the Harīrūd (river), directly south of the Selseleh-ye Safīd Kūh (Paropamisus Range), at an altitude of 3,026 ft (922 m). Herāt is the focus of one of the country's most densely populated and fertile agricultural areas, irrigated from the Harīrūd. It is a highway crossroads and is the economic centre of western Afghanistan.

Several ancient cities have stood near the site of Herāt, including one built by the Macedonian conqueror Alexander the Great. Arabs captured Herāt in 660 AD, and it became a centre of the Muslim world. An invasion by Mongols in the 13th century inflicted great suffering on the city, and Timur (Tamerlane), the Turkic conqueror, took it in about 1393.



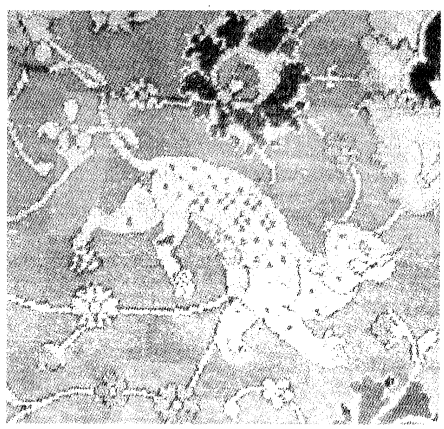
Ancient minarets in Herāt city, Afg.
K. Horold—Bavaria-Verlag

Herāt's greatest era was during the Timurid rule, when it was a centre of science and culture. Later the city was contested by the Persians and Afghans and changed hands several times before it permanently became part of Afghanistan in 1863. Following the Soviet military intervention in 1979, Soviet forces gained control of the city from Afghan guerrillas in early 1980 and established a military command there.

Herāt is dominated by an ancient citadel and has a 15th-century mosque; it is dotted with numerous ruins, including exquisitely decorated minarets. A shrine held in high veneration is the tomb of the poet and saint ʿAbdollāh Anṣārī, situated on rising ground north of the city; it was built by Shāh Rokh Mīrzā, grandson of Timur.

Herāt has wide main streets, extensive bazaars, and some light industry, including handicrafts, textile weaving, cotton ginning, and rice, flour, and oilseed milling. There is an active trade in Karakul furs. An airport and a military base are nearby. Pop. (1982 est.) 150,497, mainly Tadzhik, Turkmen, and Uzbek.

Herāt carpet, handwoven floor covering made at Herāt, the capital of Persia in the 15th century, an important city in the 17th century, and now a provincial capital in western Afghanistan. Classic Herāt carpets, made in the 16th and early 17th centuries, are known for their combination of a wine-red field and a border of clear emerald green with touches of bright golden yellow. The most magnificent



Prancing leopard, detail of a Herāt carpet, early 16th century; in the National Gallery of Art, Washington, D.C.
By courtesy of the National Gallery, Washington, D.C., Widener Collection; photograph, Otto E. Nelson—EB Inc.

are a pair called the Emperor's Carpets (Vienna and New York City), former possessions of the Habsburgs, that combine coiling vines bearing intricate and lovely palmette forms with animal chases and combats and with cloud bands as tense as coiled springs. Several other carpets show lobed medallions with small, shield-shaped pendants. Most examples from this period survive only as beautiful fragments, such as one in a museum at Hamburg, which has a border filled with a graceful host of birds and bright summer blooms. These classic carpets are Senna (Sehna) knotted and are apt to have warp and weft of silk or shoots of wool and cotton. Among antique Persian wool rugs, they seem to have excelled in design, colour, and fineness of knotting. The surviving fragments are, in fact, a touchstone by which to judge all other carpets.

A few later 17th-century examples have a cotton foundation and less appealing hues in the pile. The tradition ultimately passed over into the floral carpets of certain Indian centres; called Indo-Isfahans, these carpets survive in great abundance and until about 1950 were attributed to Herāt.

Herāt school, 15th-century style of miniature painting that flourished in Herāt, western Afghanistan, under the patronage of the Timurids. Shāh Rokh, the son of the Islāmic conqueror Timur (Tamerlane), founded the school, but it was his son Baysunqur Mīrzā (died 1433) who developed it into an important centre of painting, bringing to his court

"Courtier and Hermit" from *Khamseh* of Amīr Khosrow, Herāt school miniature, attributed to Behzād 1485; in the Chester Beatty Library, Dublin (MS. 163, fol. 23)
By courtesy of the Chester Beatty Library, Dublin; photograph, Rex Roberts

artists from all over Persia and Afghanistan. The school grew in importance until 1507, when Herāt was sacked by the Uzbeks.

Although paintings were occasionally done on silk, illustrations for manuscripts, usually poems, were more common. The literature popular at the time, therefore, largely governed the subject matter of Herāt school paintings. Many scenes from the Persian epic *Shāh-nāmeh* ("Book of Kings") by the poet Ferdowsī (died 1020) survive, as well as illustrations from the later works of Neẓāmī, Saʿdī, and Jāmī.

The Herāt style drew on numerous traditions, including the Tabriz and Shīrāz schools (*qq.v.*) of painting. The most important influence, however, was the concept of perspective (*q.v.*), introduced by the Mongols and developed by the Jalāyirid school from mid-14th century to around 1400. In the miniatures of the Herāt school, numerous figures, in groups or singly, are shown on various planes, one above the other, using the entire picture area. The juxtaposition of figures and elements of scenery one above the other produced the effect of one appearing to be behind the other.

The figures of the earlier Herāt school are stylized—tall and thin with oblong heads and pointed beards—but are painted in a variety of positions. Above all they are animated, always taking part in the action of whatever scene is represented. Artists of the Herāt school display a highly developed sense of composition combined with a fondness for descriptive detail. The colours, gay but not strident, are worked in subtle gradations. An illustration from Khwāju Kermānī's *Maśnavī* (1430–40; British Museum) shows a remarkable variety of blues and greens and demonstrates the delicately refined brushwork for which the Herāt school is famous.

The later school of Herāt was dominated by the figure of Behzād (*q.v.*), patronized by the ruler Ḥusayn Bayqarah (reigned 1469–1506). In a harmonious, imaginative, and dramatic style, Behzād painted individuals rather than characterizations. A 1489 copy of the poet Sa'dī's *Būstān* (National Library, Cairo) contains illustrations that are outstanding among Behzād's works.

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Hérault, *département,* Languedoc-Roussillon region, southern France, created from the central part of the historic province of Languedoc (*q.v.*). Its 2,360 sq mi (6,113 sq km) are bounded on the south by the Mediterranean and extend north and northwest to the southeast border of the Massif Central. The mountainous north grades down to hills and plateaus and finally to the low-lying coastal plain. Near the Mediterranean the climate changes from humid to dry, with warm winters and hot summers. The Hérault River, which gives the *département* its name, flows across it from north to south, reaching the Mediterranean Sea in a lowland of small coastal lagoons. The Canal du Midi (*q.v.*), still open though inadequate for modern commercial navigation, passes through many of these lagoons before rejoining the Rhône. Other watercourses are the Vis and Orb rivers. Close to the sandy coast, many lagoons are linked with the Mediterranean.

The agriculture is a monoculture based on wine. The recent construction of irrigation canals has not succeeded in diversifying agriculture except locally (vegetables and fruits). Sheep are raised in the north, and ewes' milk is sent to the cheese factories at Roquefort in neighbouring Aveyron *département.* Béziers is the centre for the wine trade, also important at the university city of Montpellier (*q.v.*), Hérault's capital. The main harbour is Sète, one of several seaside resorts. Traditional industry is in viticultural implements, but there are also important refineries and chemical plants. The Mediterranean littoral is being developed for tourism by the creation of beach resort towns. The *département* has three *arrondissements*—Montpellier, Béziers, and Lodève—and is in the educational division of Montpellier. Pop. (1982) 706,499.

Hérault de Séchelles, Marie-Jean (b. Sept. 20, 1759, Paris—d. April 5, 1794, Paris), nobleman and magistrate who became a member of the Committee of Public Safety that ruled Revolutionary France during the period of the Jacobin dictatorship (1793–94).

Hérault de Séchelles came from an ancient and distinguished noble family. Wealthy, handsome, and witty, he was appointed attorney to King Louis XVI in 1777, and in 1785 he was made attorney general to the Parlement of Paris, one of the high courts of justice. Nevertheless, upon the outbreak of the Revolution in 1789, Hérault joined the crowd that stormed the Bastille (July 14). In 1791 he was elected a deputy to the Revolution's Legislative Assembly. Hérault joined the Club of the Jacobins and sat with the Montagnards (as the Jacobin deputies were called) in the National Convention, which succeeded the Legislative Assembly in September 1792. On May 30, 1793, he was elected to the first Committee of Public Safety. During the Jacobin coup d'etat of June 2, Hérault, as president of the Convention, ordered the arrest of the leaders of the moderate Girondin faction. The Jacobins, in alliance with the Parisian lower classes, then took control of the Revolution. Hérault drafted most of the new, radically democratic Jacobin constitution that was submitted to the Convention on June 10. A month later he was reelected to the reorganized Committee of Public Safety.

Despite his prominence among the Jacobins, the genial, epicurean Hérault was out of place among the determined men who dominated the committee. He aroused distrust by parading his cynicism and by taking the wife of an émigré (noble in exile) as his mistress. In October 1793 his colleagues were told that he was plotting with Hébertists (left-wing Jacobins) and foreign agents against the government. The charges were almost certainly unfounded, but, after he returned from a mission to Alsace in December, Hérault was suspended from his duties. He was imprisoned in March 1794 and guillotined several weeks later.

Hérault de Séchelles, engraving by J.-B. Compagnie, after a portrait by F. Bonneville, 18th century
By courtesy of the Bibliotheque Nationale, Paris

herb: *see* spice and herb.

herbal, ancient manual facilitating the identification of plants for medicinal purposes. Hundreds of medicinal plants were known in India before the Christian era, and the Chinese have a compilation, still authoritative, of 1,892 ancient herbal remedies. The Greeks had written accounts, and, according to the elder Pliny, the physician Crateuas (early 1st century BC) produced a herbal with coloured illustrations. This has not survived but was probably largely embodied in the *De materia medica* of the Greek physician Pedacius Dioscorides. A Byzantine version of his famous herbal is the Constantinopolitan, or Viennese, Codex (*c.* AD 512). Some of its illustrations are probably derived from Crateuas, together with plant names, such as *Anemone* and *Anagallis,* which are still in use. Many manuscript herbals, drawing largely from Dioscorides and Pliny, were published in medieval Europe; during the 15th century several were printed, a notable one being Konrad von Megenberg's *Das puch der natur* (or *Buch der natur,* "Book of Nature"). When printed in 1475, it included the first known woodcuts for botanical illustrations. Very few original drawings were prepared for herbals before the 16th century: illustrations were copies and copies of copies. They became highly stylized, not only ceasing to resemble the plants depicted but also incorporating mythological notions. "Narcissus," for example, in Jacob Meidenbach's *Hortus sanitatis* (1491), is unidentifiable: a human figure, instead of the plant's sex organs, emerges from each perianth (sepals and petals of a flower).

Watercolour illustration from the *Badianus Manuscript,* an Aztec herbal in Latin by Juan Badianus and Martinus de la Cruz, 1552; in the Vatican Library
By courtesy of the Vatican Library, Vatican City

Otto Brunfels' *Herbarium vivae eicones* (1530s) contains excellent and accurate drawings by the wood engraver Hans Weiditz. This emphasis on accuracy also appeared in the subsequent herbals of Hieronymus Bock and Leonhard Fuchs. Plants brought back by explorers then began to be illustrated. Nicolás Monardes' *Dos libros* (1569), for example, contains the first published illustration of tobacco. A latinized version of an Aztec herbal (1552) contains formalized illustrations resembling European ones, suggesting that the artists were following the traditions of their Spanish masters rather than an indigenous style of drawing. Among other well-known herbalists of those times were John Gerard, Conrad Gesner, and Gaspard Bauhin.

Alongside the genuine herbals other works of a superstitious nature probably existed. Many were concerned with the fanciful medical theory of the doctrine of signatures, the use of plants to cure human ailments on the basis of supposed anatomical resemblances. In England these culminated in Nicholas Culpeper's *A Physicall Directory* (1649), which was a pseudoscientific pharmacopoeia. The herbals were replaced in the 17th-century by floras, books in which plants were studied for their own sake.

Herbart, Johann Friedrich (b. May 4, 1776, Oldenburg—d. Aug. 14, 1841, Göttingen, Hanover), German philosopher and educator, who led the renewed 19th-century interest in Realism and is considered among the founders of modern scientific pedagogy.

After studying under Fichte at Jena (1794),

Herbart worked as a tutor at Interlaken, Switz., from 1797 to 1800, during which period he made the acquaintance of Pestalozzi. Becoming a licentiate of the University of Göttingen in 1802, he was appointed extraordinary professor there in 1805. At the close of 1808 he became Kant's successor as professor at Königsberg. There he also conducted a seminary of pedagogy until 1833, when he returned as professor of philosophy to Göttingen, where he remained until his death.

Herbart's position in the history of philosophy is due mainly to his contributions to the philosophy of mind. His aims in this respect are expressed by the title of his textbook—*Psychologie als Wissenschaft neu gegrundet auf Erfahrung, Metaphysik, und Mathematik,* 2 vol. (1824–25; "Psychology As Knowledge Newly Founded on Experience, Metaphysics, and Mathematics"); of central importance is the inclusion of *Mathematik.* He rejected the whole concept of faculties (in Kantian terms) and regarded mental life as the manifestation of elementary sensory units or "presentations" (*Vorstellungen*). These he conceived as mental forces rather than as mere "ideas" in Locke's sense. The study of their interactions gave rise to a statics and dynamics of the mind, to be expressed in mathematical formulas like those of Newtonian mechanics. Ideas need not be conscious; and they might either combine to produce composite resultants or conflict with one another so that some get temporarily inhibited or repressed "below the threshold of consciousness." An organized but unconscious system of associated ideas formed an "apperception mass"; such a system could apperceive a new presentation and thus give it richer meaning. On this basis Herbart developed a theory of education as a branch of applied psychology.

His theory of education—known as Herbartianism—was set out principally in two works, *Pestalozzis Idee eines A B C der Anschauung* (1802; "Pestalozzi's Idea of an A B C of Sense Perception") and *Allgemeine Pädagogik* (1806; "Universal Pedagogy"), which advocated five formal steps in teaching: (1) preparation, a process of relating new material to be learned to relevant past ideas or memories in order to give the pupil a vital interest in the topic under consideration; (2) presentation, presenting new material by means of concrete objects or actual experience; (3) association, thorough assimilation of the new idea through comparison with former ideas and consideration of their similarities and differences in order to implant the new idea in the mind; (4) generalization, a procedure especially important to the instruction of adolescents and designed to develop the mind beyond the level of perception and the concrete; and (5) application, using acquired knowledge not in a purely utilitarian way, but so that every learned idea becomes a part of the functional mind and an aid to a clear, vital interpretation of life. This step is presumed possible only if the student immediately applies the new idea, making it his own.

Herbart maintained that a science of education was possible, and he furthered the idea that education should be a subject for university study. His ideas took firm hold in Germany in the 1860s and spread also to the United States. By the turn of the century, however, the five steps had degenerated to a mechanical formalism, and the ideas behind them were replaced by new pedagogical theories, in particular those of John Dewey.

Herbert, Sir A(lan) P(atrick) (b. Sept. 24, 1890, Elstead, Surrey, Eng.—d. Nov. 11, 1971, London), English novelist, playwright, poet, and politician, author of more than 50 books, famous for his witty championing of minority causes. More importantly, as an independent member of Parliament for Oxford University (1935–50), he introduced the matrimonial causes bill (enacted in 1937), which radically amended English divorce laws.

Herbert wrote the first of his many contributions to the humorous magazine *Punch* while still at school (Winchester College). He graduated in law at Oxford and during World War I served in the Royal Navy. His first literary success was *The Secret Battle* (1919), a story of front-line warfare. Another novel, *The Water Gipsies* (1930), affectionately described Thames riverside life. In contrast, *Holy Deadlock* (1934) was frankly propagandist, aimed at the anomalies of the divorce laws. A witty lyricist, he wrote many highly successful comic operas and musicals, to which he graduated from children's plays. Among these were *Riverside Nights* (1926), *La Vie Parisienne* (1929), *Tantivy Towers* (1931), *Helen* (1932), *Derby Day* (1932), *Big Ben* (1946), and *Bless the Bride* (1947). Herbert was knighted in 1945 and made a Companion of Honour in 1970, the year his last book was published, *A.P.H.: His Life and Times.*

Herbert (of Cherbury), Edward Herbert, 1st Baron, BARON HERBERT OF CASTLE ISLAND (b. March 3, 1583, Eyton-on-Severn, Shropshire, Eng.—d. Aug. 5, 1648, London), English courtier, soldier, diplomat, historian, metaphysical poet, and philosopher ("the father of English Deism"), also remembered for his revealing *Autobiography.*

Herbert of Cherbury, oil painting attributed to William Larkin, *c.* 1619; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Brother of the devotional poet George Herbert, he was educated at Oxford. From 1608 to 1617 he campaigned in Holland and travelled in France and Italy. He was ambassador at Paris for five years and received Irish and English peerages (1624, 1629) for his political services.

De Veritate ("On Truth") was published in Paris in 1624. Thereafter he devoted himself to philosophy, history, and literature. When the Civil War broke out he lacked enthusiasm for either cause; however, he opened Montgomery Castle to the Parliamentary forces in 1644 and met with severe criticism.

De Veritate was designed to establish instructed reason as the safest guide in a search for truth. Herbert examines freshly the nature of truth and concludes that there are five religious ideas that are God-given, innate in the mind of man. They are the belief in a Supreme Being, in the need to worship him, in the pursuit of a pious and virtuous life as the best form of worship, in repentance, and in rewards and punishments in the next world. Supplementary intuitions may be valid, but Herbert virtually rejected revelation.

De Veritate was further elaborated in his *De Causis Errorum* ("On the Causes of Errors") and *De Religione Laici* ("On the Religion of the Laity"), published together in 1645; *De Religione Gentilium* (1663; "On the Religion of the Gentiles"); and *A Dialogue Between a Tutor and His Pupil* (*c.* 1645; published 1768; authorship disputed).

His works reflect the active and versatile mind of a competent writer. The *Autobiography,* ending at 1624, (published 1764), brings his human qualities into focus: his social gifts, adventurous spirit, studious bent, and worldly wisdom. Proud of his military experience and diplomatic skill, he nourished a crotchety regard for his personal honour, resulting in affrays which he recalls with evident satisfaction.

Herbert also wrote historical works, including *The Expedition to the Isle of Rhé* (Latin 1656; Eng. trans., 1860) and *The Life and Raigne of King Henry the Eighth* (1649). *Occasional Verses* (1665) shows him to have been a talented and original poet as well.

Herbert (of Ragland) Edward Somerset, Lord: *see* Worcester, Edward Somerset, 2nd marquess of.

Herbert, George (b. April 3, 1593, Montgomery Castle, Wales—d. March 1, 1633, Bemerton, Wiltshire, Eng.), English religious poet, a major metaphysical poet, notable for the purity and effectiveness of his choice of words.

A younger brother of Edward Herbert, 1st Baron Herbert of Cherbury, a notable secular metaphysical poet, George in 1610 sent his mother for New Year's two sonnets on the theme that the love of God is a fitter subject for verse than the love of woman, a foreshadowing of his poetic and vocational bent.

Educated at home, at Westminster School, and at Trinity College, Cambridge, he was in 1620 elected orator of the university, a position that he described as "the finest place in the university." His two immediate predecessors in the office had risen to high positions in the state, and Herbert was much involved with the court. During Herbert's academic career, his only published verse was that written for special occasions in Greek and Latin. By 1625 Herbert's sponsors at court were dead or out of favour, and he turned to the church, being ordained deacon. He resigned as orator in 1627 and in 1630 was ordained priest and became rector at Bemerton. He became friends with Nicholas Ferrar, who had founded a religious community at nearby Little Gidding, and devoted himself to his rural parish and the reconstruction of his church. He also wrote poems, perhaps more than half of the manuscript volume he sent to Ferrar from his deathbed, asking him to decide whether to publish or destroy them. Ferrar published them with the title *The Temple: Sacred Poems and Private Ejaculations* in 1633.

Herbert described his poems as "a picture of the many spiritual conflicts that have passed between God and my soul, before I could subject mine to the will of Jesus, my Master, in whose service I have now found perfect freedom." Herbert shares his conflicts with John Donne, the archetypal metaphysical poet and a family friend. As well as personal poems, *The Temple* includes doctrinal poems, notably "The Church Porch," the first in the volume, and the last, "The Church Militant." Other poems are concerned with church ritual.

The main resemblance of Herbert's poems to Donne's is in the use of common language in the rhythms of speech. Some of his poems, such as "The Altar" and "Easter Wings," are "pattern" poems, the lines forming the shape of the subject, a practice Joseph Addison in the 18th century called "false wit." Samuel Taylor Coleridge in the 19th century wrote of Herbert's diction, "Nothing can be more pure, manly, and unaffected." Herbert was a versatile master of metrical form and all aspects of the craft of verse. Though he shared the critical disapproval given the metaphysical poets

until the 20th century, he was still popular with readers. Herbert also wrote at Bemerton *A Priest to the Temple: Or The Country Parson, his Character and Rule of Life* (1652). *Works* (1941; corrected, 1945), edited by F. Hutchinson, is the standard text, and Izaak Walton's biography (1670) is the chief source of information on Herbert's life.

Herbert, George Edward Stanhope Molyneux: *see* Carnarvon, George Edward Stanhope Molyneux Herbert, 5th earl of.

Herbert, Henry Howard Molyneux: *see* Carnarvon, Henry Howard Molyneux Herbert, 4th earl of.

Herbert, Victor (b. Feb. 1, 1859, Dublin—d. May 26, 1924, New York City), Irish-born U.S. composer of operettas and light music.

Herbert became active in Germany as a composer and violoncello virtuoso (studying with Max Seifritz and Bernhard Cossmann, respectively). In 1886 he went to the United States

Victor Herbert, 1906

By courtesy of the Library of Congress, Washington, D.C.

with his wife, Therese Förster, who became a prima donna in the Metropolitan Opera. He played in the Metropolitan Orchestra and under Anton Seidl and Theodore Thomas. His early compositions, romantic and melodious, were performed by the New York Philharmonic Society; he was soloist in his two cello concerti. In the United States Herbert won fame as a composer of brilliant operettas and as a conductor. In 1893 he assumed leadership of the celebrated 22nd Regiment Band (formerly P.S. Gilmore's); from 1898 to 1904 he conducted the Pittsburgh Symphony Orchestra; and in 1904 he organized his own concert orchestra. He led the fight for favourable copyright legislation, passed in 1909, and he helped found the American Society of Composers, Authors and Publishers (ASCAP) in 1914.

Herbert's first operetta was *Prince Ananias* (1894). It was followed by more than 40 others. Among the best are *The Serenade* (1897), *The Fortune Teller* (1898), *Babes in Toyland* (1903), *Mlle. Modiste* (1905), *The Red Mill* (1906), *Naughty Marietta* (1910), *Sweethearts* (1913), *The Only Girl* (1914), and *Eileen*, first performed as *Hearts of Erin* (1917). His operetta music was superbly orchestrated. He also wrote two grand operas, *Natoma* (1911) and *Madeleine* (1914), and the music for the motion picture *The Fall of a Nation* (1916), probably the first original symphonic score composed for a feature film. Late in life he wrote for revues, notably the *Ziegfeld Follies.*

Herbert, (Alfred Francis) Xavier (b. May 15, 1901, Port Hedland, W. Aus., Australia—d. Nov. 10, 1984, Alice Springs, Northern Territory, Australia), Australian novelist and short-story writer best known for his novel *Capricornia* (1938), a comic chronicle about life in the Northern Territory of Australia and the inhumane treatment suffered by the Aborigines there at the hands of white men.

The son of a railroad engineer, Herbert knew many Aborigines as a child and learned their language at this time. He studied pharmacy at the University of Melbourne but then turned to journalism, traveling over northern Australia and also working as a sailor, miner, aviator, deep-sea diver, and stock rider. In 1935 he became Superintendent of Aborigines at Darwin, a position that led to the writing of *Capricornia.* He also spent two years in England and served as a sergeant during World War II.

Herbert never fulfilled the promise of his eloquent first novel: the novels *Seven Emus* (1959) and *Soldiers' Women* (1961) and his collected short stories, *Larger than Life* (1963), were somewhat less well received by the critics and public alike. His sprawling saga *Poor Fellow My Country* (1975) expressed his pessimistic view of life but lacked the richness and vitality of *Capricornia.* His autobiography, *Disturbing Element,* was published in 1983.

Herbert, Zbigniew (b. Oct. 29, 1924, Lwów, Pol.), Polish poet and essayist.

Herbert, the son of a professor of economics at the University of Lwów, studied at an underground high school during the German occupation of Poland and also took secret military training courses with the Polish Home Army. He obtained a diploma in law after World War II and also studied philosophy and the history of art. He wrote poetry but published little during the period of Socialist Realism in Poland (1949–54). His first collection of poems, *Struna światła* (1956; "Chord of Light"), was followed by *Hermes, pies i gwiazda* (1957; "Hermes, a Dog and a Star") and *Studium przedmiotu* (1961; "A Study of the Object"). The main theme of his poetry is the tension between the poet's relation with form and his feeling for fellow human sufferers. Herbert traveled to France and Italy and published the essays inspired by these visits as *Barbarzyńca w ogrodzie* (1962; "A Barbarian in the Garden"). Herbert's poems have been translated into English (*Selected Poems,* 1968 and 1977) and into other languages.

Herbert River, river in northeastern Queensland, Australia. The river rises in the Eastern Highlands, flows for 150 mi (240 km) southeast across the Atherton Plateau past Ingham, and enters the Coral Sea at Halifax Bay in the Hinchinbrook Channel. A relatively deep stream, the longest tributary of which is Blunder Creek, it drains an area of 3,340 sq mi (8,650 sq km). Explored in 1864 by George Dalrymple, the river was named after Sir Robert George Herbert, the state's first premier. Dense forests along its middle course furnish lumber, while sugarcane is cultivated on flats near the coast. Wallaman Falls (970 ft [296 m]), on the tributary Stony Creek, forms the second-highest single cascade in Australia.

herbicide, an agent, usually chemical, for killing or inhibiting the growth of unwanted plants—*i.e.,* weeds. (*See* weed.) In former times sea salt, by-products of chemical industries, and various oils were used as weed killers. Late in the 19th century the selective control of broad-leaved weeds among cereal crops came into practice. The most important development in modern weed control was the introduction in 1945 of so-called organic herbicides; they were revolutionary in that their high toxicity allowed for effective weed control at very low dosages—about 1–2 percent of the dosage rates of such earlier weed killers as carbon disulfide, borax, and arsenic trioxide.

Modern weed killers are put in two categories: selective (affecting specific plant species) and nonselective (affecting plants generally). These, in turn, are classified as foliage-applied and soil herbicides. Contact herbicides (*e.g.,* sulfuric acid, diquat, paraquat) kill only the plant organs with which they are in contact. Translocated herbicides (*e.g.,* amitrole; picloram; 2,4-D) are effective against roots or other organs to which they are transported from aboveground, treated surfaces (*i.e.,* soil). With respect to planting time, herbicides are also classified as preplant, pre-emergence, or post-emergence weed killers. Preplant herbicides may be applied to the soil or to weeds before crop planting.

Certain herbicides (*e.g.,* sodium arsenite) are sometimes applied by the jar method, whereby the tops of weeds are bent over and immersed in jars of poisonous solution. The herbicide is drawn into the rest of the plant and into connecting plants, gradually killing the entire system. Wild morning glory, poison oak, and camel thorn are sometimes treated in this manner. Chlorinated benzene and certain aromatic solvents are used to control aquatic weeds by adding them directly to the watery medium. *See also* defoliant.

herbivore, animal adapted to subsist solely on plant tissues. Types of adaptation for a herbivorous diet include specializations such as the four-chambered stomach of ruminants, the ever-growing incisor teeth of rodents, the specialized grinding molars of cattle, sheep, goats, and other bovids, and of elephants, and the rasping tongues of the sucker-mouthed catfish (*Plecostomus*) and the pond snail. Certain herbivores are monophagous (restricted to one type of food), as is the koala to eucalyptus, but most have at least a moderate variety in their diets. Herbivores form the second link of the food chain.

Herblock, byname of HERBERT LAWRENCE BLOCK (b. Oct. 13, 1909, Chicago), American editorial cartoonist who won Pulitzer Prizes for cartooning in 1942, 1954, and 1979.

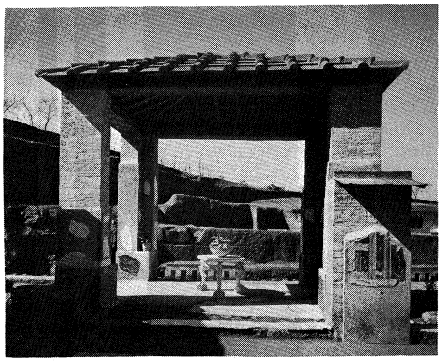
Herblock's first cartoons appeared in the *Chicago Daily News* in 1929. He worked for the Newspaper Enterprise Association (NEA) from 1933 until 1943, and he joined *The Washington Post* in 1946. A leading cartoon spokesman of liberalism in the United States, Herblock attacked contemporary injustices in politics, big business, industry, labour, and economics. He is probably best known for his cartoons of the early 1950s attacking the threat of native fascism as personified by Sen. Joseph McCarthy. As a reoccurring menace McCarthy rivaled another favourite Herblock character, a personified "clean" atom bomb that appeared in his cartoons with disconcerting frequency. His works include *The Herblock Book* (1952), *Herblock's Here and Now* (1955), *Herblock's Special For Today* (1958), *Straight Herblock* (1964), *The Herblock Gallery* (1968), *Herblock's State of the Union* (1972), *Herblock Special Reports* (1974), and *Herblock On All Fronts* (1980).

Herbois, Jean-Marie Collot d': *see* Collot d'Herbois, Jean-Marie.

Hercegovina (Yugoslavia): *see* Bosnia and Hercegovina.

Herculaneum, ancient city of about 5,000 inhabitants in Campania, Italy, five miles (eight kilometres) southeast of Naples. It was destroyed, together with Pompeii and Stabiae, by the Vesuvius eruption of AD 79; in modern times the town of Resina lies over part of it.

Ancient tradition connected Herculaneum with the name of the Greek hero Heracles, an indication that the city was of Greek origin. There is, however, historical evidence that toward the end of the 6th century BC a primitive nucleus of Oscan inhabitants (the most ancient Campanian people) came under the Greek hegemony there and that in the 4th century BC Herculaneum came under the domination of the Samnites. The city became a Roman municipium in 89 BC, when, having participated in the Social War ("war of the allies" against Rome), it was defeated by T.



Pergola in the garden of the House of Stags, Herculaneum

By courtesy of the Italian Government Travel Office—ENIT

Didius, a legate of Sulla. Herculaneum was severely shaken by an earthquake in AD 62 or 63, and the serious damage suffered by its public and private buildings had not yet been repaired when it was buried by the Vesuvius eruption of 79. Because the number of human remains found during the excavations was exceedingly small, it may be assumed that, unlike the people of Pompeii, most of the inhabitants succeeded in escaping toward Naples, in the direction opposite to the fall of lapilli and ashes.

The particular circumstances in which Herculaneum was buried, very unlike those of Pompeii, led to the formation over the city of a compact mass of tufaceous material, from about 50 to 60 feet (15 to 18 metres) deep. This, although it made excavation very difficult, preserved Herculaneum from being tampered with and looted and, because of the special conditions of humidity of the ground, made possible the conservation of wooden frameworks of houses, wooden furniture, cloth, and food. Thus, Herculaneum offers a detailed impression of private life that is only with difficulty achieved in other centres of the ancient world. Excavation began in the 18th century, when all memory of the existence of Herculaneum had been lost for centuries and the only available reports of it were those that had come down through the ancient authors, without any precise information as to the exact position of the ancient city. Quite by accident, in 1709, during the digging of a well, a wall was discovered that was later found to be a part of the stage of the Herculaneum theatre. Regular excavations were started in 1738 under the patronage of the King of Naples; between 1738 and 1765 the Portici Museum was enriched with magnificent paintings and a group of portrait statues that came from a building thought to be the ancient basilica of Herculaneum and, in addition, with a large number of bronze and marble works of art recovered from a suburban villa, called the Villa of the Papyri because of its having contributed a whole library of ancient papyri in Greek. These papyri, on philosophical subjects of Epicurean inspiration, preserved in the Biblioteca Nazionale of Naples, have been only partly read.

The excavations were resumed in 1823 with the intention of discontinuing the previous tunnelling and instead working from above ground, a method used with success at Pompeii; up to 1835 the work proved of value by bringing to light the first houses of Herculaneum, among which was the peristyle of the House of Argus. Abandoned and again resumed in 1869, after the unification of Italy, the excavations continued until 1875, when, because of the poor results obtained and the presence of the inhabited dwellings of Resina, they were once more abandoned.

After the efforts of the English archaeologist Charles Waldstein to internationalize the excavations at Herculaneum (1904) by collecting contributions for this purpose from various nations in Europe and America, the work was finally resumed in May 1927 with Italian state funds and with the object of conducting the excavations with the same continuity as those of Pompeii. The results of this work, interrupted only by World War II, make it possible to have a clear idea of the ancient city. The larger *decumanus* ("main road"), which also formed one side of the quarter of the forum with its public buildings, marks the limit between the completed excavations and those still in progress. The insulae (blocks) to the south of the *decumanus* have developed in a strictly geometrical pattern facing the *cardines* ("crossroads"), as far as the rim of the promontory. This was blocked by a wall, above which project the nobler houses, enjoying a view of the bay. Inside the residential quarter, houses of rich republican and patrician construction alternate with houses of the middle class, also finely decorated, or with houses of the commercial and workshop variety.

The public monuments uncovered include the palaestra (sports ground), with a large portico surrounding a vast central piscina (swimming pool), and two thermae (baths), of which one is next to the forum quarter and the other outside the city gate; the second bath is in a remarkable state of preservation, having remained practically entirely protected against the flow from the eruption.

Excavation continues, since the demolition of part of Resina, in the area of the forum of the ancient city, in search for its principal civil and religious buildings: temples, basilica, and senate house.

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Herculano de Carvalho e Araújo, Alexandre (b. March 28, 1810, Lisbon—d. Sept. 13, 1877, Santarêm, Port.), historian, novelist, and poet who is credited, along with Garrett, with introducing Romanticism to Portugal. As a historian he was a leader of liberal opinion, enjoying a national prestige comparable to that of Victor Hugo in France.

Herculano, miniature by Francisca de Almeida Furtado, 1852; in the Museu Nacional de Arte Antiga, Lisbon

By courtesy of the Museu Nacional de Arte Antiga, Lisbon

As a young man Herculano took part in the unsuccessful rebellion against the absolute rule of Dom Miguel and was forced into exile in England and France. In 1832 he returned to Portugal with the small army of Dom Pedro that eventually ousted Miguel and established a liberal regime. Convinced that an important cultural reform should accompany the political change, he abandoned poetry and became editor of *O Panorama* (1837–39), a review that kept abreast of European literary and social trends, in which he published his historical tales, later gathered in two volumes as *Lendas e Narrativas* (1851; "Legends and Chronicles"). Elected to the *cortes* (parliament) in 1840, he campaigned for a democratic reform of education, but he withdrew from politics in 1841 when Costa Cabral established his authoritarian regime. From 1839, when he became librarian at the Royal Library of Ajuda, he worked on his ambitious *História de Portugal*. He also wrote historical novels in the manner of Sir Walter Scott, a genre he introduced to Portugal.

The first volume of *História de Portugal* appeared in 1846. One of the finest achievements of Romantic historiography, it covers the early history of Portugal to 1279 and stresses the origin and rise of the middle class. As the result of his research in original manuscripts, he shocked his contemporaries by overturning many cherished legends. He treated the hallowed battle of Ourique, in which the tide of victory was believed to have been turned by Christ's appearance to the first king of Portugal, as a mere skirmish, denying Christ's intervention entirely. This brought a storm of protest from pulpit and press. Herculano replied by denouncing the ignorance of the clergy, and a long pamphlet war ensued.

In 1851 the Costa Cabral regime was overthrown by the movement of the Regeneration, in which Herculano took part. To combat the ultraconservative elements that sought to undermine the new regime, Herculano helped found two newspapers in which he attacked political centralism and clerical influence. Although a Roman Catholic and a convinced Christian, his quarrel with the clergy led him to regard ultramontanism (the doctrine of papal supremacy over national churches) as the main enemy of liberal institutions. To this period belongs *Da Origem e Estabelecimento da Inquisicao em Portugal* (1854–59; *History of the Origin and Establishment of the Inquisition in Portugal*, 1926). Based on hitherto unknown documents, it attempted to demonstrate that royal absolutism and clerical power had been allies in the confiscation of the property of the "New Christians" (converted Jews) through the Inquisition. He campaigned against the restoration of the monastic orders and advocated civil marriage. From 1871 he was openly critical of the new dogmas of Immaculate Conception and papal infallibility.

The fourth and last volume of his history was issued in 1853. In 1856, the appointment of a personal enemy to the national archives caused him to retire to farming at Vale de Lobos near Santarém.

Hercules (Greco-Roman mythology): *see* Heracles.

Hercules, Tower of, probably the only ancient Roman lighthouse still in use, located 1½ miles outside the city of La Coruña (Corunna), Spain, on a peninsula in Ría de la Coruña (Corunna Bay). A Phoenician tower may have occupied the site originally, but the present structure, 185 feet (56.8 metres) tall, is considered a Roman work dating from or at least remodelled during the reign of Trajan (AD 98–117).

Hercules' club (plant): *see* angelica tree.

Herculeum, Fretum (Mediterranean Sea): *see* Gibraltar, Strait of.

Hercynian orogeny, a mountain-building event of Carboniferous to Permian age (the Carboniferous Period began 345,000,000 years ago and ended 280,000,000 years ago; it was followed by the Permian Period, which ended 225,000,000 years ago) that affected central Europe in an east–west belt. Folded Hercynian mountains extended from England and Ireland through central France and Germany to southern Poland on the east. The term Armorican is commonly applied to the more westerly folded areas, and Variscan to the

remainder. The Armorican folds trend northwest–southeast in central France, whereas the Variscan folds are northeast–southwest. For this reason, it is considered likely that two separate deformational systems must have been involved. The Hercynian mountains were subsequently uplifted, tilted, and eroded during another orogenic episode, and their remnants today consist of a few great massifs of diverse Precambrian and Paleozoic rocks, of which the Massif Central in France, the Harz and Bohemian mountains, the Vosges and Black Forest, and the Meseta Central of Spain are representative.

hercynite, the mineral iron aluminum oxide, a member of the spinel (*q.v.*) series.

Herczeg, Ferenc (b. Sept. 22, 1863, Versecz, Hung.—d. Feb. 24, 1954, Budapest), novelist and playwright, the leading literary exponent of conservative-nationalist opinion in early 20th-century Hungary.

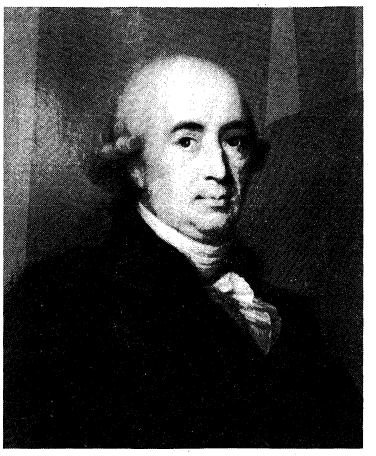
Herczeg was born into a well-to-do family of German origin. Although he studied law, he chose a literary career, which was successful from the publication of his first novel in 1890. In 1895 he founded *Új Idők* ("New Times"), which remained for half a century the literary magazine of the conservative upper and middle classes of Hungary. His light novels of manners contained just enough irony, humour, and social criticism to cause a harmless shock to the conservative public for whom they were intended and for whom this criticism was a novel experience. The best example of this type is *A Gyurkovics lányok* (1893; "The Gyurkovics Girls"), in which a clever mother marries off her seven daughters. In his later, more serious novels, Herczeg often used historical settings, the most successful being *Az élet kapuja* (1919; "The Gates of Life"), set in Renaissance Italy. His social comedies, such as *A három testőr* (1894; "The Three Bodyguards") and *Kék róka* (1917; "The Blue Fox Stole"), are amusing and skillfully written. *Bizánc* (1904; "Byzantium") and *A híd* (1925; "The Bridge") are notable historical dramas.

herdbook, official record of individuals and pedigrees of a recognized breed of livestock, especially cattle or swine. When development of purebred livestock for use in breeding began in Britain in the 18th century, it became necessary to maintain a pedigree of each animal. Records of new breeds were at first maintained by designated individuals, but eventually breeding associations were formed to control and maintain registration. In modern livestock trading, the ancestral record of an individual animal is a major determinant of its market value.

Herder, Johann Gottfried von (b. Aug. 25, 1744, Mohrungen, East Prussia—d. Dec. 18, 1803, Weimar, Saxe-Weimar), German critic, theologian, and philosopher, who was the leading figure of the Sturm und Drang literary movement and an innovator in the philosophy of history and culture. His influence, augmented by his contacts with the young J.W. Goethe, made him a harbinger of the Romantic movement. He was ennobled (with the addition of *von*) in 1802.

Early life and travels. Herder was the son of poor parents, and attended local schools. Beginning in the summer of 1762 he studied theology, philosophy, and literature at Königsberg, coming into close contact with Immanuel Kant, the founder of critical philosophy, as well as with Johann Georg Hamann, one of the Enlightenment's prominent critics.

In November 1764 Herder went to teach and preach in Riga. There he published his first works, which included two collections of fragments, entitled *Über die neuere deutsche Literatur: Fragmente* (1767; "On Recent German Literature: Fragments") and *Kritische Wälder, oder Betrachtungen die Wissenschaft und Kunst des Schönen betreffend* (1769 and 1846; "Critical Forests, or Reflections on the Science and Art of the Beautiful").



Herder, detail of an oil painting by Gerhard von Kügelgen, 1808; in the Library of Tartu State University

By courtesy of the Library of Tartu State University

In the summer of 1769 he set out on a sea voyage from Riga to Nantes, which brought him a deeper understanding of his destiny. His *Journal meiner Reise im Jahr 1769* (1769; "Journal of My Voyage in the Year 1769"), completed in Paris in December, bears witness to the change that it effected in him. Herder saw himself as a groundless being who had left the safe shore and was journeying into an unknown future. It became his vocation to unveil that future through insights gained from the past, so that its character might be felt by his contemporaries. Herder's prophetic criticisms of his own time anticipated the possibilities of intellectual developments generations ahead, including the ideas of Goethe, the brothers August Wilhelm and Friedrich von Schlegel, and Jacob and Wilhelm Grimm in poetical and aesthetic theory; Wilhelm von Humboldt in the philosophy of language; G.W.F. Hegel in the philosophy of history; Wilhelm Dilthey and his followers in epistemology; Arnold Gehlen in anthropology; and the Slav nationalists in political thought.

During a visit to Strasbourg, where he arrived in September 1770 as the companion of Prince Peter Frederick William of Holstein, Herder experienced a momentous meeting with the young Goethe, who was stirred to recognize his own artistic faculties through Herder's observations on Homer, Pindar, Shakespeare, and on literature and folk songs.

Career at Bückeburg. In April 1771 Herder went to Bückeburg as court preacher. The works that he produced there were fundamental to the Sturm und Drang, a literary movement with Promethean and irrationalist motifs, without which German Classical and Romantic literature could not have arisen. In the Romanticism Herder espoused, the medium of thought is feeling (*Gefühl*), which he compared to the sense of touch. Whereas sight apprehends things at a distance, feeling enjoys an immediate experience of reality, which it apprehends as a power reacting against an individual's own vital energy. At the same time, however, the individual experiences his own body, in which a vital power asserts itself against the world. At the moment when a person recognizes the limits imposed by the environment without becoming dependent on it, a balance of forces is achieved between the two in which the individual body is converted into the aesthetic gestalt (or integral structure) and the identification of the individual with reality is consummated.

Among his works of this period are *Plastik* (1778), which outlines his metaphysics, and *Abhandlung über den Ursprung der Sprache* (1772; "Essay on the Origin of Language"), which finds the origin of language in human nature. For Herder, knowledge is possible only through the medium of language. Although the individual and the world are united in feeling, they separate themselves in consciousness in order to link themselves anew in the "intentional," or object-directed, act in which the objective meaning of a word is rooted. Thus, what earlier had been apprehended dimly but not specifically recognized in feeling is expressly designated. Feeling and reflection thus interpenetrate each other; and the word, being at once sound and significance, is the cause of this union. Every signification of something therefore includes an emotional attitude toward it that reflects the particularity and the outlook of its users. Thus, the structure of language is a true image of human nature.

Whereas the psychologists of the time were carefully distinguishing various human faculties (conation, feeling, knowledge), Herder stressed the unity and indivisible wholeness of human nature. Consciousness and *Besonnenheit* ("reflective discernment") are not simply "higher" faculties added to an animal foundation; instead, they designate the structure of the individual as a whole with qualitatively unique human desires and human sensitivities. Since human instincts and sensitivities are subject to reflection, or "broken off" (*gebrochen*), however, the human individual is "the first liberated member of creation."

Herder's philosophy of history also began to take form at this time, springing from his attempt to use the past in order to assess the present situation and future probabilities. He had already outlined in the *Fragmente* the scheme of a typical historical development on the analogy of the ages of a man's life. By this means he tried to determine the situation of German poetry that was then current. The essay on Shakespeare and *Auch eine Philosophie der Geschichte zur Bildung der Menschheit* (1774; "Another Philosophy of History Concerning the Development of Mankind"), opposing Rationalism in historiography, were the first writings to show a deeper understanding of historical existence as the product of the contradiction between individuation and the whole of history; this contradiction itself forms the logical basis of historical development. If two forces are in conflict, one can be seen as striving to persevere and to emerge from the whole as an individual structure. Yet the whole is not satisfied with any single form: in historical catastrophes it frees itself to shape a new form of things, which is shattered again in turn when its time is past. The individual is not only an end but also a blind, unfree instrument taken or rejected by God. Even the philosopher can see the future only by tracing its conditions from patterns of past development in order to counteract it.

Further works prepared during this period were his *Älteste Urkunde des Menschengeschlechts* (1774–76; "Oldest Records of the Human Race") on Hebrew antiquities and his *An Prediger: Fünfzehn Provinzialblätter* (1744; "To Preachers: Fifteen Provincial Papers"). Two especially important works were his essay on Shakespeare and "Auszug aus einem Briefwechsel über Ossian und die Lieder alter Völker" (1773; "Extract from a Correspondence About Ossian and the Songs of Ancient Peoples"), published in a manifesto to which J.W. Goethe and Justus Möser, a forerunner of Sturm und Drang, also contributed. As Herder showed in his exposition of Shakespeare and Homer, in the genuine poetic utterance, hitherto-hidden aspects of man's life are revealed by virtue of the creative function of language. "A poet is the creator of the nation around him," he wrote, "he gives them a world to see and has their souls in his hand to lead them to that world." Poetic ability is

no special preserve of the educated; as the true "mother tongue of mankind" (Hamann), it appears in its greatest purity and power in the uncivilized periods of every nation. For Herder, this ability was proved by the Old Testament, the *Edda,* and Homer: hence Herder's concern to retrieve ancient German folk songs and his attention to Norse poetry and mythology, to the work of the minnesinger, and to the language of Martin Luther.

First years at Weimar. Thanks to Goethe's influence, Herder was appointed general superintendent and consistory councillor at Weimar in 1776. There, anticipating Goethe, he developed the foundations of a general morphology, which enabled him to understand how a Shakespearean play, for instance, or the Gospel According to John, in the historical context of each, was bound to assume the individual form that it did instead of another. Herder's method achieves its results by recognizing contradictions and by resorting to a higher unity—a method by which Herder earns a place in the history of dialectical logic.

It was at this time also that Herder completed his transition to Classicism. Among the works of this period are *Vom Erkennen und Empfinden der menschlichen Seele* (1778; "Of the Knowing and Sensing of the Human Soul"), *Briefe, das Studium der Theologie betreffend* (1780–81; "Letters Concerning the Study of Theology"), *Vom Geist der ebräischen Poesie* (1782–83; *The Spirit of Hebrew Poetry*), and his collection of *Volkslieder* (1778–79; "Folk songs"). Herder regarded poetry as a mode of coming to terms with reality. Whereas most of his contemporaries saw it either as a product of learning or as a means of amusement, he considered poetry to spring from the natural and historical environment experienced by feeling, rather as an involuntary reaction to the stimulus of events than as a deliberate act. Such feeling is the organ of a dynamic relationship between man and the world, which is expressed far more readily in the sounds, stresses, and rhythms of speech than in an image. This "voice of feeling" achieves the status of art only when it is detached from the man and from the historical environment that created it and becomes rounded off to constitute a world by itself.

Summit and later years of his career. Herder's work at Weimar reached its peak in *Zerstreute Blätter* (1785–97; "Sporadic Papers") and in the unfinished *Ideen zur Philosophie der Geschichte der Menschheit* (1784–91; *Outlines of a Philosophy of the History of Man*). In the latter work, the result of his intercourse with Goethe, Herder attempted to demonstrate that nature and history obey a uniform system of laws. Already in the development from earth to mankind, a striving of forces was at work, aiming to balance one another by generating determinate forms or individual existences. This same phenomenon could be observed as a law of "humanity" in man's communal life, in which contending forces are reconciled. At any passing moment the measure is individual, but the principle of the development toward form is general. Too often, however, man in his freedom works against nature, for his sense of the measure of things and his reason are immature. Despite these shortcomings, one must trust that growing insight and goodwill will lead men to act according to the truth that they recognize and, through the conflict of nations, will reach the equilibrium of a structure embracing all mankind.

The basic premises underlying the *Ideen* are resumed in the dialogues *Gott: einige Gespräche* (1787; 2nd ed., *Einige Gespräche über Spinozas System,* 1800; "Several Discourses on Spinoza's System"), in which Herder combines the views of the rationalists Gottfried Wilhelm Leibniz, Benedict de Spinoza, and Anthony, Ashley Cooper, 3rd Earl of Shaftesbury.

Financial difficulties, differences of opinion over the French Revolution, and, above all, his self-assertive nature, which could not bear the proximity of a greater man, led to an estrangement of Herder from Goethe. On Herder's side this resulted in a bitter enmity toward the whole Classical movement in German poetry and philosophy. His *Briefe zu Beförderung der Humanität* (1793–97; "Letters for the Advancement of Humanity") and his *Adrastea* (1801–03), containing treatises on history, philosophy, and aesthetics, emphasized the didactic purpose of all poetry, thus contradicting that very theory of the autonomy of the work of art that he himself had helped to establish. With the *Christliche Schriften* (1794–98; "Christian Writings"), the *Metakritik zur Kritik der reinen Vernunft* (1799; "Metacritique of the Critique of Pure Reason"), and the *Kalligone* (1800), a metacritique of Kant's *Critique of Judgment*, Herder began his attack on Kant, whose philosophy he saw as a threat to his own historical view of the world. In this attack he had the support of Christoph Martin Wieland, an influential poet and novelist, and of Jean Paul.

Herder died in 1803. The first collected edition of Herder's works was produced by his widow, 45 vol. (1805–20). There is also a critical edition by B. Suphan, 33 vol. (1877–1913; reprinted 1967–68). (H.D.I.)

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herd's-grass: *see* timothy.

Héré de Corny, Emmanuel (b. Oct. 12, 1705, Nancy, Fr.—d. Feb. 2, 1763, Lunéville), French court architect to Stanisław Leszczyński, duke of Lorraine, best known for laying out the town centre of Nancy, a principal example of urban design in the 18th century.

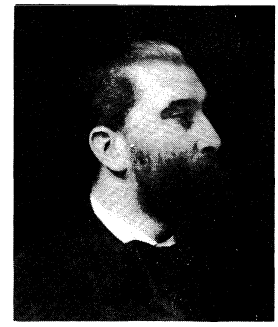
Little is known of Héré's training. Stanisław, the former king of Poland and father-in-law to Louis XV, was made duke of Lorraine in the 1730s. He commissioned Héré to unite the medieval and Renaissance sections of Nancy, separated at that time by a moat and the remnants of fortifications. Héré's resulting work, begun in 1752, consists of three areas: the Place Royale (now the Place Stanislas), the Place de la Carrière, and the Place du Gouvernement. These interconnected areas form a series of squares and promenades lined with buildings or ringed by colonnades. The squares are tastefully embellished with lines of trees and with sculptures and fountains. The layout created pleasant vistas, improved traffic patterns, and provided the basis for the future rational development of the city.

In creating this masterful project in a provincial capital and on a limited budget, Héré established himself on the level of accomplishment of the most notable city planners of his time. Among his other works, almost all at Nancy, are the church of Notre-Dame-de-Bon-Secours (1738–41) and the Hostel of Royal Missions, erected for the Jesuits between 1741 and 1743.

Heredia, city, central Costa Rica, on the central plateau 3,729 feet (1,137 m) above sea level, just northwest of San José, the national capital, via the Pan-American Highway. Probably founded in the 1570s, the city was originally called Cubujuquí and then Villavieja. The first of its many churches was established in 1706, and the name Heredia was adopted in honour of the president of the high tribunal in 1763. Throughout most of the colonial period the little village was second only to Cartago in importance in Costa Rica; the majority of the citizens were small tobacco farmers. After the independence of Mexico in 1821, Heredia took the lead among Costa Rican towns in urging annexation to the Mexican empire if Costa Rica could not remain attached to Spain. For a brief period in the 1830s Heredia served as the national capital. It is an important coffee-growing centre. Many of its residents commute to work in San José. Pop. (1984) 21,440.

Heredia, José Maria de (b. Nov. 22, 1842, La Fortuna, Cuba—d. Oct. 2, 1905, near Houdan, Fr.), Cuban-born French poet, brilliant master of the sonnet.

The son of a wealthy Spanish coffee plantation owner and a French mother, Heredia was educated at Senlis, near Paris. He claimed France as "the country of my mind and heart"; and, although he went home after finishing his schooling, he quickly returned to Paris



José Maria de Heredia, detail of a portrait by Emile Lévy
J.E. Bulloz

and studied at the School of Paleography. He became the close friend of the poet Charles-Marie-René Leconte de Lisle and, like him, was a leading figure in the Parnassians.

Heredia's 118 sonnets and some longer pieces were published as *Les Trophées* (1893). These poems capture in verse a fugitive moment of history (usually classical or Renaissance) or else some objet d'art (a vase, a coin, an ornate book binding), usually in one startling image. A selection of his poems in English translation was published in *The Flute, with Other Translations and Poems* (1977). He uses a wide range of stylistic effects (double rhymes, onomatopoeia, exotic-sounding place-names) and caps the beauty of each poem with a final couplet or line of especially haunting effect.

In 1894 Heredia was elected to the French Academy. In 1901 he became librarian of the Bibliothèque de l'Arsenal, Paris. Just before his death he completed an edition of the *Bucoliques* by the 18th-century poet André de Chénier.

hereditary leptocytosis: *see* thalassemia.

hereditary spherocytosis, form of congenital hemolytic anemia characterized by enlarged spleen, spherical (rather than disk-shaped) red blood cells of variable size and increased fragility of cell membrane, and a chronic, mild hemolytic anemia punctuated by episodes of severe aplastic anemia (failure of bone marrow to produce cells). Hereditary spherocytosis, most frequent of the familial anemias, is inherited as an autosomal dominant (an inherited characteristic not related to sex); it is rare in blacks and most common in north Europeans. Symptoms may be present at birth or may not appear until old age; the disease is most often identified during childhood or adolescence. Removal of the spleen results in cure of anemia in nearly all cases;

the defects in blood production remain but do not cause serious disability.

heredity, the transmission of physical and mental characteristics, or traits, from parents to offspring through basic units called genes.

A brief treatment of heredity follows. For full treatment, *see* MACROPAEDIA: Genetics and Heredity, Principles of.

Until the late 19th century, it was widely believed that hereditary traits were the result of a mixing of parental characteristics. According to this line of thought, a short woman and tall man would have children of medium height. In 1866, however, Gregor Mendel, an Austrian monk, published the results of his cross-breeding experiments with pea plants. From his studies, Mendel derived certain basic laws of heredity: hereditary factors (now called genes) do not mix but remain segregate; some factors are dominant, while others are recessive; each member of the parental generation transmits only half of its hereditary factors to each offspring; and different offspring of the same parents receive different sets of genes. Mendel's work went unnoticed until 1900, years after his death, when it became the foundation for the modern science of genetics.

To fully appreciate the role of heredity, one must make the important distinction between an organism's genotype and its phenotype. The genotype is an individual's total hereditary makeup. It may include recessive genes whose traits are not expressed but which can be passed to future generations; moreover, except for mutations, genotype does not change during an individual's life. By contrast, the phenotype is the visible characteristics of an organism. It is the product of complex interactions between the individual's genetic makeup and the environment. For example, a tree might have a genetic endowment for tallness but grow as a twisted shrub on a cold, windswept mountain slope. Unlike genotype, phenotype is highly changeable. A person may inherit genes for pale or dark skin, for example, but the individual's skin colour at a particular time depends heavily on exposure to the sun.

The translation of genetic information to phenotypic traits is a complex process. Genes exert their influence at the cellular level by directing the production of enzymes. These, in turn, regulate the metabolic activities of the cell. Many characteristics are polygenic—*i.e.,* influenced by more than one gene. In addition, many genes exist in numerous variations (alleles) throughout a population. Given the polygenic and multiple allelic nature of many traits, it is easy to see the vast potential for variability among hereditary characteristics.

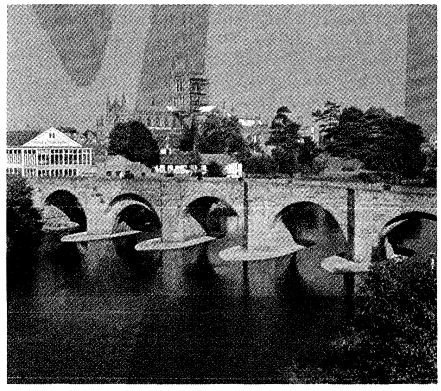
Consult the INDEX *first*

Hereford, city ("district"), county of Hereford and Worcester, England, on the River Wye. It has an area of 8 square miles (20 square km).

Hereford was founded as a settlement near the Welsh March (the politically unstable belt of territory flanking Wales on the east in medieval times) after the West Saxons had crossed the River Severn early in the 7th century. In 1086 the town included various ecclesiastical fees (tributes) but was otherwise a royal demesne (feudal holding). It also had a provincial mint and later (1215–16) the grant of an exclusive merchant guild. The wool trade, important by 1202, declined in the 16th century. The castle was of some early importance, but the invasion (13th century) and subsequent occupation of Wales by England deprived Hereford of military significance until the Civil Wars of the 17th century, when it changed hands several times.

The Cathedral Church of the Blessed Virgin Mary and St. Aethelberht exemplifies all architectural styles from Norman to Perpendicular. The see was detached from that of Lichfield in 676, Putta being its first bishop. After the body of Aethelberht, a slain English leader, had been brought to the site, a superior church was reconstructed (1012–52), but this was burned by the insurgent Welsh, and building began again in 1079. It was completed only in 1148. The western tower collapsed in 1786, taking the west front and first bay of the nave with it. Restoration of the west front was not completed until 1904–08. The cathedral's main features include a central tower (165 feet [50 m]) in Decorated style and a north porch in rich Perpendicular style. There is a noted organ, a large chained library, and a collection of rare manuscripts, early printed books, and relics.

The College of the Vicars Choral is Perpendicular in style, and the bishop's palace, which stands near the castle green, was originally a Norman hall. The castle itself no longer exists, and only one of the six gates and a few fragments of the old walls survived in modern times. All Saints Church is in Early English and Decorated styles; it, too, has a chained library. The Old Guild House (1621) is a museum. The Cathedral Grammar School was founded in 1384; the Blue Coat School in 1710.



Medieval bridge across the River Wye at Hereford, England, with the Cathedral Church of the Blessed Virgin Mary and St. Aethelberht in the background

Tourist Photo Library

Hereford's trade is mainly agricultural, with sales of Hereford cattle and the making of cider and jam, as well as fruit canning and brewing. Other manufactures include furniture, glass, leather, nickel alloys, and bricks. Pop. (1986 est.) 48,400.

Hereford, popular breed of beef cattle, the product of generations of breeding work on the part of landed proprietors and tenant farmers in the county of Herefordshire (now in Hereford and Worcester county), England. Herefordshire was noted for its luxuriant grasses, and in that district for many generations the Hereford was bred for beef and draft purposes. The characteristic colour, red with white face and white markings, has been fixed for only a comparatively short time. When the first herdbook was published in 1846, the editor grouped the breed into four classes: mottle-faced, light gray, dark gray, and red with white faces. Twenty-five years later all but the last had practically disappeared. The outstanding characteristics of the breed are uniformity of colour, early maturity, and ability to thrive under adverse conditions.

Herefords were first introduced into the United States in 1817 by the politician Henry Clay, who imported a young bull, a cow, and a heifer to his home in Kentucky. In the range areas of North America it has become the predominating breed from Canada on the north to Mexico on the south. In Great Britain it is chiefly bred in the county of Hereford and Worcester and its vicinity, although herds of this breed are found in Scotland, Ireland, and Wales. The Hereford also has met with much success under range conditions of Australia, New Zealand, Argentina, Uruguay, and southern Brazil.

In the United States a Polled Hereford strain was developed around 1900 by selecting naturally hornless registered Herefords. The number of Polled Herefords has increased rapidly; herds are found throughout the United States, including Hawaii, and the strain has been widely exported.

Hereford, Henry, Duke of: *see* Henry IV *under* Henry (England).

Hereford, William FitzOsbern, 1st Earl of: *see* FitzOsbern, William.

Hereford and Worcester, county of England, extending from the Welsh borderland in the west to the industrial Midlands in the east. With an area of 1,516 square miles (3,927 square km), it is divided into the following nine districts: Bromsgrove, Leominster, Malvern Hills, Redditch, South Herefordshire, Wychavon, Wyre Forest, and the cities of Hereford and Worcester (the county seat). The county was formed in 1974 by the amalgamation of the former counties of Herefordshire and Worcestershire.

The county's topography comprises two lowland plains, divided along the old Herefordshire–Worcestershire county boundary by the Malvern Hills. The western part, drained by the River Wye and its tributaries, is bordered by Silurian shales and limestone, which outcrop as scarplands in the northwest, and by the Woolhope Dome and Malvern foothills in the east. The core of the Malvern Hills, rising to more than 1,300 feet (400 m), is composed of Precambrian gneisses and volcanic rocks. The Forest of Dean plateau lies to the southeast, and in the west lie the Black Mountains (Old Red Sandstone), which exceed 2,200 feet (670 m) in height. The eastern plain covers part of the rich valleys of the Rivers Severn and Avon (Upper Avon), with their tributaries, the Rivers Stour and Teme. In the south the Avon valley, known as the Vale of Evesham, lies on young Lias clays, which provide excellent soil for orchards and market gardening. The Jurassic escarpment of the Cotswolds rises sharply in the southeast. The Lickey Hills (956 feet [291 m]), in which there are Silurian, Cambrian, and Precambrian rocks, cross the northeastern part of the county.

Many Norman strongholds were built in Herefordshire in the 12th century; some remains of them can be found at Wilton, Goodrich, and Pembridge. There are remains of Benedictine abbeys at Evesham and Pershore and a perfectly preserved priory church at Malvern, in addition to the cathedrals at Worcester and Hereford. Kilpeck's Church of St. Mary and St. David exemplifies the Herefordshire school of Romanesque architecture, and the Cistercian abbey church at Abbey Dore is in Early English style. Among country houses that of Treago (13th century) is a notable example of a fortified mansion; Birtsmorton Court is a 16th-century moated house.

Agriculture is a major activity in the county. Pear and apple orchards are important in the west, much fruit being grown for the cider industry. The southeast, including the Vale of Evesham, is intensively cultivated for the early market production of fruits and vegetables. Hereford and Worcester's hops production is second only to that of the county of Kent, and dairy farming predominates in the east.

The Hereford breed of cattle is world-famous, and the Ryelands breed of sheep, also well known, originated in the Ross-on-Wye area. Heavy industry is important at Worcester, but Bromsgrove is another growing centre, and there are machinery and metal industries at Redditch, Kidderminster (also famous for carpets), and Hereford. Stoke Prior, near Droitwich, has important salt and chemical industries. Agricultural-machinery manufacture, fruit canning and processing, cider production, and milk processing are carried on in many market towns. Pop. (1987 est.) 665,100.

Herefordshire, also called HEREFORD, former English county on the Welsh borderland, bounded north by Shropshire, east by Worcestershire, south by Gloucestershire and Monmouth, and west by Breconshire and Radnorshire. It covered a roughly oval-shaped area of 842 square miles (1,180 square km). In 1974 it became part of the newly created county of Hereford and Worcester (*q.v.*).

The prehistoric period in Herefordshire is represented by several sites—Sutton Walls, Croft Ambrey, Herefordshire Beacon, and Leintwardine being of note. During the 7th century the West Saxons pushed across the River Severn and established themselves between Wales and Mercia, with which kingdom they soon became incorporated. In the 8th century the Mercian king Offa extended the Mercian frontier to the River Wye, securing it by the earthwork known as Offa's Dyke, portions of which are visible at Moorhampton and near Kington. Herefordshire probably originated as a shire in the time of the English king Athelstan (reigned 925–939). The district was the scene of constant border warfare with the Welsh under Gruffydd ap Llewelyn, prince of Gwynedd. Harold Godwinson (later Harold II of England), whose earldom included this county, restored order in 1063.

Richard's Castle in the north and Ewyas Harold in the southwest were the first Norman fortresses erected on English soil, and Wigmore, Clifford, Weobley, Hereford, and Kilpeck were all sites of Norman strongholds.

In Herefordshire the influence of John Wycliffe's reformist religious teachings were widely felt, and at the end of the 14th century and the beginning of the 15th Lollardry was widespread. During the Wars of the Roses the county supported the Yorkist cause, led by Edward, Earl of March, afterward Edward IV. During the Civil Wars of the 17th century the county was royalist, and the city of Hereford, the centre of activity, changed hands several times.

Herefordshire was always a rich agricultural area. In modern times more than four-fifths of the total area of the county was under cultivation, and less than half of this was in permanent pasture. The county was more heavily wooded than most of the rest of the west country. It was famous for its pear and apple orchards, about half of which produced fruit for the cider industry. Cider at one time was the staple beverage. In support of the county's major industry, agriculture, there grew up factories for agricultural implements, fruit canning, jam making, and milk processing. New industries did, however, develop around Hereford city.

Hereke carpet, floor covering handwoven in imperial workshops founded late in the 19th century at Hereke, Turkey, about 40 miles (64 km) east of Istanbul. Large carpets and prayer rugs with pile of wool or silk were made there for palace use and for gifts presented by the sultan.

Antique carpets of various kinds were copied or patterns were created following Western fashions. Usually a tiny cartouche hidden in the design identifies the carpet's origin. These imperial workshops, or slightly earlier ones in the same neighbourhood, are increasingly believed to have been the source of a number

Silk Hereke carpet with design based on an Ottoman court prayer rug, from Turkey, early 20th century; in a private American collection

Private American collection, photograph, Otto E. Nelson—EB Inc.

of prayer and medallion rugs with modified Persian designs and inscriptions; the greatest concentration of these rugs—more than 30—is in the Topkapı Palace in Istanbul.

Hérelle, Félix d' (b. April 25, 1873, Montreal, Que., Can.—d. Feb. 22, 1949, Paris, Fr.), French-Canadian microbiologist generally known as the discoverer of the bacteriophage, a virus that infects bacteria. (The earlier identification of the bacteriophage by the British microbiologist F.W. Twort in about 1915 became obscured by Twort's disinclination to take credit for or to pursue his initial findings.)

After studying medicine in Paris and Leiden, Hérelle went to Guatemala City to direct the bacteriology laboratory of the municipal hospital and teach microbiology at the local medical school. In 1909 he was sent by the Mexican government to study microbiology at the Pasteur Institute in Paris. While there, he experimented with a bacterium known to cause enteritis (digestive tract inflammation) in certain insects. In the course of his work Hérelle occasionally noticed clear spots (areas free of bacteria) on gelatin cultures of the bacterium under study. Subsequently he investigated a form of dysentery afflicting a French cavalry squadron during World War I, and he happened to mix a filtrate of the clear areas with a culture of dysentery bacteria. The bacteria were quickly and totally destroyed by an unknown agent in the filtrate that Hérelle termed an "invisible microbe"; he later renamed it a bacteriophage.

In subsequent years Hérelle attempted to use bacteriophages as therapeutic agents in the treatment of bacterial infections. As a result of his work in Indonesia, studying human dysentery and an infectious disease of buffalo, he perfected a technique for isolating bacteriophages and published *Le bâcteriophage, son rôle dans l'immunité* (1921; "The Bacteriophage, Its Role in Immunity"). Although he achieved some success in using bacteriophages in the treatment of dysentery and other infections, the medical use of these agents against such diseases was later replaced by antibiotic and other drug therapy.

Hérelle organized the first courses in protobiology (as study of the bacteriophage was then called) at Yale University, and, at the request of the Soviet government, he established several research institutes in the Soviet Union. From 1938 until his death he continued his study and experimentation in Paris.

Herero, a group of closely related Bantu-speaking peoples of southwestern Africa. The Herero proper and a segment known as the Mbanderu inhabit parts of central Namibia and Botswana; other related groups, such as the Himba, inhabit the Kaokoveld area of Namibia and parts of southern Angola.

The Herero formerly subsisted mainly on the milk and meat of large herds of cattle, sheep, and goats, which grazed the tree-studded grassland; following European contact in the mid-19th century, several groups came to depend on horticulture as well. They were originally divided into autonomous political units under local headmen. Local residential groups were formed around extended families based on patrilineal descent; matrilineal kinsmen, however, were also frequently attached. The Herero's clan organization, in which each person belonged to an exogamous patrilineal clan and to an exogamous matrilineal clan, is unusual. The preferred mate for a man is of his father's matrilineal clan; polygyny is common. Priestly offices of the patrilineal clan and the chieftainship descend through the male line, whereas livestock is inherited in both lines. Their traditional religion is a form of ancestor worship, but many Herero have adopted Christianity.

Hereroland, geographic region of eastern Namibia, encompassing part of the western Kalahari (desert) and bordering Botswana on the east.

Hereroland occupies a semiarid area of gently undulating terrain; all intermittent rainfall drains eastward. Deep sands through which groundwater is not easily obtained support only perennial grasses, low-lying shrubs, and thorny woodlands; cattle are nevertheless grazed in the region near boreholes that have been drilled to provide drinking water. The Herero people who inhabit the region are nomadic herders of cattle and also grow subsistence levels of corn (maize), millet, and cowpeas; poultry and sheep are also raised.

The Herero, though never large in numbers, from the 17th through the late 19th century often dominated the intensively cattle-grazed Central Highland north of Windhoek, the present-day territorial capital. Their rebellion against German colonial encroachment between 1904 and 1907 led to the extermination of three-fourths of their population and to the eventual resettlement of some of the survivors in the mostly inhospitable sand veld of contemporary Hereroland. The standard wearing apparel of Herero women remains a colourful, long Victorian dress and train characteristic of the 19th century, worn mostly by contemporary German missionary wives. The principal settlements in Hereroland are Okakarara and Otjinene.

heresy, a theological doctrine or system rejected as false by ecclesiastical authority.

Heresy differs from schism in that the heretic sometimes remains in the church despite his doctrinal errors, whereas the schismatic may be doctrinally orthodox but severs himself from the church. The Greek word *hairesis* (from which heresy is derived) was originally a neutral term that signified merely the holding of a particular set of philosophical opinions. Once appropriated by Christianity, however, the term heresy began to convey a note of disapproval. This was because the church from the start regarded itself as the custodian of a divinely imparted revelation which it alone was authorized to expound under the inspi-

ration of the Holy Spirit. Thus, any interpretation that differed from the official one was necessarily "heretical" in the new, pejorative sense of the word.

This attitude of hostility to heresy is evident in the New Testament itself. St. Paul, for instance, insists that his gospel is identical with that of the Twelve Apostles, and in the later books of the New Testament the contrast in attitudes regarding approved doctrines and heretical ones is even more sharply drawn. In the 2nd century the Christian church became increasingly aware of the need to keep its teaching uncontaminated, and it devised criteria to test deviations. The Apostolic Fathers, 2nd-century Christian writers, appealed to the prophets and Apostles as sources of authoritative doctrine, and Irenaeus and Tertullian laid great stress on "the rule of faith," which was a loose summary of essential Christian beliefs handed down from apostolic times. Later, the ecclesiastical and universal church council became the instrument for defining orthodoxy and condemning heresy. Eventually, in the Western church, the doctrinal decision of a council had to be ratified by the pope to be accepted.

During its early centuries, the Christian church dealt with many heresies. They included, among others, Docetism, Marcionism, Montanism, Adoptionism, Sabellianism, Arianism, Monophysitism, Pelagianism, and Gnosticism (*qq.v.*). *See also* Donatist.

Historically, the major means that the church had of combating heretics was to excommunicate them. In the 12th and 13th centuries, however, the Inquisition was established by the church to combat heresy; heretics who refused to recant after being tried by the church were handed over to the civil authorities for punishment, usually execution.

A new situation came about in the 16th century with the Reformation, which spelled the breakup of Western Christendom's previous doctrinal unity. The Roman Catholic church, satisfied that it is the true church armed with an infallible authority, has alone remained faithful to the ancient and medieval theory of heresy, and it occasionally denounces doctrines or opinions that it considers heretical. Most of the great Protestant churches similarly started with the assumption that their own particular doctrines embodied the final statement of Christian truth and were thus prepared to denounce as heretics those who differed with them. But with the gradual growth of toleration and the 20th-century ecumenical movement, most Protestant churches have drastically revised the notion of heresy as understood in the pre-Reformation church. It does not now seem to them inconsistent for a person to stoutly maintain the doctrines of his own communion while not regarding as heretics those who hold different views. The Roman Catholic church, too, draws a distinction between those who willfully and persistently adhere to doctrinal error and those who embrace it through no fault of their own, *e.g.*, as a result of upbringing in another tradition. The term heresy also has been used among Jews, although they have not been as intense as Christians in their punishment of heretics. The concept and combating of heresy has historically been less important in Buddhism, Hinduism, and Islām than in Christianity.

Hereward THE WAKE (fl. 1070–71), Anglo-Saxon rebel against William the Conqueror and the hero of many Norman and English legends. He is associated with a region in present-day Huntingdonshire and Northamptonshire.

In 1070, expecting a conquest of England by King Sweyn II of Denmark, Hereward and some followers joined a force of Danish sailors who had come to Ely. Together they sacked Peterborough Abbey, perhaps to prevent its treasures from falling into the hands of the new Norman abbot, Turold. Soon after, Sweyn made peace with William the Conqueror, and so the Danes returned home. Hereward, however, established himself on the Isle of Ely, which in 1071 became a refuge for Anglo-Saxon fugitives, notably Morcar, earl of Northumbria. William's forces eventually captured the isle after a methodical assault, but Hereward managed to escape. He is the hero of Charles Kingsley's last novel, *Hereward the Wake* (1866).

Herford, city, North Rhine-Westphalia *Land* (state), northwestern Germany. It is situated where the Aa River joins the Werre, north of the Teutoburger Wald (mountains). It originated around a Benedictine nunnery founded in about 789 and confirmed by the emperor Louis the Pious in 823; the abbess obtained from Frederick I a princely rank and a seat in the imperial Diet. Later a member of the Hanseatic League and a free imperial town, Herford fell to Brandenburg in 1647; it passed to Westphalia in 1807 and to Prussia in 1815. The old town has several medieval houses of stone and half-timber and numerous parks and gardens. Among its churches are the Romanesque Church of Münster and the Gothic Church of Mary (1325).

Predominantly an industrial city and a centre of German furniture production, Herford also manufactures clothing, carpets, cigars, machinery, metal products, and chocolate. Pop. (1989 est.) 61,700.

Hergesheimer, Joseph (b. Feb. 15, 1880, Philadelphia—d. April 25, 1954, Sea Isle City, N.J., U.S.), American author whose novels are typically concerned with the decadent and sophisticated milieu of the very wealthy.

After giving up the study of painting, Hergesheimer turned to writing. Beginning with *The Lay Anthony* (1914), he established himself as a popular and prolific writer of novels, short stories, biography, history, and criticism. His work is distinguished for the Baroque lushness of its descriptive passages and its often penetrating psychological insights. Of his novels, *The Three Black Pennys* (1917), the story of three generations of the wealthy, mine-owning Penny family; *Java Head* (1919); and *Balisand* (1924) are considered his best. In 1921 a motion picture based on his short story "Tol'able David" was made. His books lost both their critical approval and their popularity in the 1930s.

Herihor (fl. early 11th century BC), Egyptian army officer and usurping high priest of Amon, who founded a dynasty of priest-kings that ruled southern Egypt when the country became disunited in the last years of the 20th dynasty.

Herihor's origins are altogether obscure. He is believed to have advanced through the military ranks during the troubled reign of Ramses XI (last king of the 20th dynasty, ended 1075). It was probably Herihor who expelled the viceroy of Cush from Thebes around the 19th year of Ramses' reign. At the same time, he began a new dating scheme, probably to mark his own rise to power.

Herihor's moves to usurp the throne are clearly recorded in the temple of Khons in Thebes. Reliefs in the pillared hall depict his titles of high priest of Amon, general, and captain, but subsequently, in the forecourt of the temple, he took the full pharaonic title and completely ignored Ramses XI. Nonetheless, Ramses outlived Herihor by at least two years. *See also* Ramses XI.

Hering, (Karl) Ewald (Konstantin) (b. Aug. 5, 1834, Alt-Gersdorf, Saxony [Germany]—d. Jan. 26, 1918, Leipzig, Ger.), German physiologist and psychologist whose chief work concerned the physiology of colour perception. He taught at the University of Leipzig (1895), following professorships at the Josephs-Akademie, Vienna (1865–70), and at the University of Prague (1870–95). Hering challenged the colour-vision theory of Hermann von Helmholtz, postulating three types of receptors, each capable of a dual response to pairs of colours (yellow–blue, red–green, or black–white). He also investigated respiration and, with Josef Breuer in 1868, demonstrated the role of the vagus nerve in the regulation of breathing.

heriot, in European feudal society, the right of the lord to seize his tenant's best beast or other chattel on the tenant's death. The right grew out of the custom under which the lord lent horses and armour to those of his tenants who served him in battle. When a tenant died, the horse and equipment were returned to the lord. When the tenant became responsible for providing his own equipment, the lord claimed the right to heriot. There were various types of heriot. Heriot service was an incident of both free and unfree land tenure, *i.e.*, both unfree, or villein, tenants and free tenants were subject to the feudal lord's right of heriot. A tenant could make provision for the payment of heriot in his will, but if he died in battle no heriot was required.

Herisau, capital, Appenzell Ausser-Rhoden *demi-canton,* northeastern Switzerland. It lies along on the Glatt River, just southwest of Sankt Gallen. Its Church of St. Laurence was mentioned in the 10th century, although the present building dates from the 16th century. Above the town are the ruined castles of Rosenberg and Rosenburg. Herisau is a cattle market and also serves as a manufacturing centre for cotton textiles, paper, wood, blown glass, and metal goods. There are health resorts nearby, and the town is an excursion centre for tours of the Alpstein Säntis region. The people are German-speaking and largely Protestant. Pop. (1987 est.) 14,947.

Héristal (Belgium): *see* Herstal.

Heriz carpet, Heriz also spelled HERĪS, floor covering handmade in any of a group of villages near the town of Herīs, lying east of Tabriz in northwest Iran. Heriz carpets—primarily room-sized, stout, serviceable, and attractive—have found ready markets in Europe and the U.S. They are an offshoot, apparently, of the Tabrīz carpets, a country version

Heriz carpet from Iran, 20th century; in possession of Vojtech Blau, New York City

In the possession of Vojtech Blau, New York City; photograph, Otto E. Nelson—EB Inc.

of city styles. The smooth curves and flowing lines of a sophisticated Tabriz medallion system are translated into hard, geometric angles and broken contours. Repeat patterns occur less frequently, and a jagged vine and rosette border is characteristic.

Different phases of this production and individual subvarieties have been sold in the West under specific village names, such as Sarāb (or Serapi), which has light, rather bright colour schemes; Gorevan, in darker colours; Bakshāyesh; and Mehrabān. Heriz carpets are Ghiordes-knotted on a cotton foundation. From time to time there has been experimentation in the production of silk rugs—again influenced by the Tabrīz rug trade—in rather crude designs and bold colours. Heriz carpets as here described do not predate the late 19th century, at which time they apparently supplanted a rustic production for local use.

Herkimer, village, seat (1791) of Herkimer County, central New York, U.S., on the north bank of the Mohawk River, 14 miles (23 km) southeast of Utica. The site, settled about 1725 by Palatine Germans, was known as German Flats. Fort Dayton was built in 1776, and from there General Nicholas Herkimer departed for the Battle of Oriskany (Aug. 6, 1777), where he was mortally wounded; his home (1764), 12 miles (19 km) east of the village, is preserved as a state historic site. The village (incorporated 1807) is within the town (township) of Herkimer (organized 1788). The village is a shipping point for dairy products, and it is the seat of Herkimer County Community College (1966). Pop. (1984 est.) 8,349.

Herkimer, Nicholas (b. 1728, near Herkimer, N.Y.—d. Aug. 16, 1777, Little Falls, N.Y., U.S.), American general during the War of Independence who led American militiamen in the Battle of Oriskany (Aug. 6, 1777).

Herkimer grew up in New York's Mohawk Valley, which during the Revolution was sharply divided between patriots and Loyalists and was subject to ferocious Indian attacks. He became a lieutenant in the militia during the French and Indian War and rose to brigadier general at the outbreak of the War of Independence.

In 1777 Herkimer commanded a force of about 800 militiamen in an effort to relieve Fort Stanwix, threatened by a combined force of Loyalists and Indians. On August 6, near the present site of Oriskany, New York, Herkimer's force was ambushed, and the ensuing battle proved to be one of the bloodiest of the entire war. During the fight, Herkimer sustained a severe leg wound. He is said to have then directed his troops while sitting under a tree and smoking his pipe. The American militia retreated and carried Herkimer back to his home. There he died 10 days after the battle, following an ineptly performed amputation.

herm, Greek HERMA, in Greek religion, sacred object of stone connected with the cult of Hermes, the fertility god. According to some scholars, Hermes' name may be derived from the word *herma* (Greek: "stone," or "rock," such as a boundary or landmark). With the development of artistic taste and the conception of the gods as having human form, these objects tended to be replaced either by statues or by pillars that were generally square and tapering toward the bottom so as to suggest the human figure. These were usually surmounted by the head of Hermes (hence the name) and had a phallus. They were used not only as cult objects but also for a variety of other purposes, for example, as milestones or boundary marks. They were regarded with respect, if not actually worshiped. Herms also occur in Roman sculpture and may have heads of the forest god Silvanus or the chief god, Jupiter Terminus. In later times, all manner of fanciful herms were used as ornaments; both single and double herms existed, and the heads were not always those of gods. A tapered rectangular stone post topped with a portrait bust is now called a term; it is a standard element of architecture in the classical style.

Herman DE VALENCIENNES (fl. 12th century), French poet known for a scriptural poem that was very popular in his time. Born at Valenciennes, he became a priest and wrote the *Histoire de la Bible* (after 1189), including the Old and New Testaments in an abridged form, and a separate poem on the Assumption of the Virgin. The work is known as *Le Roman de sapience* ("The Story of Wisdom"). He selected biblical stories to suit his purpose and added freely from legendary sources, displaying skill in the use of his materials.

Herman, Woody, byname of WOODROW CHARLES HERMAN (b. May 16, 1913, Milwaukee, Wis., U.S.—d. Oct. 29, 1987, Los Angeles), American jazz clarinetist, saxophonist, vocalist, and bandleader.

Herman was a child prodigy who sang and played in vaudeville at six years of age and became a touring musician in 1930. From 1934 to 1936 he played in Isham Jones's band and became front man for several of its key musicians when Jones retired. He enjoyed great commercial success, and his 1939 recording of "Woodchopper's Ball" passed the million sales mark. The band was reorganized in 1943–44 and took the name the Thundering Herd. Known for its exuberance and technical brilliance, the original Herd was disbanded in 1946. Herman's next group, which lasted from 1947 to 1949, displayed extreme subtlety in its use of saxophones. This band, which pioneered the combination of three tenor saxophones and one baritone saxophone, became identified with the "Four Brothers sound" (for the song "Four Brothers" that popularized it). This sound was retained by the Herman big bands into the 1950s.

During the 1960s and '70s, Herman became stylistically more eclectic, using material by composers as diverse as Charles Mingus and the Beatles. He toured almost continuously throughout the 1970s and '80s. Herman was responsible for showcasing, early in their careers, the work of saxophonist Stan Getz, trombonist Bill Harris, arranger Ralph Burns, arranger Jimmy Giuffre (who wrote "Four Brothers"), and a string of outstanding tenor saxophonists.

hermandad (Spanish: "brotherhood"), in medieval Castile, any of a number of unions of municipalities organized for specific ends—normally for police purposes or for defense against the aggressions of magnates. They emerged in the 12th century as temporary associations but later became permanent. One of the most famous *hermandades* was that of Toledo, Talavera, and Villa Real. The mounted constables of the *hermandades* were known as *cuadrilleros.* Banditry and rural crime were their chief concern; they both apprehended and summarily tried suspects. Originally they were disliked by the crown, but Henry II accepted and regulated their organization and functions by royal decree (1370). During the reign of Henry IV the *hermandades* fell into decay, and the Catholic Monarchs suppressed them in 1476, substituting a highly organized constabulary for the whole kingdom, known as the Santa Hermandad, whose judicial powers were considerable and whose cost was borne only by nonnoble taxpayers. Discontent compelled the Catholic Monarchs to reduce the status and expense of the Santa Hermandad in 1498, but it survived as an inefficient rural police organization until the 18th century.

The famous Hermandad de las Marismas—a federation of northern Castilian and Basque ports—was concerned with protecting the trade and shipping of its members. It enjoyed wide powers from the end of the 13th century, negotiating directly with the kings of England and France as a diplomatic entity, but it was brought under royal control in 1490.

Hermann I (b. *c.* 1156—d. April 25, 1217, Gotha, Thuringia [Germany]), landgrave of Thuringia and count palatine of Saxony who helped defeat the Hohenstaufen emperor Henry VI's attempt to transform the German kingdom from an elective into a hereditary monarchy.

Hermann received the Saxon palatinate about 1180 from his brother Louis III. On Louis III's death (1190), the emperor Henry VI (who had wanted to seize Thuringia as a vacant fief) was forced by the German princes to grant it to Hermann. At the diet of Erfurt (October 1196) Hermann's opposition was decisive in forcing Henry to abandon his plan of making the German monarchy hereditary.

In the conflict between the Welf (Guelf) Otto IV and his Hohenstaufen opponents following the death of Henry VI, Hermann influenced the course of events by frequently changing sides. In 1198, when the Hohenstaufen Philip of Swabia and Otto IV were rival pretenders to the German crown, Otto secured Hermann's support by offering him more than Philip did. In 1204, however, Philip invaded Thuringia and compelled Hermann not only to change sides but also to surrender the acquisitions he had gained by siding with Otto in 1198. Hermann deserted the Hohenstaufen

Hermann I, detail of a miniature from his psalter
Archiv fur Kunst und Geschichte, Berlin

cause in 1208 but rejoined it in 1210, and in 1211 he was among the princes who invited Frederick of Hohenstaufen (later the emperor Frederick II) to come to Germany and assume the crown. When, as a result, Otto's forces attacked Thuringia, Hermann was saved by Frederick II's arrival in Germany in 1212.

Hermann VON REICHENAU, byname HERMANNUS CONTRACTUS, or HERMANN THE LAME (b. July 18, 1013, Saulgau, Swabia [Germany]—d. Sept. 24, 1054, Reichenau Monastery, Reichenau [Germany]), German chronicler, poet, composer, astronomer, and mathematician. A contemporary of the Holy Roman emperor Henry III, Hermann von Reichenau is historiographically important as a primary source for some events of his own time in Germany.

The son of a Swabian count, Hermann was lame from youth, hence his nickname. In 1020 he entered the school attached to the Benedictine abbey of Reichenau, in which he later became a monk and taught.

Hermann's main work is a world chronicle from the birth of Christ to 1054, based on a critical revision of a lost Swabian chronicle for the years up to 1039; it was continued to 1080 by his pupil Berthold, who also added a panegyric of Hermann.

Hermann also compiled a martyrology and a poem in several metres on the eight principal vices. On music, he wrote a theoretical treatise

in which he propounded his own system of notation with letters. He also wrote and set to music a series of saints' offices, one of which, for St. Afra, is extant. There are also hymns, sequences, and antiphons doubtfully ascribed to him. Hermann's main astronomical works are *De Utilitatibus Astrolabii* ("On the Uses of the Astrolabe") and *De Mensura Astrolabii* ("On Measurement with the Astrolabe").

Hermann VON SALZA (b. *c.* 1170—d. March 20, 1239, Salerno), German grand master (*Hochmeister*), from 1210 to 1239, of the organization of German crusaders called the Teutonic Order.

Born to a minor aristocratic family of Thuringia, Hermann had made his way by sheer ability to the powerful office of grand master of the Teutonic Order by 1210. He gradually earned the confidence and support of the Holy Roman emperor Frederick II (reigned 1220–50), whom he served as a diplomat and councillor. As grand master, Herman began to shift his Order's Christianizing and military activities away from the limited opportunities left in the Middle East in the wake of the failed late Crusades and toward the expanding pagan populations of eastern Europe. Hermann's first enterprise, in Hungary, failed when the Order was expelled from that region in 1225, but the Order was soon afterward (1226) invited by Conrad of Mazovia to conquer and convert the Prussians in the region of the Vistula River. Hermann obtained a land grant in the region from Conrad, as well as a charter from Frederick II confirming the Order's mission and sovereignty among the Prussians. Hermann eventually (1233) initiated a general campaign for the conquest of Prussia under the direction of the provincial Order leader Hermann Balk.

In 1230 Hermann von Salza played a key role in effecting a reconciliation between Frederick II and Pope Gregory IX, and in 1235 he helped resolve a conflict between Frederick and his rebellious oldest son, Henry. Trusted by pope and emperor alike, Hermann elevated the Teutonic Order to the height of its power; his farsighted policies enabled the Order to create in Prussia a strong feudal state that would survive until the mid-15th century.

Hermann, Eduard (b. Dec. 19, 1869, Coburg, Saxe-Coburg-Gotha—d. Feb. 14, 1950, Göttingen, W. Ger.), German linguist who specialized in comparative studies of Indo-European languages and whose exhaustive linguistic exegesis of passages from Homer is a model of its kind: *Sprachwissenschaftlicher Kommentar zu ausgewählten Stücken aus Homer* (1914; "Linguistic Commentary on Selected Passages from Homer").

In 1931 Hermann published *Lautgesetz und Analogie* ("Phonetic Law and Analogy"), discussing, in part, children's acquisition of language. He also did a significant follow-up study on sound-law change in a small Swiss village, Charmey. He held professorships successively at the universities of Kiel, Frankfurt, and Göttingen and published papers on widely varying linguistic subjects.

Hermannstadt (Romania): *see* Sibiu.

Hermansverk, village, and seat of Sogn og Fjordane *fylke* (county), west central Norway. On the northern bank of Sognafjorden, it is in Leikanger *herredskommune* (rural municipality). The smallest county seat in Norway, it is so designated because of its central location in the *fylke* and because Sogn og Fjordane has no incorporated cities to fill the role of an administrative centre. Pop. (1970) 706.

Hermansz, Jacob: *see* Arminius, Jacobus.

hermaphroditism, the condition of having both male and female reproductive organs. Hermaphroditic plants (as most flowering plants) are called monoecious or bisexual. Hermaphroditic animals, mostly invertebrates such as worms, bryozoans (moss animals), trematodes (flukes), snails, slugs, and barnacles, are usually parasitic, slow moving, or permanently attached to another animal or plant.

In human beings, hermaphroditism is an extremely rare sex anomaly in which gonads for both sexes are present, in which external genitalia may show traits of both sexes, and in which the chromosomes show male-female mosaicism (where one individual possesses both the male XY and female XX chromosome pairs). Choice of sex must be made at birth, usually on the basis of the condition of the external genitalia (*i.e.,* which sex organs predominate), after which surgery is performed to remove the gonads of the opposite sex. The remaining genitalia are then reconstructed to resemble those of the chosen sex. Individuals with the external appearance of one sex but the chromosomal constitution and reproductive organs of the opposite sex are examples of pseudohermaphroditism (*q.v.*).

Hermaphroditus, in Greek mythology, a being partly male, partly female. The idea of such a being originated in the East; in the Greek area it appeared in Cyprus, and, although it was a favourite subject in later Greek art, it was of no importance as a Greek cult. A legend of the Hellenistic period made Hermaphroditus a beautiful youth, the son of Hermes and Aphrodite. The nymph of the fountain of Salmacis in Caria became enamoured of him and entreated the gods that she might be forever united with him. The result was the formation of a being half man, half woman.

Hermas, Shepherd of (Christian literature): *see* Shepherd of Hermas.

Hermenegild, SAINT (d. April 13, 585, Tarragona, Kingdom of the Visigoths; canonized 1585; feast day April 13), Visigothic prince, son of Leovigild of Spain. Brought up in the Arian heresy, Hermenegild married (579) a daughter of Sigebert I of Austrasia, Ingund, a zealous orthodox Catholic. Given a separate command at his father's siege of Byzantine-held Seville, he was converted through the efforts of his wife and of the bishop of Seville, St. Leander, and almost immediately rebelled against his father. He was aided initially by the Byzantines, but Leovigild succeeded in buying them off, and Hermenegild was captured and beheaded. Most contemporary writers suggested that Hermenegild was executed as a rebel, but Pope Gregory I, in his *Dialogues,* stated that he was killed for refusing to receive communion from an Arian bishop.

hermeneutics, the study of the general principles of biblical interpretation. For both Jews and Christians throughout their histories, the primary purpose of hermeneutics, and of the exegetical methods employed in interpretation, has been to discover the truths and values of the Bible.

A brief treatment of hermeneutics follows. For full treatment, *see* MACROPAEDIA: Biblical Literature and Its Critical Interpretation.

The sacred status of the Bible in Judaism and Christianity rests upon the conviction that it is a receptacle of divine revelation. This understanding of the Bible as the word of God, however, has not generated one uniform hermeneutical principle for its interpretation. Some persons have argued that the interpretation of the Bible must always be literal because the word of God is explicit and complete; others have insisted that the biblical words must always have a deeper "spiritual" meaning because God's message and truth is self-evidently profound. Still others have maintained that some parts of the Bible must be treated literally and some figuratively. In the history of biblical interpretation, four major types of hermeneutics have emerged: the literal, moral, allegorical, and anagogical.

Literal interpretation asserts that a biblical text is to be interpreted according to the "plain meaning" conveyed by its grammatical construction and historical context. The literal meaning is held to correspond to the intention of the authors. This type of hermeneutics is often, but not necessarily, associated with belief in the verbal inspiration of the Bible, according to which the individual words of the divine message were divinely chosen. Extreme forms of this view are criticized on the ground that they do not account adequately for the evident individuality of style and vocabulary found in the various biblical authors. Jerome, an influential 4th-century biblical scholar, championed the literal interpretation of the Bible in opposition to what he regarded as the excesses of allegorical interpretation. The primacy of the literal sense was later advocated by such diverse figures as Thomas Aquinas, Nicholas of Lyra, John Colet, Martin Luther, and John Calvin.

A second type of biblical hermeneutics is moral interpretation, which seeks to establish exegetical principles by which ethical lessons may be drawn from the various parts of the Bible. Allegorization was often employed in this endeavour. The *Letter of Barnabas* (about 100 AD), for example, interprets the food laws prescribed in the Book of Leviticus as forbidding not the flesh of certain animals but rather the vices imaginatively associated with those animals.

Allegorical interpretation, a third type of hermeneutics, interprets the biblical narratives as having a second level of reference beyond those persons, things, and events explicitly mentioned in the text. A particular form of allegorical interpretation is the typological, according to which the key figures, main events, and principal institutions of the Old Testament are seen as "types" or foreshadowings of persons, events, and objects in the New Testament. According to this theory, interpretations such as that of Noah's ark as a "type" of the Christian church have been intended by God from the beginning.

Philo, a Jewish philosopher and contemporary of Jesus, employed Platonic and Stoic categories to interpret the Jewish scriptures. His general practices were adopted by the Christian Clement of Alexandria, who sought the allegorical sense of biblical texts. Clement discovered deep philosophical truths in the plain-sounding narratives and precepts of the Bible. His successor, Origen, systematized these hermeneutical principles. Origen distinguished the literal, moral, and spiritual senses but acknowledged the spiritual (*i.e.,* allegorical) to be the highest. In the Middle Ages, Origen's threefold sense of scripture was expanded into a fourfold sense by a subdivision of the spiritual sense into the allegorical and the anagogical.

The fourth major type of biblical hermeneutics is the anagogical or mystical interpretation. This mode of interpretation seeks to explain biblical events as they relate to or prefigure the life to come. Such an approach to the Bible is exemplified by the Jewish Kabbala, which sought to disclose the mystical significance of the numerical values of Hebrew letters and words. A chief example of such mystical interpretation in Judaism is the medieval *Zohar.* In Christianity, many of the interpretations associated with Mariology fall into the anagogical category.

In the modern as in other periods, shifts in hermeneutical emphases reflected broader academic and philosophical trends; historical-critical, existential, and structural interpretation have figured prominently during the 20th century. On the nonacademic level, the interpretation of prophetic and apocalyptic biblical

material in terms of present-day events remains a vigorous pursuit in some circles. *See also* exegesis.

Hermes, Greek god, son of Zeus and Maia; often identified with the Roman Mercury (*q.v.*) and with Casmilus or Cadmilus, one of the Cabeiri (*q.v.*). His name is probably derived from *herma* (*see* herm), the Greek word for a heap of stones, such as was used in the country to indicate boundaries or as a landmark. The earliest centre of his cult was probably Arcadia, where Mt. Cyllene was reputed to be his birthplace. There he was especially worshipped as the god of fertility, and his images were ithyphallic.

Hermes leading a satyr chorus, vase by Douris, 5th century BC; in the British Museum

By courtesy of the trustees of the British Museum

Both in literature and cult Hermes was constantly associated with the protection of cattle and sheep, and he was often closely connected with deities of vegetation, especially Pan and the nymphs. In the *Odyssey,* however, he appears mainly as the messenger of the gods and the conductor of the dead to Hades. Hermes was also a dream god, and the Greeks offered to him the last libation before sleep. As a messenger, he may also have become the god of roads and doorways, and he was the protector of travellers. Treasure casually found was his gift, and any stroke of good luck was attributed to him; this conception and his function as a deity of gain, honest or dishonest, are natural derivatives of his character as a god of fertility. In many respects he was Apollo's counterpart; like him, Hermes was a patron of music and was credited with the invention of the kithara and sometimes of music itself. He was also god of eloquence and presided over some kinds of popular divination.

The sacred number of Hermes was four, and the fourth day of the month was his birthday. In archaic art, apart from the stylized herms, he was portrayed as a full-grown and bearded man, clothed in a long tunic and often wearing a cap and winged boots. Sometimes he was represented in his pastoral character, bearing a sheep on his shoulders; at other times he appeared as the messenger of the gods with the kērykeion, or herald's staff (*see* caduceus), which was his most frequent attribute. From the latter part of the 5th century BC he was portrayed as a nude and beardless youth, a young athlete.

Hermes, asteroid whose eccentric orbit brings it nearer the Earth than any other observed minor planet, discovered in 1937 by Karl Wilhelm Reinmuth of Germany. In January 1938 it approached within about 780,000 kilometres (485,000 miles) of Earth; announcement of this near passage occasioned some fear that it might collide with Earth.

Hermes, Georg (b. April 22, 1775, Dreierwalde, Münster—d. May 26, 1831, Bonn), German Roman Catholic theologian, originator of the theological system called Hermesianism, which attempted to demonstrate the rational necessity of Christianity. His theology was deeply influenced by the philosophical works of Immanuel Kant and J.G. Fichte.

Educated at the University of Münster, Hermes was ordained in 1799 and later became a professor of dogmatic theology there. In 1819 he was appointed professor at the University of Bonn, whence his doctrines spread throughout Germany.

Einleitung in die christkatholische Theologie (1819–29; "Introduction to the Catholic Theology") sought to establish a rational certainty for the principal tenets of the Christian faith, such as the existence of God. His *Christkatholische Dogmatik* ("Catholic Dogmatics"), published posthumously in three volumes (1834–35), derived the "necessity" of the contents of Catholic faith from the imperatives of duty and conscience. While popular during his lifetime, Hermes' works were sharply opposed after his death, and his orthodoxy was questioned. His major writings were placed on the *Index of Forbidden Books,* and his theology was condemned by Pope Gregory XVI (1835). The censure was reaffirmed by the first Vatican Council (1869–70).

Hermetic writings, also called HERMETICA, works of revelation on occult, theological, and philosophical subjects ascribed to the Egyptian god Thoth (Greek Hermes Trismegistos [Hermes the Thrice-Greatest]), who was believed to be the inventor of writing and the patron of all the arts dependent on writing. The collection, written in Greek and Latin, probably dates from the middle of the 1st to the end of the 3rd century AD. It was written in the form of Platonic dialogues and falls into two main classes: "popular" Hermetism, which deals with astrology and the other occult sciences; and "learned" Hermetism, which is concerned with theology and philosophy.

From the Renaissance until the end of the 19th century, popular Hermetic literature received little scholarly attention. More recent study, however, has shown that its development preceded that of learned Hermetism and that it reflects ideas and beliefs that were widely held in the early Roman Empire and are therefore significant for the religious and intellectual history of the time.

In the Hellenistic age there was a growing distrust of traditional Greek rationalism and a breaking down of the distinction between science and religion. Hermes-Thoth was but one of the gods and prophets (chiefly Oriental) to whom men turned for a divinely revealed wisdom.

In this period the works ascribed to Hermes Trismegistos were primarily on astrology; to these were later added treatises on medicine, alchemy (the *Emerald Tablet,* a favourite source for medieval alchemists), and magic. The underlying concept of astrology—that the cosmos constituted a unity and that all parts of it were interdependent—was basic also to the other occult sciences. To make this principle effective in practice (and Hermetic "science" was intensely utilitarian), it was necessary to know the laws of sympathy and antipathy by which the parts of the universe were related. But because these assumed affinities did not, in fact, exist and hence could not be discovered by ordinary scientific methods, recourse had to be made to divine revelation. The aim of Hermetism, like that of Gnosticism (a contemporary religious-philosophical movement), was the deification or rebirth of man through the knowledge (gnosis) of the one transcendent God, the world, and men.

The theological writings are represented chiefly by the 17 treatises of the *Corpus Hermeticum,* by extensive fragments in the writings of Stobaeus, and by a Latin translation of the *Asclepius,* preserved among the works of Apuleius. Though the setting of these is Egyptian, the philosophy is Greek. The Hermetic writings, in fact, present a fusion of Eastern religious elements with Platonic, Stoic, and Neo-Pythagorean philosophies. It is unlikely, however, that there was any well-defined Hermetic community, or "church."

Hermetism was extensively cultivated by the Arabs, and through them it reached and influenced the West. There are frequent allusions to Hermes Trismegistos in late medieval and in Renaissance literature.

To make the best use of the Britannica, consult the INDEX *first*

Hermeticism, Italian ERMETISMO, modernist poetic movement originating in Italy in the early 20th century, whose works were characterized by unorthodox structure, illogical sequences, and highly subjective language. Although it influenced a wide circle of poets, even outside Italy, it remained inaccessible to the larger public.

Hermeticism originated in the 19th-century poetry and poetic theory of Novalis and Poe as used by the French Symbolist poets, particularly Baudelaire, Mallarmé, Valéry, and Rimbaud. The term was particularly applied to the 20th-century Italian poets whose forerunner was Arturo Onofri and whose primary exponent and leader was Giuseppe Ungaretti. The formalistic devices of Hermeticism were partly an outgrowth of Futurism, a short-lived but influential movement that encouraged innovation in literary language and content. The cryptic brevity, obscurity, and involution of the Hermetics were forced upon them, however, by the intensive control over literature exerted by the Fascist regime in the interwar period.

Although two other poets who were to gain international repute, Salvatore Quasimodo and Eugenio Montale, were associated with the movement, its initial leader was Ungaretti, whose education in Paris had introduced him to French Symbolism. In his first volume of poems, *Il porto sepolto* (1916; "The Buried Port"), Ungaretti introduced an intense, purified sort of short lyric, from which punctuation, syntax, and structure had been eliminated to stress the evocative power of individual words. Montale (with *Ossia di seppia,* 1925; "Cuttlefish Bones") and later Quasimodo (with *Acque e terre,* 1930; "Waters and Lands") became his disciples. Ungaretti's *Sentimento del tempo* (1933; "The Feeling of Time") had an obscurity and abstruse symbolism that caused the critic Francesco Flora to name the movement, in a series of essays collected as *La poesia ermetica* (1936), after Hermes Trismegistos, reputed author of occult symbolic works and inventor of a magical airtight seal.

After World War II all three of Hermeticism's major poets developed their own individual styles: Ungaretti incorporating more structure, and a more straightforward tone; Montale moving in the direction of greater human warmth and simplicity; and Quasimodo writing powerful, socially committed works. Quasimodo won the Nobel Prize in 1959, and Montale received it in 1975. Some Italian poets such as Leonardo Sinisgalli, Alfonso Gatto, and Mario Luzi persisted in the introverted, formalized Hermetic style, but its great poets had already passed on to work that was more universal.

hermit, also called EREMITE, one who retires from society, primarily for religious reasons, and lives in solitude. In Christianity the word (from Greek *erēmitēs,* "living in the desert") is used interchangeably with anchorite, although the two were originally distinguished on the

basis of location: an anchorite selected a cell attached to a church or near a populous centre, while a hermit retired to the wilderness.

The first Christian hermits appeared by the end of the 3rd century in Egypt, where one reaction to the persecution of Christians by the Roman emperor Decius was flight into the desert to preserve the faith and to lead a life of prayer and penance. Paul of Thebes, who fled to the desert about 250, has been considered the first hermit.

The excessive austerity and other extremes of the early hermits' lives were tempered by the establishment of cenobite (common life) communities. The foundation was thus laid in the 4th century for the institution of monasticism (*i.e.,* monks living a common life according to an established rule). The eremitic life eventually died out in Western Christianity, but it has continued in Eastern Christianity. *See also* monasticism.

hermit, any of several hummingbird species of the genus *Phaethornis. See* hummingbird.

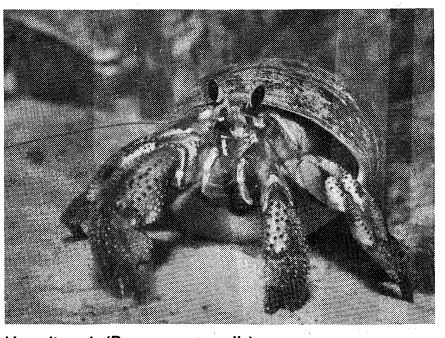
hermit crab, any crab of the families Paguridae and Coenobitidae (order Decapoda of the subclass Crustacea). The crabs use empty snail shells (*e.g.,* whelk or periwinkle) or other hollow objects as a shelter for partial containment and protection of the body.

Hermit crabs, worldwide in distribution, occur in sandy- or muddy-bottomed waters and occasionally on land and in trees. The soft abdomen is asymmetrical, usually curling to the right. There are two pairs of antennae and four pairs of legs. The first pair of legs is modified to form chelae, or pincers—the right one usually larger—that are shaped so as to cover the shell entrance when the animal is inside. The crab walks on its second and third pairs of legs and uses its last pair, on the end of the abdomen, to grip the central column of the shell.

Abdominal appendages in the female carry the eggs, which are held there until they hatch; the young immediately pass into the water and search for their own shells. As the crab grows, it periodically leaves its shell and finds and moves into a larger one.

Some hermit crabs live in the tubes of plant stems. Semiterrestrial, tropical species of *Coenobita* inhabit sections of bamboo stems, broken coconut shells, and other articles, in addition to seashells. *Pylocheles,* a deepwater crab of the Indian Ocean, lives in bamboo sections; *Xylopargus,* found in West Indian waters at depths of 180 to 360 m (600 to 1,200 feet), lives in hollow cylinders of wood. Other species make homes in coral or sponge.

Some species live in close association with other animals. *Pagurus* (*Eupagurus*) *bernhardus,* a common, bright red hermit crab of European and North American coastal waters, often carries one or more anemones on its shell. The robber crab (*q.v.*), native to islands of the South Pacific, is a terrestrial species that has discarded the shell-dwelling habit.



Hermit crab (*Pagurus samuelis*)
Russ Kinne—Photo Researchers/EB Inc.

Pagurus pollicaris, the so-called large hermit crab of the Atlantic coastal waters of North America, is reddish brown and about 10 to 12 cm (4 to 5 inches) long. *P. longicarpus,* the small hermit crab, occurs in U.S. Atlantic coastal waters and has cylindrical pincers.

Hermitage, in full STATE HERMITAGE, Russian GOSUDARSTVENNY ERMITAZH, art museum in Leningrad (formerly St. Petersburg) founded in 1764 by Catherine the Great as a court museum. It adjoined the Winter Palace and served as a private gallery for the art amassed by the empress. Under Nicholas I the Hermitage was reconstructed (1840–52), and it was opened to the public in 1852. Following the October Revolution of 1917, the imperial collections became public property. The museum is housed within five interconnected buildings, including the Winter Palace (1754–62) and the Small, Old, and New Hermitages.

The Hermitage has a rich collection of western European painting since the Middle Ages, including many masterpieces by Renaissance Italian and Baroque Dutch, Flemish, and French painters. Russian art is well represented. The Hermitage also has extensive holdings of Oriental art, especially noteworthy being its collection of the art of Central Asia.

Hermite, Charles (b. Dec. 24, 1822, Dieuze, Fr.—d. Jan. 14, 1901, Paris), French mathematician whose work in the theory of functions includes the application of elliptic functions to provide the first solution to the general equation of the fifth degree, the quintic equation.

Hermite
By courtesy of the Archives de l'Academie des Sciences de Paris; photograph, J. Colomb-Gerard, Paris

Although Hermite had proved himself a creative mathematician at the age of 20, his difficulty in passing his formal examinations forced him to devote five of his most productive years to preparing for his examination for the bachelor of science degree, which he obtained in 1848. He was given a minor teaching position at the École Polytechnique, Paris, before being appointed to the Collège de France, Paris, in the same year. It was not until 1869, with his appointment as professor at the École Normale, Paris, that he attained a position commensurate with his ability. In 1870 he became professor of higher algebra at the Sorbonne.

In 1873 Hermite published the first proof that *e* is a transcendental number; *i.e.,* it is not the root of any algebraic equation with rational coefficients.

Hermite was a major figure in the development of the theory of algebraic forms, the arithmetical theory of quadratic forms, and the theories of elliptic and Abelian functions. He first studied the representation of integers in what are now called Hermitian forms. His famous solution of the general quintic equation appeared in *Sur la résolution de l'équation du cinquième degré* (1858; "On the Solution of the Equation of the Fifth Degree"). Many late 19th-century mathematicians first gained recognition for their work largely through the encouragement and publicity supplied by Hermite.

Hermocrates (d. 408/407 BC), leader of the moderate democrats of Syracuse, Sicily; he played an important role in saving the city from conquest by the Athenians between 415 and 413 B.C.

In 424, during the Peloponnesian War (431–404) between Athens and Sparta, Hermocrates persuaded the cities of Sicily to agree to make peace, thus ending the three-year war between his city and Sicily's pro-Athenian towns. The Athenian forces, which had been sent to Sicily to support Greek settlements there, were forced to withdraw. In 415, however, the Athenians returned to besiege Syracuse with a larger army. Hermocrates headed the Syracusan defense—with limited success—until the Spartan officer Gylippus arrived with reinforcements. After the Athenian fleet was crushed in the final sea battle in the harbour at Syracuse (413), Hermocrates tricked the Athenians' army into delaying its retreat, thus giving the Syracusans time to block the escape routes. Soon after the Athenian army surrendered, Hermocrates sailed with a small squadron of Syracusan ships to help Sparta fight against Athens in the eastern Aegean Sea (412–410). In his absence the radical democrat Diocles seized power in Syracuse. Declared an exile, Hermocrates was killed attempting to force his way back in the winter of 408–407.

Hermon, Mount, Arabic JABAL ASH-SHAYKH, snowcapped ridge on the Lebanon–Syria border west of Damascus. It rises to 9,232 feet (2,814 m) and is the highest point on the east coast of the Mediterranean Sea. It is sometimes considered the southernmost extension of the Anti-Lebanon range. At its foot rise the two major sources of the Jordan River. Hermon has also been known historically as Sirion and Senir. A sacred landmark in Hittite, Palestinian, and Roman times, it represented the northwestern limit of Israelite conquest under Moses and Joshua. On its slopes are temples with Greek inscriptions dating from about AD 200.

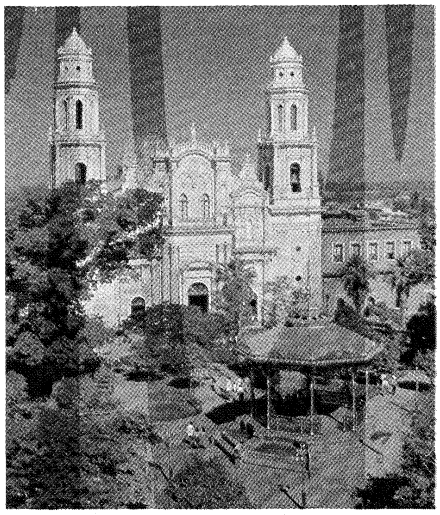
Since the Arab–Israeli War of June 1967, about 40 square miles (100 square km) of Mount Hermon's southern and western slopes have been part of the Israeli-administered Golan Heights (*q.v.*); they have been developed for recreational use, especially skiing.

Hermonthis (Greek), Egyptian PER-MONTH, modern ARMANT, ancient town in Upper Egypt, near Thebes on the west bank of the Nile. It was the seat of a sun cult and was a crowning place of kings. The war god Mentu was worshiped there in hawk-headed human form and also in his epiphany, the bull Buchis. Hermonthis was the original home of the rulers of Thebes who reunited Egypt after the First Intermediate Period (*c.* 2130–1939 BC). Excavations (1929–38) uncovered the Bucheum (the necropolis of the mummified Buchis bulls), cemeteries of various periods from the predynastic downward, and part of the town area, including the temple of Mentu.

Hermopolis Magna, modern AL-ASHMŪNAYN, ancient town of Upper Egypt, located on the Nile River south of al-Minyā in al-Minyā *muḥāfaẓah* (governorate). It was known as Khmunu ("City of the Eight") and was the capital of the Hare nome (province), the 15th nome of Upper Egypt. The great deity worshiped there was Thoth, god of learning and patron of scribes. The extensive site has been partly explored. The German Hermopolis expedition (1929–39) uncovered part of the temple of Thoth as well as considerable remains of Hellenistic and Roman times. In the necropolis on the west bank at Tunah al-Jabal, an Egyptian University expedition (1930–39) discovered a labyrinth of underground streets and catacombs connected with cults sacred to Thoth. The necropolis also contained the well-known tomb of Petosiris, high priest of Thoth in the time of Alexander the Great.

Cereals, dates, and sugarcane are now produced in the area. Pop. (1966) 7,125.

Hermosillo, city, capital of Sonora state, northwestern Mexico. Situated on the coastal plain, at an elevation of 778 ft (237 m) above



The cathedral at Hermosillo, Mex.
Ray Manley—Shostal/EB Inc.

sea level, near the confluence of the Sonora and San Miguel rivers, it is south of Nogales on the Mexico–U.S. border and east of Kino Bay on the Gulf of California coast. In addition to its administrative functions, Hermosillo is an important commercial and manufacturing centre for the surrounding irrigated farmlands, which yield fruit, wheat, cotton, corn (maize), and beans. Cattle are also raised.

Modern buildings contrast with those of Spanish colonial design in Hermosillo. The city houses the University of Sonora (1938) and is also a popular winter resort. Copper is mined nearby. Major highways and railroads linking Mexicali and Nogales with Mexico City pass through Hermosillo, which also has an airport. Pop. (1980) 297,175.

Hermoúpolis, Modern Greek ERMOÚPOLIS, chief port of the island of Syros, which forms part of the Cyclades group of Greek islands in the Aegean Sea. The city is also the capital of the *nomós* (department) of Cyclades. The seat of both a Greek Orthodox and a Roman Catholic archbishopric, it was founded in 1821 at the beginning of the War of Greek Independence by Greek refugees from Psará and Chios. The city's classical-revival architecture reflects its former importance as a Greek trading centre. The Catholic quarter, Áno (Upper) Síros, on the south hill, has many descendants of the Venetian and Genoan 13th-century settlers who remained under the Turks with protection from the kings of France. On the north hill is the Greek Orthodox quarter, Vrontado. Still the most active port in the Cyclades, Hermoúpolis has dry-dock facilities, ironworks, cotton mills, and tanning industries. Pop. (1981) 13,877.

Hernández, Gregorio, also called GREGORIO FERNÁNDEZ (b. *c.* 1576, Sarria?, Spain—d. Jan. 22, 1636, Valladolid), Spanish sculptor whose works are among the finest examples of polychromed wood sculpture created during the Baroque period. His images are characterized by their emotional intensity, spiritual expressiveness, and sense of dramatic gravity, as well as by their illusionistic realism.

Many of his best known statues, such as "St. Veronica" (1614) and the "Pietà" (1617), were once part of sculptural groups for *pasos,* or floats with scenes from the Passion, which are carried by Spanish religious confraternities during Holy Week processions. One of his iconographical innovations was that of depicting the dead Christ stretched out on a sheet, a well-known example being at the Capuchin monastery of S. Cristo at El Pardo near Madrid (1605). Besides devotional images and *pasos,* Hernández executed many altarpieces. Among the most important are those at S. Miguel (1606) and the Convento de las Huelgas (1616) in Valladolid, at the Colegiata de S. Pedro in Lerma (1615), and the high altar for the cathedral at Plasencia (1624–34).

Hernández, José (b. Nov. 10, 1834, Chacra de Pueyrredón, Buenos Aires—d. Oct. 21, 1886, Belgrano, near Buenos Aires), Argen-

José Hernández
By courtesy of the Archivo General de la Nacion, Buenos Aires

tine poet, best known for his depiction of the gauchos.

At the age of 14, because of illness, he left Buenos Aires to live in the pampas, where he learned the ways of the gauchos. From 1853 to 1868 he took part in the provinces' political struggle with Buenos Aires. After the unsuccessful revolt against Pres. Domingo Sarmiento's government in 1870, Hernández fled to Brazil (January 1871). On returning to Buenos Aires, he published *El gaucho Martín Fierro* (1872; *The Gaucho Martin Fierro,* 1974), a work depicting the life of a persecuted gaucho; it is recognized as the best example of gaucho poetry. In the poetic narrative's second part, *La vuelta de Martín Fierro* (1879; "The Return of Martín Fierro"), the gaucho hero is reintegrated into the society he had abandoned.

Hermoúpolis on the east coast of the island of Syros, Greece
Benachi—FPG/EB Inc.

Hernández, Miguel (b. Oct. 30, 1910, Orihuela, Spain—d. March 28, 1942, Alicante), Spanish poet and dramatist who combined traditional lyric forms with 20th-century subjectivity.

A goatherd in his youth, Hernández joined the Spanish Communist Party in 1936 and fought in the Civil War (1936–39). Condemned to death by the Nationalists after the war, his sentence was commuted to life imprisonment after international protests. He died in prison soon afterward, at the age of 31. Hernández's predominant themes are love—particularly of a sorrowful nature—war, death, and social injustice. Beginning with a rich, Góngoristic style, his poetry became more intimate, simple, and tragic later in life.

His first collection of poetry is the elaborate *Perito en lunas* (1933; "Connoisseur of Moons"). The poet sounds a tragic and lyric note in his best work, *El rayo que no cesa* (1936; "The Never-Ending Lightning"), a collection mostly of sonnets of great classical purity. *El hombre acecha* (1939; "The Man Who Lurks") is a desolate book full of the horror of war and prison. The posthumous *Cancionero y romancero de ausencias* (1958; *Songbook of Absences*) contains poems and lullabies he wrote in prison for his starving wife and son and is filled with passion and sorrow.

In addition to verse, Hernández also produced dramatic works. Several one-act plays of propaganda appeared during the Civil War, the most notable of which is *Pastor de la muerte* (1938; "Shepherd of Death").

Hernández Colón, Rafael (b. Oct. 24, 1936, Ponce, P.R.), governor of Puerto Rico from 1973 to 1977.

Hernández Colón was a graduate of Johns Hopkins University (1956) and of the University of Puerto Rico Law School. In his school days he wrote an undergraduate thesis on the political relationship between Puerto Rico and the United States, a topic that he continued to develop throughout his career. He was a protégé of Luis Muñoz Marín and followed the Popular Democratic party's backing of commonwealth status, asserting that either statehood or independence would result in the island's economic and political ruin.

As governor, Hernández wanted to make Puerto Rico less dependent economically on the United States; he sought a greater Puerto Rican role in world trade, immigration control, communications, and transport while favouring the commonwealth's retention of American citizenship, common defense arrangements, and a common economic market. In 1975 he embarked upon a massive housing program, increasing the commonwealth's public works budget by 20 percent to $600,000,000. He vigorously opposed Cuban intervention in the island's affairs, alleging that there were ties between the Fidel Castro regime and the Puerto Rican Socialist Party. Immediately before the inauguration of his successor, Carlos Romero Barceló, he reacted strongly to U.S. Pres. Gerald R. Ford's call for the admission of Puerto Rico to the Union as the 51st state. His assertion that statehood contradicted the United States commitment to Puerto Rican self-determination was endorsed by U.S. Pres. Jimmy Carter.

Herne, city, Nordrhein-Westfalen *Land* (North Rhine-Westphalia state), western West

Germany, at the junction of the Rhine-Herne-Kanal and the Dortmund-Ems-Kanal, about 10 mi (16 km) west of Dortmund, in the industrial Ruhr district. Known as Haranni in the 10th century, it remained a small village until the discovery of coal in the 19th century stimulated its rapid growth. It was chartered in 1897 and is now an industrial centre with coal mines, foundries, and textile factories. In 1975 Herne incorporated the neighbouring city of Wanne-Eickel, which had been formed in 1926 through the amalgamation of the towns of Wanne and Eickel. An important traffic centre of the Ruhr, the area that was formerly Wanne-Eickel has coal mining, ironworking, brewing, and chemical industries. Pop. (1983 est.) 178,911.

Herne THE HUNTER, phantom hunter who haunts Windsor Great Park, impersonated by Falstaff in Shakespeare's *The Merry Wives of Windsor.* Though Herne may have been an actual keeper of the forest, he is probably a local manifestation of the Wild Huntsman myth known throughout the world. The usual story associated with the Wild Hunt involves someone excessively fond of the chase who makes a rash pledge or compact with a stranger (the devil) and is thus doomed to hunt forever. Herne is said to ride at night, especially during storms; he wears horns, rattles chains, blasts trees and cattle, and occasionally appears to mortals.

Herne the Hunter (right), print by George Cruikshank, 1843
The Mansell Collection

Herne's oak, in his favourite haunt, was supposedly almost 700 years old when it was blown down in 1863; it was replaced with a young oak given by Queen Victoria.

Herne, James A., original name JAMES AHERN (b. Feb. 1, 1839, Troy, N.Y., U.S.—d. June 2, 1901, New York City), U.S. playwright who helped bridge the gap between 19th-century melodrama and the 20th-century drama of ideas.

After several years as a travelling actor, Herne scored an impressive success with his first play, *Hearts of Oak* (1879), written with the young David Belasco. Subsequent dramas, *Drifting Apart* (1885), *The Minute Men* (1886), and *Margaret Fleming* (1890), did not achieve the same popularity. *Margaret Fleming*, a drama of marital infidelity, has been judged his major achievement. Herne's most popular play, *Shore Acres*, was first presented in 1892. Herne was especially strong in character delineation.

Herne Bay, locality, Canterbury district, on the north coast of the county of Kent, southeastern England. It grew rapidly after the railway linked it with London in 1833. Reculver (3 mi [5 km] east) is the site of the Roman station Regulbium. There also stand twin towers called "The Sisters," the remains of a church taken down in 1806, now preserved as a landmark for mariners. Pop. (1981 prelim.) 27,528.

hernia, protrusion of an organ or tissue from its normal cavity. The herniation may be of any of a number of the bodily tissues. Brain tissue, for example, may protrude through a defect in the skull. The protrusion may extend outside the body or between cavities within the body, as when loops of intestine escape from the abdominal cavity into the chest through a defect in the diaphragm, the muscular partition between the two cavities. The term is usually applied, however, to an external herniation of tissue through the abdominal wall.

An abdominal hernia, or rupture, may occur at any weak point in the abdominal wall. The common sites are the groin (inguinal), the upper part of the thigh (femoral), and the navel (umbilical). Hernias may be congenital or may be acquired later in life.

In inguinal hernia, the protruding tissue descends along the canal that holds the spermatic cord in the male and the round ligament in the female. If such a hernia occurs bilaterally, it is called a double hernia. A femoral hernia lies on the inner side of the large femoral blood vessels. An umbilical hernia protrudes through the navel.

A hernia may be present at birth as the result of defective development of the abdominal wall, or it may occur later in life as the result of a strain or injury. An acquired hernia usually is caused by overexertion, as in lifting a heavy weight, jumping off a high wall, or violent coughing. Men develop hernias more frequently than do women because of their greater physical exertions and because the canal for the spermatic cord leading through the abdominal wall is wider than the canal for the round ligament. A special type of acquired hernia is the incisional hernia, which occurs at an incision after surgery.

The hernia may be classified as reducible, irreducible, or strangulated. A reducible hernia is one in which the contents can be pushed back into the abdomen and often may be held in place by a truss. A reducible hernia may increase in size or may form adhesions, becoming irreducible. A strangulated hernia is one in which the circulation of blood through the hernial contents is impeded by the pinching at the narrowest part of the passage. Congestion is followed by inflammation, infection, and gangrene. The tighter the constriction, the more rapidly these events take place; unrelieved strangulation may be fatal within a few hours or days. Surgery is often necessary for the permanent relief of reducible hernia, and it is the only safe treatment for more advanced forms.

herniated disk, also called PROTRUDED DISK, or SLIPPED DISK, intervertebral disk the rubbery centre or nucleus of which has slipped out from between the vertebrae so that it presses against the spinal cord. This displacement causes pain in the arms if the protrusion occurs at the level of the neck (between fifth and sixth or sixth and seventh cervical vertebrae) or pain in the lower back and in the legs if the protrusion occurs low in the backbone (usually between the fourth and fifth lumbar vertebrae or between the fifth lumbar and first sacral vertebrae). Treatment, depending on severity, may include bed rest, analgesic medication (*e.g.*, aspirin), traction, orthopedic support, and physical therapy or, if the pain requires it, surgical removal of the protruded portion and fusion of the spinal vertebrae at the point affected. An alternative to surgery is treatment by injection of chymopapain, a proteolytic enzyme derived from papaya latex, which dissolves the damaged tissue.

Hernici, ancient people of Italy, whose territory was in Latium between the Fucine Lake (modern Fucino) and the Trerus (modern Sacco) River, bounded by the Volsci on the south and by the Aequi and the Marsi on the north. In 486 BC they were still strong enough to conclude a treaty with the Romans on equal terms. They broke away from Rome in 362–358. In 306 their chief town, Anagnia (Anagni), was taken by the Romans and deprived of its independence and their league was broken up. By 195 their territory was not distinguished from Latium and they were regarded as Latins, both politically and in language. Their original language is unknown.

Herning, city, Ringkøbing *amtskommune* (county), west central Jutland, Denmark. Large-scale reclamation of surrounding heaths stimulated its growth from a rural village in the 1870s to a commercial city. A road and rail junction, its manufactures include textiles and machinery. Local lignite deposits were worked extensively during World War II. The Herning Museum includes an open-air section of old farmhouses. Herning Hallen (1954), a modern conference and exhibit complex, was enlarged in the 1970s. Pop. (1981) city, 29,522; (1982 est.) mun., 55,905.

hero, in literature, broadly, the main character in a literary work; the term is also used in a specialized sense for any figure celebrated in the ancient legends of a people or in such early heroic epics as *Gilgamesh,* the *Iliad, Beowulf,* or *La Chanson de Roland.*

These legendary heroes belong to a princely class existing in an early stage of the history of a people, and they transcend ordinary men in skill, strength, and courage. They are usually born to their role. Some, like the Greek Achilles and the Irish Cú Chulainn (Cuchulain), are of semidivine origin, unusual beauty, and extraordinary precocity. A few, like the Anglo-Saxon Beowulf and the Russian Ilya of Murom, are dark horses, slow to develop.

War or dangerous adventure is the hero's normal occupation. He is surrounded by noble peers, and is magnanimous to his followers and ruthless to his enemies. In addition to his prowess in battle, he is resourceful and skillful in many crafts; he can build a house, sail a boat, and, if shipwrecked, is an expert swimmer. He is sometimes, like Odysseus, cunning and wise in counsel, but a hero is not usually given to much subtlety. He is a man of action rather than thought and lives by a personal code of honour that admits of no qualification. His responses are usually instinctive, predictable, and inevitable. He accepts challenge and sometimes even courts disaster. Thus baldly stated, the hero's ethos seems oversimple by the standards of a later age. He is childlike in his boasting and rivalry, in his love of presents and rewards, and in his concern for his reputation. He is sometimes foolhardy and wrong-headed, risking his life—and the lives of others—for trifles. Roland, for instance, dies because he is too proud to sound his horn for help when he is overwhelmed in battle. Yet the hero still exerts an attraction for sophisticated readers and remains a seminal influence in literature.

The appearance of heroes in literature marks a revolution in thought that occurred when poets and their audiences turned their attention away from immortal gods to mortal men, who suffer pain and death, but in defiance of this live gallantly and fully, and create, through their own efforts, a moment's glory that survives in the memory of their descendants. They are the first human beings in literature, and the novelty of their experiences has a perennial freshness.

Hero OF ALEXANDRIA, also called HERON (fl. AD 62), Greek geometer and inventor who is best remembered for his formula (known as Hero's formula) of the area of a triangle

and for the invention of the aeolipile, the first steam-powered engine, which, in Hero's design, was a forerunner of the jet engine. His device consisted of a sphere mounted on a boiler by an axial shaft and having two canted nozzles to produce a rotary motion from the escaping steam.

Hero's most important work on geometry, *Metrica,* was lost until 1896. Book I enumerates means of finding the area of triangles, quadrilaterals, the regular polygons having 3 to 12 sides, circles and their segments, ellipses, parabolic segments, and the surfaces of cylinders, cones, spheres, and segments of spheres. Included is the derivation of Hero's formula,

$$A = \sqrt{s(s-a)(s-b)(s-c)},$$

in which *a, b,* and *c* are the lengths of the triangle's sides, and *s* is one-half the perimeter. Also in Book I of the *Metrica* is a method for approximating the square root of a number. This method, which was known to the Babylonians (*c.* 2000 BC), is frequently employed in modern computers. Book II of the *Metrica* gives methods for computing the volume of cones, pyramids, cylinders, parallelepipeds, prisms, frustums of cones and pyramids, spheres and spherical segments, anchor rings, the five regular solids, and some prismatoids. Book III covers the division of certain areas and volumes into parts of given ratios.

Hero's other extant works on geometry are *Definitiones, Geometrica, Geodaesia, Stereometrica, Mensurae,* and *Liber Geëponicus,* which contain problems similar to those in the *Metrica.* Akin to these works is the *Dioptra,* a book on land surveying; it contains a description of the *dioptra,* or diopter, a surveying instrument used for the same purposes as the modern theodolite. The treatise also contains a chapter on astronomy that describes a graphical method for finding the distance between Alexandria and Rome from the difference between local times at which a lunar eclipse would be observed at the two cities. *Catoptrica* ("Reflection") exists only as a Latin translation of a work formerly thought to be a fragment of Ptolemy's *Optica.* In *Catoptrica* Hero explains the rectilinear propagation of light and the law of reflection.

Of Hero's writings on mechanics, all that remain are *Pneumatica, Automatopoietica, Belopoeica,* and *Cheirobalistra.* The *Pneumatica,* in two books, describes siphons, "Hero's fountain," the aeolipile, coin-operated machines, a fire engine, a water organ, and steam-powered machines. The *Belopoeica* ("Engines of War") purports to be based on a work by Ctesibius of Alexandria (fl. *c.* 270 BC). Hero's *Mechanics,* in three books, survives only in an Arabic translation, somewhat altered. This work is cited by Pappus of Alexandria (fl. AD 300), as is also the *Baroulcus* ("Methods of Lifting Heavy Weights"), probably the same treatise under a different name. Book II of the *Mechanics* deals with the five simple machines and mechanical problems of daily life, and Book III with the construction of engines of all sorts. Both the *Belopoeica* and the *Mechanics* contain Hero's solution of the problem of two mean proportionals (*i.e.*, finding values of two quantities, *x* and *y,* that satisfy the equations $a/x = x/y = y/b$, in which *a* and *b* are known).

Only fragments of other treatises by Hero remain. One on water clocks in four books is referred to by Pappus and Proclus (AD 410–485). Another, a commentary on Euclid's *Elements,* is quoted in a surviving Arabic work by an-Nayrīzī (d. *c.* 922).

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Hero and Leander, two lovers celebrated in Greek legend. Hero, virgin priestess of Aphrodite at Sestos, was seen at a festival by Leander of Abydos; they fell in love, and he swam the Hellespont at night to visit her, guided by a light from her tower. One stormy night the light was extinguished, and Leander was drowned; Hero, seeing his body, drowned herself likewise.

The story is preserved in Ovid, Musaeus, and elsewhere. It was also adapted by later poets, such as Christopher Marlowe (*Hero and Leander*), and alluded to by Lord Byron (*The Bride of Abydos*).

Herod, byname HEROD THE GREAT, Latin HERODES MAGNUS (b. 73 BC—d. March/April, 4 BC, Jericho, Judaea), Roman-appointed king of Judaea (37–4 BC), who built many fortresses, aqueducts, theatres, and other public buildings and generally raised the prosperity of his land but who was the centre of political and family intrigues in his later years. The New Testament portrays him as a tyrant, into whose kingdom Jesus of Nazareth was born.

Herod was born in southern Palestine; his father, Antipater, was an Edomite (an Arab from the region between the Dead Sea and the Gulf of Aqaba). Antipater was a man of great influence and wealth, who increased both by marrying the daughter of a noble from Petra (in southwestern Jordan), at that time the capital of the rising Nabataean kingdom. Thus Herod was, although a practicing Jew, of Arab origin on both sides.

When Pompey (106–48 BC) invaded Palestine in 63 BC, Antipater supported his campaign and began a long association with Rome, from which both he and Herod were to benefit. Six years later Herod met Mark Antony, whose lifelong friend he was to remain. Julius Caesar also favoured the family; he appointed Antipater procurator of Judaea in 47 BC and conferred on him Roman citizenship, an honour that descended to Herod and his children. Herod made his political debut in the same year, when his father appointed him governor of Galilee. Six years later Mark Antony made him tetrarch of Galilee. In 40 BC the Parthians invaded Palestine, civil war broke out, and Herod was forced to flee to Rome. The senate there nominated him king of Judaea and equipped him with an army to make good his claim. In the year 37 BC, at the age of 36, Herod became unchallenged ruler of Judaea, a position he was to maintain for 32 years. To further solidify his power, he divorced his first wife, Doris, sent her and his son away from court, and married Mariame, a Hasmonean princess. Although the union was directed at ending his feud with the Hasmoneans, a priestly family of Jewish leaders, he was deeply in love with Mariame.

During the conflict between the two triumvirs Octavian and Antony, the heirs to Caesar's power, Herod supported his friend Antony. He continued to do so even when Antony's mistress, Cleopatra, the queen of Egypt, used her influence with Antony to gain much of Herod's best land. After Antony's final defeat at Actium in 31 BC, he frankly confessed to the victorious Octavian which side he had taken. Octavian, who had met Herod in Rome, knew that he was the one man to rule Palestine as Rome wanted it ruled and confirmed him king. He also restored to Herod the land Cleopatra had taken. Herod became the close friend of Augustus' great minister Marcus Vipsanius Agrippa, after whom one of his grandsons and one of his great-grandsons were named. Both the emperor and the minister paid him state visits, and Herod twice again visited Italy. Augustus gave him the oversight of the Cyprus copper mines, with a half share in the profits. He twice increased Herod's territory, in the years 22 and 20 BC, so that it came to include not only Palestine but parts of what are now the kingdom of Jordan to the east of the river and southern Lebanon and Syria. He had intended to bestow the Nabataean kingdom on Herod as well, but, by the time that throne fell vacant, Herod's mental and physical deterioration made it impossible.

Herod endowed his realm with massive fortresses and splendid cities, of which the two greatest were new, and largely pagan, foundations: the port of Caesarea Palaestinae on the coast between Joppa (Jaffa) and Haifa, which was afterward to become the capital of Roman Palestine; and Sebaste on the long-desolate site of ancient Samaria. In Jerusalem he built the fortress of Antonia, portions of which may still be seen beneath the convents on the Via Dolorosa, and a magnificent palace (of which part survives in the citadel). His most grandiose creation was the Temple, which he wholly rebuilt. The great outer court, 35 acres (14 hectares) in extent, is still visible as Al-Ḥaram ash-Sharīf. He also embellished foreign cities—Beirut, Damascus, Antioch, Rhodes—and many towns. Herod patronized the Olympic Games, whose president he became. In his own kingdom he could not give full rein to his love of magnificence, for fear of offending the Pharisees, the leading faction of Judaism, with whom he was always in conflict because they regarded him as a foreigner. Herod undoubtedly saw himself not merely as the patron of grateful pagans but also as the protector of Jewry outside of Palestine, whose Gentile hosts he did all in his power to conciliate.

Unfortunately, there was a dark and cruel streak in Herod's character that showed itself increasingly as he grew older. His mental instability, moreover, was fed by the intrigue and deception that went on within his own family. Deeply in love with Mariame, he was prone to violent attacks of jealousy; his sister Salome (not to be confused with her great-niece, Herodias' daughter Salome) made good use of his natural suspicions and poisoned his mind against his wife in order to wreck the union. In the end Herod murdered Mariame, her two sons, her brother, her grandfather, and her mother, a woman of the vilest stamp who had often aided his sister Salome's schemes. Besides Doris and Mariame, Herod had eight other wives and had children by six of them. He had 14 children.

In his last years Herod suffered from arteriosclerosis. He had to repress a revolt, became involved in a quarrel with his Nabataean neighbours, and finally lost the favour of Augustus. He was in great pain and in mental and physical disorder. He altered his will three times and finally disinherited and killed his firstborn, Antipater. The slaying, shortly before his death, of the infants of Bethlehem was wholly consistent with the disarray into which he had fallen. After an unsuccessful attempt at suicide, Herod died. His final testament provided that, subject to Augustus' sanction, his realm would be divided among his sons: Archelaus should be king of Judaea and Samaria, with Philip and Antipas sharing the remainder as tetrarchs. (S.H.P.)

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Herod the Great (1971), is a beautifully illustrated book by a scholar of international standing.

Herod Agrippa I, original name MARCUS JULIUS AGRIPPA (b. *c.* 10 BC—d. AD 44), king of Judaea (41–44), a clever diplomat who through his friendship with the Roman imperial family obtained the kingdom of his grandfather, Herod I the Great. He displayed great acumen in conciliating the Romans and Jews.

When Antipater, the son of Herod and the father of Agrippa, was executed by the suspicious Herod, Agrippa was sent to Rome for education and safety. There he grew up in company with the emperor Tiberius' son Drusus. After his mother's death he quickly spent his family's wealth and acquired serious debts. When Drusus died in AD 23, Agrippa left Rome, settling near Beersheba, in Palestine. An appeal to his uncle Antipas, tetrarch of Galilee, won him a minor official post but he soon vacated it.

In 36, having raised a sizable loan in Alexandria, Agrippa returned to Rome, where the emperor Tiberius received him but refused to allow him to stay at the court until his debt was paid. A new loan covered the obligation, and he secured a post as tutor to Tiberius' grandson. Agrippa also became a friend of Caligula, Tiberius' heir. An intemperate remark about Tiberius, overheard by a servant, landed Agrippa in prison, but Caligula remained his friend. Within a year Tiberius was dead, and Agrippa's fortunes were reversed.

In 37 Caligula made him king of the former realm of his uncle Philip the Tetrarch and of an adjoining region. After his uncle Antipas' banishment, Agrippa acquired his territory as well. Around 41, Agrippa, on the advice of the governor of Syria, dissuaded Caligula from introducing emperor worship at Jerusalem. Later, Caligula decided to restore Agrippa to his grandfather's throne but was assassinated before he could effect this plan. In the delicate question of the imperial succession, Agrippa supported Claudius, who emerged successful and granted him the kingdom of Judaea.

In Judaea, Agrippa zealously pursued orthodox Jewish policies, earning the friendship of the Jews and vigorously repressing the Jewish Christians. He imprisoned Peter the Apostle and executed James, son of Zebedee. Nonetheless, mindful of maintaining Roman friendship, he contributed public buildings to Beirut in Lebanon, struck coins in emulation of Rome, and in the spring of 44 was host at a spectacular series of games at Caesarea to honour Claudius. There he died, prematurely terminating the compromise he had striven to achieve between Roman authority and Jewish autonomy. Because his son was only 17 years old, Judaea once more returned to provincial status.

Agrippa is called Herod in only one source, the New Testament.

Herod Agrippa II (b. AD 27—d. *c.* 93), king of Chalcis in southern Lebanon from AD 50 and tetrarch of Batanaea and Trachonitis in south Syria from AD 53, who unsuccessfully mediated with the rebels in the Jewish Revolt of AD 66–70. He was a great-grandson of Herod I the Great.

Agrippa II was raised and educated at the imperial court in Rome. Because of his youth at the death of his father, Agrippa I, in 44, the emperor Claudius returned Judaea to the status of a province. The young prince, however, took an interest in the welfare of the Jews and helped secure them an edict of moderation. In 48 he received authority over temple affairs in Jerusalem. Two years later he became king of Chalcis, and in 53 he exchanged this land for Philip the Tetrarch's former holdings. Nero, the new emperor, in 54 added territory near the Sea of Galilee to Agrippa's realm. As his father had been, Agrippa II was an ardent collaborator with Rome and did all in his power to prevent the rupture between Rome and Jewry, but in vain.

Between 52 and 60, he appointed several high priests and earned the enmity of the conflicting parties. Though he supported the rights of the Jews at Alexandria, who faced trouble from the Hellenized populace, he avoided politics in Judaea, where the Zealots, a terrorist group, were active. In 60, when St. Paul was arrested, the procurator consulted Agrippa concerning the Apostle's case; the Tetrarch found him innocent.

In 66, the procurator Gessius Florus permitted a massacre of Jews in Caesarea, and the Zealots at Jerusalem rose in revolt. When Agrippa supported Florus, urging moderation, the Zealots gained the upper hand, and the case became hopeless.

Trouble threatened in his own kingdom. Some troops he had sent to Jerusalem capitulated in the summer of 66, and the rebels massacred the Roman garrison. Titus arrived in 67, and Agrippa assisted Roman operations. In 70 he aided Titus' son in the final conquest of Jerusalem itself. After the war, his territory was enlarged by Titus, and he apparently survived until 93.

Herod Antipas (b. 21 BC—d. AD 39), son of Herod I the Great who became tetrarch of Galilee and ruled throughout Jesus of Nazareth's ministry.

Around 4 BC Herod Antipas inherited part of his father's kingdom after the Roman emperor Augustus had adjusted his father's will. He restored the damage caused in the period between his father's death and the approval of the will, restoring two towns, one of which he renamed in honour of the Roman imperial family.

He divorced his Nabataean wife, daughter of the king of the desert kingdom adjoining his own, to marry Herodias, formerly the wife of his half brother. The marriage offended his former father-in-law and alienated his Jewish subjects. When John the Baptist, one of his subjects, reproached Herod for this marriage, Herodias goaded her husband into imprisoning him. Still unmollified, she inveigled her daughter, Salome, to ask for the Baptist's head in return for dancing at her stepfather's birthday feast. Antipas reluctantly beheaded John, and later, when Jesus' miracles were reported to him, he believed that John the Baptist had been resurrected. When Jesus was arrested in Jerusalem, Pilate, the Roman procurator of Judaea, first sent him to Antipas, who was spending Passover in the capital, because Jesus came from Antipas' realm. The Tetrarch was eager to see Jesus, expecting more miracles, but soon returned him to Pilate, unwilling to pass judgment.

Some time earlier, Antipas had built the city of Tiberias on the western shore of the Sea of Galilee, partly modelling it after a Greek city, but though he erected statues in the Greek manner in his palace, his coins bore no images. He also encouraged the Herodians, well-to-do Jews who supported him and were tolerant of Roman authority.

Herod's closeness to the imperial family resulted in his choice as a mediator in the Roman–Parthian talks of 36. To his credit the conference was a success, but Antipas' haste to report the news to Rome aroused the hostility of Aulus Vitellius, legate of Syria, later emperor. Around 37, the Nabataean king Aretas IV, whose daughter Antipas had repudiated, attacked Herod's realm, inflicting severe damage. When the Tetrarch appealed to Rome, the Emperor sent Vitellius, who, still nursing his resentment, availed himself of every possible delay. After Caligula became emperor in 37, Herodias, envious of her brother Agrippa I's success, persuaded her husband to denounce him before the Emperor, but the intended victim, Caligula's close friend, anticipated Antipas and levied charges, partially true, against him. Caligula banished Antipas to Gaul, where Herodias accompanied him, and her brother added the tetrarchy to his domains.

Herod Archelaus (b. 22 BC, Judaea—d. *c.* AD 18, Gaul), son and principal heir of Herod I the Great as king of Judaea, deposed by Rome because of his unpopularity with the Jews.

Named in his father's will as ruler of the largest part of the Judaean kingdom—Judaea proper, Idumaea, and Samaria—Archelaus went to Rome (4 BC) to defend his title against the claims of his brothers Philip and Antipas before the emperor Augustus. Augustus confirmed him in possession of the largest portion but did not recognize him as king, giving him instead the lesser title of ethnarch to emphasize his dependence on Rome.

Archelaus was half Idumaean and half Samaritan and, like his father, was considered an alien oppressor by his Jewish subjects. Their repeated complaints against him caused Augustus to order him to Rome again in AD 6. After a trial in which he was unsuccessfully defended by the future emperor Tiberius, he was deprived of his throne and exiled to Gaul.

In the account of the Gospel According to Matthew (2:22), it was fear of Archelaus' tyranny that led Jesus' family to settle outside his domain at Nazareth in Galilee.

Herodas, also called HERONDAS (fl. 3rd century BC), Greek poet, probably of the Aegean island of Cos, author of mimes—short dramatic scenes in verse of a world of low life similar to that portrayed in the New Comedy. His work was discovered in manuscript in 1890 and is the largest collection of the genre. It is written in rough iambic metre and in the vigorous, rather earthy language of the common people. His characters use vehement exclamations, emphatic turns of speech, and proverbs.

In pieces of about 100 lines Herodas portrays vivid and entertaining scenes with the characters clearly drawn. The themes cover a range of city life: a procuress attempts to arrange a tryst for a respectable matron while her husband is away; a jealous woman accuses her favourite slave of infidelity and has him bound and sent to receive 2,000 lashes; a desperate mother drags a truant urchin to the schoolmaster. It is thought that these mimes were recited with considerable improvisation by an actor who took the various roles.

Herodes Atticus, in full LUCIUS VIBULLIUS HIPPARCHUS TIBERIUS CLAUDIUS ATTICUS HERODES (b. *c.* AD 101, Marathon, Achaea—d. 177), most celebrated of the orators and writers of the Second Sophistic, a movement that revitalized the teaching and practice of rhetoric in Greece in the 2nd century AD.

Herodes Atticus, marble bust by an unknown artist; in the Louvre, Paris

Alinari—Art Resource/EB Inc.

Herodes was born into an immensely wealthy Athenian family that had received Roman citizenship during the reign of the emperor Claudius (41–54). He was befriended by Hadrian (emperor 117–138), who employed him as a commissioner in charge of eliminating corruption in the free cities of the province of Asia. Herodes became consul in 143 and later contributed to the education of Hadrian's destined successors, Marcus Aurelius and Lucius Verus. Under his direction numerous buildings were constructed throughout Greece, including an odeum (called the Odeum of Herodes Atticus) at Athens. Of his voluminous output of speeches and other writings, nothing unquestionably authentic survives. Evidently he was a strict Atticist; *i.e.,* he took the Athenian writers of the 5th and 4th centuries BC as his stylistic models. Like other 2nd-century Sophists, he sought to entertain and enlighten without referring to political matters. Herodes' activities are recorded in Philostratus' *Lives of the Sophists*, ii, 1.

Herodian, one of a party of influential Jewish supporters of the Herodian dynasty (*c.* 55 BC–*c.* AD 93), which ruled in all or parts of Palestine and neighbouring areas. Noted in the New Testament as opponents of Jesus, they probably were not a political party or a religious sect. They probably favoured the policies of Herod Antipas, who was tetrarch of Galilee and Peraea (4 BC–AD 39) and a strong promoter of Hellenistic (Greco-Roman) culture in Palestine. It seems likely that they rejected the messianic hopes of the people and thus united with the Pharisees in attempts to entrap Jesus into making anti-Roman statements.

Herodias (d. after AD 39), the wife of Herod Antipas, who was tetrarch (ruler appointed by Rome) of Galilee, in northern Palestine, from 4 BC to AD 39. She conspired to arrange the execution of John the Baptist. Her marriage to Herod Antipas (himself divorced), after her divorce from his half-brother, was censured by John as a transgression of Mosaic Law.

Herodias, according to Mark (6:19–20), would have had John killed but could not because Herod feared the man. Herod's birthday celebration offered an opportunity to revenge John's rebuke. Salome (Herodias' daughter by her first husband) performed a dance that so pleased Herod that he offered to grant any wish she expressed. Prompted by her mother, Salome asked for John's head on a platter, a wish the reluctant Herod was bound to fulfill.

Herodias also urged her husband to attempt to discredit her brother Herod Agrippa I, who had recently received the tetrarchy of Batanaea and Trachonitis, to the east of the Sea of Galilee. Their efforts antagonized the emperor Caligula, however, and they were banished in AD 39.

Herodotus (b. 484 BC?, Halicarnassus, Asia Minor [now Bodrum, Tur.]?—d. 430–420), Greek author of the first great narrative history produced in the ancient world, the *History* of the Greco-Persian Wars.

It is believed that Herodotus was born at Halicarnassus, a Greek city in southwest Asia Minor that was then under Persian rule. The precise dates of his birth and death are alike uncertain. He is thought to have resided in Athens and to have met Sophocles and then to have left for Thurii, a new colony in southern Italy sponsored by Athens. The latest event alluded to in his *History* belongs to 430, but how soon after or where he died is not known. There is good reason to believe that he was in Athens, or at least in central Greece, during the early years of the Peloponnesian War, from 431, and that his work was published and known there before 425.

Herodotus was a wide traveler. His longer wandering covered a large part of the Persian Empire: he went to Egypt, at least as far south as Elephantine (Aswān), and he also visited Libya, Syria, Babylonia, Susa in Elam, Lydia, and Phrygia. He journeyed up the Hellespont to Byzantium, went to Thrace and Macedonia, and traveled northward to beyond the Danube and to Scythia eastward along the northern shores of the Black Sea as far as the Don River and some way inland. These travels would have taken many years.

Structure and scope of the History. Herodotus' subject in his *History* is the wars between Greece and Persia (499–479 BC) and their preliminaries. As it has survived, the *History* is divided into nine books (the division is not Herodotus' own): Books I–V describe the background to the Greco-Persian Wars; Books VI–IX contain the history of the wars, culminating in an account of the Persian king Xerxes' invasion of Greece (Book VII) and the great Greek victories at Salamis, Plataea, and Mycale in 480–479 BC. There are two parts in the *History,* one being the systematic narrative of the war of 480–479 with its preliminaries from 499 onward (including the Ionic revolt and the Battle of Marathon in Book VI), the other being the story of the growth and organization of the Persian Empire and a description of its geography, social structure, and history.

Herodotus, detail of a Roman herm probably copied from a Greek original of the first half of the 4th century BC; in the Museo Archeologico Nazionale, Naples

By courtesy of the Soprintendenza alle Antichita della Compania, Naples

There has been much debate among modern scholars whether Herodotus from the first had this arrangement in mind or had begun with a scheme for only one part, either a description of Persia or a history of the war, and if so, with which. One likely opinion is that Herodotus began with a plan for the history of the war and that later he decided on a description of the Persian Empire itself. For a man like Herodotus was bound to ask himself what the Persian-led invasion force meant. Herodotus was deeply impressed not only by the great size of the Persian Empire but also by the varied and polyglot nature of its army, which was yet united in a single command, in complete contrast to the Greek forces with their political divisions and disputatious commanders, although the Greeks shared a common language, religion, and way of thought and the same feeling about what they were fighting for. This difference had to be explained to his readers, and to this end he describes the empire.

A logical link between the two main sections is to be found in the account in Book VII of the westward march of Xerxes' immense army from Sardis to the Hellespont on the way to the crossing by the bridge of boats into Greece proper. First comes a story of Xerxes' arrogance and petulance, followed by another of his savage and autocratic cruelty, and then comes a long, detailed description of the separate military contingents of the army marching as if on parade, followed by a detailed enumeration of all the national and racial elements in the huge invasion force.

Herodotus describes the history and constituent parts of the Persian Empire in Books I–IV. His method in the account of the empire is to describe each division of it not in a geographical order but as each was conquered by Persia—by the successive Persian kings Cyrus, Cambyses, and Darius. (The one exception to this arrangement is Lydia, which is treated at the very beginning of the history not because it was first conquered but because it was the first foreign country to attack and overcome the Greek cities of Asia Minor.)

The first section of Book I, the history and description of Lydia and its conquest by the Persians, is followed by the story of Cyrus himself, his defeat of the Medes and a description of Persia proper, his attack on the Massagetae (in the northeast, toward the Caspian), and his death. Book II contains the succession of Cambyses, Cyrus' son, his plan to attack Egypt, and an immensely long account of that unique land and its history. Book III describes the Persians' conquest of Egypt, the failure of their invasions to the south (Ethiopia) and west; the madness and death of Cambyses; the struggles over the succession in Persia, ending with the choice of Darius as the new king; the organization of the vast new empire by him, with some account of the most distant provinces as far east as Bactria and northwest India; and the internal revolts suppressed by Darius. Book IV begins with the description and history of the Scythian peoples, from the Danube to the Don, whom Darius proposed to attack by crossing the Bosporus, and of their land and of the Black Sea.

Then follows the story of the Persian invasion of Scythia, which carried with it the submission of more Greek cities, such as Byzantium; of the Persians' simultaneous attack from Egypt on Libya, which had been colonized by Greeks; and the description of that country and its colonization. Book V describes further Persian advances into Greece proper from the Hellespont and the submission of Thrace and Macedonia and many more Greek cities to Persian might, then the beginning of the revolt of the Greek cities of Ionia against Persia in 499, and so to the main subject of the whole work.

Method of narration. This brief account of the first half of Herodotus' *History* not only conceals its infinite variety but is positively misleading insofar as it suggests a straightforward geographical, sociological, and historical description of a varied empire. The *History*'s structure is more complex than that, and so is Herodotus' method of narration. For example, Herodotus had no need to explain Greek geography, customs, or political systems to his Greek readers, but he did wish to describe the political situation at the relevant times of the many Greek cities later involved in the war. This he achieved by means of digressions skillfully worked into his main narrative. He thus describes the actions of Croesus, the king of Lydia, who conquered the Greeks of mainland Ionia but who was in turn subjugated by the Persians, and this account leads Herodotus into a digression on the past history of the Ionians and Dorians and the division between the two most powerful Greek cities, the Ionian Athens and the Doric Sparta. Athens' complex political development in the 6th century BC is touched upon, as is the conservative character of the Spartans. All of this, and much besides, some of it only included because of

Herodotus' personal interest, helps to explain the positions of these Greek states in 490, the year of the Battle of Marathon, and in 480, the year in which Xerxes invaded Greece.

One important and, indeed, remarkable feature of Herodotus' *History* is his love of and gift for narrating history in the storyteller's manner (which is not unlike Homer's). In this regard he inserts not only amusing short stories but also dialogue and even speeches by the leading historical figures into his narrative, thus beginning a practice that would persist throughout the course of historiography in the classical world.

Outlook on life. The story of Croesus in Book I gives Herodotus the occasion to foreshadow, as it were, in Croesus' talk with Solon the general meaning of the story of the Greco-Persian Wars, and so of his whole *History*—that great prosperity is "a slippery thing" and may lead to a fall, more particularly if it is accompanied by arrogance and folly as it was in Xerxes. The story of Xerxes' invasion of Greece is a clear illustration of the moral viewpoint here; a war that by all human reasoning should have been won was irretrievably lost. To Herodotus, the old moral "pride comes before a fall" was a matter of common observation and had been proved true by the greatest historical event of his time. Herodotus believes in divine retribution as a punishment of human impiety, arrogance, and cruelty, but his emphasis is always on the actions and character of men, rather than on the interventions of the gods, in his descriptions of historical events. This fundamentally rationalistic approach was an epochal innovation in Western historiography.

Qualities as a historian. Herodotus was a great traveler with an eye for detail, a good geographer, a man with an indefatigable interest in the customs and past history of his fellowmen, and a man of the widest tolerance, with no bias for the Greeks and against the barbarians. He was neither naive nor easily credulous. It is this which makes the first half of his work not only so readable but of such historical importance. In the second half he is largely, but by no means only, writing military history, and it is evident that he knew little of military matters. Yet he understood at least one essential of the strategy of Xerxes' invasion, the Persians' dependence on their fleet though they came by land, and therefore Herodotus understood the decisive importance of the naval battle at Salamis. Similarly, in his political summaries he is commonly content with explaining events on the basis of trivial personal motives, yet here again he understood certain essentials: that the political meaning of the struggle between the great territorial empire of Persia and the small Greek states was not one of Greek independence only but the rule of law as the Greeks understood it; and that the political importance of the Battle of Marathon for the Greek world was that it foreshadowed the rise of Athens (confirmed by Salamis) to a position of equality and rivalry with Sparta and the end of the long-accepted primacy of the latter. He knew that war was not only a question of victory or defeat, glorious as the Greek victory was, but brought its own consequences in its train, including the internal quarrels and rivalry between the leading Greek city-states, quarreling that was to later culminate in the devastating internecine strife of the Peloponnesian War (431–404 BC).

Conclusion. Herodotus had his predecessors in prose writing, especially Hecataeus of Miletus, a great traveler whom Herodotus mentions more than once. But these predecessors, for all their charm, wrote either chronicles of local events, of one city or another, covering a great length of time, or comprehensive accounts of travel over a large part of the known world, none of them creating a unity, an organic whole. In the sense that he created a work that is an organic whole, Herodotus was the first of Greek, and so of European, historians. Herodotus' work is not only an artistic masterpiece; for all his mistakes (and for all his fantasies and inaccuracies) he remains the leading source of original information not only for Greek history of the all-important period between 550 and 479 BC but also for much of that of western Asia and of Egypt at that time.

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Héroët, Antoine, byname LA MAISON-NEUVE (b. 1492?, Paris—d. 1568, Digne, Fr.), Renaissance court poet whose works are representative of the amalgam of Platonism and Christian humanism that produced the modern concept of Platonic love.

A member of the court surrounding Margaret of Angoulême, sister of Francis I and later queen of Navarre, Héroët is chiefly known for his *La Parfaicte Amye* (1542), a subtle, mystical monologue exalting as man's ultimate happiness a love in which the perfect lover seeks spiritual union with his lady. The poem was written as a reply to the cynical *L'Amye de court* by Bertrand de La Borderie, which ridiculed the superficial attitudes of women at court. Héroët imitated Plato's *Symposium* in explaining the mystery of the origin of love in his poem *L'Androgyne* (written 1536; published 1542).

heroic poetry, narrative verse that is elevated in mood and uses a dignified, dramatic, and formal style to describe the deeds of aristocratic warriors and rulers. It is usually composed without the aid of writing and is chanted or recited to the accompaniment of a stringed instrument. It is transmitted orally from bard to bard over generations.

The extant body of heroic poetry ranges from quite ancient to modern works, produced over a widespread geographic area. It includes what are probably the earliest forms of this verse—panegyrics praising a hero's lineage and deeds, and laments on a hero's death. Homer relates that when Hector's body was brought home "they laid it upon the bed and seated minstrels round it to lead the dirge." Another type of heroic poem is the short, dramatic lay devoted to a single event, such as the Old English *Battle of Maldon* (*c.* 991), describing a Viking raid on Essex, or the Old High German *Hildebrandslied* (*c.* 800), dealing with a duel between father and son. The mature form of heroic poetry is the full-scale epic, such as the *Iliad* or *Odyssey.*

Most heroic poetry looks back to a dimly defined "heroic age" when a generation of superior beings performed extraordinary feats of skill and courage. The heroic age varies in different native literatures. The epics of Homer created in the 8th century BC centre on a war with Troy that may have occurred *c.* 1200 BC. The heroic poetry of the German, Scandinavian, and English peoples deals chiefly with a period from the 4th to 6th century AD, the time of the great migrations (*Völkerwanderung*) of the Germanic people. Though some of the heroes portrayed are historical personages, their actions are often combined and related for artistic purposes, with no regard for actual historical chronology.

Nevertheless, a heroic tale is assumed by the poet and his listeners to be somehow true. Its style is impersonal and objective, and the graphic realism of its detail gives it an air of probability that outweighs the occasional intrusion of marvelous elements. None of the mundane details of the hero's acts and none of the amenities connected with them are slighted. The listener is told how the hero looks, what he wears, what he eats, how he sleeps. Thus, Homer's careful description of how Achilles dresses for battle, how he dons each piece of armour, how he mounts his chariot and addresses his horses, has a verisimilitude that remains undestroyed when his horse converses with him.

Much ancient heroic poetry has been wholly lost, but the tradition is still alive among certain illiterate and semiliterate peoples living in remote communities. In the late 19th and 20th centuries a wealth of new heroic literature was collected from native storytellers in Russia, Estonia, Yugoslavia, Bulgaria, Albania, and Greece. In Central Asia heroic poems have been collected from Tatar peoples speaking Turkish dialects; some particularly fine examples come from the Kara-Kirgiz of the Tien Shan mountains. The Yakut of northern Siberia, the Ainu of northern Japan, and some of the tribes of Arabia have also composed heroic poetry in modern times.

Research by modern scholars among these people has resolved any doubt that long epics could be composed orally and has shed light on the methods of oral composition that must have been used by ancient poets like Homer. Knowing the essentials of a number of traditional stories, and armed with a stock of ready-made formulaic expressions to describe common occurrences such as meetings, partings, passages of time, and victories or defeats, the oral bard improvises his tale as he goes along. His art is a skillful blend of familiar scenes with new incident and detail. He does not memorize his tale and usually cannot repeat exactly the same version again. In 1934 the American Homeric scholar Milman Parry transcribed an epic poem of 12,000 lines (the length of the *Odyssey*) from an illiterate bard in southern Serbia. Equally astonishing feats of memory and improvisation have been reported by Russian scholars working among the Uzbek and Kara-Kirgiz bards.

heroic prose, narrative prose tales that are the counterpart of heroic poetry in subject, outlook, and dramatic style. Whether composed orally or written down, the stories are meant to be recited, and they employ many of the formulaic expressions of oral tradition. A remarkable body of this prose is the early Irish Ulaid (Ulster) cycle of stories, recorded between the 8th and 11th centuries, featuring the hero Cú Chulainn (Cuchulain) and his associates. The cycle's events are set in the 1st century BC and reflect the customs of a pre-Christian aristocracy who fight from chariots, take heads as trophies, and are influenced by Druids. A 12th-century group of Irish stories is the Fenian cycle, focusing on the hero Finn MacCumhaill (MacCool), his son, the poet Oisín (Ossian), and his elite corps of warriors and hunters, the Fianna Éireann. Interspersed in the narratives are passages of verse, usually speeches, that are often older than the prose. Because of the verse sections, it is thought that these stories may derive from a lost body of heroic poetry. Among the Irish tales only the Ulaid story "The Cattle Raid of Cooley" has the scope of an epic, but it survives in a much mutilated text. The formulaic and poetic language of the Irish cycles is admirably preserved in Lady Gregory's retelling of the stories *Cuchulain of Muirthemne* (1902) and *Gods and Fighting Men* (1904).

Other examples of heroic prose are the 13th-century Icelandic sagas. The "heroic sagas," such as the *Völsunga saga* (*c.* 1270) and the *Thidriks saga* (*c.* 1250), are based on ancient Germanic oral tradition of the 4th to 6th century and contain many lines from lost heroic lays. Of higher artistic quality are the "Icelander sagas," such as *Grettis saga* (*Grettir the Strong*) and *Njáls saga* (both *c.* 1300), dealing with native Icelandic families, who live by the grim and complicated code of the blood feud.

Heroica Matamoros (Mexico): *see* Matamoros.

Heroica Nogales, also called NOGALES, city and port of entry, north-central Sonora state, northern Mexico, contiguous with the city of Nogales, in Santa Cruz County, Ariz. The city is a Mexican–U.S. trading centre in cattle and minerals. Large-scale irrigation throughout the state has brought increased wealth to Heroica Nogales, but the main farming areas are to the south. A railroad and a highway leading southeast to Mexico City via Hermosillo, Guaymas, Mazatlán, and Guadalajara begin in Heroica Nogales. Pop. (1980) 65,603.

heroin, also called DIACETYLMORPHINE, highly addictive morphine derivative that makes up a large portion of the illicit traffic in narcotics. Heroin is made by treating morphine with acetic anhydride; the resulting substance is four to eight times as potent as morphine. (Morphine is an alkaloid found in opium, which is the dried milky exudate obtained from the unripe seedpods of the poppy plant.) Heroin was first developed from morphine by the Bayer Company of Germany in 1898; it was originally used as a narcotic analgesic, but its undesirable side effects were found to far outweigh its value as a pain-killing drug, and there are now strict prohibitions on its use in many countries.

Heroin constricts the user's pupils, slows respiration, heartbeat, and gastrointestinal activity, and induces sleep. Among those addicted to it, however, heroin's most valued effect is the ecstatic reaction that it gives after being intravenously injected; within seconds a warm, glowing sensation spreads over the body. This brief but intense rush is then followed by a deep, drowsy state of relaxation and contentment that is marked by a clouding of consciousness and by poor concentration and attention. This state lasts two to four hours and then gradually wears off. Some individuals do react negatively to heroin, experiencing only anxiety, nausea, and depression.

Heroin in powder form can be sniffed, or inhaled, and when dissolved in water it can be injected subcutaneously (skin-popping) or intravenously (mainlining). But heroin addicts, as opposed to novice users of the drug, almost invariably inject it intravenously, because this produces the most rapid and intense euphoric effects.

Heroin is a highly addictive drug, and an addict must usually inject heroin about twice a day in order to avoid the discomfort of withdrawal symptoms; these include restlessness, body aches, insomnia, nausea, vomiting, and diarrhea. An addict trying to break his body's dependence on heroin must undergo an intense withdrawal period lasting three or four days, with symptoms lessening markedly thereafter. Heroin addicts also develop a high tolerance to the drug; thus an addict must use the drug more often or in greater amounts to achieve the desired euphoric effects. Nevertheless, these effects tend to disappear completely in the case of very heavy use, although the physical addiction remains.

A heroin addiction is expensive to maintain, and such addicts, when not gainfully employed, often must engage in prostitution, procuring, burglary, robbery, or small-time narcotics peddling to supply their habit. Heroin addicts commit a disproportionately large share of property crimes in Western countries where use of the drug is a problem.

Heroin illegally available on the street has been diluted to a purity of only 2 to 5 percent, being mixed with baking soda, quinine, milk sugar, or other substances. The unwitting injection of relatively pure heroin is a major cause of heroin overdose, the main symptoms of which are extreme respiratory depression deepening into coma and then into death. Aside from this danger, heroin addicts are prone to hepatitis and other infections owing to their use of dirty or contaminated syringes; scarring of the surfaces of the arms or legs is another common injury, owing to repeated needle injections and subsequent inflammations of the surface veins.

The private use and possession of heroin is illegal in most countries of the world, although the drug may be used as a painkiller for terminal cancer patients and others who suffer severe pain. Most illegally distributed heroin comes from opium produced in the Middle East, Southeast Asia, and Mexico. Heroin addiction first appeared in the early 20th century, and for several decades thereafter it was customarily confined to the marginal or criminal elements in Western societies. But from the 1960s on its use spread somewhat to youths in middle- and upper-income families and to Third World populations. Heroin use and trafficking are worldwide problems, and both national and international law enforcement and regulatory agencies seek to control and suppress those activities.

Hérold, (Louis-Joseph-)Ferdinand (b. Jan. 28, 1791, Paris—d. Jan. 19, 1833, Paris), French composer of early romantic operas who stands midway between D.-F.-E. Auber and Jacques Offenbach in the development of the opéra comique.

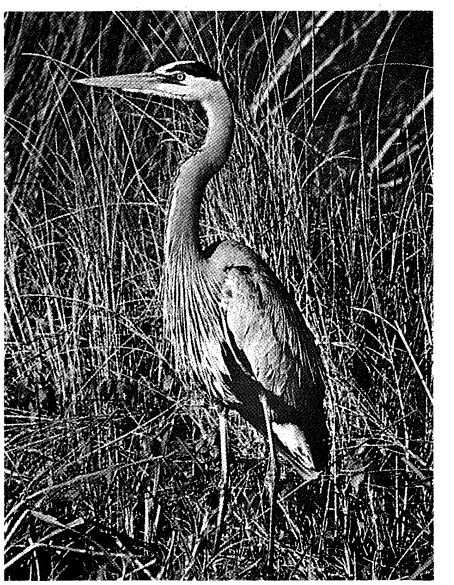
Hérold studied under C.-S. Catel and E.-N. Méhul and won the Prix de Rome in 1812. He was court pianist in Naples, where he produced his first opera, *La gioventù di Enrico V* (1815; *The Youth of Henry V*). On his return to Paris he collaborated with François Boieldieu in the opera *Charles de France* (1816) and produced 12 light operas at the Opéra-Comique between 1817 and 1830. Among his other operas are *Vendôme en Espagne* (with Auber, 1823), *Zampa* (1831), and *Le Pré aux clercs* (1832; *The Field of Honour*). His ballets include *La Fille mal gardée* (1828; *The Unguarded Maiden*) and *La Belle au bois dormant* (1829; *The Sleeping Beauty*).

Hérold, portrait miniature by an unknown artist
The Andre Meyer Collection—J.P. Ziolo

heron, any of about 60 species of long-legged wading birds of the subfamily Ardeinae of the family Ardeidae (order Ciconiiformes) and generally including several species usually called egrets (*see* egret). The Ardeidae also include the bitterns (subfamily Botaurinae). Herons are widely distributed over the world but are most common in the tropics. They usually feed while wading quietly in the shallow waters of pools, marshes, and swamps, catching frogs, fishes, and other aquatic animals. They nest in rough platforms of sticks constructed in bushes or trees near water; the nests usually are grouped in colonies called heronries.

Herons commonly stand with the neck bent in an S shape. They fly with the legs trailing loosely and the head held back against the body, instead of stretching the neck out in front as most birds do. They have broad wings, long straight sharp-pointed bills, and powder downs; the latter are areas of feathers that continually disintegrate to a fine powder which is used for preening (absorbing and removing fish oil, scum, and slime from the plumage).

Herons are subdivided into typical herons, night herons, and tiger herons. Typical herons feed during the day. In breeding season some develop showy plumes on the back and participate in elaborate mutual-courtship posturing. Best known of the typical herons are the very large, long-legged and long-necked, plain-hued, crested members of the genus *Ardea*—especially the 130-cm (50-inch) great blue heron (*A. herodias*) of North America, with



Great blue heron (*Ardea herodias*)
Laura Riley

a wingspan of 1.8 m (6 feet) or more, and the similar but slightly smaller gray, or common, heron (*A. cinerea*), widespread in the Old World. Largest of all is the goliath heron (*A. goliath*) of Africa, a 150-cm (59-inch) bird with a reddish head and neck. The purple heron (*A. purpurea*) is a darker and smaller Old World form.

The typical herons also include several species of the genus *Egretta* (egrets); the little blue heron, *Hydranassa* (or *Florida*) *caerulea,* and the Louisiana heron (*H. tricolor*), of the southeastern United States and Central and South America; and the black heron, *H.* (or *Melanophoyx*) *ardesiaca,* of Africa.

Night herons have thicker bills and shorter legs and are more active in the twilight hours and at night. The black-crowned night heron (*Nycticorax nycticorax*) ranges over the Americas, Europe, Africa, and Asia; the Nankeen night heron (*N. caledonicus*) in Australia, New Caledonia, and the Philippines; and the yellow-crowned night heron (*Nyctanassa violacea*) from the eastern and central United States to southern Brazil. Another night heron is the boat-billed heron, or boatbill (*Cochlearius cochlearius*), of Central and South America, placed by some authorities in its own family (Cochleariidae).

The most primitive herons are the six species of tiger herons (formerly called tiger bitterns), shy, solitary birds with cryptic, often barred,

plumage. The lined, or banded, tiger heron (*Tigrisoma lineatum*), 75 cm (30 in.) long, of central and northern South America is a well-known example. Another is the Mexican, or bare-throated, tiger heron (*T. mexicanum*) of Mexico and Central America.

Heron OF ALEXANDRIA (Greek geometer): *see* Hero of Alexandria.

Heron Island, coral formation of the Capricorn Group, in the southern Great Barrier Reef, in the Coral Sea, off the east coast of Queensland, Australia. The island, with an area of 42 ac (17 ha), is thickly wooded, though tourism has led to some erosion, and it lies within a lagoon 12 sq mi (31 sq km) in area. It is part of Capricornia Marine Park and is a wildlife sanctuary, accessible by launch from Gladstone, 48 mi (77 km) southwest. A major attraction is the Marine Biological Station and Aquarium. During the 1920s, Heron supported a sea-turtle industry, but turtle catching is now illegal.

Herondas (Greek poet): *see* Herodas.

heronsbill (plant): *see* storksbill.

Herophilus (b. *c.* 335 BC, Chalcedon, Bithynia—d. *c.* 280), Alexandrian physician who was an early performer of public dissections on human cadavers; and often called the father of anatomy.

As a member of the well-known scholastic community in the newly founded city of Alexandria during the single, brief period in Greek medical history when the ban on human dissection was lifted, Herophilus studied the ventricles (cavities) of the brain, the organ he regarded as the centre of the nervous system; traced the sinuses of the dura mater (the tough membrane covering the brain) to their junction, known as the torcular Herophili; and classified the nerve trunks—distinguishing them from tendons and blood vessels—as motor or sensory.

He rendered careful accounts of the eye, liver, salivary glands, pancreas, and genital organs of both sexes. He described and named the duodenum, at the lower end of the stomach, and the prostate gland. A student of Hippocrates' doctrine of medicine, which was based on balancing the four humours (body fluids)—blood, phlegm, yellow bile (choler), and black bile (melancholy)—Herophilus emphasized the curative powers of drugs, dietetics, and gymnastics. He was first to measure the pulse, for which he used a water clock.

Herophilus wrote at least nine works, including a commentary on Hippocrates, a book for midwives, and treatises on anatomy and the causes of sudden death, all lost in the destruction of the library of Alexandria (AD 272).

Héroult, Paul-Louis-Toussaint (b. April 10, 1863, Thury-Harcourt, Fr.—d. May 9, 1914, near Antibes), French chemist who invented the electric-arc furnace—widely used in making steel—and, independently of the simultaneous work of Charles M. Hall of the United States, devised the electrolytic process for preparing aluminum. This process made low-priced aluminum available for the first time, securing the widespread use of the metal and its alloys.

While a student at the École des Mines, Paris, Héroult began working on the electrolysis of aluminum compounds. In 1886 he found that electrolysis of a solution of alumina (aluminum oxide) in molten cryolite (sodium aluminum fluoride) resulted in the formation of a layer of molten aluminum at the bottom of the vessel. The Héroult process is essentially identical to the one discovered by Hall in the same year. After prolonged patent litigation, an agreement was reached between the two inventors.

Héroult is also noted for the Héroult electric furnace named for him, which found widespread use in the manufacture of aluminum and ferroalloys, first in Europe and later throughout the world.

herpes simplex, infection of either the skin or the genitalia, caused by either of two strains of the herpes simplex virus.

Skin disease. Type I is generally associated with infections in and around the mouth and with other herpes simplex infections above the waist. Typically it is characterized by a cluster of small blisters or watery vesicles on the skin or on mucous membrane. The lesions are commonly called cold sores or fever blisters. They most frequently occur on the lips and face and occasionally on the trunk and hands. The type I virus may also infect the eye, causing corneal ulcers and visual impairment. The occurrence of a lesion is often heralded by tingling and burning in the skin area, which becomes red and covered with vesicles. These vesicles break and form a crust, and the skin appears normal within 6 to 10 days after the onset of the lesion, unless there has been secondary infection. Lesions may often reappear at the same site for many years and may be precipitated by any one of a number of factors, such as sunburn, upper-respiratory and gastrointestinal tract infections, fevers, emotional stress, or anxiety.

Primary herpes simplex refers to the first appearance of the disease in an individual, usually a child, sometimes a young adult. The primary lesions are most frequently seen in the mouth, and inflammation of the mucous membrane lining the oral cavity may be severe; there is also fever and involvement of the lymph nodes. Healing normally takes place within 14 days. There is no satisfactory treatment for herpes simplex, because there are no known agents that will kill the virus, which, it is believed, may remain in the skin in some latent form between possible recurrences of the lesions.

Venereal disease. Herpes simplex virus type II is associated with genital infections. Herpes genital infections are most often transmitted through sexual contact. Sexual practices involving oral–genital contact may be responsible for some crossover infections, while other crossover infections may be the result of self-infection through hand–genital–mouth contact. The incubation period for herpes genital infection is usually four to five days but may be as short as 24 hours and as long as two weeks. The first symptoms may be pain or itching at the site of infection. This is followed within a day or two by the appearance of blister-like lesions that may occur singly or in groups. In males the common sites of infection include the foreskin, the glans, and the shaft of the penis. In females the blister may occur on the labia, the clitoris, the opening of the vagina, or, occasionally, on the cervix. Within a few days the blisters rupture and merge to form large areas of denuded tissue surrounded by swollen inflamed skin. At this stage the lesions may become exquisitely painful with intense burning and irritation. In females especially, urination may cause great discomfort. Generalized symptoms such as fever and malaise may develop, and lymph glands in the groin may enlarge. Lesions may persist in this stage for a week or more, and complete healing may take four to six weeks. Genital herpes infections generally are more severe in females and may become so uncomfortable and disabling as to require hospitalization. Recurrences of herpes genital infection are not uncommon and may be associated with emotional stress, trauma, intercourse, other infections, or menstruation. Symptoms may not be as severe in recurrent infections as in the initial one.

Serious infections may occur in infants who are born to mothers with active herpes genital infections. The virus may be transmitted to the infant as it passes through the infected birth canal. If a herpes genital infection is diagnosed in a pregnant woman near term, cesarean section is usually recommended. Type II infections have also been associated by circumstantial evidence with the later development of cancer of the cervix. The Papanicolaou smear (Pap smear) and Giemsa smear are two techniques commonly used to diagnose herpes genital infections. There is a blood test to measure the level of antibodies to the virus, but its results are not always conclusive.

A variety of treatments have been used for genital herpes, but none is entirely satisfactory. Drying agents such as alcohol, spirits of camphor, and ether have been used. Other methods of treatment include the use of ointments and creams, topical anesthetics, and antiseptic solutions. In the early 1980s no satisfactory vaccine had been found, but experiments with transfer factor and interferon appeared to show promise.

herpes zoster, also called SHINGLES, acute viral infection affecting the skin and nerves, characterized by groups of small blisters appearing along certain nerve segments. The lesions are most often seen on the back and may be preceded by a dull ache in the affected site. Herpes zoster is caused by the same virus as that of chicken pox; it probably constitutes the response of the partially immune person, resulting from the reactivation of a latent virus, whereas chicken pox is the response of the non-immune host. In most cases, spontaneous recovery occurs within two weeks. However, neuralgia may persist for months or even years after recovery from the infection.

herpetology, scientific study of amphibians and reptiles. Like most other fields of vertebrate biology (*e.g.*, ichthyology, mammalogy), herpetology is composed of a number of cross-disciplines: behaviour, ecology, physiology, anatomy, paleontology, taxonomy, and others. Most students of recent forms are narrow in their interests, working on only one order or suborder (*e.g.*, frogs, salamanders, snakes, lizards). A paleontologist is more likely to work with both amphibians and reptiles or with intermediate forms.

Herpetology as a unified science apparently stems from the ancient tendency to lump together all creeping (Greek *herpetos*) animals. Modern herpetology is a truly popular science, in which amateurs have made many valuable contributions in such areas as distribution, behaviour, and even taxonomy. The major part of the more technical research is carried out at universities and museums, as well as in the field.

The ease with which amphibians and reptiles are kept in captivity and their ability to survive operations that would kill many birds or mammals have made them ideal subjects for studies of functional anatomy, physiology, regeneration, and development. Herpetological research also includes the extraction and study of venoms and their effects.

Herr, Herbert Thacker (b. March 19, 1876, Denver, Colo., U.S.—d. Dec. 19, 1933, Philadelphia), U.S. engineer who made important improvements in steam turbines.

After working for various U.S. railroads as a machinist and draftsman for seven years, Herr became a general superintendent of the Norfolk & Western Railway, Roanoke, Va., in 1906. Two years earlier he had invented a braking device to control trains having several locomotives and had devised a mechanism that regulated braking power according to the weight of the car.

Herr's work on train brakes brought him to the attention of George Westinghouse, who installed Herr in the Westinghouse Machine Company in 1908 as vice president and general manager. He became a company director in 1913, and four years later became a vice

president of Westinghouse Electric & Manufacturing Company.

Herr's improvements in steam turbines, reported in a paper entitled "Recent Developments in Steam Turbines" (1913), incorporated elements of the highly efficient Parsons system with elements of the lighter Curtis-Rateau impulse system. He also pioneered in production of "floating frame" reduction gearing for propulsion of merchant marine and naval vessels. He served as advisory engineer to the Emergency Fleet Corporation of the U.S. Shipping Board during World War I. In 1916 he perfected a remote-control system allowing a ship's main engines to be operated from the bridge. With slight modifications his system was adopted by the U.S. Navy for some of its capital ships.

Herrera, province, southwestern Panama, bounded on the east by the Gulf of Parita. It is Panama's smallest (937 sq mi [2,427 sq km]) but second most densely populated province, with 87.3 people per sq mi (33.7 per sq km) in 1980. It consists mostly of level to rolling plains and is especially important in the production of corn (maize), rice, sugar, and a variety of vegetables and fruits; it also ranks high in raising beef and dairy cattle, swine, and poultry. A paved highway links Chitré (*q.v.*), the provincial capital, and other urban centres with the Pan-American Highway, which passes to the north. Pop. (1983 est.) 95,051.

Herrera, Fernando de, byname EL DIVINO (b. 1534?, Seville—d. 1597, Seville), lyric poet and man of letters who was one of the leading figures in the first School of Seville, a group of 16th-century Spanish Neoclassic poets and Humanists who were concerned with rhetoric and the form of language.

Although never ordained, Herrera took minor orders and was appointed to a benefice in Seville. The income from this position allowed him to spend his life studying and writing. His aristocratic literary ideas were clearly set forth in his *Anotaciones a las obras de Garcilaso de la Vega* (1580; "Notes on the Works of Garcilaso de la Vega"), which praised the Italianate innovations of the poet Garcilaso de la Vega and several other poets of Seville. In his own poetry, published as *Algunas obras de Fernando de Herrera* (1582; "Some Works of Fernando de Herrera"), he elaborated on the style of Garcilaso and began to move towards *culteranismo* (an ornate and affected poetic style that flourished in Spain in the 16th and 17th centuries and finally developed, in its most extreme form, into *gongorismo*). Although his love lyrics addressed to Luz, the countess of Gelves, were popular in his day, his most enduring poems are his patriotic odes, rich in Old Testament rhetoric and melodious eclogues. He also composed a history, *Relación de la guerra de Chipre y batalla naval de Lepanto* (1572; "Account of the War of Cyprus and the Naval Battle of Lepanto"), and a biography, *Elogio de la vida y muerte de Tomás Moro* (1592; "Eulogy on the Life and Death of Thomas More").

Herrera, Francisco, THE ELDER, Spanish EL VIEJO (b. *c.* 1576, Seville—d. 1656, Madrid), Spanish painter and engraver whose works mark the transition from Mannerism to Baroque.

Herrera is said to have been for a short time the master of Velázquez, and he has been claimed as the originator of a new national style that culminated in the achievements of Velázquez. It seems, however, that Herrera was a follower, rather than a forerunner, of the new style. His earliest known works, an engraving of Saint Ignatius of Loyola (1610) and a painting of the "Pentecost" (1617; Casa y Museo del Greco, Toledo), are in the Mannerist tradition, far removed from the simple Caravaggesque naturalism of Velázquez' earliest works. Later compositions, such as "The Apotheosis of St. Hermenegild" (*c.* 1624; Museo de Bellas Artes, Seville), echo the Venetian manner of Juan de las Roelas. A marked development in the direction of naturalism first appears in three scenes from the life of St. Bonaventure (Prado; Villandry) commissioned in 1627 by the Franciscan convent in Seville; this may be attributed to the influence of Francisco de Zurbarán, who contributed four paintings to the series. Naturalism in Herrera's work is accompanied by a broad technique, akin to José de Ribera's; but in later works, such as "St. Basil" (1637; Louvre), his brushwork became so coarse that it distorted the forms.

Sometime after 1638 Herrera moved to Madrid. He seems to have been unaffected by the later development of Velázquez or by other court painters. The elongated forms and elaborate draperies of "St. Joseph" (1648; Museo Lázaro Galdiano, Madrid), his last documented work, nevertheless suggest that he may have been influenced by the style of Van Dyck. Herrera appears to have acquired considerable fame in Seville in his own time. His influence on other artists is revealed in "The Miracle of the Loaves and Fishes" (archiepiscopal palace, Madrid), which was the model for Bartolomé Murillo's painting of this subject in the Hospital de la Caridad, Seville.

Herrera, Francisco, THE YOUNGER, Spanish EL JOVEN, or EL MOZO (b. 1622, Seville—d. Aug. 25, 1685, Madrid), painter and architect who figured prominently in the development of the Spanish Baroque style in Seville and Madrid.

He was the son and pupil of Francisco Herrera the Elder. After fleeing from his father (who was noted for his bad temper), Herrera the Younger is said to have continued

"Triumph of St. Hermengild," oil painting by Francisco Herrera the Younger, *c.* 1660–70; in the Prado, Madrid

By courtesy of the Museo del Prado, Madrid

his studies in Rome, where he became famous for paintings of still life with fish and was known as *lo spagnuolo degli pesci* ("the Spaniard of the fishes"). As a painter he is known only for a few religious compositions. The "Triumph of St. Hermengild" (*c.* 1660–70; Prado, Madrid) and "The Ecstasy of St. Francis" (1657), painted for Seville cathedral on his return from Italy, both reflect the violent movement and theatrical effect of the Roman Baroque style, which he probably introduced into Seville.

In 1660 Herrera the Younger was appointed vice president under Bartolomé Murillo of the newly founded Academy of Painting in Seville; but he soon left for Madrid, where he was active as a painter of frescoes and altarpieces and as a designer of retables. In 1672 he was appointed painter to the king and in 1677 surveyor general. As an architect he is said to have been the first to introduce the style of Francesco Borromini into Spain; and his design for the high altar of the church of Montserrat, Madrid, possibly influenced the architect and sculptor José Benito Churriguera.

Herrera, Juan de (b. *c.* 1530, Mobellán, Spain—d. Jan. 15, 1597, Madrid), architect, principal designer of the monumental Escorial, a structure that expressed the ideals of imperial Spain in the 16th century. Serving as the royal inspector of monuments, he witnessed the imitation of the Herreran style in churches and palaces throughout Spain.

After studying at the University of Valladolid, Herrera accompanied King Philip II of Spain to Italy and Brussels (1547–51) as a courtier, and from 1551 to 1559 he was with the King in Italy and at Yuste, Spain. In 1563 he was appointed assistant to Juan Bautista de Toledo at El Escorial, and in 1572 he was appointed head architect. He reorganized the workshops, completed the roofs, added a section to the west facade, designed the church (1574–82), and built the infirmary. He later worked at the summer palace at Aranjuez (after 1567), at the Exchange in Seville (after 1582), and at the cathedral of Valladolid (after 1585).

Herrera's designs have been called cold, academic, and monotonous by his detractors. While agreeing that they are severe, other critics have found them to be of harmonic proportions and, perhaps most important, expressed in a style suitable to the particular building. His addition to the west facade of El Escorial relieves the monotony of Toledo's original plan, and his church there is a marked improvement on the latter's earlier design. His design for Valladolid cathedral became the model for cathedrals in Mexico and in Lima.

Herrera Campíns, Luis (b. May 4, 1925, Acariqua, Venez.), politician who was elected president of Venezuela in 1979.

With Rafael Caldera, Herrera founded the Social Christian Party (Partido Social Cristiano, in full Comité Organizado Pro Elecciónes Independientes; COPEI) in 1946. In 1952 he was arrested, jailed, and deported as a result of his activities against the regime of Pres. Marcos Pérez Jiménez. He returned to Venezuela after the overthrow of Pérez in 1958, and he was admitted to the bar that year. Although he was well known in Venezuela and served as a member of Congress from 1959, he did not gain his party's nomination until August 1978.

Herrera y Reissig, Julio (b. Aug. 1, 1875, Montevideo—d. March 18, 1910, Montevideo), Uruguayan poet who was one of the most original poets writing in Spanish in the early 20th century. His poetry, extremely controversial in its own time for its innovations in form and language, was widely imitated and strongly influenced the development of contemporary Spanish-American poetry.

Born into a well-to-do family, Herrera rejected the bourgeois materialism around him. Leading a consciously bohemian, escapist life in Montevideo, he was soon joined by a group of young poets whose aim was to provoke literary controversy by deliberately violating the traditional principles of poetic composition, attempting to shock with bizarre themes and idiosyncratic language.

Herrera, however, proved to be a better received and more lasting talent than his friends; his volumes such as *Los maitines de la noche* (1902; "The Matins of the Night") and *Po-*

emas violetas (1906; "Violet Poems") were recognized by critics for their vividly imaginative evocation of commonplace scenes of everyday life as well as for their innovative use of language. For despite deliberately ludicrous titles, such as *Pianos crepusculares* (1910; "Twilight Pianos"), Herrera frequently depicted the ordinary. He created new poetic forms, but he also mastered traditional forms. His control of technique was not obscured by his desire to shock.

Herrera succeeded during his short lifetime, which was marred by chronic ill health, in challenging long-held assumptions about the proper subject matter for poetry and the accepted methods of poetic expression. Not until after his death, however, did he achieve widespread recognition as a major poet.

Herreshoff, Nathanael Greene (b. March 18, 1848, Bristol, R.I., U.S.—d. June 2, 1938, Bristol), American naval architect who was recognized as the foremost yacht designer of his day and who was frequently called "the Wizard of Bristol." Herreshoff designed and built five America's Cup defenders: *Vigilant,* which won the cup in 1893; *Defender,* 1895; *Columbia,* 1899 and 1901; *Reliance,* 1903; and *Resolute,* 1920.

Herreshoff worked at the Corliss Steam Engine Company in Providence, R.I., before joining his brother John at his boat company in Bristol, where they built a variety of fast, steam-powered vessels and military craft. The Herreshoffs built the first torpedo boat for the U.S. Navy. Herreshoff's talent for innovation found expression in both design and light construction techniques. In 1891 he designed the 70-foot (21.3-metre) yacht *Gloriana,* a boat that had a waterline of 45 feet (13.7 metres) and that revolutionized racing yacht design with a profile that swept easily from stemhead to the bottom of the keel.

Herrick, James Bryan (b. Aug. 11, 1861, Oak Park, Ill., U.S.—d. March 7, 1954, Chicago), American physician and clinical cardiologist who was the first to observe and describe sickle-cell anemia.

Herrick received his M.D. from Rush Medical College in 1888. He worked as an intern at Cook County Hospital and then taught at Rush, where he was professor of medicine from 1900 to 1927. He was also on the staff of Presbyterian Hospital in Chicago from 1895 to 1945. His practice, originally in general medicine, soon developed into a specialization in internal medicine, with a particular emphasis on cardiovascular diseases.

Among his published material on what came to be known as sickle-cell anemia was a three-year case history of a black patient suffering from anemia; Herrick's report on the case included the first description of the crescent-shaped red blood cells characteristic of sickle-cell disease. Later clinicians discovered that the condition is inherited and occurs predominantly in blacks, and others proved that the abnormality of the red blood cell is the precipitating factor of the disease.

Herrick also published definitive accounts of several clinical conditions involving the coronary vessels; he was the first observer to identify and describe the clinical features of coronary thrombosis (obstruction of a coronary artery by a blood clot). He participated in numerous medical associations and, among other honours, was awarded the American Medical Association's Distinguished Service Medal in 1939.

Herrick, Robert (baptized Aug. 24, 1591, London—d. October 1674, Dean Prior, Devonshire, Eng.), English cleric and poet, the most original of the "sons of Ben [Jonson]," who revived the spirit of the ancient classic lyric. He is best remembered for the line, "Gather ye rosebuds while ye may."

During the time that he was apprenticed to his uncle, Sir William Herrick, a prosperous and influential goldsmith, he cultivated the society of the London wits. In 1613 he went

Robert Herrick, detail of an engraving by W. Marshall, from the frontispiece to *Hesperides*, 1648

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

to Cambridge, graduating in 1617. He took his M.A. in 1620 and was ordained in 1623. Herrick returned to London for a time, keeping in touch with court society and enlarging his acquaintance with Ben Jonson and other writers and musicians. In 1627 he went as a chaplain to the Duke of Buckingham on the military expedition to the Île de Ré to relieve La Rochelle from the French Protestants. He was presented with the living of Dean Prior (1629), where he remained for the rest of his life, except when, because of his Royalist sympathies, he was deprived of his post from 1646 until after the Restoration (1660).

Herrick became well known as a poet around 1620–30; many manuscript commonplace books from that time contain his poems. The only book that Herrick published was *Hesperides* (1648), which included *His Noble Numbers,* a collection of poems on religious subjects with its own title page dated 1647 but not previously printed. *Hesperides* contained about 1,400 poems, mostly very short, many of them being brief epigrams. His work appeared after that in miscellanies and songbooks; the 17th-century English composer Henry Lawes and others set some of his songs.

Herrick wrote elegies, satires, epigrams, love songs to imaginary mistresses, marriage songs, complimentary verse to friends and patrons, and celebrations of rustic and ecclesiastical festivals. The appeal of his poetry lies in its truth to human sentiments and its perfection of form and style. Frequently light, worldy, and hedonistic, and making few pretensions to intellectual profundity, it yet covers a wide range of subjects and emotions, ranging from lyrics inspired by rural life to wistful evocations of life and love's evanescence and fleeting beauty. Herrick's lyrics are notable for their technical mastery and the interplay of thought, rhythm, and imagery that they display. As a poet Herrick was steeped in the classical tradition; he was also influenced by English folklore and lyrics, by Italian madrigals, by the Bible and patristic literature, and by contemporary English writers, notably Ben Jonson and Robert Burton.

Herries, John Maxwell, 4th Baron, also called (until 1566) SIR JOHN MAXWELL OF TERREGLES, MASTER OF MAXWELL (b. *c.* 1512—d. Jan. 20, 1583, Edinburgh), a leading supporter of Mary Stuart, Queen of Scots, respected for his loyalty to the Scottish crown.

Herries was known as Maxwell of Terregles until he acquired his title in 1566. By that time he was a staunch adherent of the Catholic queen, although he had previously supported Protestantism for political reasons. He led Mary's cavalry against the Scottish rebels in the Battle of Langside (May 13, 1568) and, after her defeat, gave her temporary refuge. Herries is sometimes considered a dupe of Mary's English enemies for his part in persuading her to submit her case (in the matter of the murder of her husband, Lord Darnley) to the judgment of Elizabeth I of England. The inability to reach agreement with her half-brother, James Stewart, earl of Moray, over a political settlement led to Mary's detention in England for the rest of her life. In 1578 Herries helped to force the resignation of James Douglas, 4th earl of Morton, regent of Scotland during Mary's captivity.

Herriman, George (b. 1881, New Orleans—d. May 1944, Hollywood), American cartoonist who created "Krazy Kat," a comic strip whose originality in terms of fantasy, drawing, and dialogue was of such high order that many consider it the finest strip ever produced.

Herriman turned to cartooning after a fall from a scaffold made it difficult for him to work as a house painter. His first comic strip, "Lariat Pete," appeared in 1903 in the San Francisco *Chronicle.* In the next few years he created a number of short-lived strips, from which "Krazy Kat" evolved in 1910. For more than 30 years the strip appeared in the papers in the chain belonging to William Randolph Hearst.

"Krazy Kat" was unique in a number of ways. The cast of characters was small and the basic plot always the same: Krazy Kat loved Ignatz Mouse, but the malicious Ignatz would have none of it and took every opportunity to throw a brick at Krazy. The policeman Offissa Pupp tried to protect Krazy, often by putting Ignatz in jail. The landscape backgrounds in the comic strip were stark and surrealistic, based on the Arizona desert. From these simple elements Herriman constructed an astonishing number of variations.

During the 1920s the strip attained wide popularity, particularly among intellectuals. It was highly praised by the influential critic Gilbert Seldes in *The Seven Lively Arts* (1924). About 1922 Herriman moved from New York City to Hollywood, where he was living at the time of his death. In recognition of his original touch, the strip was allowed to die with its creator.

Herrin, city, Williamson County, southern Illinois, U.S. Settled in 1818, the city remained until after World War II a coal-mining centre. Herrin was the scene of a tragic labour dispute in 1922 known as the Herrin Massacre. The nation's coal fields were closed by strikes and lockouts, and when a mining company attempted to operate a strip mine with nonunion labour, several hundred striking union miners on June 22 forced the nonunion workers to surrender and promised them safe conduct. After being marched to a point near Herrin, the captives were ordered to run for their lives under fire; more than 20 were killed, and others were wounded. A grand jury returned 214 indictments for murder and other offenses. No one was convicted. The city now produces washing machines, neon signs, upholstery, clothing, and staple machines. Nearby Crab Orchard Lake has recreational facilities. Inc. 1900. Pop. (1980) 10,040.

herring, species of slab-sided, northern fish belonging to the family Clupeidae (order Clupeiformes). The name herring refers to either the Atlantic herring (*Clupea harengus harengus*) or the Pacific herring (*C. harengus pallasii*); although once considered separate species, they are now believed to be only subspecifically distinct. Herrings are small-headed, streamlined, beautifully coloured fish with silvery iridescent sides and deep-blue,

metallic-hued backs. Adults range from 20 to 38 centimetres (8 to 15 inches) in length. One of the most abundant species of fishes in the world, herring eat such minute organisms as copepods, pteropods, and other planktonic crustaceans, as well as fish larvae. They travel in vast schools, providing food for larger predators such as cod, salmon, and tuna. Herrings may be caught with drift nets and surrounding nets (mostly seine nets or trawls). In Europe the majority of the herring catch is either salted, pickled in barrels, or cured by smoking and sold as kippered herring. In eastern Canada and the northeastern United States, most of the herring utilized are young fish, taken in inshore weirs or seines, that are canned as sardines. The bulk of the herring taken in the Pacific Ocean is used in the manufacture of fish oil and meal, and smaller quantities are pickled and smoked.

Herring spawn between December and midsummer, depending upon latitude and temperature. Each female deposits as many as 40,000 sticky eggs on seaweed or rocks; the eggs hatch in about two weeks. Herrings move shoreward to spawn, and after spawning, the schools of mature herrings disperse. The large herring fisheries are subject to great fluctuations in their annual catches because the survival of the populations of young herrings varies widely from year to year. The fish mature in about 4 years and may live 20 years.

In addition to other members of the genus *Clupea* (*e.g.*, the bristling, or sprat), the term herring is applied to other members of the family Clupeidae, including the skipjack herring (*Alosa chrysochloris*) and the alewife (*A.*, or *Pomolobus, pseudoharengus*). Various other, less common species in the family are also called herrings. The term herring is also used for certain fishes in families other than Clupeidae, such as the wolf herring (*Chirocentrus dorab*).

Herrington, Arthur William Sidney (b. March 30, 1891, Coddenham, East Suffolk, Eng.—d. Sept. 6, 1970, Indianapolis, Ind., U.S.), American engineer and manufacturer who developed a series of military vehicles, the best known of which was the World War II jeep.

Immigrating to the United States with his family at the age of five, Herrington grew up in Madison, N.J., and was educated at the Stevens Preparatory School and Stevens Institute of Technology, Hoboken, N.J. He was first employed by the Harley-Davidson Motor Company of Milwaukee. After World War I he was given a reserve commission in the Army and was retained as a consultant while returning to his civilian occupation. In France, Herrington had been impressed by the problems of conventional-drive vehicles in off-the-road maneuvering. He experimented with and designed a series of trucks with four- and six-wheel drives, which he built in association with the Marmon Motor Car Company of Indianapolis, Ind. These vehicles aided Allied troops during World War II; but none equaled the success and popularity of the smallest of the line, the quarter-ton jeep (apparently from the letters GP, for "general purpose") reconnaissance car, noted for its outstanding stamina, versatility, power, and maneuverability.

Herrington served during World War II as technical adviser to the American Mission to India and as director of the American Medical Center for Burma.

Herriot, Édouard (b. July 5, 1872, Troyes, Fr.—d. March 26, 1957, Lyon), French statesman and man of letters who was the longtime leader of the Radical Party; he served in nine different cabinets and was premier of France three times (1924–25, 1926, 1932).

The son of an army officer, Herriot was educated at the École Normale Supérieure, from which he graduated in 1894. He taught at the *lycée* of Nantes and then at Lyon, where he won a high reputation as a scholar and teacher. This reputation was enhanced by his study of *Madame Récamier et ses amis* (1904; "Madame Recamier and Her Friends") and by the acute literary criticism in his *Précis de l'histoire des lettres françaises* (1905; "A Short History of French Letters").

Herriot
H. Roger-Viollet

Herriot first entered politics through local government. He became a municipal councillor of Lyon in 1904 and mayor of that city in 1905. He remained mayor of Lyon for the rest of his life with the exception of one brief interruption during World War II. Under his administration, that growing industrial city developed many municipal services and amenities, and his local prestige became unshakable. In 1910 he became a member of the *conseil général* and in 1912 senator for the *département* of Rhône. He belonged throughout his career to the Radical Party.

Herriot first held ministerial office from December 1916 to March 1917 in Aristide Briand's Cabinet. He showed political acumen and administrative ability in his reorganization of the essential services of supplies and transport in wartime. He gave up his seat in the national Senate in November 1919 and was elected a member of the Chamber of Deputies for the *département* of Rhône. There he became leader of the Radical Party. He owed his rapid rise in Parliament to his gift for eloquent, persuasive oratory.

Herriot led the opposition to the postwar right-wing electoral coalition, the Bloc National. When the Cartel des Gauches, a left-wing coalition of Radicals and Socialists, was formed to fight the parliamentary elections of May 1924, it was led by Herriot, and its electoral triumph enabled him to form his first ministry in June 1924. He also took the ministry of foreign affairs. He forced the resignation of Alexandre Millerand, president of the republic, who had openly electioneered on behalf of the right-wing parties. He extended *de jure* recognition of the Soviet Union, which he had visited two years before. Under Herriot's leadership, France accepted the Dawes Plan and agreed to evacuate from the Ruhr the troops that former premier Raymond Poincaré had sent in to enforce payment of reparations by Germany. In April 1925 Herriot's ministry fell because of his financial policies, and in July 1926 his second ministry lasted only three days. He then joined the Cabinet of Raymond Poincaré as minister of education (1926–28). It was June 1932 before Herriot came back to power as premier and foreign minister. His ministry fell six months later when the Chamber of Deputies refused to pay the December installment of France's war debts to the United States. Herriot served as vice-premier under Gaston Doumergue in 1934 and again under Pierre Étienne Flandin in 1934–35. In June 1936 he was elected president of the Chamber of Deputies, an office that he held until France's capitulation to Germany in June 1940 during World War II.

Herriot abstained from voting when on July 10, 1940, at Vichy, the National Assembly accorded full powers to Marshal Philippe Pétain. When Pétain in August 1942 dissolved the permanent bureaus of the Chamber and Senate, Herriot joined with Jules Jeanneney, president of the Senate, in lodging a joint protest. For this he was arrested and was later deported to Germany. In April 1945 he was freed from his internment by Soviet troops. Having meanwhile been reelected mayor of Lyon, he returned there to resume his duties. He also resumed his place as president of the Radical Party and was elected to the constituent assemblies of 1945 and 1946. In 1946, too, he was elected a member of the Académie Française. The following year he was elected president of the new National Assembly of the Fourth Republic, retaining this office until his retirement in January 1954.

Herriot took part from 1948 onward in the Council of Europe. In 1952–54, however, he opposed the formation of a European Defense Community because he feared its consequence would be the rearmament of West Germany. Herriot clung throughout his life to liberal ideals of international cooperation. His intellectual gifts and honesty inspired respect and affection.

Herrmann, (Johann) Wilhelm (b. Dec. 6, 1846, Melkow, near Magdeburg, Prussia—d. Jan. 3, 1922, Marburg, Ger.), liberal German Protestant theologian who emphasized that faith should be grounded in a direct experience of the reality of the life of Christ rather than in doctrine. He was an important influence on his students Karl Barth and Rudolf Bultmann. He himself was a disciple of Albrecht Ritschl, whose emphasis on ethics and rejection of metaphysics Herrmann continued.

Herrmann began his studies at the University of Halle in 1866, becoming a lecturer there in 1875. In 1879 he was appointed professor at Marburg and remained there for the rest of his career. Both in his teaching and in his writing he stressed the view that faith is a living personal relationship with God, derived through direct communication with God in Jesus Christ. He believed that men see the truly good disclosed and actualized in Jesus. Like Ritschl before him, Herrmann drew heavily from Kant in making the assertion that God is an object not of theoretical but of practical knowledge and that therefore theology can be neither supported nor attacked by science or philosophy. Among his chief works are *Der Verkehr des Christen mit Gott* (1886; *The Communion of the Christian with God*) and *Ethik* (1901).

Hers' disease, also called GLYCOGENOSIS TYPE VI, hereditary deficiency of the liver enzyme glycogen phosphorylase, which governs the metabolic breakdown of glycogen to the simple sugar glucose, which can then be used to meet the body's energy needs. The enzyme's absence causes glycogen to accumulate, greatly enlarging the liver and producing moderate hypoglycemia (low blood sugar), since the release of glucose from storage in the liver is impaired. Other symptoms of the disease are a mild increase in the acidity of the blood and growth retardation. No other organs seem to be involved. Unlike some of the related glycogen storage diseases, Hers' disease does not cause mental retardation or reduce the life span.

Herschbach, Dudley R(obert) (b. June 18, 1932, San Jose, Calif., U.S.), American chemist and educator who, with Yuan T. Lee and John C. Polanyi, was awarded the Nobel Prize for Chemistry in 1986.

Herschbach attended Stanford University (B.S., M.S.) and received his Ph.D. in chemical physics from Harvard University in 1958. He taught at the University of California at Berkeley from 1959 to 1963 and at Harvard

University from 1963, becoming Baird professor of science there in 1976.

In an attempt to discover in detail the changes that occur in chemical reactions, Herschbach applied a technique that was then becoming popular in elementary particle physics—molecular beam scattering. He invented what is known as the "crossed molecular beam technique," a technique in which beams of molecules are brought together at supersonic speed under carefully controlled conditions. This procedure enabled a detailed, molecule-by-molecule examination of the chemical reaction event.

Consult the INDEX *first*

Herschel, Caroline Lucretia (b. March 16, 1750, Hannover, Hanover—d. Jan. 9, 1848, Hannover), German-born British astronomer noted for her contributions to the astronomical researches of her brother, Sir William Herschel; she executed many of the calculations connected with his studies and, on her own, detected by telescope three nebulae in 1783 and eight comets from 1786 to 1797.

Caroline Herschel, engraving by Joseph Brown, 1847

By courtesy of the National Portrait Gallery, London

Caroline assisted her mother in the management of the household until 1772, when her brother, William, took her to Bath, Eng., where he had established himself as a teacher of music. Once settled in Bath, Caroline trained and performed successfully as a singer. Both she and William gave their last public musical performance in 1782, when her brother accepted the private office of court astronomer to George III. In addition to keeping house for her brother and grinding and polishing mirrors, she began executing the laborious calculations that were connected with his observations. As her interest grew, she swept the heavens with a small Newtonian reflector and made her own observations and astronomical discoveries. In 1787 the king gave her an annual pension of £50 in her capacity as her brother's assistant. In 1798 she presented to the Royal Society an Index to Flamsteed's observations, together with a catalog of 560 stars omitted from the *British Catalogue* and a list of the errata in that publication.

She returned to Hannover after William's death in 1822 and soon completed the cataloging of 2,500 nebulae and many star clusters. In 1828 (when she was 77) the Astronomical Society awarded her its gold medal for an unpublished revision and reorganization of their work. She lived some 20 years longer and continued to receive the respect and admiration of both scientists and the general public.

Herschel, Sir John (Frederick William), 1ST BARONET (b. March 7, 1792, Slough, Buckinghamshire, Eng.—d. May 11, 1871, Collingwood, Kent), English astronomer and successor to his father, Sir William Herschel, in the field of stellar and nebular observation and discovery.

Early life. An only child, John was educated briefly at Eton and then privately. In 1809 he entered the University of Cambridge in the company of Charles Babbage, mathematician and inventor of the computer, and George Peacock, also a mathematician and later a theologian. In 1812 they founded the Analytical Society of Cambridge to introduce continental methods of mathematical calculus into English practice. They did so by replacing the cumbersome symbolism of Newton with the more efficient type invented by the German philosopher and mathematician Gottfried Wilhelm Leibniz. John's exceptional abilities were quickly recognized: in 1812 he submitted his first mathematical paper to the Royal Society, for which he was elected a fellow the following year. In 1813 he earned first place in the university mathematical examinations.

In 1814 John began to study for the bar in London, but he was not happy with his choice and discontinued his studies in the summer of 1815 when he became seriously ill; after convalescence he returned to Cambridge as a mathematics teacher. He left Cambridge again in 1816 to assist his renowned father in astronomical research. Through his work with his father, he gained the full benefit of the aged astronomer's unrivaled experience in the construction and use of large telescopes. This apprenticeship laid the foundation of John's subsequent achievements. In 1820 he was among the founders of the Royal Astronomical Society. In later years, John made important contributions to chemistry and the physics of light and particularly to mathematics, for which he was awarded the Copley Medal of the Royal Society in 1821.

Observation of double stars. John Herschel's first major task in astronomy was the reobservation of the double stars cataloged by his father. The movements of these pairs of stars about each other offered the best hope of investigating the gravitational forces operating in the universe. John was fortunate to find in James South a collaborator who was able to afford the refined instruments best suited for this work. The catalog that they compiled between 1821 and 1823 and published in the *Philosophical Transactions* in 1824 earned them the Gold Medal of the Royal Astronomical Society and the Lalande Prize in 1825 from the Paris Academy of Sciences. This work was their only joint undertaking.

Herschel served as secretary of the Royal Society in 1824–27. He married in 1829 and in 1831 he was knighted.

John Herschel, detail of pencil drawing by H.W. Pickersgill; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Voyage to the Southern Hemisphere. John Herschel's sense of obligation to complete his father's work in astronomy led him to consider a journey to the Southern Hemisphere to survey the skies not visible in England. In 1832 he began planning his expedition. The revision and extension of his father's catalogs, which he carried out at Observatory House, beginning in 1825, was brought to completion and published in 1833. In November of that year, John and his family set sail for the Cape of Good Hope with a large reflecting telescope for observing faint nebulae, similar in size to William's favourite instrument. He also possessed a refracting telescope for observing double stars.

The family established their home at Feldhausen, a Dutch farmhouse southeast of Cape Town. John spent four years of intense scientific activity, the clear southern skies allowing much more rapid progress in observing than was possible in England. When the family embarked for home in March of 1838, John had recorded the locations of 68,948 stars and had amassed long catalogs of nebulae and double stars. He had also described many details of the Great Nebula in the constellation Orion, as well as the Magellanic Clouds—actually two galaxies visible only in the Southern Hemisphere—and had observed Halley's Comet and the satellites of Saturn. In addition, his descriptions of sunspot activities and his measuring of solar radiation by means of a device he had invented contributed to the development of systematic studies of the Sun as an important part of astrophysics. Upon his return he was made a baronet (1838) and was lionized by the scientific world.

Herschel was also a highly accomplished chemist. His discovery in 1819 of the solvent power of hyposulfite of soda on the otherwise insoluble salts of silver was the prelude to its use as a fixing agent in photography; and he invented in 1839, independently of Fox Talbot, the process of photography on sensitized paper. He was the first person to apply the now well-known terms "positive" and "negative" to photographic images, and to imprint them upon glass prepared by the deposit of a sensitive film.

During the 1840s Herschel worked on *Outlines of Astronomy* (1849), a book for educated laymen. This very successful science text went through many editions, including Arabic and Chinese. But the bulk of his time was occupied with the *Results of Astronomical Observations, Made During the Years 1834–38 at the Cape of Good Hope* (1847). This work contains catalogs and charts of southern-sky nebulae and star clusters, a catalog of the relative positions and magnitudes of southern double stars, and his observations on the variations and relative brightness of the stars.

As a result of his seeking public office, Herschel at the end of 1850 was appointed master of the Mint. The strain of the work caused his health to deteriorate; he became depressed, and in 1854 he suffered a nervous breakdown. In 1856 he resigned his post at the Mint. He spent his remaining years working on the catalogs of double stars and of nebulae and star clusters.

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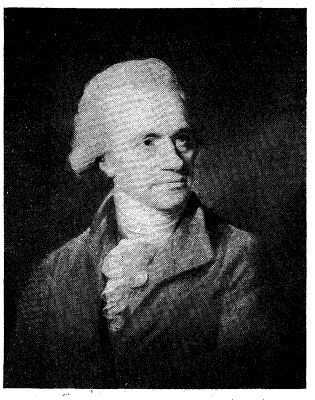
Herschel, Sir William (Frederick), original name FRIEDRICH WILHELM HERSCHEL (b. Nov. 15, 1738, Hannover, Hanover—d. Aug. 25, 1822, Slough, Buckinghamshire, Eng.), German-born British astronomer, the founder

of sidereal astronomy for the systematic observation of the heavens. He discovered the planet Uranus, hypothesized that nebulae are composed of stars, and developed a theory of stellar evolution. He was knighted in 1816.



Sir William Herschel, detail of an oil painting by L. Abbott, 1785; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Early life. Herschel's father was an army musician. Following the same profession, the boy played in the band of the Hanoverian Guards. After the French occupation of Hanover in 1757, he escaped to England, where at first he earned a living by copying music. But he steadily improved his position by becoming a music teacher, performer, and composer, until in 1766 he was appointed organist of a fashionable chapel in Bath, the well-known spa.

By this time, the intellectual curiosity he had acquired from his father led him from the practice to the theory of music, which he studied in Robert Smith's *Harmonics.* From this book he turned to Smith's *A Compleat System of Opticks,* which introduced him to the techniques of telescope construction and whetted his appetite for viewing the night sky. Combining obstinacy with boundless energy, William was not content to observe the nearby Sun, Moon, and planets, as did nearly all astronomers of his day, but was determined to study the distant celestial bodies as well, and he realized he would need telescopes with large mirrors to collect enough light, larger, in fact, than opticians could supply at reasonable cost. He was soon forced to grind his own mirrors. They were ground from metal disks of copper, tin, and antimony in various proportions. In 1781 his ambitions outran the capacities of the local foundries, and so he prepared to cast molten metal into disks in the basement of his own home; but the first mirror cracked on cooling, and on the second attempt the metal ran out onto the flagstones, after which even he accepted temporary defeat. His later and more successful attempts produced ever-larger mirrors of superb quality—his telescopes proved far superior even to those used at the Greenwich Observatory. He also made his own eyepieces, the strongest with a magnifying power of 6,450 times.

At Bath, he was helped in his researches by his brother Alexander, who had come from Hanover, and his sister, Caroline, who was his faithful assistant through much of his career. News of this extraordinary household began to spread in scientific circles. He made two preliminary telescopic surveys of the heavens. Then, in 1781, during his third and most complete survey of the night sky, William came upon an object that he realized was not an ordinary star.

It proved to be the planet Uranus, the first planet to be discovered since prehistoric times. William became famous almost overnight. His friend Dr. William Watson, Jr., introduced him to the Royal Society of London, which awarded him the Copley Medal for the discovery of Uranus, and elected him a Fellow. Watson also helped him to secure in 1782 an annual pension of £200 from George III. He could thus give up music and devote himself exclusively to astronomy. At this time William was appointed as an astronomer to George III, and the Herschels moved to Datchet, near Windsor Castle.

Although he was 43 years old when he became a professional astronomer, William worked night after night to develop a "natural history" of the heavens. A fundamental problem for which Herschel's big telescopes were ideally suited concerned the nature of nebulae, which appear as luminous patches in the sky. Some astronomers thought they were nothing more than clusters of innumerable stars the light of which blends to form a milky appearance. Others held that some nebulae were composed of a luminous fluid. When William's interest in nebulae developed in the winter of 1781–82, he quickly found that his most powerful telescope could resolve into stars several nebulae that appeared "milky" to less well equipped observers. He was convinced that other nebulae would eventually be resolved into individual stars with more powerful instruments. This encouraged him to argue in 1784 and 1785 that all nebulae were formed of stars and that there was no need to postulate the existence of a mysterious luminous fluid to explain the observed facts. Nebulae that could not yet be resolved must be very distant systems, he maintained; and, since they seem large to the observer, their true size must indeed be vast—possibly larger even than the star system of which the Sun is a member. By this reasoning, William was led to postulate the existence of what later were called "island universes" of stars.

Theory of the evolution of stars. In order to interpret the differences between these star clusters, it was natural for William to emphasize their relative densities, which he did by contrasting a cluster of tightly packed stars with others in which the stars were widely scattered. These formations showed that attractive forces were at work: with the passage of time, he maintained, widely scattered stars would no doubt condense into one or more tightly packed clusters. In other words, a group of widely scattered stars was at an earlier stage of its development than one whose stars were tightly packed. Thus, William made change in time, or evolution, a fundamental explanatory concept in astronomy. In 1785 he developed a cosmogony—a theory concerning the origin of the universe: the stars originally were scattered throughout infinite space, in which attractive forces gradually organized them into even more fragmented and tightly packed clusters. Turning then to the system of stars of which the Sun is part, he sought to determine its shape on the basis of two assumptions: (1) that with his telescope he could see all the stars in our system, and (2) that within the system the stars are regularly spread out. Both of these assumptions he subsequently had to abandon. But in his studies he gave the first major example of the usefulness of stellar statistics in that he could count the stars and interpret this data in terms of the extent in space of the Galaxy's star system. Other astronomers, cut off from the evidence by the modest size of their telescopes and unwilling to follow William in his bold theorizing, could only look on with varying degrees of sympathy or skepticism.

In 1787 the Herschels moved to Old Windsor, and the following year to nearby Slough, where William spent the rest of his life. Night after night, whenever the Moon and weather permitted, he observed the sky in the company of Caroline, who recorded his observations. On overcast nights, William would post a watchman to summon him if the clouds should break. Often in the daytime, Caroline would summarize the results of their work while he directed the construction of telescopes, many of which he sold to supplement their income. His largest instrument, too cumbersome for regular use, had a mirror made of speculum metal, with a diameter of 122 centimetres (48 inches) and a focal length of 12 metres (40 feet). Completed in 1789, it became one of the technical wonders of the 18th century.

William's achievement, in a field in which he became a professional only in middle life, was made possible by his own total dedication and the selfless support of Caroline. He seems not to have considered the possibility of marriage until after the death in 1786 of a friend and neighbour, John Pitt, whose widow, Mary, was a charming and pleasant woman. Before long, William proposed marriage; he and Mary would live in the Pitt house, while Caroline would remain at Observatory House in Slough. But Mrs. Pitt was shrewd enough to realize that William's commitment would be to Observatory House, which they made their principal home after their marriage on May 8, 1788. William continued his labour in astronomy, but as the rigours of observing took their toll of William's health, he came to appreciate more and more the comforts that Mary's sensible management brought to his home.

Theory of the structure of nebulae. William's grand concept of stellar organization received a jolt on Nov. 13, 1790, when he observed a remarkable nebula, which he was forced to interpret as a central star surrounded by a cloud of "luminous fluid." This discovery contradicted his earlier views. Hitherto William had reasoned that many nebulae that he was unable to resolve (separate into distinct stars), even with his best telescopes, might be distant "island universes" (such objects are now known as galaxies). He was able, however, to adapt his earlier theory to this new evidence by concluding that the central star he had observed was condensing out of the surrounding cloud under the forces of gravity. In 1811 he extended his cosmogony backward in time to the stage when stars had not yet begun to form out of the fluid.

This example of William's theorizing is typical of his thinking: an unrivalled wealth of observations interpreted by means of bold though vulnerable assumptions. For example, in dealing with the structural organization of the heavens, he assumed that all stars were equally bright, so that differences in apparent brightness are an index only of differences in distances. Throughout his career he stubbornly refused to acknowledge the accumulating evidence that contradicted this assumption. Herschel's labours through 20 years of systematic sweeps for nebulae (1783–1802) resulted in three catalogs listing 2,500 nebulae and star clusters that he substituted for the 100 or so milky patches previously known. He also cataloged 848 double stars—pairs of stars that appear close together in space, and measurements of the comparative brightness of stars. He observed that double stars did not occur by chance as a result of random scattering of stars in space but that they actually revolved about each other. His 70 published papers include not only studies of the motion of the solar system through space and the announcement in 1800 of the discovery of infrared rays but also a succession of detailed investigations of the planets and other members of the solar system.

BIBLIOGRAPHY. Two surveys of William Herschel's life and work are J.B. Sidgwick's highly readable *William Herschel: Explorer of the Heavens* (1953); and A. Armitage's more systematic *William Herschel* (1962). A charming picture of his personality, with extensive quotations from manuscripts, is given in *The Herschel Chronicle: The Life-Story of William Herschel and His*

Sister Caroline Herschel (1933), ed. by his granddaughter, Constance A. Lubbock. His complete published papers are reprinted in *The Scientific Papers of Sir William Herschel*, ed. by J.L.E. Dreyer, 2 vol. (1912); and the most significant are reprinted and critically analyzed by M.A. Hoskin in *William Herschel and the Construction of the Heavens* (1963).

Hersey, John (Richard) (b. June 17, 1914, Tientsin, China), American novelist and journalist noted for his documentary fiction about catastrophic events in World War II.

Hersey lived in China until the age of 10, at which time his family returned to the United States. He graduated from Yale University in 1936, and he served as a foreign correspondent in the Far East, Italy, and Russia for *Time* and *Life* magazines from 1937 to 1946. His early novel *A Bell for Adano* (1944), depicting the Allied occupation of a Sicilian town during World War II, won the 1945 Pulitzer Prize. Hersey's next books demonstrated his gift for combining a reporter's skill for relaying facts with imaginative fictionalization. Both *The Wall* (1950), about the Warsaw ghetto uprisings, and *Hiroshima* (1946), an objective account of the atomic bomb explosion in that city as experienced by survivors of the blast, are based on fact, but they are also personal stories of survival in Poland and Japan in World War II.

Hersey's later novels encompassed a wide variety of subjects and ranged from treatments of contemporary political and social issues to moral parables set in the world of the future. These works interweave social criticism and their author's moralistic aims with imaginative plots and premises.

Hershey, unincorporated community within Derry township, Dauphin County, south central Pennsylvania, U.S., situated just to the east of Harrisburg. The community was founded in 1903 by the entrepreneur Milton Snavely Hershey around Derry Church as the site for his chocolate factory. In 1909 he established a vocational school, which is now called the Milton Hershey School, and, during the Depression of the 1930s, he financed the construction of a community centre, a hotel, and a sports arena there. The Milton S. Hershey Medical Center is a department of Pennsylvania State University. The Pennsylvania State Police Academy is also located in Hershey. Pop. (1980) 13,249.

Hershey, A(lfred) D(ay) (b. Dec. 4, 1908, Lansing, Mich., U.S.), American biologist who, along with Max Delbrück and Salvador Luria, won the Nobel Prize for Physiology or Medicine in 1969. The prize was given for research done on bacteriophages (viruses that infect bacteria).

Hershey, Delbrück, and Luria began exchanging information on phage research in the early 1940s. In 1945 Hershey and Luria, working independently, demonstrated the occurrence of spontaneous mutation in both the bacteriophages and the host. The next year, Hershey and Delbrück independently discovered the occurrence of genetic recombination in phages. Delbrück incorrectly interpreted his results as specifically induced mutations, but Hershey and one of his students proved that the results they had obtained were recombinations by showing that the genetic processes in question correspond with the crossing-over of parts of similar chromosomes observed in cells of higher organisms.

Hershey is most noted for the so-called blendor experiment that he performed with Martha Chase in 1952. By showing that phage DNA is the principal component entering the host cell during infection, Hershey proved that DNA, rather than protein, is the genetic material of the phage.

He joined the staff of the Genetics Research Unit of the Carnegie Institution of Washington in 1950 after giving up his position as professor at Washington University School of Medicine in St. Louis, Mo. In 1963 he became director of the Genetics Research Unit. For his discoveries Hershey won the Albert Lasker award (1958) and the Kimber Genetics award (1965).

Hershey, Milton Snavely (b. Sept. 13, 1857, near Hockersville, Pa., U.S.—d. Oct. 13, 1945, Hershey, Pa.), American manufacturer and philanthropist who founded the Hershey Chocolate Corporation and was instrumental in popularizing chocolate candy throughout much of the world.

Following an incomplete rural school education, Hershey was apprenticed at age 15 to a confectioner in Lancaster, Pa. After completing his apprenticeship in 1876 he set up his own candy shop in Philadelphia, but the venture failed six years later. After an attempt

Milton Hershey
By courtesy of the Hershey Foods Corporation

to manufacture candy in New York City also ended in failure, Hershey returned to Lancaster, where his innovative use of fresh milk in caramels proved enormously successful. He set up the Lancaster Caramel Company, which continued to make caramels in the 1890s while Hershey became increasingly interested in chocolate making. In 1900 Hershey sold his caramel company for $1,000,000, after which he concentrated on perfecting a formula for chocolate bars. In 1903 he began building at the site of what became Hershey, Pa., a factory that became the world's largest chocolate manufacturing plant. Based on the popularity of its milk chocolate bars, his new company grew rapidly despite Hershey's refusal to advertise its products. The company town of Hershey received many public amenities under his firm but benevolent control. In 1918 Hershey turned over the bulk of his fortune to the M.S. Hershey Foundation, which supports the Milton Hershey School, a vocational school founded by him.

Herskovits, Melville J(ean) (b. Sept. 10, 1895, Bellefontaine, Ohio, U.S.—d. Feb. 25, 1963, Evanston, Ill.), American anthropologist noted for having opened up the study of the New World Negro as a new field of research. Herskovits is also known for his humanistic and relativistic writings on culture.

Herskovits took his Ph.B. at the University of Chicago (1920) and his M.A. (1921) and Ph.D. (1923) at Columbia University, where he came under the influence of Franz Boas. Herskovits was a lecturer in anthropology at Columbia and Howard University before moving in 1927 to Northwestern University, where he remained until his death. In 1951 Herskovits was named there to the first professorial chair of African studies in the United States.

From his initial studies of the American Negro as a physical type, Herskovits was led to an interest in the social problems of American Negroes and to their cultural roots in Africa. He systematically attacked some widely held myths in *The Myth of the Negro Past* (1941) and also opposed the assumption that Africa must follow the Western model and remain under the continuous direction of Europeans.

Herskovits also had interests in economics (especially in relation to anthropology) and African folk art and music. His major works include *The Economic Life of Primitive Peoples* (1940), retitled in a second edition as *Economic Anthropology* (1952); *Man and His Works* (1948), which was revised and abridged as *Cultural Anthropology* (1955); and *The Human Factor in Changing Africa* (1962).

Herstal, French HÉRISTAL, municipality, Liège province, eastern Belgium, situated on the Meuse River and the Liège-Maastricht Canal. Herstal was originally a Carolingian settlement, and its name is probably derived from the German *Heerstelle* (permanent or fortified camp). Pepin II, 7th-century ruler of the Frankish Empire, was born there, and the town disputes with Aachen (Aix-la-Chapelle) the honour of being the birthplace of Charlemagne. Now an important northeastern industrial suburb of Liège, Herstal has collieries, an electrical equipment plant, and Belgium's national weapons factory. Motorcycles and jet engines also are manufactured there, as are guns and other small arms. Pop. (1982) mun., 38,189.

Herstmonceux, parish, Wealden district, county of East Sussex, England. The parish is the site of the well-known castle of Herstmonceux, which was completed *c.* 1444 by Sir Roger de Fiennes as a fortified manor surrounded by a moat. It is one of the finest early brick buildings in England. The parish also contains All Saints church, which dates from the late 12th century. The Royal Greenwich Observatory was moved to Herstmonceux from its original site in Greenwich (London) in the 1950s. Pop. (1981) 2,246.

Herten, city, North Rhine-Westphalia *Land* (state), western Germany, situated in the heavily industrial Ruhr district, immediately southwest of Recklinghausen. First mentioned in the 9th century as a dependency of the abbots of Werden, the city belonged to numerous minor lords after 1350. Its fortifications were begun in 1528 and were extended in the 17th century. The opening of coal mines in the area in 1872 stimulated the development and expansion of the town, which was chartered in 1936.

The castle dates from the 16th century, on earlier foundations, and the Gothic Antoniuskirche (1433) was rebuilt in 1884 after a fire. The major industries are coal mining and food processing. Pop. (1989 est.) 68,111.

Hertford, parish (town), East Hertfordshire district, county of Hertfordshire, England, situated on the River Lea, on the northern periphery of London. Hertford was first recorded as the scene of a general synod (meeting of bishops) in AD 672, but the oldest buildings extant in the parish are 15th-century timber-framed houses. Numerous examples of Georgian architecture also still stand, together with a few examples of East Anglian weather boarding (clapboards), as well as of buildings faced with flints. The town has many agricultural connections and serves as the administrative centre of Hertfordshire county. There are also light engineering industries. Pop. (1981) urban area, 21,606.

Hertford, Edward Seymour, earl of: *see* Somerset, Edward Seymour, 1st duke of.

Hertford, Edward Seymour, earl of, BARON BEAUCHAMP (b. *c.* 1539—d. April 6, 1621), English lord whose secret marriage to an heir to the throne angered Queen Elizabeth I and probably influenced her choice of James VI of Scotland as her successor.

Seymour was the eldest son of the Protector (Edward Seymour, duke of Somerset) by his

second marriage. The attainder passed on his father was relieved by Act of Parliament in the reign of Mary I (1551); and, two months after the accession of Elizabeth I, Seymour was created Baron Beauchamp and earl of Hertford (January 1559). In 1560 he secretly married Lady Catherine Grey, second daughter of Henry Grey, duke of Suffolk, and sister of Lady Jane Grey. On her sister's death (1554), Catherine had come to stand next in succession to the throne after Queen Elizabeth according to the will of Henry VIII. On this account both parties to the marriage incurred the displeasure of Queen Elizabeth when the secret was exposed; they were imprisoned in the Tower of London in 1561 and were not released until 1563, after Hertford paid a heavy fine; even thereafter they remained in private custody. The death of Catherine in 1568 somewhat relieved the royal displeasure, but Hertford in his remaining years lived as quietly as possible.

Elizabeth I denied the fact of their marriage, together with the legitimacy of their two sons. The elder son, Edward Seymour (1561–1612), styled Lord Beauchamp notwithstanding the question of his legitimacy, was ignored as an heir when Elizabeth was on her deathbed; she chose the King of Scotland, who became James I of Great Britain.

Hertford, Richard de Clare, 6th earl of: *see* Gloucester, Richard de Clare, 7th earl of.

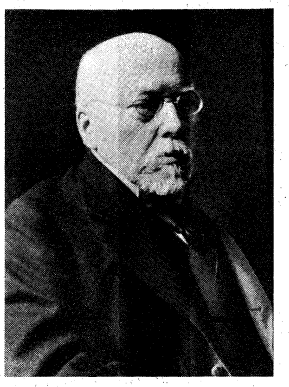
Hertfordshire, county of southern England, adjoining London on its northern side. With an area of 631 sq mi (1,634 sq km), it is divided into the following administrative districts: the boroughs of Broxbourne, Hertsmere, Stevenage, and Watford; the city of St. Albans; and Dacorum, East Hertfordshire, North Hertfordshire, Three Rivers, and Welwyn/Hatfield.

The county lies mainly within the London Basin, but its rim, the chalk Chiltern Hills, cuts across northern Hertfordshire from southwest to northeast. Most of the county, therefore, drains southward toward the Thames by the River Lea in the east and the River Colne in the west. In both these valleys the sands and gravels of the London Basin have been extensively worked, creating a series of flooded pits used now for recreation or for water storage. The gently rolling countryside is well wooded and attractive but has been increasingly submerged by the encroaching suburban development of London. The Greenbelt legislation has restricted this urban growth and helped to preserve what is left of the countryside in the vicinity of the metropolis.

Neolithic, Bronze Age, and Belgic remains are numerous, but it is the Roman legacy in the county that is richest. Several Roman roads, including Ermine and Watling streets, fanned northward from London, and the outstanding settlement in the area was St. Albans (Roman Verulamium). On the same site the Saxons later built an abbey (AD 793) whose church, rebuilt by the Normans, is today St. Albans Cathedral. In the following centuries many large country houses and estates (including Hatfield, Knebworth, and Gorhambury) were built at a convenient distance from London, and a number of typical market towns—*e.g.*, Hertford and Hitchin—developed.

The 20th century has, however, been one of special significance for the county: it has brought to Hertfordshire the two pioneer "garden cities" of the modern era—Letchworth (1903) and Welwyn Garden City (1920)—and four of the eight new towns planned around London since World War II—Hatfield, Hemel Hempstead, Stevenage, and Welwyn (*qq.v.*). Even apart from this planned growth, the residential and industrial development of other centres such as Watford has been rapid; no county in England has a greater array of direct road and rail links with London, and the whole county lies within easy commuting time of the capital. Light industries dependent on access to markets, offices moving from central London to areas of lower rentals, film studios, and thousands of exurbanites have in recent decades overflowed into Hertfordshire. Pop. (1983 est.) 975,400.

Hertling, Georg (Friedrich), Graf von (count of) (b. Aug. 31, 1843, Darmstadt, Hesse-Darmstadt—d. Jan. 4, 1919, Ruhpolding, Ger.), conservative German statesman and philosopher who became imperial chancellor during the last year of World War I but was little more than a caretaker for the military, which actually controlled the country.



Hertling, 1918

By courtesy of Bildarchiv Preussischer Kulturbesitz BPK, West Berlin

A devout Catholic scholar, Hertling exercised considerable influence on Catholic social philosophy both from his university chairs at Bonn and then Munich and as head of the Görres-Gesellschaft (Görres-Society), which he founded to advance Catholic studies. He served in the Reichstag (federal parliament) as a deputy of the Catholic Centre Party (1875–90 and 1896–1912) and was its parliamentary leader from 1909 to 1912. In 1912 King Ludwig III of Bavaria named him Bavarian prime minister and foreign minister, a position he was to retain until 1917. On Nov. 1, 1917, Hertling replaced Georg Michaelis as German chancellor to placate the Reichstag parties that had lost confidence in Michaelis. Hertling, however, exercised little real power, which remained in the hands of the supreme military command headed by Paul von Hindenburg and Erich Ludendorff. Hertling believed in ultimate German victory and never challenged the military. In September 1918, when Germany's collapse became imminent, he stepped down rather than work with a government responsible to the Reichstag.

Hertsmere, district (borough), county of Hertfordshire, England. With an area of 38 sq mi (98 sq km), Hertsmere lies immediately outside the northern boundary of Greater London, between Watford on the west and Hatfield on the east. It thus covers a part of the urban–rural fringe of contemporary London, with a considerable area of open space surviving in the form of farmland, parks, playing fields, and golf courses but with tentacles of suburban development encroaching upon it from the south. Greenbelt legislation has helped to restrict this encroachment and preserve the remaining open space. The district headquarters are at Borehamwood. Pop. (1983 est.) 88,400.

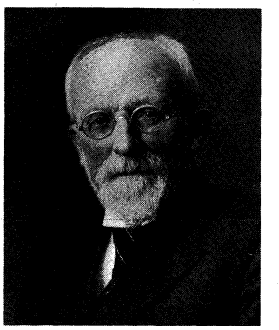
Hertwig, Oskar (Wilhelm August) (b. April 21, 1849, Friedberg, Hessen—d. Oct. 25, 1922, Berlin), German embryologist and cytologist who was the first to recognize that the fusion of the nuclei of the sperm and ovum was the essential event in fertilization.

After studying medicine and zoology at Jena, Zürich, and Bonn, he obtained a lectureship in anatomy at the University of Jena (1875) and was elected to a professorship there (1881). From 1888 to 1921 he was professor of anatomy and evolutionary history at the University of Berlin and director of the Anatomisch-Biologische Institut.

Among his important investigations were studies of nuclear transmittal of hereditary characters, biogenetic theory, and the effect of radium rays on somatic and germ cells. With his brother, Richard von Hertwig, he investigated the formation of the coelom (body cavity) and wrote several papers on the germ-layer theory, questioning the proposition that all organs and tissues derive variously from three basic tissue layers.

Hertwig, Richard (Carl Wilhelm Theodor) von (b. Sept. 23, 1850, Friedberg, Hessen—d. Oct. 3, 1937, Munich), German biologist particularly noted for the development of the germ-layer theory, which proposes that all organs and tissues are derived variously from three basic tissue layers, and for his contributions to the study of protozoans.

Educated at the universities of Zürich, Jena, and Bonn, he became a lecturer in zoology at Jena (1875) and professor at the universities of Königsberg (1881), Bonn (1883), and Munich (1885–1925). Hertwig was the first to describe the artificially stimulated development of sea urchin eggs (parthenogenesis). He worked on the theory of coelom formation proposed by German biologist Ernst Haeckel, helped to elucidate the reproductive process of the paramecium, and studied sex determination in amphibians. Many of his investigations were conducted in collaboration with his brother, Oskar Hertwig.



Richard von Hertwig

Kester Lichtbildarchiv

hertz, unit of frequency. The number of hertz (abbreviated Hz) equals the number of cycles per second. The frequency of any phenomenon with regular periodic variations can be expressed in hertz, but the term is used most frequently in connection with alternating electric currents, electromagnetic waves (light, radar, etc.), and sound. It is part of the International System of Units (SI), which is based on the metric system. The term hertz was proposed in the early 1920s by German scientists to honour the 19th-century German physicist Heinrich Hertz. The unit was adopted in October 1933 by a committee of the International Electrotechnical Commission and is in widespread use today, although it has not entirely replaced the expression "cycles per second." A rarely used multiple of the hertz is the fresnel, which is equal to 10^{12} hertz. The fresnel was named for the 18th–19th-century French scientist Augustin Jean Fresnel, one of the pioneers of the science of optics.

Hertz, Gustav (Ludwig) (b. July 22, 1887, Hamburg—d. Oct. 30, 1975, Berlin, E. Ger.), German physicist who,with James Franck, received the Nobel Prize for Physics in 1925 for work that confirmed the theory that energy can be absorbed by an atom only in definite amounts.

A nephew of the noted physicist Heinrich

Hertz, he studied at the universities of Göttingen, Munich, and Berlin, and was appointed an assistant in physics at the University of Berlin in 1913, where he began to work with Franck. Their experiments showed that when

Gustav Hertz
Historia-Photo

an electron strikes an atom, it must possess a certain minimum energy in order to displace another electron from the atom. This energy is called an ionization potential and varies for different elements. Their measurements showed that the distinct wavelengths of light emitted by each element corresponded to the series of possible energy states for the atoms of that element. This had been foreseen by Niels Bohr, who utilized the quantum theory to explain the nature of the atom.

In 1925 Hertz was appointed professor of physics at the University of Halle and in 1928 professor of physics at the Technische Hochschule in Berlin. In 1932 he devised a method of separating the isotopes of neon. Hertz, from 1945 until 1954, was engaged in research in the Soviet Union. He returned to East Germany in 1954 and was professor of physics and director of the Physics Institute in Leipzig until 1961.

Hertz, Heinrich (Rudolf) (b. Feb. 22, 1857, Hamburg—d. Jan. 1, 1894, Bonn), German physicist who was the first to broadcast and receive radio waves.

He received his Ph.D. magna cum laude from the University of Berlin in 1880, where he studied under Hermann von Helmholtz. In 1883 he began his studies of the electromagnetic theory of James Clerk Maxwell. Between 1885 and 1889, while he was professor of physics at the Karlsruhe Polytechnic, he pro-

Heinrich Hertz
Historia-Photo

duced electromagnetic waves in the laboratory and measured their length and velocity. He showed that the nature of their vibration and their susceptibility to reflection and refraction were the same as those of light and heat waves. As a result he established beyond any doubt that light and heat are electromagnetic radiations. In 1889 Hertz was appointed professor of physics at the University of Bonn, where he continued his research on the discharge of electricity in rarefied gases.

His scientific papers were translated into English and published in three volumes: *Electric Waves* (1893), *Miscellaneous Papers* (1896), and *Principles of Mechanics* (1899).

Hertz, Henrik, original name HEYMAN HERTZ (b. Aug. 25/27, 1797/8, Copenhagen—d. Feb. 25, 1870, Copenhagen), dramatist and poet, among the most popular Danish dramatists.

Orphaned early, he took his first inspiration from an unhappy love affair. He first imitated Johan Ludwig Heiberg, whom he joined in attacking contemporary Romantics. Like his friend Heiberg, he regarded perfection of form as more important than content, as is clearly expressed in his set of satirical letters, *Gjenganger-breve* (1830; "Letters of a Ghost"), which were a great success. Hertz wrote some 50 plays, of which the best known are *Sparekassen* (1836; "The Savings Bank"), *Svend Dyrings hieus* (1837; "Sven Dyring's House"), and *Kong Renés datter* (1843; *King René's Daughter,* 1843). He was also a prolific writer of many kinds of verse.

Hertz, Joseph Herman (b. Sept. 25, 1872, Rebrény, Hung.—d. Jan. 14, 1946, London), chief rabbi of the United Hebrew Congregations of the Commonwealth and author of books on Judaism and of influential commentaries on the Bible expressing a fundamentalist viewpoint.

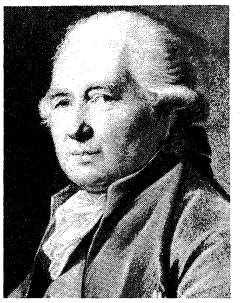
Emigrating to New York City as a boy, he was the first rabbinical graduate of the newly founded Jewish Theological Seminary of America. After serving as spiritual leader of a synagogue in Syracuse, N.Y. (1894–96), he was appointed rabbi in Johannesburg. His pro-British sympathies in the Boer War and his vigorous opposition to government-imposed religious restrictions on Jews and Roman Catholics provoked Pres. Paul Kruger to expel him from South Africa. After the war, Hertz returned to his post, a position he retained until 1911. From 1906 to 1908 he also served as professor of philosophy at Transvaal University College, now the University of Pretoria.

Hertz was elected to his post as chief rabbi in England in 1913. His career in that position was a colourful one. He attacked the newly formed Liberal Jewish movement (a movement more or less equivalent to U.S. Reform Judaism). His powerful attacks on anti-Semitism included one, in the presence of the Russian ambassador, against Russian discrimination.

A strong opponent of the "higher criticism" of the Pentateuch (Five Books of Moses), which ascribed the books to composite human authorship or editing based on various original documents, Hertz sought to reconcile the Orthodox Jewish view of the divine revelation of Scriptures with the findings of modern science. His English commentaries on the Pentateuch and on the prayer book have been widely used by Orthodox and Conservative Jews. His anthology, *A Book of Jewish Thoughts* (1920), was translated into several languages and went through many editions. In 1925 he was made a governor of the Hebrew University of Jerusalem. Hertz, a zealous Zionist, played an important role in eliciting the Balfour Declaration in 1917 (a British declaration supporting a Jewish homeland in Palestine) and, later, enthusiastically implemented its policies.

Hertzberg, Ewald Friedrich, Graf von (count of) (b. Sept. 2, 1725, Lottin, Pomerania—d. May 27, 1795, Berlin), Prussian statesman and foreign minister who aimed at the expansion of Prussia and its establishment as the arbiter of Europe through a strong alliance between Britain, the Netherlands, Russia, and Prussia aimed against France, Austria, and Spain.

Hertzberg studied constitutional law and history at Halle. In 1745 he entered the Prussian civil service, serving in the state record office and holding a minor foreign office post. By



Hertzberg, detail from a miniature by Gustav Taubert, 1792
Archiv fur Kunst und Geschichte, West Berlin

1750, he had become head of the secret cabinet archives. Two years later, he was nominated to the Berlin Academy of Sciences, where his annual speeches on Prussian administration became notable events.

Hertzberg's knowledge of the Hohenzollern dynasty's genealogies and hereditary claims proved of considerable value to Frederick II the Great's politics. A regular attendant at the secret cabinet meetings from 1754, Hertzberg was the author of the famous *Mémoire raisonné* ("Reasoned Memorandum") that justified Prussia's attack on Saxony at the beginning of the Seven Years' War (1756). Elevated to undersecretary of state in 1757, he negotiated Prussia's peace treaties with Russia (1762) and Austria and Saxony (1763). As minister for foreign affairs from 1763, he vainly sought both the exclusion of Austria from the First Partition of Poland (1772) and the acquisition of territory after the War of the Bavarian Succession (1778–79), Prussia's victorious campaign which prevented Bavaria's cession to Austria. Hertzberg was never able to influence Frederick the Great to any substantial degree and finally joined the opposition party around the crown prince, Frederick William II.

With the accession of Frederick William (1786), Hertzberg came to exert a dominant influence. He created Prussia's Fürstenbund (League of Princes) but failed to forge a powerful northern league despite alliances with Britain and the Netherlands, for Russia never joined it. When Austria and Russia declared war on Turkey (1787), Hertzberg attemped a settlement favourable to Prussia. He envisioned Russian acquisition of Bessarabia; Austria was to receive Moldavia and Walachia while restoring Galicia to Poland, which in turn would cede West Prussia, Danzig, and Thorn to Prussia. Britain refused to back Hertzberg and relations with Austria deteriorated almost to the point of war, when Frederick William II disavowed his foreign minister and signed the Convention of Reichenbach with Austria (1790), by which the latter renounced any territorial acquisitions in the Turkish war. Retiring from the ministry in 1791, Hertzberg nevertheless continued to provide unsolicited advice until his death in 1795.

Hertzen, Aleksandr (Ivanovich) (author): *see* Herzen, Aleksandr (Ivanovich).

Hertzog, J(ames) B(arry) M(unnik) (b. April 3, 1866, near Wellington, Cape Colony—d. Nov. 21, 1942, Pretoria, Union of South Africa), soldier and statesman who held the post of prime minister of the Union of South Africa from 1924 to 1939. His political principles, as first stated in his speeches in 1912, were "South Africa First" (even before the British Empire) and the "Two Streams Pol-

Hertzog
By courtesy of the South African Information Service

icy," under which each part of the white South African nation—*i.e.*, the British and the Afrikaner (Dutch)—would be free from domination by the other.

Trained in law (Victoria College, Stellenbosch, and Amsterdam University), Hertzog practiced in Pretoria (1892–95) until appointed to the high court of the Orange Free State. During the South African War (1899–1902) he rose to assistant chief commandant of the Free State forces and became a resourceful and daring guerrilla leader. Though he would have preferred to fight on, Hertzog was persuaded to sign the Peace of Vereeniging (May 1902).

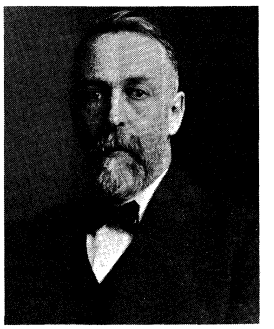
Hertzog then entered politics by organizing the Orangia-Unie (Orangia Union). When self-government was given to the largely Afrikaner Orange Free State in 1907, he became a member of the Cabinet and created a national controversy by championing the Dutch (Netherlandic) language. In 1910 he was taken into the Union's first Cabinet under Louis Botha, but his strong nationalist views caused Botha to form a new government without him in 1912. Hertzog, meanwhile, formed the National Party (1914), which gained strength by opposing Botha's active support of Britain during World War I. In 1924, with the support of the Labour Party, Hertzog became prime minister.

As prime minister, Hertzog gave the Union its flag, made Afrikaans an official language, and protected home industries. In imperial conferences he helped to pave the way for the Statute of Westminster (1931), by which Britain recognized the equality of the dominions, including their right to secede. Intrigues within his own party and the failure of his policy to preserve the gold standard moved Hertzog into a coalition with Jan Smuts in 1933. The next year the National and South African parties joined to form the United Party. With the strong support of Afrikaners, Hertzog carried through a racial policy that resulted in greater segregation of whites and blacks, disenfranchisement of the Cape Bantu, and the expansion of the native reserves. Nevertheless, he was outflanked by the opposition Purified Nationalist Party led by Daniel F. Malan, who advocated more stringent measures.

In the 1938 election Hertzog's party won a great triumph, but the outbreak of World War II led to his downfall. Though agreed on internal matters, his party was divided on the question of South Africa's role in the war. He insisted on neutrality; Smuts and his followers felt that South Africa's place was next to Britain. When Hertzog's motion to remain out of the war was defeated in Parliament (Sept. 4, 1939) by a vote of 80 to 67, he resigned, and Smuts formed a new government. Healing the breach between himself and Malan's Purified Nationalists, Hertzog became the leader of the opposition. The reunion survived until Malan's followers rejected Hertzog's program of equal rights for British South Africans and Afrikaners. At the end of 1940 an embittered Hertzog retired from politics.

Two biographies are L.E. Neame's *General Hertzog* (1930) and C.M. van den Heever's *General J.B.M. Hertzog* (1946).

Hertzsprung, Ejnar (b. Oct. 8, 1873, Frederiksberg, near Copenhagen—d. Oct. 21, 1967, Roskilde, Den.), Danish astronomer who classified types of stars by relating their colour to their absolute brightness—an accomplishment of fundamental importance to modern



Hertzsprung, *c.* 1930
Archiv fur Kunst und Geschichte, West Berlin

astronomy. The Hertzsprung–Russell diagram of stellar types was named (in part) for him. In 1913 he established the luminosity scale of Cepheid variable stars, a tool for measurement of intergalactic distances.

He had no formal education in astronomy but studied in technological colleges in Denmark and became a chemical engineer. Keenly interested in the chemistry of photography, he turned to astronomy in 1902, working in small Danish observatories, where he applied photography to the measurement of starlight. In two papers, published in 1905 and 1907, he showed that a relationship exists between the colours of the stars and their true brightness and that giant and dwarf stars must exist. The correlation of colour with true brightness became the basis of a widely used method of deducing the so-called spectroscopic parallaxes of stars (estimates of their distances from the Earth). Because the spectrum of a star is a reliable index of its absolute magnitude, its distance can be inferred from the known relationship between the apparent and absolute magnitudes. This work so impressed Karl Schwarzschild, director of the observatory at Potsdam, that he found a place for Hertzsprung on the staff at Göttingen Observatory (1909) and later the same year as a senior astronomer at Potsdam. Hertzsprung was appointed assistant director of the university observatory at Leiden, The Netherlands, in 1919 and became director in 1935. He retired in 1945 and returned to Denmark.

Hertzsprung–Russell diagram, in astronomy, graph in which the absolute magnitudes (intrinsic brightness) of stars are plotted against their spectral types. Of great importance to theories of stellar evolution, it evolved from charts begun in 1911 by the Danish astronomer Ejnar Hertzsprung and independently by the U.S. astronomer Henry Norris Russell.

On the diagram stars are ranked from bottom to top in order of decreasing magnitude (increasing brightness) and from right to left by increasing temperature (spectral class). Stars of the galactic arm in which the Sun is located tend to fall into distinct regions on the diagram. The group called the main sequence extends in a rough diagonal from the upper left of the diagram (hot, bright stars) to the lower right (dim and cool). The giant sequence of large, bright, though cool, stars appears in the upper right, and the white dwarfs, dim, small, and hot, lie in the lower left. The Sun lies near the middle of the main sequence.

Diagrams drawn for the same stars with colour instead of temperature plotted against magnitude give similar results and are called colour–magnitude diagrams. Colour–magnitude diagrams drawn for stars from other parts of the Milky Way Galaxy—*e.g.*, globular clusters—show different patterns from that for the local stars.

Heruli, a Germanic people originally from Scandinavia. They raided towns in the Roman Empire, scoring their greatest success in AD 267, when they captured Byzantium and sacked Greek cities. Two years later, the eastern Heruli were crushingly defeated by the Roman emperor Claudius II Gothicus in a battle near Naissus (modern Niš, Yugos.). From then until the mid-6th century, when they vanished from history, their fortunes varied. They were subjugated first by Ermanaric the Goth, then by the Huns. Their kingdom on the middle Danube, founded in the late 5th century, fell to the Lombards early in the 6th century.

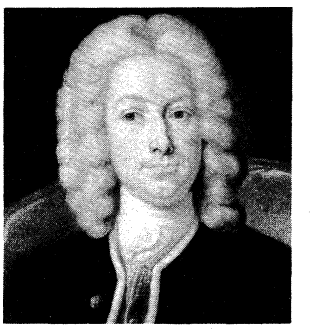
Hervé, Mademoiselle: *see* Béjart, Geneviève.

Hervé-Bazin, Jean Pierre: *see* Bazin, Hervé.

Hervey, John: *see* Bristol, John Hervey, 1st earl of.

Hervey (of Ickworth), John Hervey, Baron (b. Oct. 15, 1696—d. Aug. 5, 1743, Ickworth, Suffolk, Eng.), politician and wit whose *Memoirs of the Reign of George the Second* are of first importance and, along with the writings of Horace Walpole, are largely responsible for many of posterity's impressions of 18th-century England.

The eldest surviving son of John Hervey, 1st earl of Bristol, (1665–1751), he was educated at Westminster School and the University



Baron Hervey, detail of an oil painting from the studio of J.-B. Van Loo, *c.* 1740–41; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

of Cambridge. He then made the customary "grand tour" of Europe and, at Hannover, Ger., became a firm friend of Frederick Louis (later prince of Wales), the eldest son of King George II. His wife, Mary (Molly) Lepell, whom he married in 1720, was a close friend of the then Prince and Princess of Wales (later George II and Queen Caroline, for whom he served as vice chamberlain of the royal household, 1730–40). Hervey was Whig member of Parliament for Bury St. Edmunds, Suffolk (1725–33) and was then created Baron Hervey of Ickworth. He was disappointed in public life, for, though he was made lord privy seal in 1740, he fell with Sir Robert Walpole's government in 1742.

Hervey's renown, however, lay in the world of fashion and the court rather than in politics. He suffered from a feeble constitution, though his health improved after a visit to Italy, when he formed a close friendship with Stephen Fox (later Lord Ilchester). This friendship evoked scandalous allusions from Alexander Pope in his "Epistle to Dr. Arbuthnot," a satiri-

cal poem in which Hervey figures as "Sporus." His own outspoken *Memoirs* (published posthumously, 1848; edited by R. Sedgwick, 3 vol., 1931; rev. 1963) were, he said, written for those who prefer to see the great "dressing and undressing rather than when they are playing their part on the public stage."

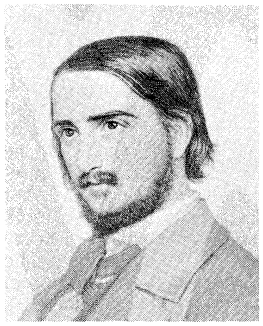
Hervey Bay, inlet and town on the Pacific Ocean between Fraser Island and Burnett Heads, southeastern Queensland, Australia. The bay was named in 1770 by the British navigator Capt. James Cook; it was surveyed in 1804 by the British navigator Matthew Flinders. Measuring 55 by 40 mi (89 by 64 km), it opens to Great Sandy Strait in the south and receives the Burnett, Mary, Isis, Burrum, and Gregory rivers.

Hervey Bay town comprises a complex of bayside resorts, including Point Vernon, Pialba, Torquay, Scarness, and Urangan. These communities also serve a district of sugarcane and pineapple plantations. Oysters are farmed, there is light engineering in the area, and tropical fish are bred. Urangan has developed as a deepwater port for Maryborough, 40 mi south-southwest. The area is accessible from Brisbane via the Bruce and Isis highways. Pop. (1981) 13,569.

Hervieu, Paul-Ernest (b. Sept. 9, 1857, Neuilly-sur-Seine, Fr.—d. Sept. 25, 1915, Paris), French novelist and playwright, most of whose dramas were tragedies centring on family conflicts and relationships, intended to teach some moral lesson.

After training as a lawyer, Hervieu entered the diplomatic service. Later, he began writing novels and short stories, of which the best are *Flirt* (1890) and *Peints par eux-mêmes* (1893). He then turned to writing plays, and for some 20 years he was associated with the Comédie-Française. One of his most successful plays was a historical drama of the Revolution, *Théroigne de Méricourt,* which he wrote especially for the Comédie's leading actress, Sarah Bernhardt. His best works had a legal background, notably *Les Tenailles* (1895), *La Loi de l'homme* (1897), and *Le Dédale* (1903). All of these were directed against the strict divorce laws then operating in France. In 1899 Hervieu was elected to the Académie Française.

Herwegh, Georg (b. May 31, 1817, Stuttgart, Württemberg—d. April 7, 1875, Lichtental, Baden), poet whose call for a revolutionary spirit in Germany was heeded by the young poets of his time. His work includes poetry that, with a lyric sensitivity unusual among the revolutionary poets of the period, stands comparison with Heinrich Heine's achievements.



Herwegh, engraving by C.A. Gonzenbach after a portrait by C. Hitz

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

He was expelled from the theological college at Tübingen and began his literary career as a journalist. Called up for military duty, he tactlessly insulted an officer and was forced to flee to Switzerland. There he found a publisher for his best known collection, *Gedichte eines Lebendigen* (1841, 1844; "Poems of One Living"), political poems expressing the aspirations of German youth. Although the book was confiscated, it made his reputation overnight and ran through several editions. When he returned to Germany in 1842, he was enthusiastically welcomed by popular demonstrations of sympathy; the Prussian king Frederick William IV received him in an amicable spirit and is said to have considered him an honourable enemy. But when a new journal Herwegh was planning was suppressed, he wrote to the King in a tactless tone and was immediately expelled from Prussia, returning to Switzerland as a political martyr. From there he went to France. When the revolution of 1848 broke out, he led 800 French and German workingmen in an uprising in Baden. His disastrous defeat practically put an end to his career. He escaped to Switzerland and lived in Zürich and Paris until an amnesty in 1866 permitted him to return to Germany. He also translated the works of Alphonse de Lamartine and wrote poetry collected in *Neue Gedichte* (1877; "New Poems"), which appeared after his death.

Herz, Henri (b. Jan. 6, 1803, Vienna—d. Jan. 5, 1888, Paris), brilliant Austrian pianist, teacher, and composer.

Herz studied with his father and Daniel Hünten, then went to the Paris Conservatoire, where his teachers included Antonín Reicha and Victor Dourlen. He toured extensively in Europe, Russia, South America, and the United States, where he presented more than 400 concerts. From 1842 to 1874 he served as a professor of piano at the Paris Conservatoire and later founded the École Spéciale de Piano in Paris. He was also a noted maker of pianos, taking the first prize at the Paris Exposition of 1855.

Modelling himself on Ignaz Moscheles (1794–1870), Herz became one of the most renowned pianists and composers of the second quarter of the 19th century. Although his compositions, which resemble those of Johann Hummel, Moscheles, and Karl Czerny, were very popular, they were criticized for shallow virtuosity by commentators such as Robert Schumann.

Herzberg, Gerhard (b. Dec. 25, 1904, Hamburg), Canadian physicist and winner of the 1971 Nobel Prize for Chemistry for his work in determining the electronic structure and geometry of molecules, especially free radicals—groups of atoms that contain odd numbers of electrons. One of his most important works is the three-volume *Molecular Spectra and Molecular Structure* (1939–66).

Herzberg became *Privatdozent* (unsalaried lecturer) at the Technische Universität at Darmstadt in 1930 but fled Nazi Germany in 1935 and obtained a position with the University of Saskatchewan, Saskatoon, Can. From 1945 to 1948 he worked at the Yerkes Observatory, Williams Bay, Wis., and then returned to Canada, where he joined the National Research Council, Ottawa.

Herzberg's spectroscopic studies not only provided experimental results of prime importance to physical chemistry and quantum mechanics but also helped stimulate a resurgence of investigations into the chemical reactions of gases. He devoted much of his research to diatomic molecules, in particular the most common ones—hydrogen, oxygen, nitrogen, and carbon monoxide. He discovered the spectra of certain free radicals that are intermediate stages in numerous chemical reactions, and he was the first to identify the spectra of certain radicals in interstellar gas. He also contributed much spectrographic information on the atmospheres of the outer planets and the stars.

Herzegovina (Yugoslavia): *see* Bosnia and Hercegovina.

Herzen, Aleksandr (Ivanovich), Herzen also spelled HERTZEN, Russian ALEKSANDR IVANOVICH GERTSEN (b. April 6 [March 25, old style], 1812, Moscow—d. Jan. 21 [Jan. 9, O.S.], 1870, Paris), journalist and political thinker who originated the theory of a unique Russian path to Socialism, called peasant populism. Herzen chronicled his career in

Herzen, detail of an oil painting by Nikolay Nikolayevich Gué, 1867; in the State Tretyakov Gallery, Moscow

By courtesy of the State Tretyakov Gallery, Moscow

My Past and Thoughts (1861–67), one of the greatest works of Russian prose.

Early Life. Herzen was the illegitimate son of a wealthy nobleman, Ivan Alekseyevich Yakovlev, and a German girl of humble origins. Reared in his father's house, he received an elite and far-ranging education from French, German, and Russian tutors. Still, the "taint" of his birth, as he regarded it, made him resentful of authority and, ultimately, of the autocratic, serf-based Russian social order. This resentment also bred a cult of the Decembrists, a revolutionary group that staged an unsuccessful uprising against the emperor Nicholas I in 1825. Herzen and his friend Nikolay Ogaryov, who, like Herzen, was influenced by the heroic libertarianism of the German playwright Friedrich Schiller, took a solemn oath to devote their lives to continuing the Decembrists' struggle for Russian freedom.

Attending the University of Moscow between 1829 and 1833, Herzen evolved from "romanticism for the heart to idealism for the head" and became an adept of the German philosopher Friedrich Schelling's *Naturphilosophie.*

Eventually Herzen and Ogaryov and their circle fused the pantheistic idealism of Schelling with the Utopian Socialism of the French social philosopher Henri de Saint-Simon to produce a philosophy of history in which the "World Spirit" evolved ineluctably toward the realization of freedom and justice.

This metaphysical politics was enough, however, to lead to the arrest of the entire circle in 1834. Herzen was exiled for six years to work in the provincial bureaucracy in Vyatka (now Kirov) and Vladimir; then, for an indiscreet remark about the police, he spent two more years in Novgorod. The misery of this period was relieved by an extravagantly romantic courtship and an initially happy marriage with his cousin, Natalya Zakharina, in 1838.

Herzen's eight-year experience with injustice and the acquaintance it afforded with the workings of Russian government hardened his radicalism. He abandoned the nebulous idealism of Schelling for the thought of two other contemporary German philosophies—the "realistic logic" of G.W.F. Hegel and the materialism of L.A. Feuerbach. He thus became a "Left-Hegelian," holding that the dialectic (development through the reconcili-

ation of conflicting ideas) was the "algebra of revolution" and that the disembodied truths of "science" (*i.e.,* German idealism) must culminate in the "philosophy of the deed," or the struggle for justice as proclaimed by French Socialism. In later life Herzen explained that this metaphysical approach to politics was inevitable for his generation, since the despotism of Nicholas I made action impossible and thus left pure thought as the only free realm of expression.

Armed with these philosophical weapons, Herzen returned to Moscow in 1842 and immediately joined the camp of the Westernizers, who held that Russia must progress by assimilating European rationalism and civic freedom, in their dispute with the Slavophiles, who argued that Russian development must be founded on the Orthodox religion and the fraternal peasant commune. Herzen contributed to this polemic two able and successful popularizations of Left-Hegelianism, *Diletantizm v nauke* ("Dilettantism in Science") and *Pisma ob izuchenii prirody* ("Letters on the Study of Nature"), and a novel of social criticism, *Kto vinovat?* ("Who Is to Blame?"), in the new "naturalistic" manner of Russian fiction.

Soon, however, Herzen fell out with the other Westernizers because the majority of the group were reformist liberals, whereas Herzen had by now embraced the anarchist Socialism of the French social theorist Pierre-Joseph Proudhon. At this point, in 1846, Herzen's father died, leaving him a considerable fortune; and the following year Herzen left Russia for western Europe—as it turned out, for good.

Life in exile. Herzen went immediately to the capital of European radicalism, Paris, hoping for the imminent triumph of social revolution. The revolutionary upheavals of 1848 that he witnessed in Paris and Italy soon disabused him: he became convinced that the Western "matadors of rhetoric" were too imbued with the values of the past to level the existing social order, that Europe's role as a progressive historical force was finished, that Western institutions were in fact "dead." He concluded further that, contrary to the teachings of the Hegelians, there was no "rational" inevitability in history and that society's fate was decided instead by chance and human will. He developed these themes in two brilliant but rather confused works, *Pisma iz Frantsii i Italii* ("Letters from France and Italy") and *Stogo berega* (*From the Other Shore*). His disillusionment was vastly increased by his wife's infidelity with the radical German poet Georg Herwegh and by her death in 1852.

Loss of faith in the West, however, provoked a spiritual return to Russia: though "old" Europe, "fettered by the richness of her past," had proved incapable of realizing the ideal of Socialism, "young" Russia, precisely because its past offered nothing worth conserving, now seemed to Herzen to possess the resources for a radical new departure. And Herzen (borrowing an idea from his old foes, the Slavophiles) found these resources above all in the collectivist peasant commune, which he viewed as the basis for a future Socialist order. This new faith in Russia's revolutionary potential was expressed in *Letters* to the French historian Jules Michelet and the Italian revolutionist Giuseppe Mazzini in 1850 and 1851.

In 1852 Herzen moved to London and the following year, with the aid of Polish exiles, he founded the "Free Russian Press in London," the first uncensored printing enterprise in Russian history. In 1855 Nicholas I died, and soon thereafter Alexander II proclaimed his intention of emancipating the serfs. Responding to this unprecedented "thaw," Herzen rapidly launched a series of periodicals designed to be smuggled back to Russia: "The Polar Star" in 1855, "Voices from Russia" in 1856, and a newspaper, *Kolokol* (*The Bell*), created in 1857 with the aid of his old friend Ogaryov, now also an émigré. Herzen's aim was to influence both the government and the public toward emancipation of the peasants, with generous allotments of land and the liberalization of Russian society. To this end, he moderated his political pronouncements, speaking less of Socialist revolution and more of the concrete issues involved in Alexander's reforms. For a time he even believed in enlightened autocracy, hailing Alexander II in 1856 (in words that echoed the famous dying tribute of Julian the Apostate to Christ) with: "you have conquered, oh Galilean!" *Kolokol* soon became a major force in public life, read by the Tsar's ministers and the revolutionary opposition.

Soon, however, the ambiguity of Herzen's position between reform and revolution began to cost him support. After 1858 moderate liberals, such as the author Ivan Turgenev, attacked Herzen for his Utopian recklessness; and after 1859 he quarrelled with the political writer N.G. Chernyshevsky and the younger generation of radicals, whose intransigent manner appeared to him as very dangerous to reform. He also lost faith in the government; when the Emancipation Act was finally enacted in 1861, he denounced it as a betrayal of the peasants.

He therefore veered again to the left and called on the student youth to "go to the people" directly with the message of Russian Socialism. Furthermore, on the urging of the anarchist Mikhail Bakunin, he threw the support of *Kolokol* behind the unsuccessful Polish revolt of 1863. He immediately regretted this rashness, for it cost him the support of all moderate elements in Russia without restoring his credit among the revolutionaries. *Kolokol*'s influence declined sharply. In 1865 Herzen moved his headquarters to Geneva to be near the young generation of Russian exiles, but in 1867 public indifference forced *Kolokol* to cease publication.

Amidst these political reverses, Herzen turned his energies increasingly to his memoirs, *My Past and Thoughts,* which were designed to enshrine both his own legend and that of Russian radicalism. A loosely constructed personal narrative, interspersed with sharp vignettes of both Russian and Western political figures and with philosophical and historical digressions, it provides a masterful fresco of contemporary European radicalism. At times witty, irreverent, and playful in style, and at other times lyrical, passionate, and rhapsodical, it is one of the most original and powerful examples of Russian prose. Published principally between 1861 and 1867, its scope and quality have placed it alongside the great Russian novels of the 19th century in artistic stature.

In 1869 Herzen wrote letters *K staromu tovarishchy* ("To an Old Comrade"; Bakunin), in which he expressed new reservations about the costs of revolution. Still, he was unable to accept liberal reformism completely, and he expressed interest in the new force of the First International, Marx's federation of working-class organizations. This wavering position between Socialism and liberalism, which characterized so much of his career, proved to be his political testament. The ambiguities of his position have made it possible ever since for both Russian liberals and Socialists to claim his legacy with equal plausibility.

(M.E.Ma.)

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Herzl, Theodor (b. May 2, 1860, Budapest—d. July 3, 1904, Edlach, Austria), founder of the political form of Zionism, a movement to establish a Jewish homeland. His pamphlet *The Jewish State* (1896) proposed that the

Herzl, 1904

By courtesy of the Zionist Archives and Library, New York

Jewish question was a political question to be settled by a world council of nations. He organized a world congress of Zionists that met in Basel, Switz., in August 1897 and became first president of the World Zionist Organization, established by the congress. Although Herzl died more than 40 years before the establishment of the State of Israel, he was an indefatigable organizer, propagandist, and diplomat who had much to do with making Zionism into a political movement of worldwide signficance.

Early years. Herzl was born of well-to-do middle-class parents. He first studied in a scientific secondary school, but to escape from its anti-Semitic atmosphere he transferred in 1875 to a school where most of the students were Jews. In 1878 the family moved from Budapest to Vienna, where he entered the University of Vienna to study law. He received his license to practice law in 1884 but chose to devote himself to literature. For a number of years he was a journalist and a moderately successful playwright.

In 1889 he married Julie Naschauer, daughter of a wealthy Jewish businessman in Vienna. The marriage was unhappy, although three children were born to it. Herzl had a strong attachment to his mother, who was unable to get along with his wife. These difficulties were increased by the political activities of his later years, in which his wife took little interest.

Conversion to Zionism. A profound change began in Herzl's life soon after a sketch he had published in the leading Viennese newspaper, *Neue Freie Presse,* led to his appointment as the paper's Paris correspondent. He arrived in Paris with his wife in the fall of 1891 and was shocked to find in the homeland of the French Revolution the same anti-Semitism with which he had become so familiar in Austria. Hitherto he had regarded anti-Semitism as a social problem that the Jews could overcome only by abandoning their distinctive ways and assimilating to the people among whom they lived. At the same time, his work as a newspaperman heightened his interest in, and knowledge of, social and political affairs and led him to the conviction that the answer to anti-Semitism was not assimilation but organized countereffort by the Jews. The Dreyfus affair in France also helped crystallize this belief. French military documents had been given to German agents, and a Jewish officer named Alfred Dreyfus had been falsely charged with the crime. The ensuing politi-

cal controversy produced an outburst of anti-Semitism among the French public. Herzl said in later years that it was the Dreyfus affair that had made a Zionist out of him. So long as anti-Semitism existed, assimilation would be impossible, and the only solution for the majority of Jews would be organized emigration to a state of their own.

Herzl was not the first to conceive of a Jewish state. Orthodox Jews had traditionally invoked the return to Zion in their daily prayers. In 1799 Napoleon had thought of establishing a Jewish state in the ancient lands of Israel. The English statesman Benjamin Disraeli, a Jew, had written a Zionist novel, *Tancred.* Moses Hess, a friend and co-worker of Karl Marx, had published an important book, *Rom und Jerusalem* (1862), in which he declared the restoration of a Jewish state a necessity both for the Jews and for the rest of humanity. Among the Jews of Russia and eastern Europe, a number of groups were engaged in trying to settle emigrants in agricultural colonies in Palestine. After the Russian pogroms of 1881, Leo Pinsker had written a pamphlet, "Auto-Emanzipation," an appeal to western European Jews to assist in the establishment of colonies in Palestine. When Herzl read it some years later, he commented in his diary that, if he had known of it, he might never have written *The Jewish State.*

Herzl's first important Zionist effort was an interview with Baron Maurice de Hirsch, one of the wealthiest men of his time. De Hirsch had founded the Jewish Colonization Association with the aim of settling Jews from Russia and Romania in Argentina and other parts of the Americas. The 35-year-old journalist arrived at the Baron's mansion in Paris with 22 pages of notes, in which he argued the need for a political organization to rally the Jews under a flag of their own, rather than leaving everything to the philanthropic endeavours of individuals like the Baron. The conversation was notable for its effect on Herzl rather than on the Baron de Hirsch, who refused to hear him out. It led to Herzl's famous pamphlet *The Jewish State,* published in February 1896 in Vienna. The Jewish question, he wrote, was not a social or religious question but a national question that could be solved only by making it "a political world question to be discussed and settled by the civilized nations of the world in council." Some of Herzl's friends thought it a mad idea, but the pamphlet won favourable response from eastern European Zionist societies. In June 1896, when Herzl was en route to Constantinople (Istanbul) in the hope of talking to the Ottoman sultan about obtaining the grant of Palestine as an independent country, his train stopped in Sofia, Bulg.; hundreds of Jews were present at the station to greet Herzl and to hail him as a leader. Although he remained in Constantinople for 11 days, he failed to reach the Sultan. But he had begun the career as organizer and propagandist that would end only with his death eight years later.

The First Zionist Congress. Herzl went to London in an effort to organize the Jews there in support of his program. Not all the Jewish leaders in England were happy to see him because his political approach was not in tune with their ideas, but at public meetings in the East End he was loudly cheered. He was a tall, impressive figure with a long black beard and the mien of a prophet. Despite his personal magnetism, he found that his efforts to influence Jewish leaders in England were of little avail and therefore decided to organize a world congress of Zionists in the hope of winning support from the masses of Jews in all countries. He proposed to hold the congress in Munich, but as the Jews there—who were mostly assimilated—opposed it, he settled upon Basel. The congress met at the end of August 1897, attended by about 200 delegates, mostly from central and eastern Europe and Russia along with a few from western Europe and even the United States. They represented all social strata and every variety of Jewish thought—from Orthodox Jews to atheists and from businessmen to students. There were also several hundred onlookers, including some sympathetic Christians and reporters for the international press. When Herzl's imposing figure came to the podium, there was tumultuous applause. "We want to lay the foundation stone," he declared, "for the house which will become the refuge of the Jewish nation. Zionism is the return to Judaism even before the return to the land of Israel." One of Herzl's most faithful supporters was the writer Max Nordau, who gave a brilliant address in which he described the plight of the Jews in the East and in the West. The three-day congress agreed upon a program, henceforth to be known as the Basel Program, declaring that "Zionism aspires to create a publicly guaranteed homeland for the Jewish people in the land of Israel." It also set up the Zionist Organization with Herzl as president.

Later accomplishments. The seven remaining years of his life were devoted to the furtherance of the Zionist cause, although he remained literary editor of the *Neue Freie Presse* in order to earn a living. He established a Zionist newspaper, *Die Welt,* published as a German-language weekly in Vienna. He negotiated unsuccessfully with the Sultan of Turkey for the grant of a charter that would allow Jewish mass settlement in Palestine on an autonomous basis. He then turned to Great Britain, which seemed favourable to the establishment of a Jewish settlement in British territory in the Sinai Peninsula. When this project failed, the British proposed Uganda in East Africa. This offer, which he and some other Zionists were willing to accept, aroused violent opposition at the Zionist congress of 1903, particularly among the Russians. Herzl was unable to resolve the conflict. He died of a heart ailment at Edlach, near Vienna, at the age of 44. He was buried in Vienna, but, in accordance with his wish, his remains were removed to Jerusalem in 1949 after the creation of the Jewish state and entombed on a hill west of the city now known as Mt. Herzl.

After the First Zionist Congress in Basel, Herzl had written in his diary:

> If I had to sum up the Basel Congress in one word—which I shall not do openly—it would be this: At Basel I founded the Jewish state. If I were to say this today, I would be greeted by universal laughter. In five years, perhaps, and certainly in 50, everyone will see it.

While the Jewish state was the product of many complex historic forces, including two world wars and the labours of Herzl's many followers, it was he who organized the political force of Jewry that was able to take advantage of the accidents of history. Through the strength of his personality, he aroused the enthusiasm of the Jewish masses and gained the respect of many statesmen of his time, in spite of the opposition of some Jewish leaders to his plans. (D.B.-G.)

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Herzliyya, city, west central Israel, on the Plain of Sharon and the Mediterranean Sea, at the north of the Tel Aviv–Yafo metropolitan area. Founded in 1924 with the financial backing of American Zionists, it was named for Theodor Herzl, the founder of modern political Zionism. The original settlement, about 2½ mi (4 km) from the sea, was based on agriculture, chiefly citrus; with the growth of Tel Aviv, most of the area has been converted into suburban residences. Herzliyya has also expanded westward to the sea; the coastal section, known as Herzliyya Pituaḥ (Herzliyya Development), is the site of many luxury resort hotels as well as fine new private homes. The city is also the home of Herzliyya Studios, Israel's main film company.

Just north of the city are the ruins of the ancient settlement of Apollonia, named for the Greek god Apollo by Hellenistic traders in the 3rd century AD, on the site of the ancient Canaanite settlement of Reshef. It was brought under Jewish rule by the Maccabean king John Hyrcanus (129–104 BC), and was destroyed and rebuilt several times in subsequent centuries. Renamed Arsūf (*q.v.*) by the Arabs after their conquest of Palestine in the 7th century AD, it was the site of a famous crusader victory in 1191. Inc. 1960. Pop. (1982 est.) 60,700.

Articles are alphabetized word by word, not letter by letter

Herzog, Isaac Halevi (b. November 1888, Łomża, Pol.—d. July 25, 1959, Jerusalem), scholar, author, religious philosopher, lecturer, chief rabbi of the Irish Free State (1925–36), and chief rabbi of Palestine (later Israel) from 1936. Herzog made significant contributions to reconciling the necessities of modern living with the demands of the Talmud. For more than 20 years he was a leading Jewish representative to the conferences and commissions organized to find a solution to the Arab–Jewish conflict in Palestine and to attempt to find refuge and help for the victims of the Nazi persecution of Jews.

Herzog, Johann Jakob (b. Aug. 12, 1805, Basel, Switz.—d. Sept. 30, 1882, Erlangen, Ger.), German Protestant theologian, professor of church history (University of Halle, 1847–54) and New Testament exegesis (University of Erlangen, 1854–77), and authority on the Hussite-Waldensian church. He compiled and edited the standard theological reference work *Real-Encyklopädie für protestantische Theologie und Kirche* (22 vols., 1854–68), which was published in an abridged English version as *The New Schaff-Herzog Encyclopedia of Religious Knowledge* (13 vol., 1951–54).

Herzog, Werner, original name WERNER H. STIPETIC (b. Sept. 5, 1942, Munich), German motion-picture director whose unusual films capture men and women at psychological extremes. With Rainer Fassbinder and Volker Schlöndorff, Herzog led the postwar West German cinema movement that U.S. and European directors praised highly.

Herzog was educated in Munich and at the University of Pittsburgh—studying history, literature, and theatre—and travelled extensively in Mexico, Great Britain, Greece, and The Sudan. *Herakles* (1962) was an early short, and *Lebenszeichen* (1967; *Signs of Life*) was his first feature film. He became known for working with small budgets and writing and producing his own motion pictures.

Herzog's films, usually set in a distinct and unfamiliar landscape, are imbued with mysticism. In *Auch Zwerge haben klein angefangen* (1970; *Even Dwarfs Started Small*), the microcosm of a barren island inhabited by dwarfs stands for a larger reality, and in *Fata Morgana* (1971), a documentary on the Sahara, the desert acquires an eerie life of its own. One of Herzog's best known films, *Aguirre, der Zorn Gottes* (1972; *Aguirre, the Wrath of God*), follows a band of Spanish explorers into unmapped territory, recording their gradual mental and physical self-destruction. *Jeder für sich und Gott gegen alle* (1975; *Every Man for Himself and God Against All*) is a retelling of the Kaspar Hauser legend. Herzog's most realistic film, *Stroszek* (1977), concerns an immigrant in the United States,

and its overwhelming theme is man's isolation from his world. Other films include *Herz aus Glas* (1977; *Heart of Glass*), *Nosferatu* (1979), *Woyzeck* (1979), and *Fitzcarraldo* (1982).

Herzog's films are characterized by a surreal and subtly exotic quality. His work was warmly received outside of Germany, where he was hailed as one of the most innovative contemporary directors.

Heschel, Abraham Joshua (b. 1907, Warsaw—d. Dec. 23, 1972, New York City), Jewish theologian and philosopher, noted especially for his presentation of the prophetic and mystical aspects of Judaism and for his attempt to construct a modern philosophy of religion on the basis of the ancient and medieval Jewish tradition.

After a traditional Jewish education, Heschel went on to higher studies at the University of Berlin and the Hochschule für die Wissenschaft des Judentums. He taught at the latter school, at the noted Jüdisches Lehrhaus at Frankfurt am Main, at the Institute of Jewish Studies in Warsaw after being deported from Nazi Germany (1938), at the Institute for Jewish Learning in London, and at Hebrew Union College in Cincinnati, Ohio, before taking the chair of professor of Jewish ethics and mysticism at Jewish Theological Seminary of America in New York City (1945), a post he held until his death.

Heschel sought to evoke in 20th-century man the inner depth of devotion and spontaneous response that he discerned in traditional Jewish piety. He also stressed social action as an expression of the ethical concern of the pious man and was at the forefront of protests and demonstrations in the 1960s and early 1970s to secure equal rights for American blacks and to end the U.S. military intervention in Vietnam.

Although he came to the English-speaking world comparatively late in life, he soon achieved a vivid and moving English prose style. Among his best-known works are *The Earth Is the Lord's* (1950); *Man Is Not Alone; A Philosophy of Religion* (1951); *The Sabbath: Its Meaning to Modern Man* (1951); *Man's Quest for God: Studies in Prayer and Symbolism* (1954); *God in Search of Man: A Philosophy of Judaism* (1956); and *The Prophets* (1962; originally published in German in 1936).

Heseltine, Philip: *see* Warlock, Peter.

Heshen (Chinese official): *see* Ho-shen.

Hesilrige, Sir Arthur, 2ND BARONET, Hesilrige also spelled HASELRIG (b. *c.* 1601—d. Jan. 7, 1661, London), a leading English Parliamentarian from the beginning of the Long Parliament (1640) to the founding of Oliver Cromwell's Protectorate (1653). He emerged briefly as a powerful figure during the confusion that followed the fall of the Protectorate in 1659.

A native of Leicestershire, Hesilrige succeeded to his father's baronetcy in 1629. He sat in both the Short and Long Parliaments in 1640 and played a major role in the impeachment of King Charles I's chief minister, Thomas Wentworth, 1st Earl of Strafford (1641). He was one of the five members of Parliament who went into hiding to escape arrest by Charles in January 1642.

After the outbreak of the Civil War (August 1642) Hesilrige raised his own cavalry unit and in July 1643 distinguished himself at the battles of Lansdown, Somerset, and Roundway Down, Wiltshire. In 1647 he supported Cromwell, helping to lead the army, which was controlled by Independents, in its successful struggle to gain ascendancy over the Presbyterian-dominated Parliament. He was also appointed governor of Newcastle in 1647, but he refused to serve on the court that tried Charles I. When Cromwell declared himself lord protector in 1653, Hesilrige went into opposition to the government but served in several Protectorate Parliaments. Upon the collapse of the Protectorate in 1659 he became the most prominent member of Parliament. The dissolution of Parliament by the army caused Hesilrige to help General George Monck seize power in the name of Parliament (January 1660), but Monck went on to restore King Charles II to the throne. The new regime imprisoned Hesilrige in the Tower of London, where he died.

Hesiod, Greek HESIODOS, Latin HESIODUS (fl. *c.* 700 BC), one of the earliest Greek poets, often called the "father of Greek didactic poetry." Two of his complete epics have survived, the *Theogony,* relating the myths of the gods, and the *Works and Days,* describing peasant life.

Life. Not a great deal is known about the details of Hesiod's life. He was a native of Boeotia, a district of central Greece to which his father had migrated from Cyme in Asia Minor. Hesiod may at first have been a rhapsodist (a professional reciter of poetry), learning the technique and vocabulary of the epic

Hesiod, detail of a mosaic by Monnus, 3rd century; in the Rheinisches Landesmuseum, Trier, Ger.

By courtesy of the Rheinisches Landesmuseum, Trier, Ger.

by memorizing and reciting heroic songs. He himself attributes his poetic gifts to the Muses, who appeared to him while he was tending his sheep; giving him a poet's staff and endowing him with a poet's voice, they bade him "sing of the race of the blessed gods immortal." That his epics won renown during his lifetime is shown by his participation in the contest of songs at the funeral games of Amphidamas at Chalcis on the island of Euboea. This, he says, was the only occasion on which he crossed the sea, but it is not likely to have been the only invitation that he received from places other than his hometown of Ascra, near Mount Helicon.

Genuine works. Of Hesiod's two extant epics, the *Theogony* is clearly the earlier. In it, following the Muses' instructions, Hesiod recounts the history of the gods, beginning with the emergence of Chaos, Gaea (Earth), and Eros. Gaea gives birth to Uranus (Heaven), the Mountains, and Pontus (the Sea); and later, after uniting herself to Uranus, she bears many other deities. One of them is the Titan Cronus, who rebels against Uranus, emasculates him, and afterward rules until he in turn is overpowered by Zeus. This story of crime and revolt, which is the central subject of the *Theogony,* is interrupted by many additional pedigrees of gods. Elsewhere, in addition to mythical family relations, Hesiod presents new ones that are the product of his own speculation. Thus, the names of the 50 sea maidens (the Nereids) fathered by the sea god Nereus indicate various qualities of the Sea. In a different way, the story describing the first woman, Pandora, sent by Zeus to bedevil man, brings out Hesiod's firm belief in the supreme and irresistible power of Zeus. This power is most majestically displayed in the Titanomachia, the battle between the Olympian gods, led by Zeus, and the Titans, who support Cronus. After his victory Zeus organizes his kingdom.

Hesiod's authorship of the *Theogony* has been questioned but is no longer doubted, though the work does include sections inserted by later poets and rhapsodists. The story of Typhoeus' rebellion against Zeus was almost certainly added by someone else, while the somewhat overlapping accounts of Tartarus, the hymn on Hecate, and the progeny of the sea monster Keto are highly suspect. The discovery of a Hurrian theogony similar to Hesiod's seems to indicate that Hesiod's theogony owes significant episodes to Middle Eastern models. Nonetheless, the Uranus–Cronus–Zeus succession as told by Hesiod approximates the pattern of a classical Greek tragic trilogy. Thus, the Erinyes (the deities of vengeance) are born when Uranus is overthrown by Cronus, while their own hour for action comes when Cronus is about to be overthrown by Zeus. These and other similar features plausibly represent Hesiod's own contributions to the inherited story.

Hesiod's other epic poem, the *Works and Days,* has a more personal character. It is addressed to his brother Perses, who by guile and bribery has already secured for himself an excessive share of their inheritance and is seeking to gain another advantage in a similar manner. Trying to dissuade him from such practices, Hesiod recounts in the first part of the poem two myths illustrating the necessity for honest, hard work in man's wretched life. One takes up and continues the story of Pandora, who out of curiosity opens a jar, loosing multifarious evils on humanity; the other traces man's decline since the Golden Age. Against the brutality and injustice of his contemporaries Hesiod affirms his unshakable belief in the power of justice. For him Justice is a deity and, indeed, Zeus's favourite daughter, and the happiness of individuals as well as of communities depends on their treatment of her.

The part of Hesiod's message that exalts justice and deprecates hubris is addressed to the leaders of his community, who seem inclined to abet Perses. Hesiod also speaks to Perses directly, urging him to abandon his schemes and thenceforth to gain his livelihood through strenuous and persistent work: "Before success the immortal gods have placed the sweat of our brows." Hard work is for Hesiod the only way to prosperity and distinction. The concept of life that Hesiod here develops is in conscious opposition to the more glorious ideals of the heroic epic of Homer.

In the second half of the poem, Hesiod describes with much practical detail the kind of work appropriate to each part of the calendar and explains how to set about it. The description of the rural year is enlivened by a vivid feeling for the rhythm of human life and the forces of nature, from the overpowering winter storm, which drives man back into his home, to the parching heat of summer, during which he must have respite from his labours.

The poem ends with a series of primitive taboos and superstitions, followed by a section explaining which parts of the month are auspicious for sowing, threshing, shearing, and the begetting of children. It is difficult to believe that either of these sections could have been composed by Hesiod.

Spurious works. Such was the power of Hesiod's name that epics by other poets were soon attributed to him; these are often included in editions of his works. The *Precepts of Chiron,* the *Astronomy,* the *Ornithomanteia* (Divination by Birds), the *Melampodeia,* which described a contest between two seers,

and the *Aigimios* are today little more than names. There are numerous extant fragments of the *Catalogues of Women,* which deals primarily with women who through union with gods become mothers of heroes and ancestresses of noble families. Papyruses deciphered since the 1890s, and especially in the 1950s and 1960s, have added much to knowledge of its content and have made it possible to arrive at a clearer idea of its organization. There is no evidence for the theory that the oldest parts are by Hesiod. The story of Alcmene, Heracles' mother, is extant in an expanded form as the *Shield of Heracles,* probably dating from the early or middle 6th century. In its present form the *Contest Between Homer and Hesiod,* ending in Hesiod's victory, postdates the emperor Hadrian (2nd century).

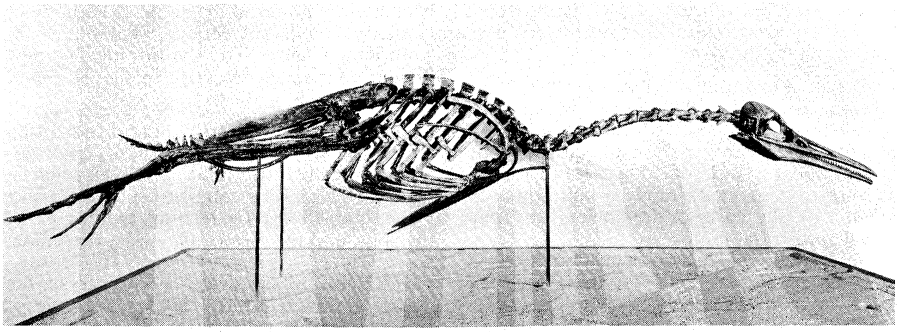
Assessment. One of the earliest Greek epic poets, Hesiod, through his works, serves as a useful corrective to Homer's more glamorous portrayal of the world. Hesiod has an essentially serious outlook on life and is an artist who deals with the gloomier side of existence, relating, in his *Theogony,* the bloody power struggle among the divine dynasts Uranus, Cronus, and Zeus, while his *Works and Days* demonstrates that, in Hesiod's immediate circle at any rate, mankind's situation on earth was equally deplorable during what he calls the "age of iron." (F.So.)

BIBLIOGRAPHY. *Works. The Works and Days, Theogony,* and *The Shield of Herakles,* trans. by R. Lattimore (1959), a brisk, modern translation, perhaps appreciated best when sampled along with *Hesiod, the Homeric Hymns, and Homerica,* trans. by H.G. Evelyn-White, rev. ed. (1959), an antique but accurate translation, with parallel text. More exotic translations include *Fable of the Hawk and the Nightingale,* trans. by Robert Graves (1959); and *The Georgicks of Hesiod,* trans. by G. Chapman (1618 and 1858). A more recent edition of the original Greek text of Hesiod's epics and a selection of "fragments" (*i.e.,* passages preserved from the *Catalogues of Women*), ed. by R. Merkelbach, F. Solmsen, and M.L. West was published in 1970. West also edited *Works and Days,* with prolegomena and commentary (1978).

Biography and criticism. Scholarly analyses of Hesiod's poems and discussions of various facets of these works are provided by F. Solmsen, *Hesiod and Aeschylus* (1949); and M.L. West in the "Prolegomena" of *Hesiod Theogony* (1966). The best appreciation of his poetic individuality is in Hermann Frankel, *Dichtung und Philosophie des frühen Griechentums* (1951). Important for Hesiod's place in the history of Greek thought is Werner Jaeger, *Paideia: The Ideals of Greek Culture,* trans. from the German by Gilbert Highet, 2nd ed., vol. 1 (1945, reprinted 1970). Near-Eastern theologies comparable with Hesiod's *Theogony* are summarized by West; for suggestions about the relationship, see P. Walcott, *Hesiod and the Near East* (1966).

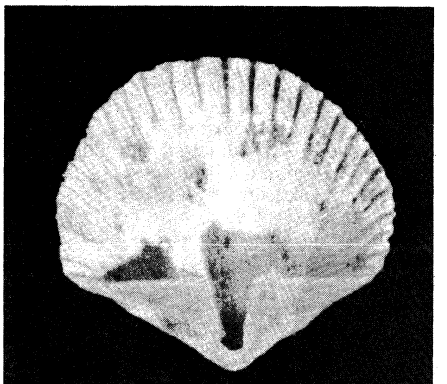
Hesperides (Greek: Daughters of Evening), singular HESPERIS, in Greek mythology, clear-voiced maidens who guarded the tree bearing golden apples that Gaea gave to Hera at her marriage to Zeus. According to Hesiod, they were the daughters of Erebus and Night; in other accounts, their parents were Atlas and Hesperis or Phorcys and Ceto. They were usually three in number, Aegle, Erytheia, and Hespere (or Hesperethusa), but by some accounts were as many as seven. They were said to live among the Hyperboreans. The golden apples were also guarded by the dragon Ladon, the offspring of Phorcys and Ceto. As Ladon is the name of an Arcadian river, Arcadia was possibly the original site of the garden. Heracles later either stole the apples or had Atlas get them for him. The golden apples that Aphrodite gave to Hippomenes before his race with Atalanta were from the garden of the Hesperides.

Hesperornis, extinct genus of birds found as fossils in Cretaceous deposits (the Cretaceous Period began 136,000,000 years ago and lasted 71,000,000 years). The best known of the birds of the Cretaceous Period, *Hesperornis* combines primitive and advanced characteristics. It is primitive in that teeth were present in the lower jaw; in the upper jaw, however, teeth were restricted to the back portions. It has been suggested that the horny beak that has come to be characteristic of birds was in the process of formation in the front part of the jaw. The wings were small and were useless for flight; the wing bones were mere splints. The chest was not characteristic of most birds; it lacked the prominent keel that serves as an anchor for powerful flying muscles. The legs in *Hesperornis* were powerfully developed and clearly adapted for rapid diving and swimming through the water. The neck was long and slender and the head smallish; both were probably capable of rapid side-to-side movements. *Hesperornis* was clearly an actively swimming bird that probably chased and caught fish.



Hesperornis, skeleton
By courtesy of the American Museum of Natural History, New York

Hesperorthis, extinct genus of brachiopods, or lamp shells, which as fossils are especially characteristic of Ordovician marine rocks (between 430,000,000 and 500,000,000 years old). The plano-convex shell of *Hesperorthis* consists of two units, or valves, the brachial valve being flat and the pedicle valve convex. The shell has a radiating pattern of ribs and a relatively broad, triangular area at the dorsal shell margin.



Hesperorthis
By courtesy of the trustees of the British Museum (Natural History); photograph, Imitor

Hesperus, Greek HESPEROS, also called VESPER, in Greco-Roman mythology, the evening star, son or brother of Atlas. He was later identified with the morning star, Phosphorus, or Eosphorus (Latin Lucifer), the bringer of light. Hesperus is variously described by different authors as the father of the Hesperides (the guardians of the golden apples) or of their mother, Hesperis.

Hess, Germain Henri (b. Aug. 7, 1802, Geneva—d. Nov. 30, 1850, St. Petersburg), chemist whose studies of heat in chemical reactions formed the foundation of thermochemistry.

After practicing medicine for several years in Irkutsk, Hess became professor of chemistry in 1830 at the Technological Institute, University of St. Petersburg. His early investigations concerned minerals and the natural gas found near Baku. He discovered the oxidation of sugars to yield saccharic acid and in 1834 published a work on chemistry that became a standard text in Russia for many years.

In 1840 Hess announced the law of constant heat summation, also known as Hess's law, which states that the amount of heat involved in producing one chemical from another is always the same, no matter how many stages are taken to obtain the desired product. Hess's law heralded the formulation of the more complete law of conservation of energy and prepared the way for the development of chemical thermodynamics in the late 19th century by the U.S. physicist Josiah Willard Gibbs.

Hess, Moses, original name MORITZ HESS (b. June 21, 1812, Bonn—d. April 6, 1875, Paris), German journalist and Socialist who influenced Karl Marx and Friedrich Engels and who was an important early proponent of Zionism.

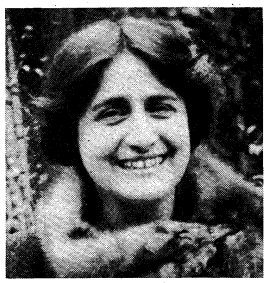
His first published work, *Heilige Geschichte der Menschheit von einem Jünger Spinozas* (1837; "The Holy History of Mankind, by a Young Spinozist"), exhibited the sharp imprint not only of Spinoza's but also of Hegel's transcendental philosophy. Hess saw a material application of his beliefs in an idealistic, somewhat anarchic Socialism and organized workers' groups while propagating his ideas in the radical newspaper *Rheinische Zeitung* ("Rhinelander Gazette"), for which he was Paris correspondent (1842–43). After Karl Marx joined the newspaper, Hess affected Marx's thinking appreciably, and they collaborated on several works. Later, Marx rejected Hess's type of utopian Socialism, specifically mocking Hess in *The Communist Manifesto* (1848). Hess himself gradually changed his idealistic views and became much more pragmatic in his beliefs. During the revolution of 1848 in Germany, Hess was forced to flee the country, and, after wandering through Europe, he settled in Paris in 1853.

His most prominent work, the early Zionist *Rom und Jerusalem, die letzte Nationalitätsfrage* (1862; *Rome and Jerusalem: A Study in Jewish Nationalism,* 1918), was ignored at the time of publication, but it influenced such later Zionist leaders as Aḥad Ha'am and Theodor Herzl. Among Hess's many contentions in *Rom und Jerusalem,* the major ones state that the Jews will always be a homeless people, never fully accepted by others, until they have their own country.

Hess, Dame Myra (b. Feb. 25, 1890, London—d. Nov. 25, 1965, London), English

pianist known for her interpretations of the works of Bach, Mozart, Beethoven, and Robert Schumann.

Hess studied at the Guildhall School of Music and at the Royal Academy of Music under the noted teacher Tobias Matthay, whose theories of touch, related to arm weight and muscular relaxation, helped form her style. She made her debut in London in 1907 and for a while gave duet recitals with her cousin, Irene Scharrer. From 1939 to 1946, even during the height of the German bombardment of Britain, she organized and frequently performed at daily concerts at the National Gallery to bolster the morale of Londoners.



Dame Myra Hess, *c.* 1925

In her earlier years she cultivated an intimate chamber music style that was particularly effective in her performances of the works of Schumann. The more powerful style of her later career became evident in her performances of the concerti of Beethoven and Johannes Brahms. She was made Dame Commander of the British Empire in 1941.

Hess, (Walter Richard) Rudolf (b. April 26, 1894, Alexandria—d. Aug. 17, 1987, West Berlin), German National Socialist, Hitler's deputy as party leader, cabinet member, and head of the Nazi Party organization. Second in the line of Adolf Hitler's succession, he created an international sensation when in 1941 he secretly flew to Great Britain on an abortive self-styled mission to negotiate a peace between Britain and Germany.

Rudolf Hess
EB Inc.

The son of a merchant, Hess served in the German Army during World War I, later transferring to the air force. After the war, he studied at the University of Munich, where he engaged in nationalist and anti-Semitic propaganda. Hess joined the fledgling Nazi Party in 1920 and quickly became Hitler's friend and confidant. After participating in the abortive November 1923 Munich (Beer Hall) Putsch, he escaped to Austria but returned voluntarily to Landsberg prison, where he took down and edited much of Hitler's dictation for *Mein Kampf.* Promoted to Hitler's private secretary, Hess was charged with creating a new centralized party organization after the defection of the leftist followers of Gustav Strasser (1932). In April 1933 Hess became deputy party leader and in December entered the cabinet.

During the later 1930s and the first years of World War II, when military and foreign policy preoccupied Hitler, Hess's power waned, and his influence was further undermined by Martin Bormann and other top Nazi leaders. Hess decided in the spring of 1941 to bring the continuing military struggle between Germany and Britain to an end by means of a spectacular coup and thereby restore his flagging prestige. On May 10 he secretly flew to Scotland with peace proposals, demanding a free hand for Germany in Europe in return for Germany's promise to respect the integrity of the British Empire and the return of Britain's former colonies. Hess's proposals met with no response from the British government, which treated him as a prisoner of war and held him throughout World War II. His quixotic action was likewise rejected by Hitler himself, who accused Hess of suffering from "pacifist delusions."

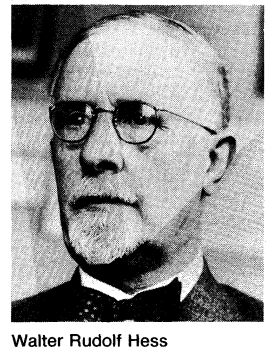
After the war, Hess was tried at the Nuremberg (Nürnberg) war crimes trials, convicted, and given a life sentence. He served his sentence at Spandau prison in Berlin, where from 1966 he was the sole inmate.

Hess, Victor Francis (b. June 24, 1883, Waldstein, Styria, Austria—d. Dec. 17, 1964, Mount Vernon, N.Y., U.S.), joint recipient, with Carl D. Anderson of the United States, of the Nobel Prize for Physics in 1936 for his discovery of cosmic rays—high-energy radiation originating in outer space.

Educated at the University of Graz, Hess received his Ph.D. from the University of Vienna in 1906. His research dealt chiefly with radioactivity and atmospheric electricity. As early as 1911 he studied the electrical conductivity of the atmosphere during balloon ascents and on high mountains; he discovered that it increased rapidly with altitude. His experiments proved what had for long been suspected: that an extremely penetrating radiation of extraterrestrial origin permeates the atmosphere. Further investigation of this radiation led to the discovery of the positron, or positively charged electron, by Anderson and opened up new fields of research in modern physics.

Hess, Walter Rudolf (b. March 17, 1881, Frauenfeld, Switz.—d. Aug. 12, 1973, Locarno), Swiss physiologist, who received (with António Egas Moniz) the 1949 Nobel Prize for Physiology or Medicine for discovering the role played by certain parts of the brain in determining and coordinating the functions of internal organs.

Originally an ophthalmologist (1906–12), Hess turned to the study of physiology at the University of Bonn and was appointed professor of physiology and later director of the Physiological Institute (1917–51) at the University of Zürich. He became interested in the study of the autonomic nervous system—those nerves originating at the base of the brain and extending throughout the spinal cord that control the automatic functions such as digestion and excretion. They also trigger the activities of a group of organs that respond to complex stimuli, such as stress.

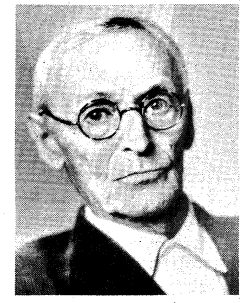


Walter Rudolf Hess
EB Inc.

Using fine electrodes to stimulate or destroy specific areas of the brain in cats and dogs, Hess found that the seat of autonomous function lies at the base of the brain, in the medulla oblongata and the diencephalon (interbrain), particularly that part of the interbrain known as the hypothalamus. He mapped the control centres for each function to such a degree that he could induce the physical behaviour pattern of a cat confronted by a dog simply by stimulating the proper points on the animal's hypothalamus. Among Hess's books is *The Biology of Mind* (1964).

Hesse (Germany): *see* Hessen.

Hesse, Hermann (b. July 2, 1877, Calw, Ger.—d. Aug. 9, 1962, Montagnola, Switz.), German novelist, poet, and winner of the Nobel Prize for Literature in 1946, whose main theme deals with man's breaking out of the established modes of civilization to find his essential spirit. With his appeal for self-realization and his celebration of Eastern mysticism, Hesse posthumously became a cult figure to young people in the English-speaking world.



Hermann Hesse, 1957
Wide World Photos

At the behest of his father, who had been a missionary in the Orient, Hesse entered the Maulbronn seminary. Though a model student, he was unable to adapt, so he was apprenticed in a Calw tower-clock factory and later in a Tübingen bookstore. His disgust with the constrictions of conventional schooling was expressed in the novel *Unterm Rad* (1906; *Beneath the Wheel*), in which an overly diligent student is driven to self-destruction.

Hess remained in the bookselling business until 1904, when he became a free-lance writer and brought out his first novel, *Peter Camenzind,* about a failed and dissipated writer. The inward and outward search of the artist is further explored in *Gertrud* (1910) and *Rosshalde* (1914). A visit to India in these years was later reflected in *Siddhartha* (1922), a lyric novel based on the early life of Buddha.

During World War I, Hesse lived in neutral Switzerland, wrote denunciations of militarism and nationalism, and edited a journal for German war prisoners and internees. He became a permanent resident of Switzerland in 1919 and a citizen in 1923, settling in Montagnola.

A deepening sense of personal crisis led Hesse to psychoanalysis with J.B. Lang, a disciple of Carl Gustav Jung, whom he also came to know. The influence of analysis appears in *Demian* (1919), an examination of the achievement of self-awareness by a troubled adolescent. This novel had a pervasive effect on a troubled Germany and made its author famous. Hesse's later work shows his interest in Jungian concepts of introversion and extroversion, the collective unconscious, idealism, and symbols. The duality of man's nature preoccupied Hesse throughout the rest of his career.

Der Steppenwolf (1927; *Steppenwolf*) describes the conflict between bourgeois acceptance and spiritual self-realization in a middle-aged man. In *Narziss und Goldmund* (1930; *Narcissus and Goldmund*), an intellectual ascetic who is content with established religious faith is contrasted with an artistic sensualist pursuing his own form of salvation. In his last and longest novel, *Das Glasperlenspiel* (1943; English titles *The Glass Bead Game,* or *Magister Ludi*), Hesse again explores the dualism of the contemplative and the active life, this time through the figure of a supremely gifted intellectual.

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Hesse-Darmstadt, German HESSEN-DARMSTADT, former landgraviate, grand duchy, and state of Germany. It was formed in 1567 in the division of old Hesse; after Hesse-Kassel was absorbed by Prussia in 1866, Hesse-Darmstadt was usually known simply as Hesse.

Hesse-Darmstadt was originally only the small territory of Upper Katzenelnbogen with Darmstadt, being situated in what is now the extreme southern portion of the present-day *Land* (state) of Hessen. But the landgraviate received significant accretions of territory during the 17th and 18th centuries, partly owing to its steadfast loyalty to the Habsburg Holy Roman emperors. Hesse-Darmstadt entered Napoleon's Confederation of the Rhine in 1806 and was consequently raised to the status of a grand duchy in that year. Hesse-Darmstadt joined the allies in 1813 and entered the German Confederation in 1815. The Congress of Vienna ceded some of Hesse-Darmstadt's lands to Prussia and Bavaria but in compensation gave the duchy, among other territories, a district on the west bank of the Rhine containing the important cities of Mainz and Worms. The grand duke Louis I (reigned 1768–1830) granted Hesse-Darmstadt a constitution in 1820, carried through other reforms, and made the grand duchy the first of the southern German states to join the Prussian Zollverein (Customs Union). Hesse-Darmstadt thereafter oscillated between liberalism and conservatism. The duchy sided with the Austrians in the Seven Weeks' War (1866) and consequently lost its territory north of the Main River to the Prussian-sponsored North German Confederation. But when the German empire was founded in 1871, Hesse-Darmstadt became one of its constituent states.

Following the abdication of the last grand duke, Ernest Louis, in 1918, Hesse became a republic and one of the constituent states of the Weimar Republic of postwar Germany. In 1945 the territory east of the Rhine was in the U.S. occupation zone and became part of the *Land* of Greater Hesse (later called simply Hessen), while the rest became part of the *Land* of Rhineland-Palatinate.

Hesse-Kassel, also spelled HESSE-CASSEL, also called (1944–45) ELECTORAL HESSE, German HESSEN-KASSEL, HESSEN-CASSEL, or KURHESSEN, former landgraviate of Germany, formed in 1567 in the division of old Hesse.

In 1567 Hesse was partitioned among four sons of Landgrave Philip the Magnanimous, Hesse-Kassel going to William IV the Wise. Hesse-Kassel was the largest, most important, and most northerly of the four Hesse landgraviates. The landgrave William IV introduced sound financial management and a pacific foreign policy. Under his successors, Hesse-Kassel became Calvinist. It fought on the side of the Swedes in the Thirty Years' War and on the side of Great Britain in the Seven Years' War. During the 18th century Hessian troops fought in nearly every European and Turkish campaign, and in 1776–86 as many as 17,000 Hessian mercenaries fought for the British in the American Revolution.

In 1803 Hesse-Kassel was raised to the status of an electorate, and it was to remain the only territory so styled after the end of the Holy Roman Empire (1806). The elector William I (reigned 1785–1821) pursued a policy of neutrality toward Napoleon, who nevertheless occupied Hesse-Kassel after the Battle of Jena (1806) and in 1807 united it with the Kingdom of Westphalia. In 1815 Hesse-Kassel regained its independence, but the elector William I and his successor William II (reigned 1821–47) were reactionaries who overturned the liberal reforms made in Hesse-Kassel previously by the French. The electors continuously quarreled with liberal reformers in the Diet (legislative assembly), and in 1831 revolutionary action compelled William II to turn over control of the government to his son Frederick William as regent. Frederick William became elector in 1847 and agreed to the liberal reforms adopted by the revolutionary government in 1848, but in 1850 he sided with the Austrians and repudiated the reforms, adopting a reactionary policy.

In the Seven Weeks' War between Prussia and Austria (1866), Frederick William sided with Austria, against the wishes of the majority of the Diet. The country was then annexed by Prussia and the elector exiled. In 1867 Hesse-Kassel, with Nassau, some former Hesse-Darmstadt districts, and Frankfurt, was made part of the Prussian province of Hesse-Nassau. This in 1944 was split into Nassau and Electoral Hesse (Kurhessen); but on Sept. 19, 1945, these provinces were united with the part of Hesse-Darmstadt east of the Rhine to form Greater Hesse, later called simply Hessen.

Hessen, also called HESSE, *Land* (state) of Germany, eighth largest of the 16 *Länder,* occupying an area of 8,152 square miles (21,114 square km) in the west-central part of that country. Hessen is bounded by the states of Lower Saxony (north), North Rhine-Westphalia (northwest), Rhineland-Palatinate (west), Baden-Württemberg (south), Bavaria (southeast), and Thuringia (east). The state lies between the Upper Rhine Plateau to the west and the Thuringian Forest to the east. It was formed in 1945 through the amalgamation of former Prussian provincial units. Its capital is Wiesbaden.

History. The Hessians are generally supposed to be descended from the Frankish tribe of the Chatti, whose homeland lay north of the Main River. The Chatti were Christianized by St. Boniface in the early 8th century. Their territory was governed by various dynasties of counts beginning in the 10th century, but in 1130 the region of Hesse was joined to the landgraviate of Thuringia. Upon the death in 1247 of the last landgrave of Thuringia, Henry Raspe, Hesse was acquired by his niece, Sophia, the wife of Henry II of Brabant. Sophia gave the territory to her son, Henry I the Child (died 1308). He founded the Brabant dynasty of Hesse and was raised to the rank of a prince of the Holy Roman Empire in 1292.

For the next two centuries the landgraves of Hesse expanded their territory and often clashed with the neighbouring archbishop-electors of Mainz. Hesse was twice partitioned in the 15th century, but Philip the Magnanimous, landgrave from 1509 to 1567 and Hesse's greatest ruler, reunited the territory. Philip introduced Lutheranism into Hesse in 1526 and the next year founded the first Protestant university in Europe, at Marburg. By his last will Philip divided Hesse between his four sons into Hesse-Kassel, Hesse-Darmstadt, Hesse-Rheinfels, and Hesse-Marburg. Rheinfels and Marburg were absorbed by the other two lines in 1583 and 1648, respectively. (*See* Hesse-Darmstadt; Hesse-Kassel.) In 1945 most of the Hesse territories and part of old Nassau were merged to form the *Land* of Greater Hesse (Gross-Hessen), later called simply Hessen.

Land and people. The present-day *Land* of Hessen consists mainly of richly wooded uplands. Eastern Hessen is dominated by the Vogels Mountain, a great basaltic mountain, and by the Rhön, a mountainous mass rising to the Wasser Peak (3,117 feet [950 m]), Hessen's highest mountain. The Spessart and the Oden forests both belong in part to Hessian territory. The northern part of Hessen is drained by the northward-flowing Eder and Fulda rivers before they unite to form the Weser, while most of the rest of the state is drained westward by rivers that are tributaries of the Main and Rhine rivers. Beechwoods and conifers cover the highlands, and cultivated land lies on the limestone uplands and on the loess soils of the river lowlands.

The largest towns are Frankfurt am Main, Wiesbaden, Kassel, Darmstadt, and Offenbach am Main. The majority of the population is Protestant and most of the remainder is Roman Catholic.

The economy. The state is well wooded, and small-scale farming is still widespread. Wheat is the most widely grown crop, followed by potatoes and sugar beets. Poultry, pigs, and cattle are the chief livestock. The southwest of Hessen is primarily industrial but is also an area of intensive agriculture. The plains along the Rhine and Main rivers are a mosaic of vineyards, orchards, and fields of grain, potatoes, and tobacco. Market gardening is especially important near the cities. The surrounding hills have a three-year rotation of rye, oats, and potatoes, and livestock farms concentrate on the production of butter and cheese.

The state's mineral resources are sparse; there are some low-grade iron ores in the Taunus Mountains, which are of little economic significance, salt mines near Fulda, and small brown-coal deposits near Frankfurt am Main and Kassel. The state's industries depend on the Rhine waterway and its extensions up the Main and Neckar. The Rhine-Main area, centred on Frankfurt am Main, Mainz, and Wiesbaden, is one of the great industrial regions of Germany. Kassel, Offenbach, Wiesbaden, and Darmstadt are other large manufacturing centres. Vehicles, machinery, chemicals (especially at Höchst, a western quarter of Frankfurt am Main), electrical goods, scientific instruments, and textiles are among the products of these and other towns. New industries have developed since World War II, stimulated by the arrival of German refugees from eastern Europe; these manufactures include the making of glass, toys, and musical instruments. Book publishing is a prominent economic activity.

Hessen has a highly developed network of highways, and there are federal and private bus services. The Rhine provides the chief waterway, and its economic importance cannot be overestimated. Frankfurt's Rhine-Main Airport is one of western Europe's busiest airports. Rail travel in Hessen is largely electrified and has international European links.

Cultural life. The universities at Frankfurt am Main, Giessen, and Marburg in Hessen are supplemented by a technical university at Darmstadt, Protestant and Roman Catholic theological colleges, teacher-training colleges, and colleges of music and fine arts. On the banks of the Weser River are many ruined castles, old churches, and palaces, and there are also interesting half-timbered buildings, burgher houses, and town halls throughout the state. Pop. (1989 est.) 5,568,892.

BIBLIOGRAPHY. Little material specifically on Hessen is in English. An exhaustive bibliography of ancient to contemporary works is in *Schriftum*

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Hessian fly (*Mayetiola* or *Phytophaga destructor*), small fly of the gall midge (*q.v.*) family Cecidomyiidae (order Diptera); it is very destructive to wheat crops. Though a native of Asia it was transported into Europe and later into North America, supposedly in the straw bedding of Hessian troops during the U.S. War of Independence (1775–83).

In the spring the dark-coloured female lays about 250 to 300 reddish eggs on young wheat, barley, or rye plants. After several days the larvae, which are red at first but soon turn white, emerge; they feed for about a month on the plant sap. They then develop into capsules (puparia), which give rise to adult flies that live about three days, just long enough to lay eggs. This second generation passes the winter as pupae affixed to wheat stubble. In the spring they develop into adults, completing the cycle. When conditions are favourable, additional generations may occur between the spring and autumn ones.

The best method for combatting the Hessian fly is to delay planting long enough in the spring that the plants do not grow until after the adult has emerged, laid its eggs, and died. Some varieties of wheat have proved to be resistant. Deep plowing of wheat stubble helps prevent emergence of the flies in the spring.

hessonite, also called ESSONITE, or CINNAMON STONE, translucent, semiprecious, reddish-brown variety of grossular (*q.v.*), a garnet mineral.

Hess's law of heat summation, rule first enunciated by Germain Henri Hess, a Swiss-born Russian chemist, in 1840, stating that the heat absorbed or evolved in any chemical reaction is a fixed quantity and is independent of the path of the reaction or the number of steps taken to obtain the reaction. Hess's law is a consequence of the first law of thermodynamics and need not be considered a separate thermodynamic law; in thermochemistry, however, it retains its identity because of its importance as the basis for calculating heats of reactions. Hess's law is exemplified by the calculation of the heat of formation of carbon dioxide from its elements (carbon [C] and oxygen [O]). This reaction is represented by

$$C(c) + O_2(g) \rightarrow CO_2(g);$$
$$\Delta H^\circ = -94.054 \text{ kcal (kilocalorie)}$$

In the equation (c) and (g) denote crystalline and gaseous, respectively; ΔH° is called the heat of formation.

In accordance with Hess's law, the heat of formation of carbon dioxide is the same, whether it occurs in one reaction as represented by the equation above or in two steps as represented by the equations given below:

$$C(c) + \tfrac{1}{2}O_2(g) \rightarrow CO(g);$$
$$\Delta H^\circ = -26.417 \text{ kcal}$$
$$CO(g) + \tfrac{1}{2}O_2 \rightarrow CO_2(g);$$
$$\Delta H^\circ = -67.637 \text{ kcal}$$

The sum of the above equations is:

$$C(c) + O_2(g) \rightarrow CO_2(g);$$
$$\Delta H^\circ = -94.054 \text{ kcal.}$$

Thus Hess's law allows the calculation of the heats of various reactions from the heats of other reactions.

Hestia, in Greek religion, goddess of the hearth, daughter of Cronus and Rhea, and one of the 12 Olympian deities. When the gods Apollo and Poseidon became suitors for her hand she swore to remain a maiden forever, whereupon Zeus, the king of the gods, bestowed upon her the honour of presiding over all sacrifices.

She was worshipped chiefly as goddess of the family hearth; but, as the city union was only the family union on a large scale, she had also, at least in some states, a public cult at the civic hearth in the *prytaneion,* or town hall. Hestia was closely connected with Zeus, god of the family in its external relation of hospitality and its internal unity. She was also associated with Hermes, the two representing domestic life on the one hand, and business and outdoor life on the other. In later philosophy Hestia became the hearth goddess of the universe.

Hestia, classical sculpture; in the Museo Torlonia, Rome

By courtesy of the Deutsches Archaologisches Institut, Rome

Heston, Willie, byname of WILLIAM MARTIN HESTON (b. Sept. 9, 1878, Galesburg, Ill., U.S.—d. Sept. 9, 1963, Traverse City, Mich.), U.S. collegiate halfback who played with Fielding Yost's University of Michigan (Ann Arbor) teams that from 1901 through 1904 scored 2,326 points in 44 games to their opponents' 40 points.

Heston graduated from Grant's Pass (Oregon) High School and played football at San Jose (Calif.) State Normal College, where Yost was an assistant coach before going to Michigan in 1901. Heston led Michigan to two national championships (1901–02) and to a victory in the first Rose Bowl game (1902), in which Michigan set a rushing yardage record that survived until 1959. In that game Heston himself gained 170 yards on 18 carries. Heston was the first Michigan player chosen (1903–04) by Walter Camp on his All-America team. In his four years there Heston scored 93 touchdowns for Michigan. He was known for his speed and an efficient stiffarm, and in four seasons at Michigan he rushed for a total of 2,339 yards.

In his first game as a professional for the Canton Bulldogs in 1905, he suffered a broken leg that ended his playing career. Later he was a prosecuting attorney and a judge in Wayne County (Detroit), Mich.

Consult the INDEX *first*

Hesychasm, in Eastern Christianity, type of monastic life in which practitioners seek divine quietness (Greek *hēsychia*) through the contemplation of God in uninterrupted prayer. Such prayer, involving the entire human being—soul, mind, and body—is often called "pure," or "intellectual," prayer or the Jesus prayer. St. John Climacus, one of the greatest writers of the Hesychast tradition, wrote, "Let the remembrance of Jesus be present with each breath, and then you will know the value of the *hēsychia.*" In the late 13th century, St. Nicephorus the Hesychast produced an even more precise "method of prayer," advising novices to fix their eyes during prayer on the "middle of the body," in order to achieve a more total attention, and to "attach the prayer to their breathing." This practice was violently attacked in the first half of the 14th century by Barlaam the Calabrian, who called the Hesychasts *omphalopsychoi,* or people having their souls in their navels.

St. Gregory Palamas (1296–1359), a monk of Mt. Athos and later archbishop of Thessalonica, defended the Hesychast monks. In his view the human body, sanctified by the sacraments of the church, is able to participate in the prayer, and human eyes may become able to see the uncreated light that once appeared on Mt. Tabor on the day of Christ's transfiguration. The teachings of Palamas were confirmed by the Orthodox Church in a series of councils held in Constantinople (1341, 1347, 1351). Hesychast spirituality is still practiced by Eastern Christians and once had wide popularity in Russia through the publication of a collection of Hesychast writings, known as the *Philokalia,* in 1782.

Hesychius OF ALEXANDRIA (fl. 5th century AD), author of the most complete Greek lexicon known from antiquity, valued as a basic authority for the dialects and vocabularies of ancient inscriptions, poetic text, and the Greek Fathers of the church.

Although nothing is known of his life, Hesychius indicated the comprehensive design of his lexicon in a letter prefacing the work. Entitled *Synagōgē pasōn lexeōn kata stoicheion* ("Alphabetical Collection of All Words"), the lexicon was based on other accessible specialized lexica dating to the 1st century BC, but Hesychius particularly borrowed from Diogenianus of Heraclea, a 2nd-century-AD language scholar from a Greek colony in southern Italy. Hesychius, however, contributed original glosses interpreting Homeric proverbs, citations from other classical Greek authors, selections from different dialects, and a glossary illustrating the vocabulary of Cyril of Alexandria, the early 5th-century theological spokesman for Greek Orthodoxy. Hesychius' introduction further stated that he included the sources of the rare words listed. The lexicon has been preserved only in a 15th-century abridgement, whose Venetian editor exten-

sively interpolated and disfigured the original manuscript and deleted the sources of the entries, thus reducing the lexicon to a copious glossary. Nevertheless, enough of Hesychius' work remains so that citations from Attic literature preserve the ancient readings for which easier synonyms were later substituted in other extant manuscripts of these writings. Two volumes (*alpha* to *omicron*) of a critical edition of Hesychius' lexicon by K. Latte were published in 1953 and 1966, respectively.

Hesychius OF JERUSALEM (d. *c.* 450), priest-monk, renowned in the Eastern Church as a theologian, biblical commentator, and preacher. He played a prominent role in the 5th-century controversy on the nature of Christ and was acclaimed as having annotated the whole of sacred Scripture.

Serving as a priest in the church in Jerusalem *c.* 412, Hesychius gained repute as a theologian and catechist, so that by 429 he was recognized by chroniclers and the Orthodox *Mēnologion* (lives of the saints liturgically arranged by month) as the pre-eminent biblical interpreter and teacher of the church in Jerusalem and Palestine.

Most of Hesychius' writings have been lost, although scholarship in the second half of the 20th century continues to identify more of his works hidden among Greek manuscripts and Latin translations. His biblical commentaries include interpretations of the Old Testament books of Leviticus, Job, Isaiah, and Ezekiel. A celebrated moralistic annotation on the Psalms that had long been attributed to the 4th-century spokesman for orthodoxy, Athanasius of Alexandria, is now acknowledged as Hesychius'. Some earlier commentaries, of probable authenticity, contain germinal terminology of the heterodox Nestorians.

As a biblical exegete, Hesychius generally followed the allegorical method of the 2nd-century Christian theologian Origen of Alexandria. Hesychius' preoccupation with symbolism led him to deny that a literal meaning could be found for every sentence in the Scriptures. In order to avoid heretical interpretations of Scripture, he rejected such philosophical terms as person, essence, or substance to express doctrine on the nature of Christ. On this point he allowed only the term *logos sarkotheis* ("the word made flesh"), a biblical concept. Against the diminution of Christ's divinity by Arius (*q.v.*) and his Antiochene followers, he veered toward the view of the Monophysites.

Credited with the earliest known liturgical addresses on the Virgin Mary, Hesychius also wrote a church history after 428 that controverted Nestorianism and other heretical beliefs. This text was incorporated into the proceedings of the second Council of Constantinople in 553. The works of Hesychius were published in the series *Patrologia Graeca,* J.-P. Migne (ed.), vol. 27, 55, and 93 (1866).

Hesychius OF MILETUS (fl. 6th century), Byzantine historian and literary biographer whose chronicle of world history influenced later Byzantine historical accounts and provided singular data on the history of Constantinople. His works are also a valuable source for the history of Greek literature. A native of Miletus during the reign (527–565) of the Eastern Roman emperor Justinian I, Hesychius wrote the *Historia Romaike te kai pantodape* ("Roman and Universal History") in six books. The chronicle extended from the Assyrian ruler Belus, the reputed founder of the Assyrian empire (2nd millennium BC), to the emperor Anastasius I (died 518). It also contains a long passage, the *Patria Kōnstantinoupoleōs,* on the origins of the city of Constantinople, which is the sole extant text of the original *Historia.*

Hesychius also wrote a history of the emperor Justin I (518–527) and of the early years of Justinian I, but the work is lost. His *Onomatologos ē pinax tōn en paideia onomastōn* ("Nomenclature, or Index of Famous Persons in Learning") is significant for its biographical notices of notable Greek writers. In it the authors were classified as poets, philosophers, historians, orators-grammarians, medical men, and miscellaneous writers. In each category the subjects were entered chronologically. The biographies followed a fixed form comprising the writer's origins, education, place and time of writings, and a list of his works. The authors were all non-Christian. About the mid-9th century an anonymous synopsis was made, which substituted an alphabetical order for the original chronological arrangement and added articles on Christian and later writers.

hetaera (Latin), Greek HETAIRA (Female Companion), one of a class of professional independent courtesans of ancient Greece who, besides developing physical beauty, cultivated their minds and talents to a degree far beyond that allowed to the average Attic woman. Usually living fashionably alone, or sometimes two or three together, the hetaerae enjoyed an enviable and respected position of wealth and were protected and taxed by the state. Though they were generally foreigners, slaves, or freedwomen, their freedom was greater than that of the married woman, who was bound to seclusion. That their homes were frequented by married men was not censured by society. They were often hired as entertainers for symposia and family sacrifices. The hetaerae of Corinth and Athens were especially noted for their outstanding physical and cultural accomplishments. Phryne and Lais are historic representatives.

heterochlorid, any protozoan of the plantlike flagellate order Heterochlorida. Heterochlorids have two flagella of unequal length and chromatophores whose pigments vary from yellow to yellow-green. Food reserves are stored as leucosin (probably a carbohydrate) and lipids. Some genera may be amoeboid during part of the life cycle; others may include a palmella stage, a condition in which the cells occur in a mucilaginous envelope but continue to metabolize. Its siliceous cyst wall is formed within the cytoplasm. Representative genera include *Nephrochloris, Chloromeson,* and *Rhizochloris.*

To make the best use of the Britannica, consult the INDEX *first*

heterocyclic compound, any of a class of organic chemical substances that consist of molecules containing one or more rings of atoms with at least one atom being an element other than carbon. The class includes many compounds of biological importance, such as nucleic acids and certain vitamins, hormones, and pigments. Also included are industrially significant pharmaceuticals, pesticides, herbicides, dyestuffs, and plastics.

A brief treatment of heterocyclic compounds follows. For full treatment, *see* MACROPAEDIA: Chemical Compounds.

Ordinary organic compounds have a backbone of carbon atoms, which are bonded to one another and also to hydrogen or other atoms, or both. Joining a chain of carbon atoms together results in a ring, or cyclic compound. In heterocyclic compounds one or more of the carbon atoms in the ring is replaced by the atom (called a hetero-atom) of another element. Most frequently, the hetero-atoms are oxygen, nitrogen, or sulfur.

As in hydrocarbons, the heterocyclic ring atoms may be saturated (held together by single bonds) or unsaturated (one or more bonds are double or triple). Heterocyclic rings may also be aromatic (having alternating single and double bonds). Many of the naturally occurring heterocycles are aromatic.

Because of its geometry, the carbon atom most readily forms rings containing five or six members. A common aromatic heterocycle with five members, in which the hetero-atom is nitrogen, is called pyrrole. Both the plant pigment chlorophyll and the red pigment of blood, hemoglobin, contain pyrrole nuclei. Many of the aromatic heterocyclic compounds consist of a heterocycle fused to a benzene ring. A number of natural and synthetic pigments, such as indigo and the phthalocyanins, are derived from fused rings containing pyrrole nuclei, as is the amino acid tryptophan. A pyrrolidine derivative, vinyl pyrrolidone, is the basis for water-soluble polymers that are used as blood plasma extenders. They are also incorporated into many cosmetic products, such as hair sprays.

Five-membered, oxygen-containing heterocycles occur widely in nature, especially in many simple sugars. Treating carbohydrates, which are polymers (long-chain molecules) of simple sugars, in a particular way produces furfural. This is a derivative of furan whose hetero-atom is oxygen. Produced commercially from corncobs and oat husks, furfural is used as an industrial solvent and to make phenol-furfural resins. Furfural can be chemically reduced to give furfuryl alcohol, which can be polymerized to make heat- and alkali-resistant resins that are used to line chemical plants.

The simplest six-membered heterocycles are pyridine, with the hetero-atom nitrogen, and pyran, with an oxygen hetero-atom. The pyridine ring occurs in many natural substances, such as vitamin B_6 (pyridoxine) and nicotine. Commercially important pyridine derivatives include the weedkiller paraquat and vinylpyridine, a starting material for some synthetic rubbers. A number of important pharmaceuticals also contain the pyridine nucleus. Fused rings (*i.e.,* those that share a carbon atom) of pyridine form the basis of some important alkaloids (*e.g.,* quinine and morphine). Fused tetrahydropyran nuclei occur in a number of important natural products, such as vitamin E (tocopherol) and the anthocyanin pigments, which furnish the reds and blues of many flowers.

Some important substances contain smaller or larger rings. Ethylene oxide, for example, is a three-membered heterocycle consisting of two carbon atoms and one oxygen atom. It is produced by partial oxidation of ethylene. Its main use is in the manufacture of ethylene glycol, commonly employed in automobile antifreeze. The important antibiotics, the penicillins and cephalosporins, all contain four-membered heterocycles with nitrogen as the hetero-atom.

Many heterocyclic compounds contain more than one hetero-atom in a single ring. In many cases, the hetero-atoms are the same. An example is imidazole, with two nitrogen atoms in a five-membered ring. It is an important constituent of the amino acid histidine. The thiazole ring with one sulfur and one nitrogen atom occurs in vitamin B_1 (thiamine), penicillins, and a number of other drugs. Six-membered rings containing two nitrogen atoms—uracil, thymine, and cytosine—are important components of nucleic acids. The pyrimidine ring occurs in barbiturate drugs. Dioxan, a heterocyclic ether, contains two oxygen atoms and is important industrially as a solvent.

Fused rings may contain several hetero-atoms. For example, the purine bases adenine and guanine, found in nucleic acids, contain four nitrogen atoms in a ring, as does the alkaloid caffeine. Riboflavin, another of the B-group vitamins, has three fused rings and also contains four-ring nitrogen atoms.

heterogeneous reaction, any of a class of chemical reactions in which the reactants are components of two or more phases (solid and

gas, solid and liquid, two immiscible liquids) or in which one or more reactants undergo chemical change at an interface, *e.g.*, on the surface of a solid catalyst. The reaction of metals with acids, the electrochemical changes that occur in batteries and electrolytic cells, and the phenomena of corrosion are part of the subject of heterogeneous reactions. By far the majority of the researches on heterogeneous reactions are devoted to heterogeneous catalysis (*e.g.*, the reactions between gases or liquids accelerated by solids). Heterogeneous reactions are of considerable practical interest; they are not, however, understood as well as those reactions that occur in only one phase (homogeneous reactions). *Compare* homogeneous reaction.

heterogenesis: *see* alternation of generations.

heterophony, in music, texture resulting from simultaneous performances of melodic variants of the same tune, typical of Middle Eastern practices as well as of a vast array of folk music. Yugoslavian epic singers, for example, accompany themselves heterophonically on the *gusle* (fiddle). In Persian art music, instrumentalists are expected to vary the singers' improvised lines. A complex heterophony, with different types of variation assigned to different instruments, characterizes the gamelan (tuned percussion orchestra) music of Indonesia. Medieval European monophonic song (unharmonized melody), too, appears to have been heterophonically accompanied on many occasions. Heterophony also occurs in jazz, especially of the Dixieland and Chicago varieties.

heteropteran, a member of the insect order Heteroptera, which comprises the "true bugs." The order is divided into three suborders: the aquatic Hydrocorisae (giant water bugs, water boatmen, water scorpions, and backswimmers), the semi-aquatic Amphibicorisae (shore bugs and water striders), and the terrestrial Geocorisae (bedbugs, stinkbugs, assassin bugs, lace bugs, fire bugs, and plant bugs). Members of the order are found on all land masses except Antarctica and in climates from tropical to arctic, although the majority of the 30,000 known species live in tropical areas. Unique to this order are certain pelagic (ocean-going) water striders (family Gerridae), which may not touch land for generations. Owing to their fragility there is only a poor fossil record of the heteropteran order. The earliest heteropteran fossils are from the Permian Period of Australia (some 225,000,000 years ago).

A brief treatment of heteropterans follows. For full treatment, *see* MACROPAEDIA: Insects.

Heteropterans range in size from under one millimetre (0.04 inch) to more than 100 mm. They are distinguished from other insects by the presence of a pair of simple eyes in front of and above the compound eyes, a hardened gula (the area below the mouthparts), and an "X" formed on the back by the overlapped wings. They live chiefly on plant or animal juices.

As in other insects, the head contains the organs of sight, sound, and smell; the thorax serves as the point of attachment for the legs and wings; and the abdomen contains reproductive organs. The two pairs of wings differ. The forewings have a leathery basal half and a membranous tip; the hindwings are thin and membranelike throughout. In some species the legs are adapted for jumping, swimming, or grasping. In aquatic adaptations the limb may be flattened, but in some cases it has developed a fringe of long hairs which spread out to present a greater surface during each swimming stroke.

The mouthparts are adapted to piercing and sucking; the mandibles and maxillae have evolved into stylets that lie within a troughlike labium. When these mouthparts are joined and extended they form two tubes. Food is ingested through the anterior tube, or canal; the posterior canal is the passage through which digestive juices, often containing killing or stunning toxins, reach the food source.

In terrestrial forms, respiration takes place through 10 pairs of holes (spiracles) in the body wall. Aquatic forms have various modifications of this system. In some the spiracles are surrounded by water repellent (hydrofuge) hairs and act as storage chambers while the insect is below the surface. Plastron respiration occurs in the Naucoridae; air is held in a series of grooves (the plastron) radiating out from a spiracle. As long as the water is well oxygenated these bugs do not need to surface, as the plastron can absorb as much dissolved oxygen as is necessary.

Water striders and their relatives actually walk on the water's surface-tension film. The long slender legs assure widely spaced points of contact, and the body is very slight. A dense hydrofuge coat protects the body from becoming waterlogged during submersion.

Terrestrial heteropterans occupy a great variety of habitats. Some live on plants, some under rocks or bark, and some in the ground. Members of certain families (*e.g.*, Nabidae) live in spider webs, subsisting on trapped insects or, occasionally, the spider. Semiaquatic forms generally are associated with quiet waters, although some species are adapted for living in rapids. The Polyctenidae, which live in bat nests, and the Termitaphididae, which live in termite nests, are wingless.

Heteropterans are generally not social insects. Predatory species disperse soon after hatching, as opportunities to feed are greater away from competitors. Nymphal stages of plant-eating (phytophagous) species may remain in a group for a time, as they usually hatch on their preferred food plant. The diets of predatory forms vary widely. Members of the suborder Amphibicorisae prey on worms, small arthropods, and plankton. Many terrestrial species prey on other insects, including other heteropterans. Aerial hunters generally ambush their victims, as they are not rapid enough fliers to pursue many prey species. They paralyze the prey with a salivary secretion. A few forms, including bedbugs, (Cimicidae), bat bugs, and some assassin bugs (Reduviidae) subsist on avian or mammalian blood. The Termitaphididae live only on the fungi growing in certain termite nests. These bugs secrete from pores on their backs a substance that is eaten in turn by the termites.

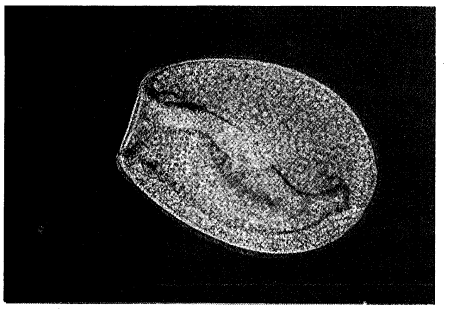
Eggs may be laid in groups or singly, and they may hatch shortly after being laid, although many species overwinter in the egg. The hatched young typically have five nymphal stages, or instars, going through five molts in a gradual metamorphosis to the adult form. The nymphs lack the rigid protective exoskeleton of the adult but as a result are able to expand and thus take in greater quantitites of food. Nymphs, which lack wings, generally rely on motionlessness or camouflage to protect them from predators. The wings only become functional after the final molt into the adult form. Many heteropterans produce sound with various bodily parts (stridulating organs). These sounds may have significance in mating behaviour, but they are generally not loud enough to be easily noticed by humans.

Heteropterans are important to man in several ways. Some, such as plant bugs (Miridae) and stinkbugs (Pentatomidae), may damage crops while feeding. On the other hand, certain predatory heteropterans are used to control infestations of other crop-damaging insects. Some, like the bedbugs, are biting pests, and still other may serve as carriers of various diseases.

heterosis, also called HYBRID VIGOUR, the increase in such characteristics as size, growth rate, fertility, and yield of a hybrid organism over those of its parents. Plant and animal breeders exploit heterosis by mating two different pure-bred lines that have certain desirable traits. The first-generation offspring generally show, in greater measure, the desired characteristics of both parents. This vigour may decrease, however, if the hybrids are mated together; so the parental lines must be maintained and crossed for each new crop or group desired.

heterospecific mating, also called INCOMPATIBLE MATING, mating in which the man and woman have incompatible blood types, such that the woman may develop antibodies to her partner's blood type. This mating causes difficulties in childbirth, since there is a chance that the child conceived in a heterospecific mating will have its father's blood type. When a heterospecific pregnancy occurs, the mother produces antibodies to the blood type of the fetus, which attack and destroy fetal red blood cells. The classic example of this is seen when an Rh-negative woman marries an Rh-positive man and has children who are Rh-positive (*see* Rh blood group system). Frequently the mother develops antibodies to the fetal blood type, which may result in miscarriage, a stillborn child, or a baby born with severe hemolytic anemia or jaundice. Sometimes the only way to save the life of the newborn is to replace its blood completely by a total exchange transfusion. Heterospecific incompatibilities also occur involving the ABO blood group system (*q.v.*).

heterotrich, any member of the ciliated protozoan order Heterotrichida. Complete ciliation is typical, although there is a tendency toward loss of the cilia, which are minute, hairlike processes, in several families (Peritromidae, Licnophoridae). Heterotrichs are considered the most primitive of the subclass Spirotrichia because of their uniform ciliation. Heterotrichida have a zone of membranelles



Heterotrich (*Bursaria truncatella*)
Eric Grave—Photo Researchers

near the peristome (a groove leading to the mouth) and often an undulating membrane close by. Representative genera include *Bursaria,* an oval freshwater form; *Spirostomum,* a long, cylindrical protozoan; *Stentor* (*q.v.*), a trumpet-shaped freshwater genus; and Nyctotheroides, a common parasite of frogs and toads.

Hethum (king of Little Armenia): *see* Hayton.

hetman, military title used in the Polish–Lithuanian state (16th–18th century); the *hetman wielki* ("great hetman") was the chief of the armed forces and the commander in the field when the king was not present. In the Ukraine a variation of the term, ataman, was used to designate the military leader of the Zaporozhian Cossacks (16th century) and the prince of the area east of the Dnepr River (17th–18th century). Ataman was also the name of the elected commander of the various great Cossack hosts in Russia; after 1723, however, only atamans of the villages were elected.

Hetonaian Series, major division of Cretaceous rocks and time in Japan (the Cretaceous Period began about 144,000,000 years ago and lasted about 77,600,000 years). The Hetonaian is the uppermost series of the Cretaceous in Japan and overlies the Urakawan Series. Two stages, the Upper and Lower Hetonaian stages, are recognized, representing shorter spans of time; they are characterized by distinctive fossil ammonite cephalopods and by various species of the large Cretaceous oyster, *Inoceramus* (all mollusks). These forms enable correlations to be made, often over large distances.

Hettangian Stage, standard, worldwide division of Jurassic rocks and time. (The Jurassic Period began about 208,000,000 years ago and lasted about 64,000,000 years.) Named for exposures at Hettange-Grande, a village near Thionville in Moselle *département*, Fr., it is the lowermost stage of the Jurassic Period. The Hettangian is characterized by sandstones and some limestones and marls. Invertebrate fossils including clams, oysters, and ammonoid cephalopods are abundant.

Hettner, Alfred (b. Aug. 6, 1859, Dresden, Saxony—d. Aug. 31, 1941, Heidelberg, Ger.), German geographer who sought to place geography on a firm philosophical and scientific foundation and strongly influenced the modern development of geography in Germany.

While completing work on his doctorate at the University of Strasbourg (now in France), Hettner became increasingly absorbed in philosophy. His conception of the nature of geography was rooted in the views of the German philosopher Immanuel Kant, but he was also influenced by a number of the great German geographers. In his view, geography was fundamentally chorology, or the study of geographical distributions over the Earth's surface. It was concerned with man's interconnection and interaction with his natural environment, but it should also take into account the arrangement, by area, of the Earth's physical phenomena. The study of local differences in phenomena over the Earth's surface was the keynote of this concept.

Following researches on Chile and Patagonia, he went to Colombia (1882–84) and, after returning to Germany, published his findings on the Colombian Andes (1888). He then turned his attention to the geomorphology of the highlands of Saxony, but in 1888 he returned to South America and began more than a year of travels. The hardship and illness endured in the course of this venture resulted in permanent impairment of his ability to walk. Later field researches took him to Russia (1897), North Africa (1911), and Asia (1913–14). While serving as professor at the University of Heidelberg (1899–1928), he became the mentor of a number of students who distinguished themselves as geographers.

For more than 40 years Hettner's principal medium for disseminating his ideas on the scope and methodology of geography was the influential *Geographische Zeitung* ("Geographical Journal"), first published in 1899. The first volume of his *Grundzüge der Länderkunde* (1907; "Foundations of Regional Geography") dealt with Europe, but its companion volume, on other regions, did not appear until 1924. He also wrote *Vergleichende Länderkunde,* 4 vol. (1933–35; "Comparative Regional Geography"). One of the major works of geographical literature, the 11-volume *Handbuch der Geographischen Wissenschaft* ("Handbook of Geographical Science"), completed in 1940, was his conception.

Hetzer, Ludwig, Hetzer also spelled HATZA (b. *c.* 1500, Bischofszell, Thurgau—d. Feb. 4, 1529, Constance), controversial Anabaptist, iconoclast, and colleague of Protestant Reformers.

After studies at Freiburg im Breisgau (now in Germany), Hetzer published *Judicium Dei* (1523; "The Judgment of God"), in which he condemned the use of images, and *Ein Beweis* (1524; "One Proof"), a work on the conversion of the Jews. The first work became a major part of the Reformed effort to combat the pictorial element in religion.

In early 1525 Hetzer was expelled from Zürich for his role as a leader of the Swiss Brethren, an anti-Lutheran group. He soon moved to Augsburg but was again expelled and travelled to Basel, where he received a favourable reception from the Swiss Reformer John Oecolampadius. After a brief return visit to Zürich, where he provoked the opposition of the Swiss Reformer Huldrych Zwingli, Hetzer went to Strassburg. There in 1526 he met Hans Denck, a German Anabaptist leader, who collaborated with him in the production of his major work, a translation of the Hebrew prophets (1527) that preceded Martin Luther's edition by five years. In 1528 Hetzer was arrested and imprisoned in Constance on a charge of adultery, though his opposition to the Trinitarian concept of God was the more likely cause, and was condemned to death by decapitation.

heulandite, hydrated sodium and calcium aluminosilicate mineral in the zeolite family, formulated $(Ca,Na_2)Al_2Si_7O_{18} \cdot 6H_2O$. It forms brittle, transparent, coffin-shaped crystals in various shades of white through red, gray, or brown. It is found with other zeolite minerals filling cavities in granites, pegmatites, and basalts. Typical occurrences are in Berufjördhur, Ice.; on islands near Bombay; on the Faeroe Islands; and in northeastern New Jersey. Heulandite's molecular structure is an open framework containing six-membered rings of silicate tetrahedra (four oxygen atoms arranged at the points of a triangular pyramid around a central silicon atom) joined in parallel planes. This structure and the substitution of aluminum atoms for some of the silicon atoms give the mineral its cation-exchange properties (dissolved sodium, potassium, calcium, and magnesium readily replacing one another in the molecular structure), making it useful in water softeners.

Heulandite is a member of a group of zeolite minerals with a characteristic platy habit. Others in the group are stilbite, epistilbite, and brewsterite. These minerals have similar modes of occurrences, physical properties, and molecular structures. Stilbite and epistilbite are more common in sheaflike aggregates or crosslike penetration twins than in single crystals. For chemical formulas and detailed physical properties, *see* zeolite (table).

Heulenburg, Heulalius von: *see* Hoffmann, Heinrich.

Heuneburg, Celtic fortified site overlooking the Danube River in Baden-Württemberg *Land* (state), Germany. Recent excavations have shown that the Heuneburg fort community carried on a prosperous trade with the Greeks at Massilia (Marseille) during the 6th century BC. Imported Greek black-figure pottery and Massiliote wine amphorae have been uncovered. Mediterranean influence has also been detected in the stronghold's fortification system.

Outside the hill-fort were a number of princely graves, including the Hochmichele barrow, which dates from the 6th century BC and is noted for its wagon grave, located in a great central burial chamber formed of sawed wooden planks nearly 20 feet (6 metres) long.

Heureaux, Ulises (b. Oct. 21, 1845, Puerto Plata, Dominican Republic—d. July 26, 1899, Moca), president of the Dominican Republic who allowed most of his country's economy to fall under U.S. control. The republic's fiscal disorder led to U.S. intervention after Heureaux's assassination.

Heureaux received some schooling in a Methodist mission and then joined a revolt against Spain in the early 1860s, distinguishing himself as a soldier. Following Dominican independence and years of internal chaos, Heureaux became president in 1882 and exiled Luperón, his former leader. In 1884 and 1886 he selected his country's presidents while he continued to direct the government; from 1887 to his death he ruled officially and uninterruptedly after abolishing the constitutional barrier against reelection.

Heureaux, portrait by an unknown artist

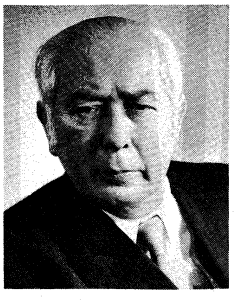
By courtesy of the Library of Congress, Washington, D.C.

Heureaux imposed order on the Dominican Republic by executing anyone who opposed him. Relative peace during his regime encouraged agriculture and trade and especially the growing of sugar, which became the country's chief export. His improvident dealings with the San Domingo Improvement Company of New York—which floated loans, built railways, and took over the collection of customs—left the country bankrupt and led to interference in the country's affairs by the United States after Heureaux was assassinated by political enemies.

Heusler alloy, any of the first magnetic alloys composed of metals that, in their pure state, are not magnetic. The alloys are named after Fritz Heusler, 19th-century German mining engineer and chemist. Heusler alloys consist of approximately two parts of copper, one of manganese, and one of tin. The tin may be replaced by aluminum, arsenic, antimony, bismuth, or boron; the copper may be replaced by silver.

Heuss, Theodor (b. Jan. 31, 1884, Brackenheim, Ger.—d. Dec. 12, 1963, Stuttgart, W.Ger.), liberal democratic legislator, first president of the Federal Republic of Germany, author, and leader of the Freie Demokratische Partei (Free Democratic Party, FDP), who helped draft a new constitution for postwar West Germany.

After receiving a political science degree from the University of Munich (1905), Heuss was



Heuss, 1951

By courtesy of the Presse- und Informationsamt der Bundesregierung, Bonn

an editor on several newspapers and taught at the Hochschule für Politik in Berlin. A member of the Deutsche Demokratische Partei (German Democratic Party, DDP) during the Weimar period, he served in the Reichstag (federal lower house) in 1924–28 and 1930–33. His books were burned as "un-German" after Hitler's accession to power. After World War II, Heuss helped found the FDP in 1946 and headed it from 1949, serving on the parliamentary council that wrote the Federal Republic's constitution. On Sept. 12, 1949, he was elected president of the new state and held that largely ceremonial post until his retirement in 1959.

Heutsz, Johannes Benedictus van (b. Feb. 3, 1851, Coevorden, Neth.—d. July 10, 1924, Montreux, Switz.), Dutch general and governor general of the Dutch East Indies (1904–09) who conquered the Sumatran kingdom of Acheh (Atjeh) and brought all of Indonesia directly under Dutch rule.

Sent to Acheh as a subaltern in 1873, van Heutsz won fast promotions. By 1887 he was chief of staff, and in 1899 he was appointed military and civil governor of Acheh; he managed to subdue the kingdom in a year. As governor general, van Heutsz brought the rest of the Outer Islands under direct control and thereafter was able to attract international investors. He introduced primary schools in the villages, which were partly responsible for support of their schools, and made instruction in the Indonesian language compulsory.

Hevajra, Tibetan KYE-RDO-RJE, Mongolian KEVAJRA, in northern Buddhism, a fierce protective deity, the *yab-yum* (in union with his female consort, Vajrayoginī) form of the fierce protective deity Heruka. Hevajra is a popular deity in Tibet, where he belongs to the *yi-dam* (tutelary, or guardian, deity) class. His

Hevajra united with his female consort; Lamaist bronze, early 19th century; in the Rijksmuseum voor Volkenkunde, Leiden, Neth.

By courtesy of the Rijksmuseum voor Volkenkunde, Leiden, The Netherlands

worship is the subject of the *Hevajra Tantra,* a scripture that helped bring about the conversion of the Mongol emperor Kublai Khan (1215–94).

Hevajra is represented in art as blue in colour, with a headdress of skull crowns topped by a figure of the Buddha Akṣobhya. He is characteristically shown with 8 heads, 4 legs, and 16 arms. The arms on the left hold skull cups containing various divinities, the ones on the right their steeds. A multiarmed form of Hevajra, but without his female consort, is found in Cambodia and Thailand.

Hevelius, Johannes (Latin), German JOHANN HEWEL, or JOHANN HOWELCKE, Polish JAN HEWELIUSZ (b. Jan. 28, 1611, Gdańsk, Pol.—d. Jan. 28, 1687, Gdańsk), astronomer who compiled an atlas of the Moon (*Selenographia,* published 1647) containing one of the earliest detailed maps of its surface as well as names for many of its features. A few of his names for lunar mountains (*e.g.,* the Alps) are still in use, and a lunar crater is named for him. Hevelius also made a catalog of 1,564 stars, the most comprehensive of its time, and a celestial atlas in which several constellations, now accepted, were shown for the first time. After his death, the catalog and the atlas were published together (*Prodromus Astronomiae,* 1690) by his wife, who had collaborated with him in his observations.

A member of a noble family of Gdańsk, Hevelius was a city councillor and a brewer. After studying at Leiden University in the Netherlands, he returned to Gdańsk and built an observatory atop his house and equipped it with fine instruments of his own making. Although he built and used telescopes, he preferred to measure celestial positions without the aid of lenses. In 1679 Edmond Halley visited Hevelius and compared the use of a sextant having telescopic sights with Hevelius' sextant with open sights. Hevelius showed that he could determine stellar positions about as accurately without a telescope as Halley could with one.

Heves, *megye* (county), northern Hungary, occupying an area of 1,404 sq mi (3,637 sq km) and extending northward into the Mátra and Bükk mountains (*qq.v.*), which are popular year-round resort areas with facilities for winter sports and hunting. Sanatoriums are also located there. In the scattered highland villages, peasant costumes and customs are still seen.

Lentils, tobacco, and melons are major crops. Viticulture and fruit growing are characteristic of the Mátra foothills, where horse breeding is also significant. Main cities are Eger (*q.v.*), the *megye* seat, in the Eger River Valley, and Gyöngyös, which lies in the Visonta opencut lignite mining field. At Kisköre a dam was constructed on the Tisza River in 1975. Pop. (1983 est.) 348,000.

Hevesy, George Charles de (b. Aug. 1, 1885, Budapest—d. July 5, 1966, Freiburg im Breisgau, W.Ger.), chemist whose development of isotopic tracer techniques greatly advanced understanding of the chemical nature of life processes. This work earned him the 1943 Nobel Prize for Chemistry. He also discovered, with Dirk Coster, the element hafnium (1923).

Educated at Berlin and the University of Freiburg, in 1911 Hevesy began work at the University of Manchester under Ernest Rutherford on the chemical separation of radium. Though his attempts proved unproductive, they stimulated him to explore the use of radioactive isotopes as tracers. He joined Friedrich Paneth at Vienna (1912) and made significant progress in tracer studies. Invited to Copenhagen (1920), he and Coster, pursuing a suggestion of Niels Bohr, discovered hafnium among ores of zirconium.

Hevesy became professor at Freiburg (1926), where he began to calculate the relative abundance of the chemical elements. In 1934, after the preparation of a radioactive isotope of phosphorus, he began to study various physiological processes by tracing the course of "labelled" radioactive phosphorus through the body. These experiments revealed the dynamic state of the body constituents. Fleeing from the Nazis (1943), Hevesy became professor at the Institute of Organic Chemistry, Stockholm. His published works include the two-volume *Adventures in Radioisotope Research* (1962).

Ḥevron (Israeli-occupied Jordan): *see* Hebron.

Hewart (of Bury), Gordon Hewart, 1st Viscount, also called (1916–22) SIR GORDON HEWART, or (1922–40) BARON HEWART OF BURY (b. Jan. 7, 1870, Bury, Lancashire, Eng.—d. May 5, 1943, Totteridge, Hertfordshire), lord chief justice of England from 1922 to 1940.

A scholar of University College, Oxford, Hewart was called to the bar at the Inner Temple in 1902 and practiced on the northern circuit. After an unsuccessful contest for a seat in Parliament in northwest Manchester in 1912, he was elected as a liberal for Leicester in 1913 and later represented the eastern division of that city. In December 1916 he was appointed solicitor general in David Lloyd George's coalition government. He was made attorney general in January 1919 and was admitted to the cabinet in 1921. As law officer, Hewart played a leading part in a great deal of litigation arising under the Defence of the Realm Acts; while in the House of Commons he proved himself a powerful debater. He took an active part in the final phase of the negotiations with Sinn Feiners. He acted as president of the War Compensation Court from 1922.

Hewart was knighted in 1916; on Jan. 16, 1918, he was sworn in as a member of the Privy Council and, on March 24, 1922, was appointed lord chief justice; at the same time, he was created Baron Hewart of Bury. He resigned as chief justice in 1940 and in that year was created Viscount Hewart of Bury. As a judge, Hewart was prone to reach a decision too soon and on insufficient material and so seemed to take sides. His book *The New Despotism* (1929) was a powerful but not always temperate indictment of the quasijudicial powers granted to the executive and of the use made of them. On the other hand, champions of civil liberties approved of his opposition to governmental encroachments and bureaucratic restrictions.

Hewish, Antony (b. May 11, 1924, Fowey, Cornwall, Eng.), British astrophysicist who won a Nobel Prize for Physics for his discovery of pulsars.

Hewish was educated at Cambridge and in 1946 joined the university's radio astronomy group led by Sir Martin Ryle. While director of a research project at the Mullard Radioastronomy Observatory at Cambridge in 1967, Hewish recognized the significance of an observation made by a graduate assistant, Jocelyn Bell. Hewish determined that the regularly patterned radio signals, or pulses, that Bell had detected were not caused by earthly interference or, as some speculated, by intelligent life forms attempting to communicate with distant planets, but rather were energy emissions from certain stars. For this work in identifying pulsars as a new class of stars, he was awarded jointly with Ryle the Nobel Prize for Physics in 1974, the first time the prize had been given for observational astronomy.

In 1971 Hewish was named professor of radio astronomy at the Cavendish Laboratory, Cambridge.

Hewitt, Abram Stevens (b. July 31, 1822, Haverstraw, N.Y., U.S.—d. Jan. 18, 1903, Ringwood, N.J.), U.S. industrialist, philanthropist, and politician who in 1886 defeated Henry George and Theodore Roosevelt to become mayor of New York City.

Hewitt grew up on a farm in New York and attended public schools before winning a scholarship to Columbia College (now in Columbia University). He was graduated in 1842 and remained at Columbia as an instructor of mathematics while studying law. He then went into the iron-making business with Edward and Peter Cooper. The firm was a success, and Hewitt became wealthy. A man

of distinct social conscience, Hewitt produced gun-barrel iron for the federal government during the Civil War without taking a profit.

In 1870 Hewitt's company began the first commercial-grade steel production in the United States. A year later he joined with Edward Cooper and Samuel J. Tilden in a campaign to oust the Tweed Ring from controlling both the Tammany Hall Democratic organization and the municipal government of New York City. In 1874 Hewitt won a seat in the U.S. House of Representatives, where he remained (with the exception of the 1879–81 term) until 1886.

The three-way race in 1886 for mayor of New York City pitted Hewitt, the Democratic candidate, against Henry George of the United Labor ticket and Theodore Roosevelt on the Republican ballot. Hewitt's victory was a personal triumph, and he proceeded to rupture relations with Tammany Hall by administering a comprehensive reform program. After one term, he retired from politics.

Hewitt's philanthropic endeavours began with the establishment of Cooper Union in 1859. He was chairman of the board that drew up the charter, and he later served as secretary of the board, directing the organization's educational and financial operations. In 1902 he contributed a $600,000 endowment to Cooper Union. During the last decade of his life, Hewitt served as a trustee of Columbia College, Barnard College, and the Carnegie Institution.

Hewitt, Peter Cooper (b. May 5, 1861, New York City—d. Aug. 25, 1921, Paris), electrical engineer who invented the mercury-vapour lamp, a great advance in electrical lighting.

At an early age, Hewitt began research on electricity and mechanics in a greenhouse converted into a workshop. In 1901 he marketed his first mercury-vapour lamp, but an improved model, brought out in 1903, had better colour qualities and found widespread use for industrial lighting. He later developed the quartz-tube mercury lamp, which found extensive use in biological research.

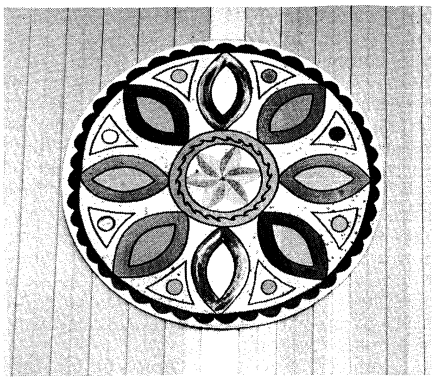
Other inventions by Hewitt include the mercury rectifier (a device for converting alternating current into direct current) and a radio receiver. He discovered the fundamental principle of the vacuum-tube amplifier during study of the flow of electricity through rarefied gases. His interest in aeronautics culminated in the construction (1918) of an early helicopter.

Consult the INDEX *first*

Hewson, William (b. Nov. 14, 1739, Hexham, Northumberland, Eng.—d. May 1, 1774, London), British anatomist and physiologist who described blood coagulation and isolated a key protein in the coagulation process, fibrinogen, which he called coagulable lymph. He also investigated the structure of the lymphatic system and described red blood cells.

Hewson was trained in medicine at William Hunter's anatomy school in London (1759–61) and at Edinburgh (1761–62). He then returned to Hunter's school as a partner, but after a dispute with Hunter over the priority of his discoveries, he left in 1772 to establish his own school. In 1770 he was elected to the Royal Society and was awarded the Copley Medal.

hex sign, emblem painted on a barn, especially in Pennsylvania Dutch country, an agricultural region in southeastern Pennsylvania largely settled by German immigrants who have preserved ethnic custom and identification to a high degree. Hex designs, usually round, with colourful, simple floral and geometric motifs, are said to protect farm animals



Hex sign painted on a Pennsylvania barn
Grant Heilman

from disease and other misfortunes resulting from witches' spells and especially the evil eye.

hexachloroplatinic acid ($H_2PtCl_6 \cdot 6H_2O$), also called CHLOROPLATINIC ACID, complex compound formed by dissolving platinum metal in aqua regia (a mixture of nitric and hydrochloric acids) or in hydrochloric acid that contains chlorine. It is crystallized from the solution in the form of reddish-brown deliquescent (moisture-absorbing) crystals with specific gravity 2.43 and melting point 60° C (140° F). It is the starting material from which most platinum compounds are made; it is also used in platinum-plating baths.

hexachord, in music, six-note pattern corresponding to the first six tones of the major scale (as, C–D–E–F–G–A). The names of the degrees of the hexachord are ut, re, mi, fa, sol, and la (also called solmization [*q.v.*] syllables); they were devised by the 11th-century teacher and theorist Guido of Arezzo. The hexachord was described in medieval and Renaissance musical theory and was widely used in the teaching of singing. Its value was that it gave the singer a fixed set of pitch relations by which he could orient himself as he sang; as a practical device it proved an effective way to teach the sight-reading of music and to teach individual melodies. Modifications of the system to encompass a full octave are still in use.

The essence of the hexachord system is that each hexachord includes only one semitone—between mi and fa. A series of seven overlapping hexachords completed the gamut of formally recognized musical tones, a span of two and one-fourth octaves, containing the notes of the C major scale plus B♭.

There were three varieties of hexachord—natural, hard, and soft. In the natural hexachord, which started on C, mi is E and fa is F. In the hard hexachord, which started on G, mi is B and fa is c. In the soft hexachord, which started on F, mi is A, but fa cannot be B♮, for B♮ is a whole tone, not a semitone, above A; fa is therefore B♭. Both B♭ and B♮ were thus fitted into a system of hexachords that always kept the same relative pitches between ut and la and therefore provided one

Overlapping hexachords

hard	natural	soft	hard
		D la	E la
		C sol	D sol
		B♭ fa B	C fa†
	A la	A mi	B♮ mi B
	G sol	G re	A re
	F fa	F ut	G ut
E la	E mi		
D sol	D re		
C fa	C ut		
B♮ mi B			
A re			
Γ ut*			

*Gamma ut, the low G that begins the gamut.
†Middle C.

set of pitches that the singer could always use to orient himself.

The pupil learned to sing his gamut by memorizing the sound of the series ut, re, mi, fa, sol, la as it was sung. He then knew at what point to make the semitone interval mi–fa, whether or not the music included B♭ or B♮. If he needed to sing B♮ he used the hard hexachord; if he needed to sing B♭, he used the soft hexachord.

A partial representation of the gamut shows four of the seven overlapping hexachords: Ascending the hard hexachord to its fourth note, C fa, the singer would find himself on a level with the first note, C ut, of the natural hexachord. The full name of this note is, therefore, C fa ut. He could then think himself into the overlapping hexachord by taking this C as ut and continuing from there. This process of transferring to an overlapping hexachord at the pivotal points is called mutation. It enabled the singer to apply the solmization syllables to any series of notes he encountered, although he would take musical context into consideration in choosing the best note on which to mutate. *See also* gamut.

hexadecanol (chemistry): *see* cetyl alcohol.

hexagonal system, one of the principal categories of structures to which a given crystalline solid can be assigned. Components of crystals in this system are located by reference to four axes—three of equal lengths set at 120° to one another and a fourth, perpendicular to the plane of the other three. If the atoms or atomic groups in the solid are represented by points and the points are connected by line segments, the resulting lattice will define the edges of an orderly stacking of blocks, or unit cells. The hexagonal unit cell is distinguished by the presence of a single line, called an axis of 6-fold symmetry, about which the cell can be rotated by either 60° or 120° without changing its appearance.

A type of unit cell commonly included in the hexagonal system contains two additional lattice points. Its shape is that of a regular rhombus, with internal angles of 60° and 120°. Some crystallographers, however, prefer to assign this unit cell to a separate primary crystal system, the rhombohedral or trigonal system. Among the primary crystal systems, the hexagonal system has the fewest substances assigned to it, including arsenic, calcite, dolomite, quartz, apatite, tourmaline, emerald, ruby, cinnabar, and graphite, among others.

All crystals in the hexagonal system are classed as optically uniaxial; each crystal exhibits double refraction and yields two refractive indices for light of each colour, one parallel to the optical axis and one perpendicular to the optical axis.

hexahedrite, any iron meteorite containing about 6 percent nickel and having a cubic cleavage and crystal structure. Etching a polished surface often brings out a design called Neumann lines, usually caused by the presence of systems of very narrow, flat lamellae (plates). Hexahedrites contain about 92 percent kamacite in large crystals showing Neumann lines; other major minerals are troilite, schreibersite, and plessite.

hexameter, a line of verse containing six feet, usually dactyls (′ ∪ ∪). Dactylic hexameter is the oldest known form of Greek poetry and is the preeminent metre of narrative and didactic poetry in Greek and Latin, in which its position is comparable to that of iambic pentameter in English versification. The epics of Homer and of Virgil are composed in dactylic hexameter. Although the hexameter has been used in English verse by such 19th-century poets as Arthur Hugh Clough and Henry Wadsworth Longfellow (notably in the latter's *Evangeline*), its rhythms are not readily adapted to the language, and it has never been a popular form.

Hexapla (Greek: Sixfold), edition of the Old Testament compiled by Origen of Alexandria in Caesarea, Palestine, before AD 245 that presented for comparison different Hebrew and Greek versions in six parallel columns. For some books, including the Psalms, Origen presented as many as three additional Greek texts from unknown sources. In the column devoted to the Septuagint version, he indicated by the use of critical symbols the variations that occurred in Hebrew and Greek renditions.

The entire work took 20 years to complete and may have filled 7,000 pages. It was available in Caesarea until about 600 and was consulted by many scholars, including Jerome in preparing for his Vulgate translation. The fate of the great work is not known, but it survives in fragments copied in old manuscripts, in quotations in the works of various Church Fathers, and in several editions of its Septuagint column—which, because scribes often copied the critical marks incorrectly or left them out, introduced some confusion into the text of the Septuagint.

Hexham, parish (town), Tynedale district, county of Northumberland, England, on the River Tyne. Its abbey church of St. Andrew, containing a great stone staircase, dominates the town. The church and monastery were founded *c.* 673 by the Archbishop of York; in 678 it became head of the new see of Bernicia. A borough from 1276, Hexham was the leading market town of Tynedale but suffered frequently from raids by Scots from across the border to the north. With the growth of modern transport links, Hexham has grown in importance as a livestock market and rural service centre for an extended area in west Northumberland. Pop. (1981) 9,177.

hexogen (explosive): *see* RDX.

hexylresorcinol, synthetic drug used locally as an antiseptic and orally as an anthelmintic, or worming agent, effective against hookworm (*Necator americanus* and *Ancylostoma duodenale*) and intestinal roundworm (*Ascaris lumbricoides*). Its irritation of the oral or gastrointestinal mucous membranes may cause the patient some distress, but it eliminates intestinal worms by the same irritant action. Used locally, hexylresorcinol is effective against many microorganisms.

Ḥeydar, Sheykh: *see* Ḥaydar, Shaykh.

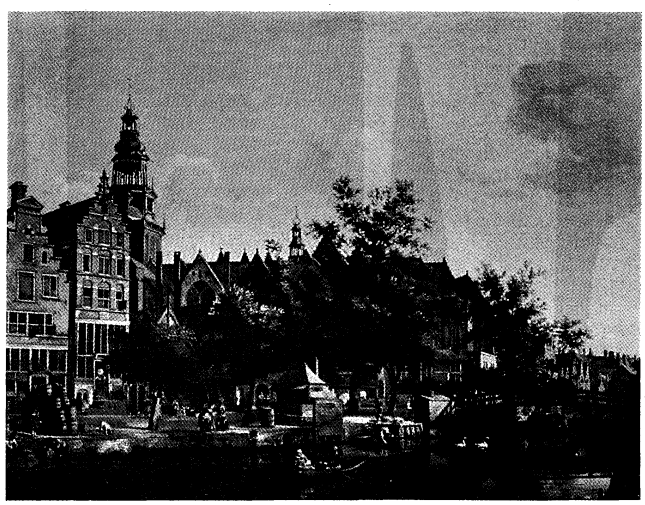
Heyden, Jan van der, (b. March 5, 1637, Gorinchem, Neth.—d. March 28, 1712, Amsterdam), leading painter of cityscapes in late-17th-century Holland, especially known for his views of Amsterdam done in the 1660s.

Little is known of his early life, though it is recorded that van der Heyden studied under a Dutch glass painter. In 1650 van der Heyden's family moved to Amsterdam, where he lived for the rest of his life. Recurrent subjects in his paintings seem to indicate he travelled to Brussels, Cologne, and perhaps even farther before his marriage in 1661. Later in life he possibly visited London.

Although he painted a few landscapes and still-life pictures, van der Heyden's reputation rests upon his architectural subjects—the town views that he painted in early maturity. In these he combined breadth and truth of general effect with remarkable attention to detail. His feats of technical virtuosity, such as separately realizing each brick of his houses, have continually amazed his viewers. His pictures are well composed and harmoniously coloured, exploiting contrasts of foliage and mellow brickwork. His cityscapes were very influential in the development of architectural painting in 18th-century Holland. Van der Heyden was also interested in mechanical inventions and in 1690 published *Brandspuiten-boek* ("Fire Engine Book"), a study of fire-fighting equipment illustrated with his own etchings.

Heydrich, Reinhard (Tristan Eugen), by-name THE HANGMAN, German DER HENKER (b. March 7, 1904, Halle, Ger.—d. June 4, 1942, Prague), German Nazi official, Heinrich Himmler's chief lieutenant in the SS (Schutzstaffel), who organized mass executions in occupied territories during the opening years of World War II.

At the age of 14 Heydrich joined a Free Corps band, in which he became schooled in street-fighting, terrorism, and looting. In 1922 he joined the Navy, rising to the rank of first lieutenant, but resigned in 1931 to devote his time to Nazi Party affairs. Soon after Hitler became chancellor, Heydrich was appointed chief of the political department of the Munich police force, with control over the notorious Dachau concentration camp. In 1934 he was appointed SS chief for Berlin and was later made deputy chief of the SS under Heinrich Himmler. Ruthless in dealing with "enemies of the state," Heydrich was singled out in September 1941 to supersede Baron Konstantin von Neurath as *Reichsprotektor* for Bohemia and Moravia. He ordered the execution of 300 Czechs within five weeks of his arrival in Prague. He was then dispatched to Norway, The Netherlands, and occupied France to suppress mounting sabotage and terrorism, and his visits resulted in more mass executions. He was so hated and feared by anti-Nazi elements throughout Europe that he was called "the Hangman."



"The Oude-Zijds-Voorburgwal, Amsterdam," oil painting by Jan van der Heyden, *c.* 1675; in the Mauritshuis, The Hague

By courtesy of the Mauritshuis, The Hague

On May 27, 1942, Czech patriots bombed and shot him while he was riding in his car on the Prague–Berlin highway. He died June 4 in a Prague hospital. Gestapo officials exacted vengeance for his death by executing hundreds of Czechs and wiping out the entire village of Lidice.

Heyerdahl, Thor (b. Oct. 6, 1914, Larvik, Nor.), ethnologist and adventurer who organized and led the famous "Kon-Tiki" (1947) and "Ra" (1969) transoceanic scientific expeditions. Both expeditions were intended to prove the possibility of ancient transoceanic

Heyerdahl

Pierre Vauthey—Gamma/Liaison

contacts between distant civilizations and cultures. For the most part, Heyerdahl's theories have not been accepted by the more academic anthropologists.

In the 1947 voyage of the primitive raft "Kon-Tiki," Heyerdahl and a small crew sailed from the Pacific coast of South America to Polynesia, proving the possibility that the Polynesians may have originated in South America. The story of the voyage was related in Heyerdahl's book *Kon-Tiki* (1950) and in a documentary motion picture of the same name.

In 1969 Heyerdahl and a small crew of diverse nationalities crossed the Atlantic Ocean from Morocco to within 600 miles of Central America in a meticulously constructed facsimile of an ancient Egyptian reed boat, the "Ra," thus confirming the possibility that the pre-Columbian cultures of the Western Hemisphere might have been influenced by Egyptian civilization. Again, the voyage was described by Heyerdahl in *The Ra Expeditions* (1971) and was the subject of a documentary film.

Late in 1977 Heyerdahl and an international crew embarked upon the "Tigris" expedition, a four-month, 4,000-mile voyage in a craft made of reeds. The expedition began on the Tigris River in Iraq, travelling down the Persian Gulf, across the Arabian Sea to Pakistan, and ending in the Red Sea. The goal of the "Tigris" expedition was to establish the possibility that the ancient Sumerians might have used similar means to spread their culture through southwest Asia and the Arabian peninsula. The voyage was recorded in Heyerdahl's book *The Tigris Expedition* (1979) and in a documentary film.

Heyerdahl's other books include *Aku-Aku: The Secret of Easter Island* (1958); *Fatu-Hiva: Back to Nature* (1974); and *Early Man and the Ocean: A Search for the Beginnings of Navigation and Seaborne Civilizations* (1979), in which he synthesized the findings of earlier expeditions and provided additional evidence for his theory of cultural diffusion.

Heymans, Corneille (-Jean-François) (b. March 28, 1892, Ghent—d. July 18, 1968, Knokke, Belg.), Belgian physiologist, who received the Nobel Prize for Physiology or Medicine in 1938 for his discovery of the regulatory effect on respiration of sensory organs

Heymans
Boyer—H. Roger-Viollet

associated with the carotid artery, in the neck, and with the aortic arch, leading from the heart.

At the University of Ghent (1920–68) he worked with his father, Jean-François Heymans, whom he succeeded (1930) as professor of pharmacology, on determining the way in which changes in blood composition and pressure cause alterations in heart and respiratory function.

Experimenting with anesthetized dogs, Heymans demonstrated the existence of a set of sensory organs, known as pressoreceptors, in the wall of the carotid sinus—a slight enlargement of the carotid artery, at the point where it divides into the external and internal carotids. He showed that these receptors monitor blood pressure and help to regulate heart rate and respiration. He also found near the pressoreceptors, and at the base of the aorta, a set of chemoreceptors, or glomera, that monitor the oxygen content of the blood and help to regulate breathing through the medulla, the respiratory centre at the base of the brain.

Heyn, Piet, Heyn also spelled HEIN, original name PIETER PIETERSZOON (b. Nov. 15, 1577, Delfshaven, Neth.—d. June 18, 1629, near Dunkirk, Fr.), admiral and director of the Dutch West India Company who captured a Spanish treasure fleet (1628) with 4,000,000 ducats of gold and silver (12,000,000 gulden or florins). That great naval and economic victory provided the Dutch Republic with money to continue its struggle against Spain for control of the southern, or Spanish, Netherlands (now Belgium and Luxembourg).

Captured at sea in 1597, Heyn spent four years as a Spanish galley rower. After being released in an exchange of Dutch and Spanish prisoners (1601), he became a merchant skipper and amassed a sizable fortune. He became a director (1621) of the Dutch West India Company, formed to promote and protect the Dutch contraband trade with Spanish and Portuguese colonies.

Three years after his appointment (1624) as a vice admiral of the fleet, Heyn captured 22 Portuguese ships at San Salvador, Braz. In September 1628, at Matanzas Bay, Cuba, he captured part of a fleet that was carrying an annual shipment of precious metals mined in Mexico and Peru to Spain. He had planned to retire with his share of the booty but was recalled to active duty with the rank of lieutenant admiral of Holland in 1629; he was then given command of the republic's entire fleet and ordered to clear the North Sea of the Dunkirk pirates, who were in the pay of King Philip IV of Spain. Although his fleet destroyed the pirates (June 1629), Heyn was killed in the battle.

Heyrovský, Jaroslav (b. Dec. 20, 1890, Prague—d. March 27, 1967, Prague), Czech chemist who received the Nobel Prize for Chemistry in 1959 for his discovery and development of polarography, an instrumental method of chemical analysis used for qualitative and quantitative determinations of reducible or oxidizable substances. His instrument measures the current that flows when a predetermined potential is applied to two electrodes immersed in the solution to be analyzed.

Educated at the Charles University (Universita Karlova) of Prague and at University College, London, Heyrovský worked in London under Sir William Ramsay and F.G. Donnan. After holding several posts at the Charles University, he became professor and director of the department of physical chemistry (1926–54), and he was director of the Polarography Institute at the Czechoslovak Academy of Sciences (1950, 1952–63).

The work that eventually led to the discovery of polarography was begun in London at Donnan's suggestion. Within 10 years of the demonstration of the first polarograph (1924) the method was in common use. Heyrovský's monograph *Polarographie* appeared in 1941.

Heyse, Paul Johann Ludwig von (b. March 15, 1830, Berlin—d. April 2, 1914, Munich), German writer and prominent member of the traditionalist Munich school who received the Nobel Prize for Literature in 1910.

Heyse studied Classical and Romance languages and travelled for a year in Italy, supported by a research grant. After completing

Heyse, *c.* 1870
Archiv fur Kunst und Geschichte, West Berlin

his studies he became an independent scholar and was called to Munich by Maximilian II of Bavaria. There, with the poet Emanuel Geibel, he became the head of the Munich circle of writers, who sought to preserve traditional artistic values from the encroachments of political radicalism, materialism, and realism. He developed a representative Classical–Romantic style and became a master of the carefully wrought short story. Chief among his short stories is *L'Arrabiata* (1855; Eng. trans., 1967). He also published novels (*Kinder der Welt,* 1873; *Children of the World,* 1882) and many unsuccessful plays. Among his best works are his translations of the works of Giacomo Leopardi and other Italian poets. In 1871 he formulated a definition of the novella form, the "Falkentheorie" ("falcon theory," from Giovanni Boccaccio's model novella, *Tale of a Falcon*). Heyse, who was given to idealization and who refused to portray the dark side of life, became an embittered opponent of the growing school of Naturalism, and his popularity had greatly decreased by the time he received the Nobel Prize.

Heyward, (Edwin) DuBose (b. Aug. 31, 1885, Charleston, S.C., U.S.—d. June 16, 1940, Tryon, N.C.), U.S. novelist, dramatist, and poet whose first novel, *Porgy,* was the basis for a highly successful play, an opera, and a motion picture.

At the age of 17 Heyward worked on the waterfront, where he observed the Negro life that was to become the subject of his writing. Heyward first wrote poems: *Carolina Chansons* (1922), a joint publication with Hervey Allen; *Skylines and Horizons* (1924); and *Jasbo Brown and Selected Poems* (1931). *Porgy* (1925) was set in Catfish Row, a Charleston tenement street. Other novels include *Angel* (1926), about mountain people in North Carolina; *Peter Ashley* (1932), about pre-Civil War Charleston; and *Star-Spangled Virgin* (1939), concerned with the Virgin Islands during the New Deal.

In 1927 Heyward and his wife Dorothy dramatized *Porgy,* and in 1935 the opera *Porgy and Bess* was produced, the libretto and words being by Heyward and Ira Gershwin and the music by George Gershwin. A motion-picture version appeared in 1959. Other plays include *Brass Ankle* (1931), about miscegenation, and *Mamba's Daughters,* also dramatized by Heyward and his wife from the novel (1929).

Dorothy Heyward (1890–1961) studied at G.P. Baker's "47 Workshop" at Harvard and had a play produced on Broadway in 1924. Most effective as a collaborator with her husband and others, she also wrote *Jonica* (1929), *Set My People Free* (1948), and other plays.

Heywood, Jasper (b. 1535, London—d. Jan. 9, 1598, Naples), Jesuit priest and poet whose translations of the works of the Roman playwright Seneca, including *Troades* (1559), *Thyestes* (1560), *Hercules furens* (1561), and other plays issued as *Seneca His Tenne Tragedies Translated into English* (1581), influenced English drama. A son of the playwright John Heywood, he was educated at Oxford, joined the Jesuits in Rome (1562), and became professor at their college at Dillingen, Ger., in 1564. Head of the Jesuit mission to England from 1581, he was imprisoned during 1583–85 and then exiled.

Heywood, John (b. 1497?, London?—d. after 1575, Mechelen, Belg.), playwright who, by humanizing characterization, helped put English drama on the road to the fully developed comedy of the Elizabethans. One of the first dramatists who was not an ecclesiastic, he replaced biblical allegory with representations of everyday life and manners.

From 1519 Heywood was active at the court of Henry VIII as a singer and "player of the virginals," and later as master of an acting group of boy singers. He received periodic grants that indicate that he was in favour at court under Edward VI and Mary.

Heywood's works for the stage were interludes—entertainments popular in 15th- and 16th-century England, consisting of dialogues on a set subject. The four interludes to which Heywood's name is attached are witty, satirical debates in verse, ending on a didactic note like others of their genre, and reflecting some influence of French farce and of Chaucer.

Interludes were performed separately, or preceding or following a play, or between the acts. *The playe called the foure P.P. . . . A palmer. A pardoner. A potycary. A pedler* (not dated but printed *c.* 1544) is a contest in lying. *The play of the wether,* printed in 1533, describes the chaotic results of Jupiter's attempts to suit the weather to different people's desires. *A play of love* and *Wytty and Wytless,* both printed in 1533, complete the list of interludes definitely ascribed to Heywood, although two others printed in the same year without an author's name are generally considered to be by Heywood. These are *A mery play between the pardoner, the frere, the curate and neybour Pratte* and *A mery play Betwene Johan Johan the Husbande, Tyb his Wyfe, and Syr Jhān the Preest.* Heywood's other works included *A Dialogue conteining . . . all the proverbes in the English tongue* (1549) and collections of

epigrams, published together as *John Heywoodes woorkes* in 1562; ballads, among them "The Willow Garland" sung by Desdemona in *Othello;* and a long verse allegory, *The Spider and the Flie* (1556).

Despite several episodes of oppression, Heywood remained a Roman Catholic. In 1564, leaving his property in the hands of his son-in-law, John Donne (father of the poet), he fled to Belgium, where he died at an advanced age.

Heywood, Thomas (b. 1574?, Lincolnshire, Eng.—d. Aug. 16, 1641, London), English actor-playwright whose career spans the peak periods of Elizabethan and Jacobean drama.

Heywood apparently attended the University of Cambridge, though his attendance there remains undocumented. After arriving in London some time before 1598, he joined Philip Henslowe's theatrical company and was subsequently active in London as a playwright and actor for the rest of his life. He claimed to have had "either an entire hand, or at least a maine finger" in 220 plays. Of these, 24 survive that are generally accepted as wholly or partly his.

Most of Heywood's plays are theatrical mélanges employing two or more contrasted plots, poorly unified and liberally laced with clowning. They are sentimental in theme but realistic in setting and reveal an affectionate regard for all the daily sights, sounds, and activities of London. His output includes romances such as *The Captives* and *A Pleasant Comedy, called A Maidenhead Well Lost* (both in 1634); adventure plays such as *The Fair Maid of the West* (1631); and seven lord mayor's pageants written between 1631 and 1639. He also wrote masques, mythological cycles, and chronicle histories. His most popular history play, *If You Know Not Me, You Know Nobody* (1605–06), is about Elizabeth I.

Heywood's art found its finest expression in the field of domestic sentiment. His masterpiece, *A Woman Killed with Kindness* (1607), is one of the earliest middle-class tragedies.

Heywood also wrote many books and pamphlets, now of interest chiefly to students of the period. His most important prose work was *An Apology for Actors* (1612), an account of actors' place and dignity and their use in society since antiquity. His plays were so popular that they were sometimes performed at two theatres simultaneously. His charming masque *Love's Mistress* (1636) was seen by Charles I and his queen three times in eight days.

Hezekiah, Hebrew ḤIZQIYYA, Greek EZEKIAS (fl. late 8th and early 7th centuries BC), son of Ahaz, and a descendant and 13th successor of David as king of Judah at Jerusalem. The dates of his reign are often given as about 715 to about 686 BC, but inconsistencies in biblical and Assyrian cuneiform records have yielded a wide range of possible dates.

Reigning at a time of Assyrian supremacy, Hezekiah attempted to assert Hebrew religious tradition against the Assyrian cults and to achieve a degree of political independence. He expressed the contemporary yearning for the golden age of David.

Shortly after beginning his reign, Hezekiah possibly joined a revolt of surrounding states against Assyria; Sargon II of Assyria certainly talked of "subduing" Judah in 710. Later (701) Sennacherib of Assyria suppressed a revolt in which Judah was involved, and possibly undertook another invasion of Judah some years later. In each case rebellion was futile, though Jerusalem was spared.

hi-fi system: *see* high-fidelity sound system.

Hi-no-kami (Shintō fire god): *see* Ho-musubi.

Hialeah, city, Dade county, southeastern Florida, U.S. It lies on the Miami River Canal, just northwest of Miami. Settled in 1910 by James Bright and Glenn Curtiss, the town took its name from a Seminole Indian word meaning "pretty prairie." The town grew slowly until World War II brought industrial development to the region. Although there is some manufacturing, the city serves mainly as a residential suburb of Miami. The horse-racing track Hialeah Park (opened Jan. 25, 1925) became famous for its elaborate landscaping and imported flamingos nesting on an infield lake. Inc. town, 1917; city, 1925. Pop. (1987 est.) 166,583.

hiatus, in prosody, a break in sound between two vowels that occur together without an intervening consonant, both vowels being clearly enunciated. The two vowels may be either within one word, as in the words V*ie*nna and n*ai*ve, or the final and initial vowels of two successive words, as in the phrases "s*ee i*t" and "g*o i*n." Hiatus is the opposite of elision, the dropping or blurring of the second vowel; it is also distinct from diphthongization, in which the vowels blend to form one sound.

Hiawatha (Ojibwa: "He Makes Rivers"), a legendary chief (*c.* 1450) of the Onondaga tribe of North American Indians, to whom Indian tradition attributes the formation of the League of Five Nations, known as the Iroquois League. In his miraculous character, Hiawatha is the incarnation of human progress and civilization. He teaches agriculture, navigation, medicine, and the arts, conquering by his magic all the powers of nature that war against man. The story of Hiawatha is told in Henry Wadsworth Longfellow's *Song of Hiawatha* (1855), a long poem, written in the metre of the Finnish *Kalevala,* that enjoyed wide popularity.

Hiba arborvitae (tree): *see* false arborvitae.

Hibbing, village, St. Louis county, northeastern Minnesota, U.S. It is situated on the Mesabi Range, in a forest and lake region. Organized as a lumbering camp and named after Frank Hibbing, a timber cruiser, it was laid out and incorporated in 1893. When rich deposits of hematite iron ore were discovered under the streets, most of the community was moved (1919) 2 miles (3.2 km) south. Old Hibbing became the site of the Hull-Rust-Mahoning Mine, one of the world's largest open-pit mines, 535 feet (163 m) deep, nearly 5 miles (8 km) across, and up to 1 mile (1.6 km) wide. The ore was mostly exhausted by the 1950s, and Hibbing turned with much success to the processing of nonmagnetic taconite. The original Northland–Greyhound bus line was established near Hibbing in 1926 as a commuter service between the old and new sites. Hibbing Community College was opened in 1916. The Minnesota Museum of Mining is in Community Park. Pop. (1988 est.) 19,129.

hibernation, a state of greatly reduced metabolic activity and lowered body temperature adopted by certain mammals and by at least one bird (the poorwill, *Phalaenoptilus nuttalli*) as an adaptation to adverse winter conditions.

A brief treatment of hibernation follows. For full treatment, *see* MACROPAEDIA: Behaviour, Animal.

The term hibernation is commonly applied to all types of winter dormancy in vertebrate animals; thus defined, hibernators include many fishes, amphibians, and reptiles that overwinter with body temperatures near freezing, as well as bears and a few other mammals that spend most of the winter sleeping in dens. The latter, however, do not undergo much lowering of body temperature and are rather easily awakened; they are not considered true hibernators.

The true hibernator spends most of the winter in a state close to death; in fact, the animal may appear to be dead. The body temperature is close to 0° C; the respiration is only a few breaths per minute; and the heartbeat is so slow and gradual as to be barely perceptible. Exposed to moderate warmth, the animal slowly awakens, requiring an hour or more to reach an alert state.

Among mammals, true hibernators are found only in the orders Chiroptera (bats), Insectivora (hedgehogs and allies), and Rodentia (ground squirrels, marmots, etc.). Typically, the hibernator relies on a combination of reserve body fat, stored food supplies (in rodents only), and a protected den to enable it to survive the winter. At intervals of several weeks the animal elevates its body temperature, awakens, moves about, feeds, and then returns to its state of torpor.

In some desert regions, certain animals escape the rigours of summer drought by entering a torpid state, estivation, similar in many ways to hibernation.

Hiberno-Saxon style, in Western visual arts, the decorative vocabulary that resulted from the interaction of the Irish, or Hibernians, and the Anglo-Saxons of southern England during the 7th century. Irish monks sailed to northern England in 635, taking with them an ancient Celtic decorative tradition of curvilinear forms: scrolls and spirals, "trumpet" forms, and a double curve, or shield, motif known as a pelta. This abstract ornamental system was seen in their sculpture, in metalwork, and in Irish manuscripts, with their elaborate initials and other decorative embellishments.

The pagan Anglo-Saxons' art was similarly characterized by abstract patterning, but the ornamental vocabulary differed—interlacing patterns, including elaborate zoomorphic interlace, were common. The Anglo-Saxons had no tradition of painting or calligraphy, but they excelled in metalwork. The rich gold and jeweled examples that survive show their love of metallic brilliance and bright colour.

Hiberno-Saxon art is characterized by a combination of these two traditions, particularly the Irish curvilinear motifs and elaborated initials and the Saxon zoomorphic interlacings and bright colouring. A third influence was Mediterranean art, which became an important artistic ingredient after St. Augustine's mission arrived from Rome with many manuscripts and other art objects to use in converting the Saxons. This tradition brought with it the representation of the human figure, but the basic characteristics of Hiberno-Saxon art remained those of their pagan ancestors: concern for geometric design rather than naturalistic representation, love of flat areas of colour, and the use of complicated interlace patterns. All these elements can be found in the great manuscripts produced by the Hiberno-Saxon school: the Lindisfarne Gospels (698), the Book of Durrow (second half of the 7th century), and the Book of Kells (*c.* 800). The Hiberno-Saxon style was imported to the European continent by Irish and Saxon Christian missionaries, and there it exercised much influence, particularly on the art of the Carolingian empire.

Hiberus River (Spain): *see* Ebro River.

hibiscus (genus *Hibiscus*), any of about 250 species of herbs, shrubs, and trees, in the mallow family (Malvaceae), native to warm temperate and tropical regions. Several are cultivated as ornamentals for their showy flowers.

The tropical Chinese hibiscus, or China rose (*Hibiscus rosa-sinensis*), which may reach a height of 4.5 m (15 feet), rarely exceeds 2 m in cultivation. It is grown for its large, somewhat bell-shaped reddish blossoms. Cultivated varieties with white, yellow, and orange flowers are available. The East African hibiscus (*H. schizopetalus*), a drooping shrub, is often grown in hanging baskets indoors.

Other members of the genus *Hibiscus* include the fibre plants mahoe and kenaf (*q.v.*), okra, flower-of-an-hour, rose of Sharon (*qq.v.*), and

China rose (*Hibiscus rosa-sinensis*)
Sven Samelius

many flowering plants known by the common name mallow (*qq.v.*).

hiccup, also spelled HICCOUGH, spasmodic contraction of the diaphragm (the muscular partition separating the chest cavity from the abdominal cavity) which causes a sudden intake of breath that is involuntarily cut off by closure of the glottis (the opening between the vocal cords), thus producing a characteristic sound. Hiccups arise from various causes, most commonly overdistention of the stomach. Gastric irritation, nerve spasms, and various metabolic disturbances may also cause hiccups. A wide variety of folk remedies are used to stop hiccups by interrupting the rhythm of the diaphragm spasms; the most common and effective treatment is to hold one's breath for as long as possible. Regardless of treatment, hiccups usually stop within minutes, although they may persist for days or weeks, and there have been isolated reports of hiccups continuing for several years. Prolonged severe hiccups are treated by surgically crushing the phrenic nerve that innervates the diaphragm.

hichiriki, a Japanese short, double-reed aerophone (wind instrument) used in ancient court music and surviving in the *gagaku,* or courtly music, tradition. It is derived from earlier continental Asian models. The present Japanese form is about 7 inches (18 cm) in length and has seven top finger holes and two thumbholes underneath. It is made of internally lacquered bamboo and wrapped with bands of cherry or wisteria bark between the finger holes. The reed (*shita*), being broad and thick, is placed in a widened end of the pipe, thus giving the *hichiriki* an external conical shape, although the pipe is cylindrical. The use of a loose but controlled embouchure (lip position) and delicate finger movement help to create its rich, fluid melodic style.

Hickok, Wild Bill, byname of JAMES BUTLER HICKOK (b. May 27, 1837, Troy Grove, Ill., U.S.—d. Aug. 2, 1876, Deadwood, Dakota Territory [now in South Dakota, U.S.]), American frontiersman, army scout, marksman, and gambler who became an American legend. His reputation as a marksman gave rise to legends and tales about his life.

As a child in Illinois, he worked on neighbouring farms and helped his father in assisting escaped slaves. He left home in 1856 to farm in Kansas and there became involved in the Free State (antislavery) movement. He later served as a village constable in Monticello, Kan. While working as a teamster in

Hickok
Culver Pictures

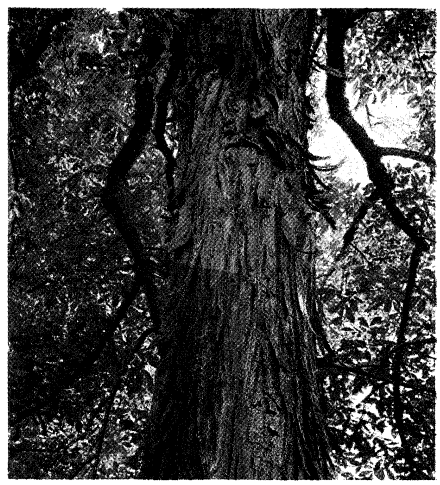
1861, he killed Dave McCanles at Rock Creek (Nebraska Territory), and legends about him probably began in the exaggerated tales of his role in this gunfight.

During the American Civil War Hickok worked for the Union as a teamster, scout, and spy. After the war he was appointed deputy U.S. marshal, and he later became a scout for the army. Hickok is remembered particularly for his services in Kansas as sheriff of Hays City and marshal of Abilene, where his iron-handed rule helped to tame two of the most lawless towns on the frontier. From 1872 to 1874 Hickok traveled through New York state with Buffalo Bill's Wild West show, then drifted some more.

In 1876 he met and married a widowed actress, Mrs. Agnes Lake, *née* Mersman, but he soon left her (in Cincinnati) to visit the goldfields of the Black Hills in the Dakota Territory. It was there, at a poker table in the Number Ten saloon in Deadwood, that Hickok was shot dead by a drunken stranger, Jack McCall. McCall's motive was never learned; he was tried, convicted of murder, and hanged on March 1, 1877.

Hickory, city, Catawba county, west-central North Carolina, U.S., near the foothills of the Appalachian Mountains. It was founded in 1874 and grew up around Hickory Tavern. Industrial development began with a small wagon-manufacturing plant opened in 1880. The city's manufactures now include furniture, textiles, cordage, hosiery, and electronic and electrical components. It is the seat of Lenoir Rhyne College (1891; Lutheran) and Catawba Valley Technical Institute (1958). Lake Hickory, created by Oxford Dam (a source of electric power) on the Catawba River, is nearby. Inc. as Hickory Tavern, 1870; as Hickory, 1913. Pop. (1986 est.) city, 25,006; metropolitan area (MSA), 217,600.

hickory, any of about 18 species of deciduous timber and nut-producing trees that constitute the genus *Carya* of the walnut family (Juglandaceae). About 15 species of hickory are native to eastern North America, and 3 to eastern Asia. Fossil remains identifiable as belonging to the genus are found in western North America, Greenland, Iceland, and Europe.



Shagbark hickory (*Carya ovata*)
Grant Heilman—EB Inc.

Hickories typically grow to about 30 m (100 feet) tall and have a long taproot. The leaves are composed of 3 to 17 leaflets each; those of some species turn bright yellow in autumn. The male and female flowers, both of which lack petals, are borne in different clusters on the same tree, the male in hanging catkins and the female in terminal spikes of 2 to 10 flowers. The fruit is an egg-shaped nut enclosed in a fleshy husk that splits into four woody valves as it matures.

The nuts of some species contain large, sweet-tasting, edible seeds; the principal edible nuts are those of the shagbark hickory (*C. ovata*), the shellbark hickory (*C. laciniosa*), the mockernut hickory (*C. tomentosa*), and the pecan (*C. illinoensis*). The nuts of the bitternut hickory (*C. cordiformis*) and the water hickory (*C. aquatica*) are bitter-tasting and inedible, because the skin covering the kernels contains tannin. The nuts of most other species are edible but are too small to be commercially important.

Shellbark hickory (*Carya laciniosa*)
Richard Parker

Pecan (*q.v.*), the most valuable species economically, is cultivated for its flavourful nuts and its light-coloured wood. The wood of other hickories is used as fuel and for tool handles, sports equipment, furniture, and flooring.

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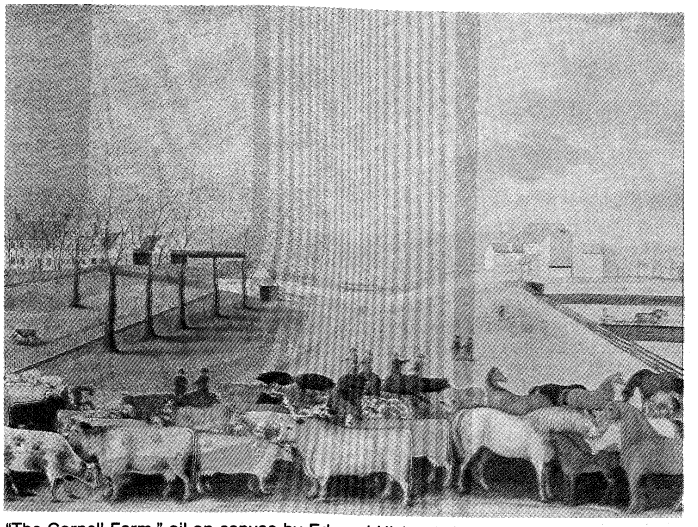
Hicks, Edward (b. April 4, 1780, Attleboro, Pa., U.S.—d. Aug. 23, 1849, Newtown, Pa.), American primitive, or folk, painter known for his naive depictions of the farms and landscape of Pennsylvania and New York, and especially for his many versions (about 25 extant, perhaps 100 painted) of "The Peaceable Kingdom." The latter work depicts Hicks's belief, as a Quaker, that Pennsylvania was the fulfillment of Isaiah's prophecy (11:6–9) of justice and gentleness between all men and beasts. William Penn and other Quakers appear on the left of the picture, making their treaty with the Indians, while Isaiah's beasts are gathered on the right with little children playing among them. The landscape, figures, and animals make a charmingly awkward pageant of the Quakers' ideas.

Hicks came to art late. A painter of coaches and signs in early life, for many years he devoted all his serious energies to his avocation of preaching. It was as a preacher that he was celebrated among his contemporaries, and the 3,000 mourners at his funeral grieved at the loss of a favourite minister. He began to make easel paintings when he was in middle age, and with some reluctance. Although he feared that art was contrary to religion, he testified that it could sometimes bring meaning to life. Unable to make a painting without an apparent moral, he often framed a picture with



"The Cornell Farm," oil on canvas by Edward Hicks, 1836; in the National Gallery of Art, Washington, D.C.

By courtesy of the National Gallery of Art, Washington, D.C., gift of Edgar William and Bernice Chrysler Garbisch

edifying verse of his own composition, like that surrounding his view of Niagara Falls.

Hicks, Elias (b. March 19, 1748, Hempstead Township, Long Island, N.Y.—d. Feb. 27, 1830, Jericho, Long Island, N.Y., U.S.), early advocate of the abolition of slavery in the United States and a liberal Quaker preacher whose followers became known as Hicksites (*see* Friends General Conference), one of two factions created by the schism of 1827–28 in American Quakerism.

After assisting in ridding the Society of Friends (Quakers) of slavery, Hicks worked for general abolition. He urged a boycott of the products of slave labour, advocated establishment of an area in the Southwest as a home for freed slaves, and helped secure legislation that brought an end to slavery in New York state. In 1811 the first of several editions of his *Observations on the Slavery of the Africans and Their Descendants* was published. One of the first to preach progressive revelation, which allowed for continuing revision and renewal of doctrinal beliefs, Hicks, in 1817, successfully opposed the adoption of a set creed by the Society of Friends at the Baltimore Yearly Meeting. He was subsequently called a heretic for his opposition to Evangelicalism, which stressed established beliefs, and he was held responsible by some for the Quaker schism of 1827–28. After this separation Hicks's followers called themselves the Liberal branch of the Society of Friends, but orthodox Quakers labeled them Hicksites. The Hicksites became increasingly isolated from other Quakers until the 20th century, when mutual cooperation began to prevail.

BIBLIOGRAPHY. Hicks's life and work are analyzed in Bliss Forbush, *Elias Hicks: Quaker Liberal* (1956).

Hicks, Granville (b. Sept. 9, 1901, Exeter, N.H., U.S.—d. June 18, 1982, Franklin Park, N.J.), critic, novelist, and teacher who was one of the foremost practitioners of Marxist criticism in American literature.

After graduating from Harvard with the highest honours and studying two years for the ministry, Hicks joined the Communist Party in 1934. As literary editor of the *New Masses,* he became one of the party's chief cultural spokesmen. His book *The Great Tradition* (1933; rev. ed. 1935) evaluated American literature since the Civil War from a Marxist point of view.

Hicks was dismissed from his teaching position at Rensselaer Polytechnic Institute in 1935 and consequently became the centre of a storm of controversy over academic freedom in the United States. In 1939 he broke with the Communists after the Nazi–Soviet pact, explaining his growing dissatisfaction with the party's uncritical endorsement of Soviet policy in a letter to *The New Republic* magazine. He remained an active writer. *Part of the Truth: An Autobiography* was published in 1965, and in 1970 was published *Literary Horizons,* a collection of his book reviews over the preceding 25 years. *Granville Hicks in the New Masses,* edited by J.A. Robbins, was published in 1974.

Hicks, Sir John R(ichard) (b. April 8, 1904, Leamington Spa, Warwickshire, Eng.—d. May 20, 1989, Blockley, Gloucestershire), British economist who made pioneering contributions to general economic equilibrium theory and, in 1972, shared (with Kenneth J. Arrow) the Nobel Prize for Economics. He was knighted in 1964.

Sir John's classic work, *Value and Capital* (1939; second edition 1946), helped to resolve basic conflicts between business-cycle theory and the equilibrium theory, which holds that economic forces tend to balance one another, rather than simply reflect cyclical trends. Both Hicks and Arrow demonstrated that active forces, not passive ones, strike economic balances when the forces cancel each other out. Their theories were used widely by public and private interests to determine foreign trade, investment policies, and prices.

Hicks was on the faculties of the London School of Economics and Political Science (1926–35), Gonville and Caius College, Cambridge (1935–38), the University of Manchester (1938–46), and Nuffield College, Oxford (1946–52). Then, for two decades, he was a fellow of All Souls College, Oxford, and thereafter a professor emeritus. His *Collected Papers* were published in two volumes (1981–82).

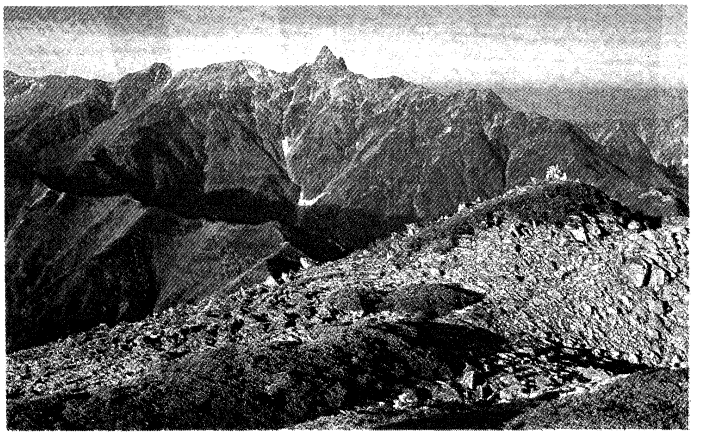
Hicks Beach, Sir Michael Edward, 9TH BARONET, 1ST EARL ST. ALDWYN OF COLN, VISCOUNT QUENINGTON OF QUENINGTON, VISCOUNT ST. ALDWYN OF COLN (b. Oct. 23, 1837, London—d. April 30, 1916, London), British Conservative statesman, who was chancellor of the Exchequer (1885–86, 1895–1902).

The son of Sir Michael Hicks Beach, 8th Baronet, he was educated at Eton and at Christ Church College, Oxford. Succeeding as 9th baronet in 1854, Hicks Beach became a Conservative MP in 1864, remaining in the House of Commons until 1906. He held minor office under Benjamin Disraeli in 1868 and was appointed chief secretary for Ireland in 1874, joined the Cabinet two years later, and was colonial secretary from 1878 to 1880.

Hicks Beach became chairman of the Conservative Party in 1884. He was chancellor of the Exchequer and leader of the Commons in Lord Salisbury's caretaker government of 1885, but he surrendered both positions to Randolph Churchill when Salisbury's second ministry was formed in July 1886, becoming instead chief secretary for Ireland. Resigning in 1887, largely for reasons of health, he returned to the Cabinet to serve as president of the Board of Trade (1888–92). From 1895 until 1902, when he retired with Salisbury, he proved an efficient and authoritative chancellor of the Exchequer, and one who insisted upon increased taxation to help finance the South African War (1899–1902). Though an orthodox free trader, he revived certain duties for revenue purposes. The controversy over his corn (wheat) tax in 1902 was the occasion in the following year for the start of Joseph Chamberlain's tariff-reform campaign, against which Hicks Beach fought bitterly. Created Viscount St. Aldwyn in 1906, he played little further part in politics. His earldom was conferred in 1915.

Hida Range, Japanese HIDA-SAMMYAKU, mountain group in the Chūbu *chihō* (region) of central Honshu, Japan. The range stretches from north to south along the borders of Toyama, Niigata, Nagano, and Gifu *ken* (prefectures). With the Kiso and Akaishi ranges, it constitutes the Central Mountain Knot of Japan. The Hida Range was first referred to as the Japanese Alps in the late 19th century; the term now usually includes all three ranges, the Hida Range being known as the Northern Alps.

The mountains chiefly consist of granite pierced through by crystalline rocks containing feldspar. Recent volcanoes, including



Mount Yariga, the second highest peak in the Hida Range, Japan

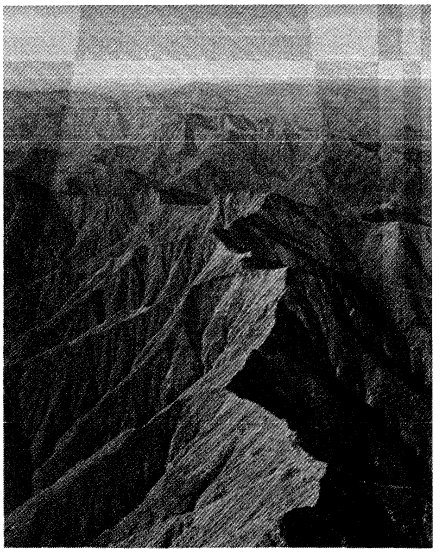
Takayuki Toyama—Bon

Norikura-dake (9,928 ft [3,026 m]) and Ontake-san (10,049 ft), rest upon the granitic foundation. The Hida-sammyaku as a whole is characterized by rugged landforms dissected by deep river gorges. The highest peaks are found near the centre of the range, where Yariga-take rises to 10,433 ft and Hotaka-dake to 10,466 ft. Cirques (deep, steep-walled basins) and moraines (glacial deposits of earth and stones) occur in the higher levels of several major peaks.

The eastern margin of the range is marked by a bold fault scarp that descends abruptly to the lowlands of the Fossa Magna, the great fissure that traverses central Honshu from the Pacific to the Sea of Japan. The northern end of the mountains also terminates in a precipitous cliff at the Sea of Japan, but the descent to the west is more gradual, merging into the Hida-kōchi (Hida Highlands).

The Hida-sammyaku is almost totally included in Chūbu-sangaku National Park. It is well known as a centre of mountaineering and skiing. Several of the mountains' rivers, such as the Ōtaki-gawa and the Kurobe-gawa, have been harnessed for the production of hydroelectric power.

Hidaka-sammyaku (Japanese: Hidaka Range), mountain range, southernmost portion of the Shiribeshi-yama system, on Hokkaido, Japan, projecting into the Pacific Ocean at Erimo-misaki (Cape Erimo). The mountains are east of the Tokachi-heiya (Tokachi Plain). The seaward margin of the range is skirted by marine terraces that reach their maximum height of 1,181 ft (360 m) near Erimo-misaki.



Hidaka-sammyaku, Japan

Photos Pack—EB Inc.

The Hidaka-sammyaku contains Poroshiridake (Mt. Poroshiri), the highest nonvolcanic mountain in Hokkaido. It rises near the centre of the range to 6,732 ft, near remains of former glaciation.

hidalgo, in Spain, a hereditary noble or, in the later Middle Ages and the modern era, a knight or member of the gentry.

The term appeared in the 12th century as *fidalgus,* or Castilian *hidalgo,* supposedly a contraction of *hijo de algo,* "son of something," and it applied to all nobles, but especially to the lesser nobility as distinct from the magnates (*ricos hombres*) and commoner knights (*caballeros villanos*). The hidalgos enjoyed some exceptional privileges and were dependent on rents or offices. By the 15th century they were probably thought of as being of Christian descent and thus distinguished from former Muslims and from *conversos,* descended from Jews.

The impoverished hidalgo is depicted in the anonymous picaresque novel *Lazarillo de Tormes* and in Cervantes' *Don Quixote.*

Where the same name may denote a person, place, or thing, the articles will be found in that order

Hidalgo, state, east central Mexico, bounded by the states of San Luis Potosí and Veracruz (north), Puebla (east), México and Tlaxcala (south), and Querétaro (west). It was part of the state of México until 1869, when it was established as a separate state in honour of the revolutionary patriot Miguel Hidalgo y Costilla. On the central plateau, its area is 8,036 sq mi (20,813 sq km).

Northern and eastern Hidalgo constitute one of the most mountainous areas in Mexico, with peaks reaching 10,000 ft (3,000 m); the south and west form a relatively flat and semiarid tableland, sloping off into tropical lowlands. In the plains region are Lake Metztitlán and the valley of Tulancingo, a centre of textile industries.

With cool to temperate climates and a considerable range of moisture, the state produces a variety of agricultural products, including corn (maize), alfalfa, beans, barley, rice, other cereals, coffee, and maguey for pulque. Hidalgo also contains extensive mineral deposits, mined since colonial days. Silver, gold, mercury, copper, and opals are among the mineral products. During pre-Columbian times, Hidalgo was the centre of the Indian Toltec civilization, centred at Tenochtitlan, whose precious metal was one of the prime attractions for the Spanish after 1520.

Although once very underdeveloped industrially, the state now has major transport-equipment and metalworking factories, as well as textile, cement, and other industrial activity.

Although fairly well urbanized today, Hidalgo still has numerous indigenous groups, such as the Otomi, living in agricultural villages and settlements. Tula, west of Pachuca (*q.v.*), the state capital, was once capital of the Toltecs and is an archaeological site. Tulancingo (*q.v.*) and Huejutla de Reyes are commercial cities. The main Matamoros–Mexico City highway traverses the state. Pop. (1980) 1,547,493.

Hidalgo, minor planet 944, whose path reaches from the orbit of Mars out to that of Saturn, with a period of revolution of about 14 years. Hidalgo's orbit is also strongly tilted out of the plane of the solar system, with an inclination of about 43°. It may have been deflected into this unusual path by a close approach to Jupiter in the past. Hidalgo's brightness indicates a diameter between about 24 and 48 kilometres (15 and 30 miles). The asteroid was discovered by Walter Baade in 1920.

Hidalgo del Parral, formerly PARRAL, city, south central Chihuahua state, north central Mexico. The city, renamed in honour of the patriot Miguel Hidalgo y Costilla, lies on the Río Parral, 5,449 ft (1,661 m) above sea level and south of Chihuahua, the state capital. An important mining town in the 16th century, it still processes and exports the lead, zinc, silver, copper, and gold that are mined nearby. The city still has a colonial atmosphere, with mule-drawn wagons plying steep, narrow streets. A railroad and a highway lead 48 mi (77 km) east to join the main Ciudad Juárez–Mexico City routes. Pop. (1979 est.) 80,000.

Hidalgo y Costilla, Miguel (b. May 8, 1753, Corralejo, near Guanajuato, Mex.—d. July 31, 1811, Chihuahua), Catholic priest who is called the father of Mexican independence. Ordained priest in 1789, he had an uneventful early career, though his interest in the economic advancement of his parishioners in Dolores, through the introduction of newer methods of agriculture, made him suspect by the Spanish authorities. In 1808 Spain was invaded by French troops, and Napoleon forced the abdication of King Ferdinand VII in favour of the French emperor's brother Joseph Bonaparte. Though Spanish officials in Mexico were loath to oppose the new king, many Mexicans formed secret societies, some supporting Ferdinand, others independence from Spain. Father Hidalgo belonged to such a group in San Miguel, near Dolores. When the plot was betrayed to the Spanish, several members were arrested. Warned to flee, Hidalgo decided instead to act promptly. On Sept. 16, 1810, he rang the church bell in Dolores to call his parishioners to an announcement of revolution against the Spanish. What he began in San Miguel as a movement for independence became a social and economic war of the masses against the upper classes. Thousands of Indians and mestizos flocked to Hidalgo's banner of the Virgin of Guadalupe, capturing Guanajuato and other major cities west of Mexico City. Soon Hidalgo was at the gates of the capital, but he hesitated and the opportunity was lost. His followers melted away. The responsible elements in Mexico were frightened by the prospect of social upheaval. After his defeat at Calderón on Jan. 17, 1811, Hidalgo fled north, hoping to escape into the United States. He was caught, degraded from the priesthood, and shot as a rebel.

Though he accomplished little, Father Hidalgo's name became the symbol of the independence movement for most Mexicans, and September 16, the anniversary of the Grito de Dolores (*q.v.*), is celebrated as Mexico's Independence Day.

Hidatsa, also called MINITARI, or GROS VENTRES OF THE MISSOURI, American Plains Indian people of Siouan stock who lived on the upper Missouri River between the Heart and the Little Missouri rivers in semipermanent villages. The Hidatsa were a sedentary people who lived in circular lodges roofed with earth; they raised corn, beans, and squash and made pottery. Except for tobacco, which was traded to other tribes, the women did all the farming. The men hunted bison and other large game on the grasslands and engaged in warfare. Hidatsa social organization included age-graded military societies in which membership was obtained by purchase; there were also various clan and social societies. They traced descent through the maternal line. As with other Plains tribes, the sun dance was the major ceremony, involving the practice of self-torture.

The language of the Hidatsa is most closely related to that of the Crow (*q.v.*), with whom they were united before the historic period. Culturally they resembled the Mandan, a result of more than 200 years of continuous and peaceful association. In the latter part of the 18th century, there were more than 2,000 Hidatsa who, with the Mandan, occupied a central position in the extensive trading network on the northern plains. Horses, dressed hides, and buffalo robes, obtained from the nomadic warrior peoples to the west, were exchanged with European traders for guns, knives, and other manufactured goods.

In 1837 a smallpox epidemic so severely reduced their numbers that they consolidated into one village. Continual harassment by their Dakota enemies forced them to move the village to Ft. Berthold, banding together with the Mandan in 1845 and with the Arikara in 1862 for purposes of defense. Since the establishment of a permanent Indian bureau in 1868, the Hidatsa, Mandan, and Arikara, collectively known as the Three Affiliated Tribes,

have lived together on the Fort Berthold Reservation in North Dakota. The Hidatsa reservation population was approximately 1,000 in the late 20th century.

hiddenite, green, semiprecious variety of the silicate mineral spodumene (*q.v.*).

hide, in early English history, the land necessary to support a free peasant family. In the 12th and 13th centuries, the hide commonly appeared as 120 acres (50 hectares) of arable land, but it probably represented a much smaller holding before 1066. It was the basis of the earliest taxation and the basis for mustering the primitive English militia, the fyrd. By the end of the Anglo-Saxon period, it had become unusual for a single peasant to hold an entire hide, most being restricted to a quarter hide, or yardland. Long after the Norman Conquest (1066), however, the hide was the unit according to which assessment for national taxation was expressed.

hide, the pelt taken from a cow, steer, or bull of the bovine species, from the pelt of a horse, or from the integument of some other large adult animal. The pelts of smaller animals are commonly called skins—namely, sheepskins, goatskins, calfskins, etc. For the preservation and tanning of hides, *see* leather.

Hide, Sir Nicholas: *see* Hyde, Sir Nicholas.

hide-and-seek, old and popular children's game in which one player closes his eyes for a brief period (often counting to 100) while the other players hide. The seeker then opens his eyes and tries to find the hiders; the first one found is the next seeker, and the last is the winner of the round. In one of many forms of the game, the hiders try to run back to base while the seeker is away looking for them; if all of the hiders return safely, the seeker repeats as seeker in the next round.

In other variations, the seeker may be helped by those he finds, or only one may hide and be sought by all the rest, as in sardines, where one hides and is joined by seekers surreptitiously as they find him, the name of the game coming from the crowded condition of the hiding place. Hide-and-seek appears to be equivalent to the game *apodidraskinda,* described by the 2nd-century Greek writer Julius Pollux.

Hielm, Jonas Anton (b. Dec. 30, 1782, Kristiansand, Nor.—d. March 30, 1848, Christiania [now Oslo]), political leader who defended Norway's position within the Swedish-Norwegian union and led an early attempt to form a national reform party with peasant and liberal urban support.

Hielm was elected to the Storting (parliament) in 1830. As part of his effort to forge a political party from urban and peasant elements, he aided in writing a political tract, "Olaboka" (1830; "Ole's Book"), by John Neergaard, which resulted in a substantial increase in peasant political activity by 1833. The alliance did not come about, however, because of peasant distrust of the liberals. In 1830 Hielm also spoke out against Sweden's failure to involve Norwegian representatives in the making of union foreign policy as provided for in the Constitution and the Act of Union of 1814. Largely because of Hielm's individual efforts, this abuse of Norway's status within the union was ended by the king in the mid-1830s. Hielm was also responsible for another triumph for Norway: the 1838 decision of the king to allow Norwegian merchant ships to fly the Norwegian, rather than the union, flag in all seas. For his effort in that affair Hielm became known as the "liberator of the flag."

Hien Vuong, also called CHUA HIEN, NGUYEN PHUOC TAN, OR THAI TON (b. 1619?—d. 1687), member of the Nguyen family (*q.v.*) who ruled in southern Vietnam in 1648–87. He persecuted European Christian missionaries, expanded the territory under his control, and made notable agricultural reforms.

Hien Vuong launched campaigns in 1655–61 designed to defeat the Trinh rulers in northern Vietnam and to assert the legitimacy of his own rule in the south. Enraged at the refusal of the Europeans to give him modern armaments and tactical support, he directed his anger against foreign missions that had been established in his domain, and he had Christians—Vietnamese converts as well as European evangelists—slain and their churches razed.

During his reign Hien Vuong also acquired southern lands at the expense of the Chams and the Cambodians. He improved the mandarin examination system by which civil-service posts were filled, and he established a bureau of agriculture that urged the colonization and development of the newly conquered territories. He promulgated needed land reforms, although they failed to alter significantly the social conditions of his lower-class subjects. Hien Vuong sought to secure official recognition of his sovereignty from China, but the Chinese continued to uphold the legitimacy of the northern Trinh family.

Hiera (island, Italy): *see* Vulcano Island.

Hierakonpolis, also called NEKHEN, modern KAWM AL-AḤMAR, prehistoric royal residence of the kings of Upper Egypt and most important site of the beginning of Egypt's historical period, located in Aswān *muḥāfaẓah* (governorate). Hierakonpolis, then called Nekhen, enjoyed its period of greatest importance from about 3400 BC to the beginning of the Old Kingdom (about 2575). It took part in the wars between Nubia and Upper and Lower Egypt that resulted in the final unification of Egypt in 3200.

Excavations by J.E. Quibell in 1898 found monuments of the unification of Egypt: a ceremonial slate palette of King Narmer and a decorated limestone mace-head of King Scorpion, now in the Cairo Museum. A large town with nearby cemeteries stretched 1.9 miles (3 km) along the desert margin. The late predynastic and early dynastic kings built an oval mud-brick and stone temple and a large niched mud-brick enclosure. Later dedications included a pair of large copper statues of Pepi I and Merenre (6th dynasty). Thutmose III completely rebuilt the archaic temple. During the period of the New Kingdom, el-Kab, across the river, became economically more important, but Nekhen retained its place as a religious and historic centre.

Hierapolis, modern PAMUKKALE, ancient Phrygian city in southwestern Turkey, about 6 miles (10 km) north of the ruins of Laodicea. Situated on the Coruh River, a tributary of the Buyuk Menderes (Maeander) River, it was probably established by Eumenes II of Pergamum in 190 BC. It became a sacred city (hieron), its chief religious festival being the Letoia, named after the goddess Leto, a local variant of the Great Mother of the Gods, who was honoured with orgiastic rites. There was also a worship of Apollo Lairbenos. Hierapolis was rebuilt during the reign of the Roman emperor Tiberius in approximately AD 14–37 and survived until 1334, when it was abandoned after an earthquake. Extensive ruins, excavated since the 19th century, include baths, a gymnasium, an agora, and a Byzantine church.

Hierapolis, ancient Syrian city, now partly occupied by Manbij (Membij), about 50 miles (80 km) northeast of Aleppo. The place first appears in Greek as Bambyce, but its Syrian name was probably Mabbog. The Seleucids made it the chief station on their main road between Antioch and Seleucia-on-Tigris. As a centre of the worship of the Syrian nature goddess Atargatis, it became known to the Greeks as the Holy City (Hierapolis).

In the 3rd century AD, Hierapolis was one of the great cities of Syria, but it thereafter declined. Hārūn ar-Rashīd restored it at the end of the 8th century, and the crusaders captured it in the 12th century; but Saladin retook it (1175), and later it became the headquarters of Hülegü and his Mongols, who completed its ruin. The remains of the city are extensive but are almost wholly of late date.

hieratic script, ancient Egyptian cursive writing, used from the 1st dynasty (*c.* 2925–*c.* 2775 BC) until about 200 BC. Derived from the earlier, pictorial hieroglyphic writing used in carved or painted inscriptions, hieratic script was generally written in ink with a reed pen on papyrus; its cursive form was more suited to such a medium than were the formal hieroglyphs. It was originally written vertically and later horizontally from right to left. After about 660 BC demotic script (*q.v.*) replaced hieratic in most secular writings, but hieratic continued to be used by priests in the transcription of religious texts for several more centuries.

Hierocles OF ALEXANDRIA (fl. *c.* 430), Neoplatonist philosopher who, after studying under the Greek philosopher Plutarch of Athens and visiting Constantinople, spent the rest of his life in Alexandria, where he won a reputation as a teacher of philosophy.

His commentary on the *Chrysa epe* ("Golden Words"; 71 hexameters ascribed to Pythagoras) is written in a clear and simple style. His other work, *Peri pronoias* ("On Providence"), is known only from the summary and fragments in the 9th-century Byzantine scholar Photius' *Bibliotheca.* Hierocles rejected the multiplicity of entities introduced by the Athenian school of Neoplatonism. His teachings on morals and psychology are a mixture of Platonic, Aristotelian, and Stoic elements. His theory of creation seems to show Christian influence.

The Neoplatonist Hierocles should not be confused with the Stoic Hierocles of Alexandria, who lived in the 1st or 2nd century AD.

hieroglyph, a character used in a system of pictorial writing, particularly that form used on ancient Egyptian monuments. Hieroglyphic symbols may represent the objects that they depict but usually stand for particular sounds or groups of sounds. Hieroglyph, meaning "sacred carving," is a Greek translation of the Egyptian phrase "the god's words," which was used at the time of the early Greek contacts with Egypt to distinguish the older hieroglyphs from the handwriting of the day (demotic). Modern usage has extended the term to other writing systems, such as Hieroglyphic Hittite, Mayan hieroglyphs, and early Cretan. There is no connection between Egyptian hieroglyphs and these other scripts, the only certain derivative from the Egyptian writing being that used for Meroitic.

A brief treatment of hieroglyphs follows. For full treatment, *see* MACROPAEDIA: Writing.

Egyptian hieroglyphic writing was composed entirely of pictures, though the object depicted cannot be identified in every instance. The earliest examples that can be read show the hieroglyphs used as actual writing, that is, with phonetic values, and not as picture writing such as that of the Eskimos or American Indians. The origins of the script are not known. It apparently arose in the late predynastic period (just before 2925 BC). There were contacts between Egypt and Mesopotamia at this time, and it has been thought that the concept of writing was borrowed from the Sumerians. This is certainly possible, but, even if this was the case, the two systems were so different in their use of signs that it is clear that they developed independently.

Except for names and a few titles, the oldest inscriptions cannot be read. In many cases individual hieroglyphs were used that are familiar from later periods, but the meaning of the inscription as a whole is obscure. It is apparent that this writing did not represent the sounds as completely as was the case later.

In the period of the 3rd dynasty (*c.* 2650–*c.* 2575 BC), many of the principles of hieroglyphic writing were regularized. From that time on, until the script was supplanted by an early version of Coptic (about the 3rd and 4th centuries AD), the system remained virtually unchanged. Even the number of signs used remained constant at about 700 for more than 2,000 years. With the rise of Christianity in the 2nd and 3rd centuries AD came the decline and ultimate demise not only of the ancient Egyptian religion but of its hieroglyphics as well. The use, by the Egyptian Christians, of an adapted form of the Greek alphabet, caused a correspondingly widespread disuse of the native Egyptian script. The last known use of hieroglyphics is on an inscription dated AD 394.

Hieroglyphic writing followed four basic principles. First, a hieroglyph could be used in an almost purely pictorial way. The sign of a man with his hand to his mouth might stand for the word "eat." Similarly, the word "sun" would be represented by a large circle with a smaller circle in its centre. Second, a hieroglyph might represent or imply another word suggested by the picture. The sign for "sun" could as easily serve as the sign for "day" or as the name of the sun god Re. The sign for "eat" could also represent the more conceptual word "silent" by suggesting the covering of the mouth. Third, the signs also served as representatives of words that shared consonants in the same order. Thus the Egyptian words for "man" and "be bright," both spelled with the same consonants, *hg,* could be rendered by the same hieroglyph. Fourth, the hieroglyphs stood for individual or combinations of consonants.

It is arguable whether the ancient Greeks or Romans understood hieroglyphics. The Greeks almost certainly did not, since, from their viewpoint, hieroglyphics were not phonetic signs but symbols of a more abstruse and allegorical nature. The humanist revival of the European Middle Ages, although it produced a set of Italian-designed hieroglyphics, gave no further insight into the original Egyptian ones.

The first attempt to decipher hieroglyphics, based on the assumption that they were indeed phonetic symbols, was made by the German scholar Athanasius Kircher in the mid-1600s. Despite his initial correct hypothesis, he correctly identified only one symbol.

The discovery of the Rosetta Stone in 1799 was to provide the key to the final unlocking of the mystery. The stone was inscribed with three different scripts: hieroglyphic, demotic, and Greek. Based on the stone's own declaration, in the Greek portion, that the text was identical in all three cases, several significant advances were made in translation. A.I. Silvestre de Sacy, a French scholar, and J.D. Akerblad, a Swedish diplomat, succeeded in identifying a number of proper names in the demotic text. Akerblad also correctly assigned phonetic values to a few of the signs. An Englishman, Thomas Young, correctly identified five of the hieroglyphics. The full deciphering of the stone was accomplished by another Frenchman, Jean-Françoise Champollion. He brought to the stone a natural facility for languages (having, by age 16, become proficient in six ancient Oriental languages as well as Greek and Latin). By comparison of one sign with another, he was able to determine the phonetic values of the hieroglyphics. Later studies simply confirmed and refined Champollion's work.

Hieron I (d. 467/466 BC, Catana, Sicily), brother of the tyrant Gelon and tyrant of Syracuse, Sicily, from 478 to 467/466 BC.

Hieron became ruler of Syracuse upon the death of Gelon. During his reign he took advantage of the defeat of Carthaginian power in Sicily (in 480) to greatly increase the power of Syracuse. His most important single achievement was the defeat of the Etruscans at Cumae (474), by which he saved the Greeks of Campania (now in southern Italy). A bronze helmet (now in the British Museum, London), with an inscription commemorating the event, was dedicated at Olympia. He removed the inhabitants of Naxos and Catana (Catania) to Leontini, resettled Catana (which he renamed Etna) with Dorians, concluded an alliance with Acragas (Agrigentum, modern Agrigento), and espoused the cause of the Locrians (of southern Italy) against Anaxilas, tyrant of Rhegium (Reggio di Calabria). Though despotic in his rule, Hieron was a liberal patron of literature. The poets Aeschylus, Pindar, and Bacchylides were among those who repaid his hospitality with elegant flattery.

Hieron II (d. 216/215 BC), tyrant of Syracuse, Sicily, from about 270 to 216/215 BC, who struggled against the Mamertini and eventually allied his city with Rome.

On the departure of Pyrrhus, king of Epirus, from Sicily in 276, the Syracusans appointed Hieron commander of the troops, and he strengthened his position by marrying the daughter of Leptines, the city's leading citizen. Meanwhile, the Mamertini, a body of Campanian mercenaries who had been employed by Agathocles, the former tyrant of Syracuse, had captured the stronghold of Messana (Messina, in northeastern Sicily), from which they harassed the Syracusans. Hieron defeated them in a pitched battle near Mylae, but Carthaginian forces intervened to prevent him from capturing Messana. His grateful countrymen then chose Hieron as king. When in 264 he again attacked Messana, the Mamertini called on Rome for aid. Hieron at once joined the Carthaginian leader Hanno, who had recently landed in Sicily, but they were defeated by the Roman consul Appius Claudius, and Hieron withdrew to Syracuse. Pressed by the Roman forces, in 263 he was compelled to conclude a treaty with Rome that restricted his kingdom to southeast Sicily and the eastern coast as far as Tauromenium (Taormina). From this date until his death he remained loyal to the Romans, frequently supplying them with soldiers and provisions during the Punic Wars. Hieron maintained a powerful defensive fleet and employed his famous kinsman, the Greek Archimedes, in the construction of ingenious mechanical devices for defense of the city.

Hieronymus, Eusebius: *see* Jerome, Saint.

hierophant, Greek HIEROPHANTĒS ("displayer of holy things"), in ancient Greece, chief of the Eleusinian cult, the best-known of the mystery religions of ancient Greece. His principal job was to chant demonstrations of sacred symbols during the celebration of the mysteries. At the opening of the ceremonies, he proclaimed that all unclean persons must stay away—a rule that he had the right to enforce.

Usually an old, celibate man with a forceful voice, he was selected from the Eumolpids, one of the original clans of the ancient Greek city of Eleusis, to serve for life. Upon taking office he symbolically cast his former name into the sea and was thereafter called only *hierophantēs.* During the ceremonies he wore a headband and a long, richly embroidered purple robe.

hieros gamos (Greek: "sacred marriage"), sexual relations of fertility deities in myths and rituals, characteristic of societies based on cereal agriculture, especially in the Middle East. At least once a year, divine persons (*e.g.,* humans representing the deities) engage in sexual intercourse, which guarantees the fertility of the land, the prosperity of the community, and the continuation of the cosmos.

As ritually expressed, there are three main forms of the *hieros gamos:* between god and goddess (most usually symbolized by statues); between goddess and priest-king (who assumes the role of the god); and between god and priestess (who assumes the role of the goddess). In all three forms there is a relatively fixed form to the ritual: a procession that conveys the divine actors to the marriage celebration; an exchange of gifts; a purification of the pair; a wedding feast; a preparation of the wedding chamber and bed; and the secret, nocturnal act of intercourse. In some traditions this appears to have been an actual physical act between sacred functionaries who impersonate the deities; in other traditions it appears to have been a symbolic union. On the following day the marriage and its consequences for the community are celebrated.

Some scholars have applied the term *hieros gamos* to all myths of a divine pair (*e.g.,* heaven–earth) whose sexual intercourse is creative. The term, however, should probably be restricted only to those agricultural cultures that ritually reenact the marriage and that relate the marriage to agriculture, as in Mesopotamia, Phoenicia, Canaan, Israel (the Song of Solomon has been suggested to be a hierogamitic text), Greece, and India.

Hierro (Canary Islands, Spain): *see* Ferro.

Hierta, Hans: *see* Järta, Hans.

Hierta, Lars Johan (b. Jan. 23, 1801, Uppsala, Swed.—d. Nov. 20, 1872, Stockholm), journalist and politician who became a leading agitator for Swedish political and social reform.

Hierta's work as a clerk for the noble estate of the Riksdag (estates assembly) in the 1820s acquainted him with the operation of the increasingly conservative Swedish regime and made him its critic. He established the *Aftonbladet* ("Evening Press") in 1830, remaining its owner-editor until 1851. Under him the newspaper gained a large and loyal following for its wide-ranging liberal opposition to the regime (causing conservatives to refer to Hierta as "King Lars"). In the 1830s he countered numerous attempts of the government to suppress the paper by reissuing it under such slightly different names as Second *Aftonbladet,* Fourth *Aftonbladet,* etc., until censorship was ended in 1844.

The main issues Hierta fought for were extension of the franchise, a modern parliament, mass public education, and free choice of occupation. He was elected to the third (middle-class) chamber of the Riksdag in 1859, and, as a leader in that body, he continued to press for reform, which culminated in the establishment of a modern two-chamber parliament (still called the Riksdag) in 1865. From 1866 to 1872 he served as president (*ålderspresident*) of the lower chamber.

Consult the INDEX *first*

Higashi-Murayama, city, Tokyo *to* (metropolis), Honshu, Japan, east of Lake Sayama. The town of Kumegawa, now the city centre, was a post station in the 8th century and an important local centre until the late 14th century. Higashi-Murayama remained the commercial hub of the surrounding tea-producing area until World War II. The city is now a residential suburb of the Tokyo–Yokohama metropolitan area, with some industry (food products, electric appliances). Pop. (1987 est.) 128,895.

Higashi-Ōsaka (Japanese: "East Ōsaka"), city, Ōsaka Urban *fu* (urban prefecture), Honshu, Japan. It lies to the east of Ōsaka and was formed in 1967 by the merger of the three towns of Fuse, Kawachi, and Hiraoka. It is a residential suburb of Ōsaka, and its developing industrial district produces electric appliances, machinery, clothing fibres, and paper. The Hiraoka residential area at the foot of Ikoma-yama (Mount Ikoma) also serves as a resort. It is the site of the remains of ancient

Shopping arcade in Higashi-Ōsaka, Japan
Design Uni—FPG/EB Inc.

tombs, the 7th-century Hiraoka Shrine, and the surrounding Kongō-Ikoma Quasi-national Park. Pop. (1985) 522,798.

Higden, Ranulf, Higden also spelled HIGDON (b. *c.* 1280, western England—d. March 12, 1364, Chester), English monk and chronicler remembered for his *Polychronicon*, a compilation of much of the knowledge of his age.

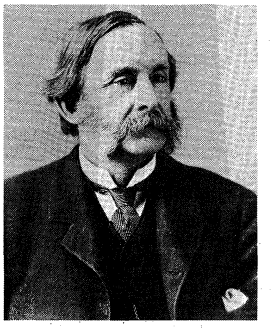
After taking monastic vows in 1299, Higden entered the abbey of St. Werburgh, a Benedictine community in Chester. His *Polychronicon* was a universal history from the creation to his own times. Modeling his seven books on the seven days of creation, he gave an account of world geography and a universal history of the world in six parts, based on a compilation from about 40 sources. Higden himself carried the work down to the 1340s; continuators worked on the Polychronicon during the reign of Richard II (1377–99).

Although marred by recordings of miracles and supernatural events, the work provides a significant indication of the historical, geographical, and scientific knowledge of the 14th century. It was the most exhaustive history of its time, and it remained popular for at least two centuries. Its Latin text was translated into English by John of Trevisa in 1385 and was first printed in 1482. Higden wrote a number of other works, all theological, such as *Speculum Curatorum* (1340).

Higginson, Thomas Wentworth (Storrow) (b. Dec. 22, 1823, Cambridge, Mass., U.S.—d. May 9, 1911, Cambridge), American reformer who was dedicated to the Abolition Movement before the Civil War (1861–65).

Ordained after graduating from Harvard Divinity School (1847), Higginson became pastor of the First Religious Society of Newburyport, Mass., where he preached a social gospel too liberal even for Unitarians. Two years later his progressive views on temperance, women's rights, labour, and slavery caused him to lose his congregation.

On the passage of the Fugitive Slave Act (1850), he joined the Boston Vigilance Committee to aid escaping slaves. While pastor of a "Free Church" in Worcester, Mass. (1852–61), he took a leading part in liberating the fugitive Anthony Burns (1854); he supported John Brown both in Kansas (1856) and in his raid on Harpers Ferry (1859). During the Civil



Higginson
By courtesy of the Library of Congress, Washington, D.C.

War he accepted command of the 1st South Carolina Volunteers, later the 33rd U.S. Colored Troops, the first black regiment in the U.S. armed forces. After 1864 he wrote a series of popular biographies and histories and a novel. Higginson discovered and encouraged the poet Emily Dickinson.

high (meteorology): *see* anticyclone.

High Atlas (mountains, Morocco): *see* Haut Atlas.

high bar (gymnastics): *see* horizontal bar.

high blood pressure: *see* hypertension.

High Card Pool: *see* Red Dog.

High Commission, Court of, English ecclesiastical court instituted by the crown in the 16th century as a means to enforce the laws of the Reformation settlement and exercise control over the church. In its time it became a controversial instrument of repression, used against those who refused to acknowledge the authority of the Church of England.

The Act of Supremacy (1534) recognized Henry VIII as supreme head of the Church of England and assigned to the crown the power to visit, investigate, correct, and discipline the regular and secular clergy. This act was given practical effect in 1535 when Thomas Cromwell was appointed viceregent, invested with royal authority in ecclesiastical affairs, and directed to delegate part of it to such persons as he thought fit. The first general commission was held under Edward VI in 1549; and the Elizabethan Act of Supremacy (1559) confirmed the royal powers by declaring the queen to be "Supreme Governor of this realm" in spiritual or ecclesiastical as well as temporal things and authorizing the crown to exercise all jurisdiction of spiritual or ecclesiastical matters and to visit, redress, and correct all "errors, heresies, schisms, abuses, offenses, contempts, and enormities whatsoever."

Until 1565 the work performed by the commissioners was mainly visitational and their authority temporary. But the continued difficulties in enforcing the settlement and the increasing amount of ecclesiastical business delegated to it by the privy council transformed a temporary device into a permanent, regularized prerogative court. These developments were reflected in the appearance of the term high commission by 1570, and the title of court about 10 years later. In the face of growing opposition to the established church from Roman Catholics and Puritans alike, an increasing burden was placed upon the commissioners.

The total membership of the commission, varying between 24 in 1549 and 108 in 1633, consisted mainly of canon lawyers, bishops, and important laymen. Its jurisdiction in relationship to other ecclesiastical courts was both concurrent and appellate. It could assume only certain types of jurisdiction in criminal matters and could not initiate cases between two parties, although it had appellate jurisdiction in this area. Its procedure was normally based on the administration of the oath ex officio, which became the most controversial instrument of the court. Those who refused to take the oath were immediately turned over to the much feared Court of Star Chamber. Those who submitted were forced to answer all questions put to them, thereby being compelled to choose between committing perjury or providing the grounds for their own conviction. Although this procedure had been adopted from the church courts, here the penalties were generally secular: fine or imprisonment. The commission did not employ torture or inflict the death penalty.

The opposition that eventually destroyed the commission came principally from the Puritans, the common lawyers, and the common-law judges. The Puritans resented the commission's enforcement of certain services they regarded as idolatrous and the use of the ex officio oath. The common lawyers' opposition stemmed from the traditional hostility between lay and church courts.

Under James I the common-law judges, encouraged by the support of the parliamentary opponents of the royal prerogative, insisted that the commissioners' jurisdiction was based on statutory permission, not prerogative right of the crown. This legal opposition became part of the constitutional struggle between the Stuart kings and their parliaments.

In 1641, when Charles I had to give way to Parliament, the court was abolished, and it was provided that no similar court should ever by set up, the commissioners being accused of having greatly wronged and oppressed the king's subjects. At the Restoration the parliamentary prohibition was retained. The court was briefly revived in 1686 by James II, only to be finally condemned by the Bill of Rights in 1689 as "illegal and pernicious." *See also* prerogative court.

High Commissioner for Refugees: *see* United Nations High Commissioner for Refugees, Office of the.

High Court of Admiralty, in England, formerly the court presided over by the deputy of the admiral of the fleet. The court is supposed in the *Black Book of the Admiralty* to have been founded in the reign of Edward I, but it actually appears to have been established by Edward III about the year 1360. At this time the court seems to have had some civil jurisdiction over mercantile and shipping cases, although it originally dealt only with matters of discipline in the English fleet and with cases of piracy and prizes (ships and goods captured at sea). At first there were three separate Admiralty courts (each with a presiding admiral) for three different sections of the country, but these were merged into one high Admiralty court presided over by one admiral early in the 15th century. By this time the court had a marshal and other officers and forms of legal process.

The Admiralty court's jurisdiction historically embraced all crimes and offenses involving English ships or crews that were committed at sea or along the English coast outside of the borders of any county. The jurisdiction over such criminal cases was formally conferred in the 16th century on the lord high admiral or his deputy and on three or four other substantial persons appointed by the lord chancellor.

The early Admiralty court appears to have used much the same procedure as that used by the common-law courts. But the court's jurisdiction over shipping and mercantile cases and the consequent international nature of its cases eventually occasioned the introduction of a procedure based on Roman civil law and similar to that used in continental Europe. In the 15th and 16th centuries the Admiralty court gradually acquired jurisdic-

tion over many commercial and other cases properly belonging to the common-law courts. This occasioned many jurisdictional disputes between it and the judges of the common-law courts. The position of the common-law judges prevailed, and the Admiralty Court sank into comparative insignificance during the 17th century. The great maritime wars of the 18th century gave scope to the exercise of its prize jurisdiction, however, and its international importance as a prize court in the late 18th and early 19th centuries is widely acknowledged.

In 1834 the power to try crimes committed within the jurisdiction of the Admiralty (*i.e.,* at sea) was transferred to the Central Criminal Court. By an act in 1844 this power was also given to the justices of assize. The Admiralty court henceforth concentrated on marine cases involving shipping, collisions, and salvage; the court's jurisdiction in this regard was greatly enlarged by two enabling statutes passed in the mid-19th century. The manner in which these statutes were administered, the valuable assistance rendered by the nautical assessors working under the court's aegis, the great increase in shipping, especially of steam shipping, and the number and gravity of cases of collision, salvage, and damage to cargo made the court one of the most important tribunals of the country. In 1875, by the operation of the Judicature Acts of 1873 and 1875, the High Court of Admiralty was merged with the other great courts of England into the High Court of Justice.

High Court of Justice, in England and Wales, court system centred in London and comprising three divisions of both original and appellate jurisdiction, mostly in civil matters and only occasionally in criminal cases. The divisions are the Chancery Division, presided over by the lord chancellor or the vice-chancellor and hearing cases involving the administration of estates, mortgages, contracts, land sales, etc.; the Queen's (or King's) Bench Division, presided over by the lord chief justice and hearing cases involving contract or tort, and occasionally criminal matters; and the Family Division, headed by a president and dealing with marriage, adoption, wardship, and other family-related matters.

All High Court judges may sit in any division, administering both law and equity, although they are now usually assigned to specific work and divisions. There are four sittings: Michaelmas (from October 1 to December 21), Hilary (from January 11 to the Wednesday before Easter), Easter (from the second Tuesday after Easter to Friday before the spring Bank Holiday, the last Monday in May), and Trinity (from the second Tuesday after the spring holiday to July 31).

The High Court is the second part of the Supreme Court of Judicature (*q.v.*), ranking immediately below the Court of Appeal and above the Crown Court.

high-fidelity sound system, also called HI-FI SYSTEM, device capable of a high accuracy in the electronic reproduction of sound. Such reproduction is generally achieved by use of an assemblage of physically separate high-quality components, including a source of sound or music, such as a phonograph record, magnetic tape, compact disc, or radio signal; a phonograph cartridge, tape player, or disc player, which transcribe sound signals into a usable electrical form; an audio amplifier capable of building up the small signals delivered by the signal transcriber; and one or more loudspeakers. High-fidelity sound systems assembled from individual components manufactured by specialists have been in use since the 1920s, and complete systems housed in cabinets appeared by the 1950s.

A high-fidelity sound system that reproduces stereophonic sound on two separate channels is called a stereophonic sound system (*q.v.*).

High God, also called SKY GOD, in anthropology and the history of religion, a type of supreme deity found among many nonliterate peoples of North and South America, Africa, northern Asia, and Australia. The adjective high is primarily a locative term: a High God is conceived as being utterly transcendent, removed from the world that he originally created. A High God is high in the sense that he lives in or is identified with the sky—hence, the alternative name. Among North American Indians and Central and South Africans, thunder is thought to be the voice of the High God. In Siberia the sun and moon are considered the High God's eyes. He is connected with food and heaven among American Indians.

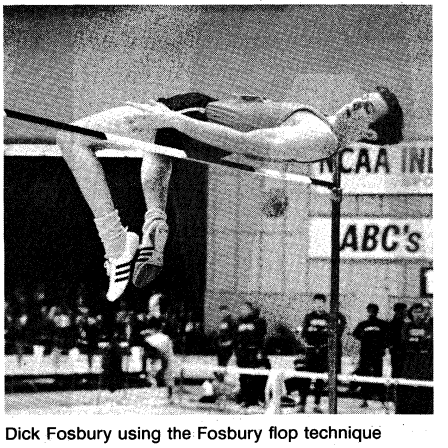
Though the pattern varies from people to people, the High God usually is conceived as masculine or sexless. He is thought to be the sole creator of heaven and earth. Although he is omnipotent and omniscient, he is thought to have withdrawn from his creation and therefore to be inaccessible to prayer or sacrifice. Generally, no graphic images of him exist, nor does he receive cult worship or appear in the mythology. If he is invoked, it is only in times of extreme distress, but there is no guarantee that he will hear or respond. His name often is revealed only to initiates, and to speak his name aloud is thought to invite disaster or death; his most frequent title is Father. In some traditions he is conceived to be a transcendent principle of divine order; in others he is pictured as senile or impotent and replaced by a set of more active and involved deities; and in still other traditions he has become so remote that he is all but forgotten.

Some scholars consider the conception of the High God to be very old, preceding the creation of particular pantheons; some see the High God as secondary, both in importance and in chronology; and some see him as a very recent development stimulated by Christianity. Christian missionaries, naturally having a monotheistic bias, tended to overemphasize high gods. In recent times the figure of the High God has been revived among some African messianic groups.

High Holy Days (Judaism): *see* yamim nora'im.

high-jacking: *see* hijacking.

high jump, in track-and-field sport, a running jump to attain height. The sport's equipment includes a level, semicircular runway allowing an approach run of at least 15 m (49 feet) from any angle within its 180° arc. Two rigid vertical uprights support a light horizontal crossbar in such a manner that it will easily fall if touched by a contestant as he tries to jump over it. The jumper lands in a pit beyond the bar that is at least 5 × 4 m (16 × 13 feet) in size and filled with cushioning material. The standing high jump was last an event in the 1912 Olympics.



Dick Fosbury using the Fosbury flop technique
AP/Wide World

The only formal requirement of the high jumper is that he take off on his jump from one foot. Many styles have evolved, including the now little-used scissors, or Eastern, method, in which the jumper clears the bar in a nearly upright position; the Western roll and straddle, with the jumper's body horizontal, face-down, and parallel to the bar at the height of the jump; and a more recent backward twisting, diving style often termed the Fosbury flop, after its first prominent exponent, the U.S. Olympic champion Richard Fosbury (1968).

In competition the bar is raised progressively as contestants succeed in clearing it. Entrants may begin jumping at any height above a required minimum. Knocking the bar off its supports constitutes a failed attempt, and three failures at a given height disqualify the contestant from the competition. Each jumper is credited with his highest jump. In the case of ties, the winner is the one with fewest misses at the final height, or in the whole competition, or the fewest total jumps in the competition. *See* Sporting Record: *Athletics. See also* Olympic Games.

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High Peak, district (borough), northeastern part of the county of Derbyshire, north-central England. It occupies an upland area of 209 square miles (541 square km) between the densely populated metropolitan areas of Greater Manchester (west) and South Yorkshire (east). The district's High Peak has the highest elevation (2,088 feet [636 m]) in the southern Pennines, which form the upland "spine" of England. Except for valleys along its western border, the district lies within Peak District National Park. The flat-topped, bleak, hard sandstone moorlands in the north and east are underlain by limestone bedrock exposed as a denuded elevated plateau and deep valley region in the southwest. Clusters of towns industrially associated with Greater Manchester's cotton-milling industries are centred on Glossop and New Mills in the extreme west. Limestone quarrying is important around Buxton, a spa dating from Roman times, in the southwest; potter's clay and blue john (a variety of fluorspar) are also mined. The rough grazing of sheep is commonplace throughout the district. Tourists visit the region for rock climbing, grouse hunting, and exploring caverns. Chapel-en-le-Frith is the district seat. Pop. (1985 est.) 82,700.

high place, Hebrew BAMAH, or BAMA, Israelite or Canaanite open-air shrine usually erected on an elevated site. Prior to the conquest of Canaan (Palestine) by the Israelites in the 12th–11th century BC, the high places served as shrines of the Canaanite fertility deities, the Baals (Lords) and the Asherot (Semitic goddesses). In addition to an altar, *matztzevot* (stone pillars representing the presence of the divine) and *asherim* (upright wooden poles symbolizing the female deities) often were erected on the high places, which sometimes were located under a tree or grove of trees. Other accoutrements sometimes associated with the bamah were *ḥammanim,* which were small incense altars. The high place at Megiddo in Israel is one of the oldest known high places, dating from *c.* 2500 BC.

Because the Israelites had associated the divine presence with elevated places (*e.g.,* Mt. Sinai), they used Canaanite high places to worship their own God, Yahweh. Canaanite agricultural fertility rites and practices were adopted by the previously nomadic Israelites, often in a syncretic fashion with Yahweh replacing Baal. A strong reaction to the adoption

of such rites led to protests by Israelite judges and prophets from the 12th to the late 7th century BC, when the Deuteronomic Reform of 621 led to the extirpation of the many local high places as sites of worship. The Temple at Jerusalem on Mount Zion thus became the only legitimate high place in the Israelite religion, and the name bamah became a term of reproach and contempt.

High Plains, region in the United States, sometimes understood to mean the southern portion of the Great Plains, or, in its most specific sense, the northern portion of the Llano Estacado ("Staked Plain"). In this more restricted sense, the High Plains may be said to cover the northernmost Panhandle of Texas, northeastern New Mexico, eastern Colorado, and westernmost Kansas. The High Plains are generally flat grassland, drained eastward by the Platte, Arkansas, and Canadian rivers. The economy is based on cattle, irrigated and dry farming, and some natural-gas and petroleum extraction.

High Point, city, Guilford county, north-central North Carolina, U.S.; with Winston-Salem and Greensboro it forms a tri-city area. Settled by Quakers in about 1750, it was laid out in 1853 at the "highest point" of the North Carolina Railroad between Goldsboro and Charlotte. Since the late 1800s it has become one of the nation's leading centres for furniture manufacturing. The Southern Furniture Exposition attracts national and foreign buyers. The hosiery industry is also important. Other manufactures include paint, chemicals, and machinery. High Point College, a Methodist institution, was founded in 1924. Inc. 1859. Pop. (1987 est.) city, 67,416; Greensboro–Winston-Salem–High Point metropolitan area (MSA), 915,700.

high priest, Hebrew KOHEN GADOL, in Judaism, the chief religious functionary in the Temple of Jerusalem, whose unique privilege was to enter the Holy of Holies (inner sanctum) once a year on Yom Kippur, the Day of Atonement, to burn incense and sprinkle sacrificial animal blood to expiate his own sins and those of the people of Israel. On this occasion he wore only white linen garments, forgoing the elaborate priestly vestments worn during the year whenever he chose to officiate at services. The high priest had overall charge of Temple finances and administration, and in the early period of the Second Temple he collected taxes and maintained order as the recognized political head of the nation. The high priest could not mourn the dead, had to avoid defilement incurred by close proximity to the dead, and could marry only a virgin. The office, first conferred on Aaron by his brother Moses, was normally hereditary and for life. In the 2nd century BC, however, bribery led to several reappointments, and the last of the high priests were appointed by government officials or chosen by lot. According to tradition, 18 high priests served in Solomon's Temple (*c.* 960–586 BC) and 60 in the Second Temple (516 BC–AD 70). Since that time, there has been no Jewish high priest, for national sacrifice was permanently interrupted with the destruction of the Second Temple.

high-rise building, also called HIGH-RISE, a multistory building that is tall enough to necessitate the use of a system of mechanical vertical transportation such as elevators. The skyscraper (*q.v.*) is a very tall high-rise building.

The first high-rise buildings were constructed in the United States in the 1880s. They arose in urban areas where increased land prices and great population densities created a demand for buildings that rose vertically rather than spread horizontally, thus occupying less precious land area. High-rise buildings were made practicable by the use of steel structural frames and glass exterior sheathing. By the mid-20th century, such buildings had become a standard feature of the architectural landscape in most countries in the world.

The foundations of high-rise buildings must sometimes support very heavy gravity loads, and they usually consist of concrete piers, piles, or caissons that are sunk into the ground. Beds of solid rock are the most desirable base, but ways have been found to distribute loads evenly even on relatively soft ground. The most important factor in the design of high-rise buildings, however, is the building's need to withstand the lateral forces imposed by winds and potential earthquakes. Most high-rises have frames made of steel or steel and concrete. Their frames are constructed of columns (vertical-support members) and beams (horizontal-support members). Cross-bracing or shear walls may be used to provide a structural frame with greater lateral rigidity in order to withstand wind stresses. Even more stable frames use closely spaced columns at the building's perimeter, or they use the bundled-tube system, in which a number of framing tubes are bundled together to form exceptionally rigid columns.

High-rise buildings are enclosed by curtain walls; these are non-load-bearing sheets of glass, masonry, stone, or metal that are affixed to the building's frame through a series of vertical and horizontal members called mullions and muntins.

The principal means of vertical transport in a high-rise is the elevator (*q.v.*). It is moved by an electric motor that raises or lowers the cab in a vertical shaft by means of wire ropes. Each elevator cab is also engaged by a set of vertical guide tracks and has a flexible electric cable connected to it that provides power for lighting, door operation, and signal transmission.

Because of their height and their large occupant populations, high-rises require the careful provision of life-safety systems. Fire-prevention standards should be strict, and provisions for adequate means of egress in case of fire, power failure, or other accident should be provided. Although originally designed for commercial purposes, many high-rise buildings are now planned for multiple uses. The combination of office, residential, retail, and hotel space is common. *See also* building construction.

high school, in most school systems in the United States, any three- to six-year secondary school serving students approximately 13 (or 14 or 15) through 18 years of age. Often in four-year schools the different levels are designated, in ascending order, freshman, sophomore, junior, and senior.

The most common form is the comprehensive high school that includes both general academic courses and specialized—commercial, trade, and technical—subjects in its curriculum. There are also many varieties of specialized schools, agricultural schools, business or commercial schools, trade or vocational schools, and preprofessional schools, such as the High School of Music and Art in New York City and the Bronx High School of Science.

Most American high schools are public—*i.e.,* tuition-free, supported by state funds. There are, however, a number of private high schools throughout the country, supported generally through a combination of tuition charges and private grants or endowments. Most of these schools offer primarily academic courses to college-oriented students, and many are sectarian. *See also* secondary education.

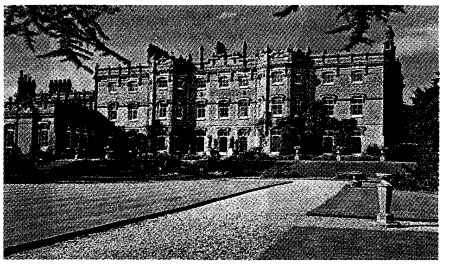
high seas, in maritime law, all parts of the mass of saltwater surrounding the globe that are not part of the territorial sea or internal waters of a state. For several centuries beginning in the European Middle Ages, a number of maritime states asserted sovereignty over large portions of the high seas. Well-known examples were the claims of Genoa in the Mediterranean and of Great Britain in the North Sea and elsewhere.

The doctrine that the high seas in time of peace are open to all nations and may not be subjected to national sovereignty (freedom of the seas) was proposed by the Dutch jurist Hugo Grotius as early as 1609. It did not become an accepted principle of international law, however, until the 19th century. Freedom of the seas was ideologically connected with other 19th-century freedoms, particularly laissez-faire economic theory, and was vigorously pressed by the great maritime and commercial powers, especially Great Britain. Freedom of the high seas is now recognized to include freedom of navigation, fishing, the laying of submarine cables and pipelines, and overflight of aircraft.

By the second half of the 20th century, demands by some coastal states for increased security and customs zones, for exclusive offshore-fishing rights, for conservation of maritime resources, and for exploitation of resources, especially oil, found in continental shelves caused serious conflicts. The first United Nations Conference on the Law of the Sea, meeting at Geneva in 1958, sought to codify the law of the high seas but was unable to resolve many issues, notably the maximum permissible breadth of the territorial sea subject to national sovereignty. A second conference (Geneva, 1960) also failed to resolve this point; and a third conference began in Caracas in 1973, later convening in Geneva and New York City. *See also* territorial waters.

High Tatras (Czechoslovakia–Poland): *see* Tatras.

High Wycombe, town, Wycombe district, county of Buckinghamshire, England. It lies along the River Wye, at the edge of the Chiltern Hills and on the fringe of the London metropolitan area. The town is noted for furniture, especially Windsor chairs, made from local beechwood. Ancillary industries include manufacture of precision instruments, paper mills, and printing works. There are Roman remains, and a royal charter was granted to the town in 1237. The town was largely rebuilt in the 16th century. Wycombe Abbey is now a public (*i.e.,* private, fee-paying) girls' school. The town centre contains the 18th-century Little Market House and Guildhall and the Red Lion Inn. High Wycombe is associated with Benjamin Disraeli, the 19th-century British statesman who fought several elections there and lived at nearby Hughenden Manor. Pop. (1981) 70,219.



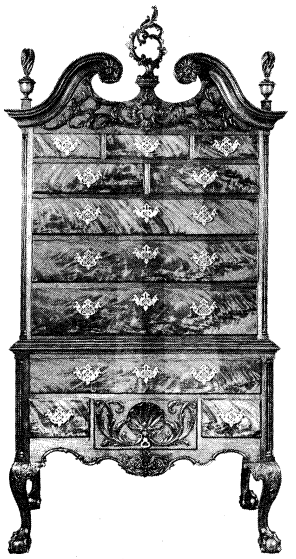
Hughenden Manor on the northern outskirts of High Wycombe, Buckinghamshire

J. Allan Cash—EB Inc.

highboy, also called TALLBOY, a high or double chest of drawers. The name is derived from a corruption of the French *bois* ("wood") and became common in English in the late 17th century.

The prototype of the highboy was the chest of drawers on a stand with turned (shaped on a lathe) legs. The lower section is usually wider than the upper and contains three drawers

of the same size. The upper section generally consists of another set of three drawers and, on top of them, two or three smaller drawers to complete the sequence. The piece is topped with a cornice. The two sections are divided by wide moldings, in which there is sometimes inserted a slide shelf. Although usually flat-



Highboy, Philadelphia, 1760–70; in the Museum of Fine Arts, Boston

By courtesy of the Museum of Fine Arts, Boston, M. & M. Karolik Collection

fronted, highboys were occasionally made in a serpentine shape. Later versions were sometimes topped by a curved, or swan-necked, pediment. The feet were usually of the curved ogee, or elongated S, variety, and the handles and keyholes of decorated brass.

higher education, any of various types of education given in postsecondary institutions of learning and usually affording, at the end of a course of study, a named degree, diploma, or certificate of higher studies. Higher-educational institutions include not only universities and colleges but also various professional schools that provide preparation in such fields as law, theology, medicine, business, music, and art. Higher education also includes teacher-training schools, junior colleges, and institutes of technology. The basic entrance requirement for most higher-educational institutions is the completion of secondary education, and the usual entrance age is about 18 years. (*See also* college; university.)

Higher education had its origin in Europe of the Middle Ages, when the first universities were established. In modern times the nature of higher education around the world has been largely determined by the models established in influential countries such as France, Germany, Great Britain, the United States, and the Soviet Union.

Both France and Germany have systems of higher education that are basically administered by state agencies. Entrance requirements for students are also similar in both countries. In France an examination called the *baccalauréat* is given at the end of secondary education. Higher education in France is free and open to all students who have passed this examination. A passing mark admits students to a preparatory first year at a university, which terminates in another, more rigorous examination. Success in this examination allows students to attend universities for another three or four years until they have attained the first university degree, called a *licence* in France.

Basic differences, however, distinguish these two countries' systems. French educational districts, called *académies,* are under the direction of a rector, an appointee of the national government who also is in charge of the university in each district. The uniformity in curriculum throughout the country leaves each university with little to distinguish itself. Hence many students prefer to go to Paris, where there are better accommodations and more cultural amenities for students. Another difference is the existence in France of higher-educational institutions known as *grandes écoles,* which provide advanced professional and technical training. Most of these schools are not affiliated with the universities, although they too recruit their students by giving competitive examinations to candidates who possess a *baccalauréat.* The various *grandes écoles* provide a rigorous training in all branches of applied science and technology, and their diplomas have a somewhat higher standing than that of the ordinary *licence.*

In Germany, a country made up of what were once strong principalities, the regional universities have autonomy in determining their curriculum under the direction of rectors elected from within. Students in Germany change universities according to their interests and the strengths of each university. In fact, it is a custom for students to attend two, three, or even four different universities in the course of their undergraduate studies, and the majority of professors at a particular university may have taught in four or five others. This marked degree of mobility means that schemes of study and examination are marked by a freedom and individuality unknown in France.

Each of these countries has influenced higher education in other nations. The French, either through colonial influence or through the work of missionaries, introduced many aspects of their system in North and West Africa, the Caribbean, and the Far East. In the 1870s Japan's growing university system was remodeled along French lines. France's *grandes écoles* have been especially copied as models of technical schools. German influence has come about through philosophical concepts regarding the role of universities. The Germans were the first to stress the importance of universities as research facilities, and they also created a sense of them as emblems of a national mind. The doctoral degree, or Ph.D., invented in Germany, has gained popularity in systems around the world.

The autonomy of higher-educational institutions is strikingly pronounced in Great Britain. Its universities enjoy almost complete autonomy from national or local government in their administration and the determination of their curricula, despite the fact that the schools receive nearly all of their funding from the state. Entry requirements for British universities are rather complicated. A student must secure a General Certificate of Education (corresponding to the French *baccalauréat*) by taking examinations in various subjects and receiving passing marks in them. The greater the number of "advanced level" passes, rather than "ordinary level" passes, that a student acquires, the better his chances are of entering the university of his choice. (Britain has a centralized admissions bureau to which candidates for admission are able to give their choice of universities in an order of preference.) This selective admission to universities, combined with the close supervision of students through a tutorial system, makes it possible for most British undergraduates to complete a degree course in three years rather than the standard four years. Great Britain's academic programs are more highly specialized than their European continental counterparts. Most undergraduates follow an "honours" course (leading to an honours degree) in one or, at the most, two subjects, while the remaining minority of students take "pass" courses that cover a variety of subjects. Great Britain's model of higher education has been copied to varying degrees in Canada, Australia, India, South Africa, New Zealand, and other former British colonial territories in Africa, Southeast Asia, and the Pacific.

The system of higher education in the United States differs from its counterparts in Europe in certain ways. In the United States, there is a nationwide assumption that students who have completed secondary school should have at least two years of university education. Hence a great number of "junior colleges" and "community colleges" have sprung up to provide two years of undergraduate study, in contrast to the traditional universities and colleges, where a majority of students complete four years of study for a degree and where substantial numbers go on for one to three years of postgraduate study in a "graduate school." Universities that provide four-year study courses are either privately funded foundations or are state or city foundations that depend heavily on the government for financial support. Private universities and colleges depend largely on tuition charges levied on students. The individual state governments fund the nation's highly developed system of state universities, which ensure the provision of higher education for the vast majority of those willing and academically qualified to receive such education.

In the American system, the four-year, or "bachelor's," degree is ordinarily obtained not by passing a "finals" examination but rather by the accumulation of course "credits," or hours of classroom study. The quality of work done in these courses is assessed by means of a continuous record of marks and grades in a course transcript. The completion of a certain number (and variety) of courses with passing grades leads to the "bachelor's" degree. The first two years of a student's studies are generally taken up with prescribed courses in a broad range of subject areas, along with some "elective" courses selected by the student. In the third and fourth years of study, the student specializes in one or perhaps two subject fields. Postgraduate students can pursue either advanced studies or research in one of the many graduate schools, which are usually specialized institutions. At these schools students work toward either a "master's" degree (which involves one to two years of postgraduate study) or a doctoral degree (which involves two to four years of study and other requirements).

A marked feature of American education that derives from the German model is the de-emphasis on lecture and examination. In both of these countries, students are evaluated according to their performance in individual courses, where discussion and written essays figure importantly. The American model of higher learning was adopted wholesale by the Philippines and influenced the educational systems of Japan and Taiwan after World War II.

Higher education in the Soviet Union is characterized by direct state administration, differing from the French in that a single political party controls the governing body. The schools of higher learning are divided into universities, where humanities and pure sciences are taught; institutes, where single fields are taught (*e.g.,* law, medicine, and agriculture); and polytechnical institutes, where subjects similar to those in the institutes are taught but with a broader scientific foundation. Another distinction of the Soviet system is that it greatly extends the educational network by offering a broad array of carefully prepared correspondence courses. These courses are supplemented by radio and television broadcasts and are further augmented by regional study centres. Many students are thus able to proceed part-time with their education while holding full- or part-time jobs. Students are

admitted to higher-educational institutions on the basis of competitive examinations. The duration of studies for a first degree ranges from four to six years, with five years being the average. The curriculum consists of compulsory, alternative, and optional subjects. Candidates for a degree must take examinations in two or three basic disciplines related to a chosen specialty. At the conclusion of a first-degree course, all students receive the same diploma, but students with the best results are awarded a "distinction." Most institutions organize graduate schools for postgraduate studies, which are likewise concluded by a set of examinations. Virtually all students in the Soviet system are supported by government grants. Soviet influence is seen in countries that embrace communist doctrine and that look toward the Soviet Union for assistance in building new programs.

Educational systems outside of the Western Hemisphere have long followed the lead of the most influential countries, although not always to their advantage. The major problem is that many developing countries have a much greater need for technical institutes rather than for academic universities, so that they can produce professionals and scientists able to address their particular problems. In these countries, language is often a problem because much of the technology developed in the West requires a vocabulary that many languages do not have. Reading skills in English are widely cultivated for these purposes.

Modern trends in higher education indicate a willingness worldwide to learn from the strengths of the various systems. Schools in North America frequently suffer from the lack of uniformity of educational standards, which European systems provide through centralized bureaucratic control. Coordinated national accrediting organizations solve much of this problem. European universities have moved toward greater autonomy in curriculum development, and steps have been taken so that broader segments of the population can benefit from higher education.

Highland, region of northern Scotland, created by the administrative reorganization of 1975. It has an area of just less than 10,000 square miles (25,900 square km). It embraces the former counties of Caithness, Sutherland, Ross and Cromarty, and Inverness (excluding the Western Isles), and Nairn, part of Moray, and part of Argyll. Highland region is divided into the districts of Caithness, Sutherland, Ross and Cromarty, Skye and Lochalsh, Lochaber, Inverness, Badenoch and Strathspey, and Nairn. Pop. (1986 est.) 200,764.

highland fling, national dance of Scotland. A vigorous dance requiring delicate balance and precision, it was probably originally a victory dance for a solo male dancer, performed after battle. It is performed in $\frac{4}{4}$ time and consists of a series of intricate steps performed on one spot. Especially characteristic is a light step in which the dancer hops on one foot while moving the other foot in front of and in back of the calf. The dance is regularly performed in competition at the Highland Games held throughout Scotland.

Highland fling, engraving, 1867
The Bettmann Archive

Highland Games, originally, athletic meetings carried out in the Scottish Highlands. The name now denotes similar athletic competitions in any part of the world, usually conducted under the auspices of a local Caledonian society and held according to what are believed to be traditional customs. The games originated in impromptu competitions at clan assemblies summoned by the chiefs for hunting, military exercises, and the conduct of clan business generally. The complete breakup of the clan organization after the Jacobite rising of 1745 put an end to these gatherings.

Tossing the caber at a Braemar gathering
Aberdeen Journals Ltd.

The first of the modern Scottish athletic games was instituted about 90 years later at Braemar and Strathdon (the Lonach gathering). Other meetings, notably at Ballatar and Aboyne in Aberdeenshire, at Oban (the Argyll gathering), and at Dunoon (the Cowal gathering), followed between 1864 and 1871. There are currently about 40 major meetings and gatherings in Scotland alone, the Braemar gathering being the most prestigious.

The local chief, if there is one, usually acts as president and at some gatherings is received with ceremony and escorted to his place to the music of the bagpipes. At the Lonach gathering, the clansmen, armed with pikes, follow their chief to the arena. Athletic events in the Highland Games include the usual flat and hurdle races, long and high jumps, pole vault, throwing the hammer, and tossing the weight. In these last two events, there are links with the past in the wooden shaft of the hammer (though the original hammer head is replaced by an iron ball) and in the round stone ball used for putting at many games. An exclusively Highland event is tossing the caber, a tapered fir pole about 17 feet (5 m) long and about 90 pounds (40 kg) in weight that must be thrown so that it turns end over end and comes to rest with the small end pointing away from the thrower. Competitors in tossing the weight and tossing the caber must wear the kilt. Competitions in bagpipe music and Highland dancing also form an important part of the meetings.

Highland Park, city, northern residential suburb of Chicago, Lake county, northeastern Illinois, U.S. White settlement of the site began in 1834, and by the turn of the century Highland Park had become a wealthy residential suburb. Ravinia Park (36 acres [15 hectares]) was established in 1905 as an amusement park. The park has become the location of one of the nation's most prominent music festivals and is the summer home of the Chicago Symphony Orchestra. Inc. 1869. Pop. (1987 est.) 30,670.

Highland Park, city, Wayne county, southeastern Michigan, U.S., surrounded by Detroit. Settled in the early 1800s, it was first called Nabors and then Whitewood. It was incorporated as a village in 1889, adopting its present name (after a local ridge, since leveled). Henry Ford opened his first (Model T) automobile plant there in 1910, introducing the assembly-line method of production. After the Model T was discontinued in 1927, the assembly operations were moved to Dearborn. Highland Park's diversified industry is now led by the Chrysler Corporation administrative, engineering, and research centre and the Ford Motor Company tractor plant. Highland Park Community College was established in 1918. Inc. city, 1918. Pop. (1987 est.) 25,745.

Highlands, the, also called SCOTTISH HIGHLANDS, major physiographic and cultural division of Scotland, lying northwest of a line drawn from Dumbarton, near the head of the Firth of Clyde on the western coast, to Stonehaven, on the eastern coast. The western offshore islands of the Inner and Outer Hebrides and Arran and Bute are sometimes included in the division. Gaelic customs and language survive in the Highlands.

Highmore, Joseph (b. June 13, 1692, London—d. March 1780, Canterbury, Kent, Eng.), English portrait painter who was stylistically associated with the English Rococo.

In about 1714 Highmore left Sir Godfrey Kneller's academy. In Highmore's early work he adapted Kneller's style of portraiture to a more realistic if less masterful rendering. Highmore's style was affected by French Rococo artists, such as Philippe Mercier and Hubert Gravelot, who were established in London during the 1730s and 1740s. But their influence is traceable less in Highmore's portraits than in his genre illustrations. In 1744 he painted a series of 12 illustrations

"Pamela Asks Sir Jacob Swinford's Blessing," illustration no. 11 for *Pamela* by Samuel Richardson, oil painting by Joseph Highmore, 1744; in the Tate Gallery, London
By courtesy of the trustees of the Tate Gallery, London; photograph, J.R. Freeman & Co. Ltd.

for Samuel Richardson's novel *Pamela,* which suggest comparison with William Hogarth's "Marriage à la Mode." Highmore's work is less boisterous and satirical and more refined than Hogarth's, however.

Consult the INDEX *first*

Hightower, Rosella (b. Jan. 30, 1920, Ardmore, Okla., U.S.), American ballerina and ballet teacher.

Hightower began ballet classes in Kansas City, Mo., with Dorothy Perkins in 1928. When she was 17 years old she studied in Europe, first performing with Leonide Massine's Ballet Russe (1938–41). Hightower then performed primarily with Marquis George de Cuevas' company until his death in 1961, after which she formed the Centre of Classical Dance in Cannes, Fr.

Hightower served as the director of the Marseille Opera Ballet (1969–72) and also of the Nancy Grand Theatre (1973–74); in 1980 she was appointed director of the Paris Opéra Ballet.

highway, major road, usually in rural areas, but more recently a rural or urban road where points of entrance and exit for traffic are limited and controlled. *See* road.

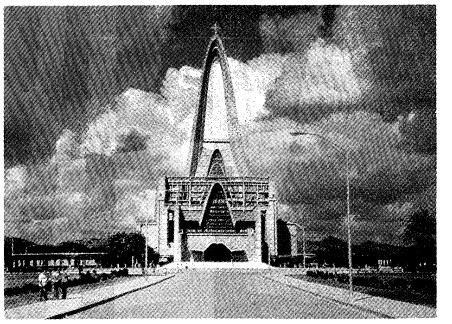
Higuchi Ichiyō, pseudonym of HIGUCHI NATSU, also called HIGUCHI NATSUKO (b. May 2, 1872, Tokyo—d. Nov. 23, 1896, Tōkyō), poet and novelist, the most important Japanese woman writer of her period, whose characteristic works dealt with the licensed pleasure quarters of Tokyo.

She had a comfortable childhood as the daughter of a low-ranking government employee. Upon the death of her father in 1889, however, she suddenly found herself the sole support of her mother and younger sister, and she lived in hardship and poverty until her own death at the age of 24. Ichiyō had studied classical literature at a relatively well-known poetry school for several years when the success of a classmate in publishing fiction encouraged her to try writing as a means of earning a living.

Higuchi Ichiyō, 1896
By courtesy of the Nippon Kindai Bungaku-kan, Tokyo

In 1891 she was introduced to a minor novelist, Nakarai Tōsui, who became an important inspiration for the literary diary that she kept from 1891 to 1896, published as *Wakabakage* ("The Shadow of Young Leaves"). Ichiyō ignored Tōsui's chief suggestion, namely that she use colloquial language in her writing, and proceeded to polish her own distinctive classical prose style. She wrote with sensitivity chiefly of the women of the old Tokyo downtown area, at a time when traditional society was giving way to industrialization. Her works include *Otsugomori* (1894; *The Last Day of the Year*) and her masterpiece, *Takekurabe* (1895; *Growing Up*), a delicate story of children being reared on the fringes of the pleasure district.

Higüey, in full SALVALEÓN DE HIGÜEY, city in the wide coastal lowland of the southeastern Dominican Republic. Founded in 1502 by Juan Ponce de León, Higüey has long been



Basilica in Higüey, Dominican Republic
John Donald

a pilgrimage centre known for its elaborate shrine of the Virgin, which houses a magnificent altar.

The city is a commercial as well as a religious and administrative centre. The surrounding area produces cacao, corn (maize), rice, cattle, and dairy products. A paved highway leading eastward from Santo Domingo ends in Higüey; secondary highways run from the town to the northern and southern coasts. Pop. (1981 prelim.) 33,501.

Hiisi (Finnish god): *see* Tapio.

Hiiumaa, German DAGÖ, or DAGDEN, Russian KHIUMA, Swedish DAGÖ, island, Estonian Soviet Socialist Republic. It lies in the Muhu archipelago in the Baltic Sea, northwest of the Gulf of Riga. Hiiumaa is the northernmost of the three larger islands forming the archipelago. It is separated from the island of Saaremaa to the south by Soela Strait and from the mainland to the east by Muhu Strait. Hiiumaa is a low-lying island of 373 square miles (965 square km), composed of limestone and marine sedimentaries.

The island, owned by the Brothers of the Sword in the early 13th century and the Teutonic Knights from 1237, was settled by Germans and Swedes. It came under the rule of Denmark in 1560, Sweden in 1582, Russia in 1721, and Estonia in 1920. The village of Kärdla has about one-third of the island's population and lies on the northeastern coast. Livestock herding, farming, fishing, and fish processing are major economic activities. Pop. (1970 est.) 9,700.

hijacking, also spelled HIGH-JACKING, the illegal seizure of a land vehicle, aircraft, or other conveyance while it is in transit. Although in the late 20th century the term hijacking most frequently referred to the seizure of an airplane and its forcible diversion to destinations chosen by air pirates, the term may also be used to describe acts of illegal seizure of such vehicles as railroad cars, trucks, and automobiles. In the United States in the 1920s (when the term originated), hijacking for the most part referred to on-the-road thefts of truckloads of illegally manufactured liquor or to the similar seizure of rumrunners at sea. By the mid-1950s, use of the term had been broadened to encompass the hijacking of trucks carrying legitimate cargo, as well as the hijacking of legal ships.

Airplane hijacking is also known as skyjacking. The first such hijacking within the United States occurred on May 1, 1961, when a man forced a commercial airliner enroute from Miami to Key West, Fla., to detour to Cuba. By the end of 1961, four planes had been hijacked to Cuba. Most of the planes that were subsequently skyjacked in the United States or elsewhere in the Western Hemisphere were flown to Cuba by either homesick Cubans or politically motivated leftists. Some skyjackings were purely financially motivated, with the skyjackers calling for huge ransom payments in exchange for ensuring the safety of the passengers and crew. Few of these latter attempts were successful.

A more dangerous and destructive spate of hijackings began in Europe and the Middle East from 1968 onward. The participants were usually politically motivated Palestinians or other Arabs who commandeered aircraft while in flight and threatened harm to the passengers and crew unless certain of their comrades were released from jail in Israel or some other location. Some of these hijackers also held the passengers and crew hostage and demanded large ransom payments from those people's governments. The climax of this new form of terrorism occurred in September 1970, when an 11-day sequence of skyjackings resulted in 300 passengers being held hostage for a week and the destruction of four jet aircraft (on the ground) worth a total of $50,000,000. Arab and other leftist hijackers abducted, confined, and even occasionally murdered individuals traveling on airplanes that were diverted from scheduled routes. The threat that airplane hijacking posed to international communications as well as to the lives and safety of crews and passengers was unparalleled since the days of high-seas piracy. An international agreement to apprehend, extradite, and punish hijackers was difficult to obtain, however, because several Middle Eastern governments that were overtly or secretly involved in hijackings considered such acts to be ones of political expedience rather than criminal offenses.

Hijackings continued to occur in sizable numbers in the early 1970s and in 1973 the U.S. Federal Aviation Administration instituted systematic searches of each airline passenger and his hand luggage. A magnetometer, an electronic device that could detect metal objects, was used to check passengers for weapons. Carry-on luggage and other belongings of passengers were searched by hand or by low-pulse X-ray machines. Local armed guards were stationed at the search points and at other airport locations such as embarkation gates. Many other countries, mostly in Europe, adopted similar measures in their airports, which generally proved effective. The number of hijackings decreased significantly in 1973 and 1974, but the practice still continued to occur despite airport precautions and long jail sentences for convicted hijackers in most Western countries.

Beginning as early as 1963, the United Nations had urged member nations to sign an international convention against hijackers, which had been drafted in Tokyo. Seven years later, on Dec. 16, 1970, 50 nations meeting at The Hague signed a convention for the suppression of unlawful seizure of aircraft. It specifically designated that the unlawful seizure of an aircraft in flight, employing force, threat of force, or intimidation, was an extraditable offense in any extradition treaty between the signatories.

In 1978 at a seven-nation summit meeting in Bonn, the United States, Italy, Canada, Japan, Great Britain, France, and West Germany pledged to institute sanctions against nations that gave sanctuary to hijackers. In that same year the nine member states of the European Economic Community (EEC) agreed to boycott the airline of any nation that harboured hijackers or that refused to release hijacked aircraft. The threat of being denied landing rights in the EEC countries' airports proved

effective, and several Middle Eastern nations that had previously provided sanctuary for hijackers and hijacked aircraft now ceased to do so. In the 1980s air hijackings continued to occur, though the security and punishment measures that had been instituted in most countries probably served to deter a much greater number from being committed.

Ḥijāz, al- (Saudi Arabia): *see* Hejaz.

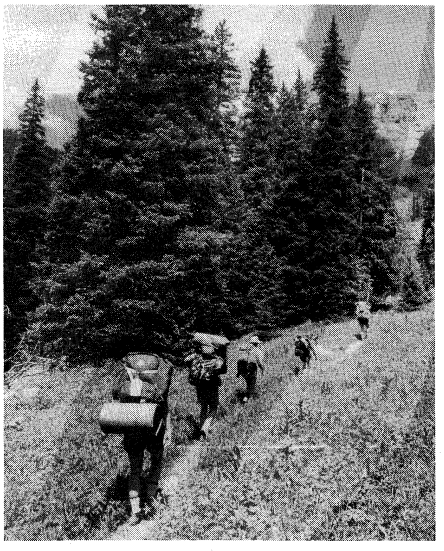
Hijra: *see* Hegira.

hijiri (Japanese: "holy man"), in Japanese religion, a man of great personal magnetism and spiritual power, as distinct from a leader of an institutionalized religion. Historically, *hijiri* has been used to refer to sages of various traditions, such as the shaman, Shintō mountain ascetic, Taoist magician, or Buddhist reciter. Most characteristically *hijiri* describes the wandering priest who operates outside the orthodox Buddhist tradition to meet the religious needs of the common people.

hike (Egyptian religion): *see* heka.

hiking, walking as a recreational activity and sport. Especially among those with sedentary occupations, hiking is a natural exercise that promotes physical fitness, is economical and convenient, and requires no special equipment. Because the hiker can walk as far as he wants, there is no physical strain unless he walks among hills or mountains.

Many persons walk alone, mainly on weekends or holidays; but youth clubs and other groups arrange rambles, or hikes. The normal length of the walk undertaken is from 7 to 12 miles (11 to 19 km), for a half day or from 12 to 20 miles (19 to 32 km) for a full day. These organized rambles, combining exercise with



Hikers on the trail to Ice Lake basin in San Juan National Forest, Colorado

© Tom Bean

enjoyment of the countryside, are in country districts surrounding large towns and follow a planned route. Most densely populated European towns have hiking trails outside them.

For regular and intensive walkers there are available services offered by such associations as the Ramblers' Association in Great Britain and the Wilderness Society in the United States. These organizations encourage hiking and preserve footpaths, bridle paths, and rights of way in parkland and recognized open spaces in areas of natural beauty against the encroachment of builders, local authorities, and national undertakings. They also help hikers to obtain hostel accommodation and, by exchange of information and services, enable persons of one country to pursue these activities in others. The Appalachian Trail Conference (U.S.), with the aid of its member organizations in 14 states, maintains campsites and a trail more than 2,000 miles (3,200 km) long between Mount Katahdin in Maine and Mount Oglethorpe in Georgia; it publishes information on conditions of the camps and trail.

Hiking, in addition to being a sport in itself, is basic to many other sporting activities and is also a widely recommended and practiced form of physical training. Hiking, for example, constitutes a large part of mountain climbing; experienced mountaineers know they must train themselves for the long, arduous hikes over the lower trails and across glaciers and snow fields. Back-pack camping, hunting, cross-country skiing and snowshoeing, and orienteering are other sports in which hiking is important. The ability to walk considerable distances without becoming overtired (an ability generally acquired through practice) also enhances the enjoyment of such other activities as bird watching, nature walks, field trips of all sorts, and even sightseeing.

Hiking is used as a test of fitness, notably in England, where it is embraced in the Duke of Edinburgh's scheme for boys, and in Sweden and The Netherlands. In Sweden, it was made a national fitness test in the early 1930s and by the 1970s more than 3,000,000 Swedish men, women, and boys possessed the time qualification badge. The Nijmegen marches in The Netherlands, organized by the Dutch League of Physical Culture, are open to the world in both civilian and military categories. The test comprises four separate days' consecutive walking over distances up to 35 miles (56 km) each day, with about 12,000 persons taking part.

Hikmet, Nazım, also called NAZIM HİKMET RAN (b. 1902, Salonika, Ottoman Empire [now Thessaloníki, Greece]—d. June 2, 1963, Moscow), poet who was one of the most important and influential figures in 20th-century Turkish literature.

The son of an Ottoman government official, Nazım Hikmet grew up in Anatolia; after briefly attending the Turkish naval academy, he studied economics and political science at the University of Moscow. Returning home as a Marxist in 1924 after the advent of the new Turkish Republic, he began to work for a number of journals and started Communist propaganda activities. In 1951 he left Turkey forever after serving a lengthy jail sentence for his radical and subversive activities. From then on he lived in the Soviet Union and eastern Europe, where he continued to work for the ideals of world Communism.

His mastery of language and introduction of free verse and a wide range of poetic themes strongly influenced Turkish literature in the late 1930s. After early recognition with his patriotic poems in syllabic metre, in Moscow he came under the influence of the Russian Futurists, and by abandoning traditional poetic forms, indulging in exaggerated imagery, and using unexpected associations, he attempted to "depoetize" poetry. Later his style became quieter, and he published *Şeyh Bedreddin destanı* (1936; "The Epic of Shaykh Bedreddin"), about a 15th-century revolutionary religious leader in Anatolia; and *Memleketimden insan manzaraları* ("Portraits of People from My Land"), a 20,000-line epic. Although previously censored, after his death in 1963 all his works were published and widely read, and he became a poet of the people and a revolutionary hero of the Turkish left. Many of his works have been translated into English, including *Selected Poems* (1967), *The Moscow Symphony* (1970), *The Day Before Tomorrow* (1972), and *Things I Didn't Know I Loved* (1975). Nazım Hikmet is also known for his plays, which are written in vigorous prose and are also mainly Marxist inspired.

Hikobē (Japanese painter): *see* Okada Beisanjin.

Hikone, city, Shiga *ken* (prefecture), Honshu, Japan, on the eastern shore of Lake Biwa. The city grew around the castle built by the Ii family in 1603. Hikone is now a tourist centre, its

The castle in Hikone, Japan

FPG—EB Inc.

visitors attracted by the castle and parts of the old castle town. Industries along the Nagoya–Kōbe expressway near Hikone include textile, cement, and pulp factories. Pop. (1985) 94,-205.

Hikotarō (Japanese soldier): *see* Maebara Issei.

hilāl (symbol): *see* crescent.

Hilaria, in botany, genus of perennial grasses in the family Poaceae, consisting of about seven species native primarily to warm, dry areas of southern North America. They are known variously as galleta, big galleta, and curly mesquite.

Curly mesquite (*H. belangeri*) and galleta (*H. jamesii*) are palatable to livestock when fresh and green. All the species, however, are important range grasses.

Hilaria, in Roman religion, day of merriment and rejoicing in the Cybele-Attis cult and in the Isis-Osiris cult, March 25 and November 3, respectively. It was one of several days in the festival of Cybele that honoured Attis, her son and lover: March 15, his finding by Cybele among the reeds on the bank of the River Gallus; March 22, his self-mutilation; March 24, fasting and mourning at his death; and March 25, the Hilaria, rejoicing at his resurrection. Some of the activities on the Hilaria resembled those associated with April Fools' Day. November 3, the Hilaria of the Isis-Osiris cult, marked the resurrection of Osiris, husband of Isis.

Hilarion, SAINT (b. *c.* AD 291, Tabatha, Palestine [near modern Gaza, Israeli-occupied Egypt]—d. 371, Cyprus; feast day October 21), monk and mystic who founded Christian monasticism in Palestine modeled after the Egyptian tradition.

Most knowledge about Hilarion derives from a semi-legendary and rhetorically embellished account of his life written *c.* 391 by the Latin biblical scholar Jerome, using material by Epiphanius of Salamis (Cyprus), an influential 4th-century theologian-chronicler. Jerome greatly exaggerated Hilarion's importance in order to glorify Palestinian monasticism, to which he himself belonged. Despite a histor-

ical nucleus, therefore, it is often difficult to determine the facts.

According to Jerome, Hilarion came from non-Christian parents and studied under a grammarian at Alexandria, where he became a Christian. He also came under the influence of the renowned desert ascetic Anthony of Egypt and followed his discipline for two months. Returning to Palestine in 306 at the age of 15, he instituted the eremitical life there by erecting a hut in the wilderness some seven miles from Maiuma, near Gaza, on the road to Egypt. He observed the strict ascetical regimen of fasting and chanting the Old Testament psalm prayers, and, like the Egyptian hermits, he wove baskets of rushes to earn his subsistence, possessing only a monk's garb, which he willed to a colleague at death. Jerome's account emphasizes Hilarion's proselytizing the Saracens and his wonder-working among the sick and demoniacs. After establishing the first Palestinian monastery in 329, Hilarion, seeking solitude, migrated to the monastic centre at Thebes, Egypt, thence through North Africa and Sicily, eventually settling in Cyprus. He is credited with prophesying the religious persecution decreed by Emperor Julian the Apostate (361–363). After death, his body was recovered by the monks of his original foundation in Gaza. A cult of veneration spread to Europe, especially about Venice and Pisa, Italy, and in parts of France.

Jerome's *Vita Sancti Hilarionis* ("Life of Saint Hilarion") is contained in the series *Patrologia Latina,* J.-P. Migne (ed.), vol. 23 (1864). An English translation appeared in *The Nicene and Post-Nicene Fathers,* 2nd series, vol. 6 (1900).

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Hilarion OF KIEV (fl. 11th century), the first native metropolitan of Kiev, who reigned from 1051 to 1054, and the first known Kievan Rus writer and orator.

A priest, Hilarion became the second archbishop of Kiev, the chief city in Rus at that time. Although Kievan bishops had all previously been appointed by the patriarch of Constantinople, Hilarion was chosen by Prince Yaroslav I the Wise and an assembly of Rus bishops. Scholars are divided in interpreting his election, but it is likely that an agreement on the matter had been reached between the Rus and Greek hierarchies.

Hilarion's importance to the Rus Church derives from the sentiments he expressed *c.* 1050 in his classically structured panegyric of Saint Vladimir (grand prince of Kiev 980–1015), the first Christian ruler of Kievan Rus and the institutor of Orthodoxy as the state religion. Entitled "Sermon on Law and Grace," the encomium not only rhetorically extolled the monarch for implanting the true religion in his country but also eulogized the Slavic people. Recalling the historical events by which Saint Vladimir uprooted the pre-Christian Slavic cults so that Christian worship and monasticism could flourish, Hilarion fused local patriotism with the universality of Christian belief in the inexorable unfolding of a divine plan of salvation. He showed a wide familiarity with Greek patristic and apologetic literature and styled his work in the form of Byzantine imperial panegyrics. His appreciation of Greek Orthodoxy is manifested by his concept of the Rus Church as the Slavonic version of Byzantine Christian culture.

Hilarius (fl. 1125), medieval poet and wandering scholar, a pupil of Peter Abelard and associated with Angers, Anjou.

Hilarius wrote light verse of great charm in Latin, including poems dedicated to English persons—which has led to the otherwise unsupported theory that he was English himself. His fame rests on three Latin religious plays, two of which, like two of his poems, have French refrains. Those on the raising of Lazarus and on Daniel were written to be performed at matins or vespers. Both follow the biblical narrative fairly closely. The third play, which bears no trace of liturgical performance, is on a nonbiblical subject: the legend of the image of St. Nicholas. All three plays show variety of metre, great liveliness and dramatic power. The French refrains (lacking in the play on Daniel), which are a lyrical addition, not an interpretation of the Latin, give an impression of directness and freshness.

Hilary, SAINT, Latin HILARIUS (b. Sardinia—d. Feb. 29, 468; feast day February 28), pope from 461 to 468.

As Pope St. Leo I's legate to the so-called robber synod of Ephesus (449), he opposed the deposition of Patriarch Flavian of Constantinople, whose dying appeal to Rome evoked the celebrated *Tome* of Leo. The work condemned Eutychianism, a heresy that held that the human aspect of Christ's nature was subsumed by his divinity. After supporting Flavian, Hilary fled to Rome, where he was elected Leo's successor. His letters show him as a wise and zealous administrator, correcting abuses and solving disputes submitted from southern Gaul and Spain. His synod of 465 is the oldest Roman synod of which the acts survive.

Hilary OF ARLES, SAINT, Latin HILARIUS (b. 401, probably northern Gaul—d. May 5, 449, Arles; feast day May 5), Gallo-Roman bishop of Arles who is often regarded as providing the occasion for extending papal authority in Gaul.

While young, he entered the Abbey of Lérins that was presided over by his kinsman Honoratus, who later became bishop of Arles. In 429, Hilary succeeded Honoratus as bishop and vigorously promoted reforms through several councils, including that of Orange (441). His enthusiasm led him to interfere with provinces outside his metropolitan jurisdiction: in 443–444, he deposed Bishop Chelidonius of Besançon, irregularly replacing him with another bishop, Projectus, an act that was quashed by Pope St. Leo I the Great, who deprived Hilary of all metropolitan rights but did not remove him from his see. These measures, to which Hilary submitted, were endorsed by a decree of the Western Roman emperor Valentinian III.

Hilary OF POITIERS, SAINT, Latin HILARIUS (b. *c.* 315, Poitiers, Gaul—d. *c.* 367, Poitiers; feast day January 13), Gallo-Roman doctor of the church who as bishop of Poitiers was a champion of orthodoxy against Arianism (*q.v.*) and was the first Latin writer to introduce Greek doctrine to Western Christendom.

A convert from Neoplatonism, Hilary was elected bishop of Poitiers (*c.* 353). He was exiled (356–360) to Phrygia by the Roman emperor Constantius II for not condemning the leading opponent of Arianism, St. Athanasius the Great, at the Council of Béziers (356).

While in Phrygia, he wrote *De trinitate,* the first work in Latin to deal with the issues of the Trinitarian controversies. In *De synodis* ("Concerning the Synods") he explained the history of the Arian controversy and directed the faithful in the East to rally against those who believed the Son was unlike the Father. His appeals to Constantius were unsuccessful, and he was expelled from the East. Returning to Poitiers, he spent his last years combatting Arianism in Gaul and writing his commentary on the Psalms and *Tractatus mysteriorum* on typology. His reaffirmation of orthodoxy, almost alone in Gaul, earned him the title of the Athanasius of the West. Probably the earliest hymnist, he composed a book of lyrics (*c.* 360). He was declared a doctor of the church in 1851 by Pope Pius IX.

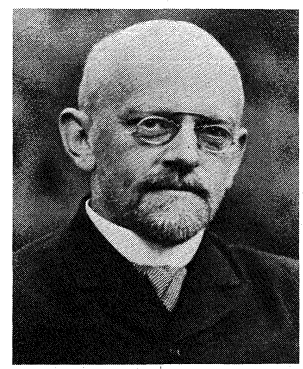
Hilberseimer, Ludwig (b. Sept. 14, 1885, Karlsruhe, Ger.—d. May 6, 1967, Chicago), German-born U.S. city planner who founded in 1928 the Department of City Planning at the Bauhaus, Dessau.

An original and logical thinker, his first project for a new city was essentially two cities on top of one another, dwelling houses for workers being built above the offices and workshops. Later he developed a linear form of city with housing and industrial units related horizontally.

In 1938 Hilberseimer went to the United States as professor of city planning at the Illinois Institute of Technology, Chicago, and there demonstrated further the implications of the decentralization of cities with a plan for Chicago, and in regional planning studies showing the possibilities for integrating agriculture, industry, and transportation. His writings include *The New City* (1944); *The New Regional Pattern* (1949); and *The Nature of Cities* (1955).

Hilbert, David (b. Jan. 23, 1862, Königsberg, Prussia—d. Feb. 14, 1943, Göttingen, Ger.), German mathematician who reduced geometry to a series of axioms and contributed substantially to the establishment of the formalistic foundations of mathematics. His work in 1909 on integral equations led to 20th-century research in functional analysis.

The first steps of Hilbert's career occurred at the University of Königsberg, at which, in 1884, he finished his *Inaugurel-dissertation* (Ph.D.); he remained at Königsberg as a *Privatdozent* (lecturer, or assistant professor) in 1886–92, as an *Extraordinarius* (associate professor) in 1892–93, and as an *Ordinarius* in 1893–95. In 1892 he married Käthe Jerosch, and they had one child, Franz. In 1895 Hilbert



Hilbert

By courtesy of the University Library, Gottingen, W.Ger.

accepted a professorship in mathematics at the University of Göttingen, at which he remained for the rest of his life.

The University of Göttingen had a flourishing tradition in mathematics, primarily as the result of the contributions of Carl Friedrich Gauss, Peter Gustav Lejeune Dirichlet, and Bernhard Riemann in the 19th century. During the first three decades of the 20th century this mathematical tradition achieved even greater eminence, largely because of Hilbert. The Mathematical Institute at Göttingen drew students and visitors from all over the world.

Hilbert's intense interest in mathematical physics also contributed to the university's reputation in physics. His colleague and friend, the mathematician Hermann Minkowski, aided in the new application of mathematics to physics until his untimely death in 1909. Three winners of the Nobel Prize for Physics—Max von Laue in 1914, James Franck in 1925, and Werner Heisenberg in 1932—spent

significant parts of their careers at the University of Göttingen during Hilbert's lifetime.

In a highly original way, Hilbert extensively modified the mathematics of invariants—the entities that are not altered during such geometric changes as rotation, dilation, and reflection. Hilbert proved the theorem of invariants—that all invariants can be expressed in terms of a finite number. In his *Zahlbericht* ("Commentary on Numbers"), a report on algebraic number theory published in 1897, he consolidated what was known in this subject and pointed the way to the developments that followed. In 1899 he published the *Grundlagen der Geometrie* (*The Foundations of Geometry*, 1902), which contained his definitive set of axioms for Euclidean geometry and a keen analysis of their significance. This popular book, which appeared in 10 editions, marked a turning point in the axiomatic treatment of geometry.

A substantial part of Hilbert's fame rests on a list of 23 research problems he enunciated in 1900 at the International Mathematical Congress in Paris. In his address, "The Problems of Mathematics," he surveyed nearly all the mathematics of his day and endeavoured to set forth the problems he thought would be significant for mathematicians in the 20th century. Many of the problems have since been solved, and each solution was a noted event. Of those that remain, however, one, in part, requires a solution to the Riemann hypothesis, which is usually considered to be the most important unsolved problem in mathematics (*see* number theory).

In 1905 the first award of the Wolfgang Bolyai prize of the Hungarian Academy of Sciences went to Henri Poincaré, but it was accompanied by a special citation for Hilbert.

In 1905 (and again from 1918) Hilbert attempted to lay a firm foundation for mathematics by proving consistency—that is, that finite steps of reasoning in logic could not lead to a contradiction. But in 1931 the Austrian–U.S. mathematician Kurt Gödel showed this goal to be unattainable: propositions may be formulated that are undecidable; thus, it cannot be known with certainty that mathematical axioms do not lead to contradictions. Nevertheless, the development of logic after Hilbert was different, for he established the formalistic foundations of mathematics.

Hilbert's work in integral equations in about 1909 led directly to 20th-century research in functional analysis (the branch of mathematics in which functions are studied collectively). His work also established the basis for his work on infinite-dimensional space, later called Hilbert space, a concept that is useful in mathematical analysis and quantum mechanics. Making use of his results on integral equations, Hilbert contributed to the development of mathematical physics by his important memoirs on kinetic gas theory and the theory of radiations. In 1909 he proved the conjecture in number theory that for any n, all positive integers are sums of a certain fixed number of nth powers; for example, $5 = 2^2 + 1^2$, in which $n = 2$. In 1910 the second Bolyai award went to Hilbert alone and, appropriately, Poincaré wrote the glowing tribute.

The city of Königsberg in 1930, the year of his retirement from the University of Göttingen, made Hilbert an honorary citizen. For this occasion he prepared an address entitled "Naturerkennen und Logik" ("The Understanding of Nature and Logic"). The last six words of Hilbert's address sum up his enthusiasm for mathematics and the devoted life he spent raising it to a new level: "Wir müssen wissen, wir werden wissen" ("We must know, we shall know"). In 1939 the first Mittag-Leffler prize of the Swedish Academy went jointly to Hilbert and the French mathematician Émile Picard.

The last decade of Hilbert's life was darkened by the tragedy brought to himself and to so many of his students and colleagues by the Nazi regime. (I.K.)

BIBLIOGRAPHY. Hilbert's collected works, *Gesammelte Abhandlungen,* 3 vol. (1932–35, reprinted 1965; 2nd ed., 1971), contain almost all of Hilbert's papers, including the *Zahlbericht;* there are also assessments of his work by other mathematicians. Four of his six books have been translated into English, but the *Zahlbericht* is available only in German and French. Constance Reid, *Hilbert* (1970), is a full-length biography. Kurt Reidemeister (ed.), *Gedenkband* (1971), contains some previously unpublished papers of Hilbert and also the recording of his 1930 speech.

Hilda OF WHITBY, SAINT, Hilda also spelled HILD (b. 614, Northumbria—d. Nov. 17, 680, Whitby, Yorkshire, Eng.; feast day November 17), founder of Streaneshalch (now Whitby) Abbey and one of the foremost abbesses of Anglo-Saxon England. With Bishops SS. Colman of Lindisfarne and Cedd of the East Saxons, she led the Celtic party at the Synod of Whitby (663/664).

She was baptized (*c.* 627) with her great-uncle King Edwin of Northumbria. Later she became abbess of Hartlepool Abbey, Durham, and in 654/655 was entrusted with the upbringing of the daughter of King Oswiu, Edwin's successor. The child's name was Aelfflaed (later St. Aelfflaed). The King also gave Hilda the land on which she founded (*c.* 657) a double monastery of monks and nuns at Streaneshalch. Her abbey became one of the great religious centres of northeastern England. Among its members was Caedmon, the earliest English Christian poet. In 663/664 Streaneshalch housed the Synod of Whitby, summoned by Oswiu to settle the dispute over the date of Easter. Hilda supported the Celtic Church and opposed the Wilfridian party led by the Northumbrian bishop St. Wilfrid, who supported the Roman Church. Unlike Colman, Hilda submitted to Oswiu's decision in favour of the Wilfridian party.

Hildebrand (pope): *see* Gregory VII, Saint.

Hildebrand, Adolf von (b. Oct. 6, 1847, Marburg, Ger.—d. Jan. 18, 1921, Munich), German artist and one of the first sculptors of the 19th century to insist upon the aesthetic autonomy of sculpture from painting, a doctrine he most effectively promulgated in *Das Problem der Form in der bildenden Kunst* (1893), which helped establish the theoretical foundation for modern sculpture.

The son of the economist Bruno Hildebrand, he studied first at the Kunstschule, Nürnberg, and then with the sculptors Kaspar von Zumbusch in Munich and Rudolf Siemering in Berlin. He lived in Italy (1872–97), where he became friendly with the art theorist Konrad Fiedler and the painter Hans von Marées, whose views on form were to be fundamental to Hildebrand's aesthetics of sculpture. In his most important work, the Wittelsbach Fountain (Maximilian-platz, Munich), he suppressed naturalistic detail, emphasizing instead compact form and clarity of design derived from ancient Greek sculpture. Although his emphasis on pure form led eventually to abstract sculpture, his own work sacrifices wit and spontaneity to formal rigour and academic composition.

Hildebrand, Joel H. (b. Nov. 16, 1881, Camden, N.J., U.S.—d. April 30, 1983, Kensington, Calif.), U.S. educator and chemist whose monograph *Solubility* (1924; later editions, *Solubility of Non-Electrolytes*) was the classic reference for almost a half century.

Hildebrand spent the greater part of his professional life at the University of California, Berkeley, where he was in turn dean of the College of Letters and Science and the College of Chemistry.

Hildebrand was the author of more than 200 scientific papers and a number of chemistry texts and was sought as a speaker and consultant in the United States and abroad. Cited for his research and consultative services in World Wars I and II, he received the Distinguished Service Medal in 1918 and the King's Medal (British) in 1948. Among his publications were *An Introduction to Molecular Kinetic Theory* (1963), *Principles of Chemistry,* (7th ed., 1964), *Regular and Related Solutions* (with J.M. Prausnitz and R.L. Scott, 1970), and *Viscosity and Diffusivity* (1977).

Hildebrandslied, English SONG OF HILDEBRAND, Old High German alliterative heroic ballad on the fatalistic theme of a duel of honour between a father and a son. The fragmentary ballad, dating from *c.* 800, is the sole surviving record of Old High German heroic poetry. Its hero, Hildebrand, appears in Germanic legend as an elder warrior, a magician, and an adviser and weapons master to Dietrich von Bern, the poetic incarnation of the Ostrogothic king Theodoric the Great. In the *Song of Hildebrand* the hero is forced into a duel by the aggressions of a young warrior, Hadubrand, who does not know that Hildebrand is his father. Though the fragment stops short of a conclusion, it leaves no doubt that Hildebrand kills his son.

An inferior 15th-century version, *The Younger Lay of Hildebrand,* ends in the reconciliation of the two men.

Hildebrandt, Johann Lucas von (b. Nov. 14, 1668, Genoa—d. Nov. 16, 1745, Vienna), Austrian Baroque architect and military engineer whose work strongly influenced the architecture of central and southeastern Europe in the 18th century. The types of buildings he developed for parish churches, chapels, villas, garden pavilions, palaces, and houses were much imitated, spreading his architectural principles throughout and beyond the Habsburg empire.

Born in Italy of German parents, Hildebrandt studied architecture, town planning,

Garden facade of Belvedere Palace, Vienna, by Johann Lucas von Hildebrandt
Foto Marburg—Art Resource/EB Inc.

and military engineering in Rome. He joined the Austrian Imperial Army as a fortification engineer and participated (1695–96) in three Piedmontese campaigns under Prince Eugene of Savoy, afterward moving to Vienna and turning to civil architecture. In 1700 he was appointed court engineer and employed as an architect by Prince Eugene and other Austrian aristocrats, in Vienna, in Salzburg, and in southern Germany.

After the death of the Baroque architect Johann Fischer von Erlach, a strong influence on Hildebrandt, the younger man became the leading court architect. The main elements of his style were derived from the French architectural era of Louis XIV and from north Italian late-Baroque models, particularly the undulating walls of the Italian architect Guarino Guarini. He became famous for his architectural decoration, articulating the surface of his buildings with quasipictorial effects and introducing new motifs of decoration.

Of Hildebrandt's numerous works some of the most outstanding are the Belvedere in Vienna, summer residence of Prince Eugene of Savoy (1700–23); Schönborn Castle near Göllersdorf, northwest of Vienna (1710–17); the Mirabell Palace (1721–27) in Salzburg; and the episcopal residence at Würzburg, Ger. (1729–37).

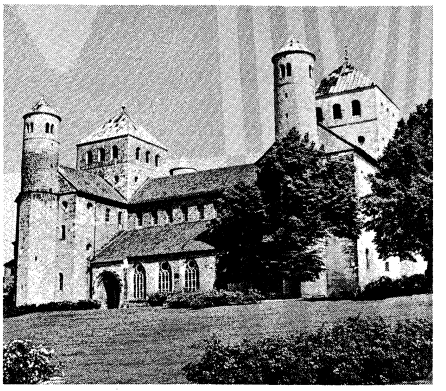
Hildegard, SAINT, byname SIBYL OF THE RHINE (b. 1098, Böckelheim, West Franconia—d. Sept. 17, 1179, Rupertsberg, near Bingen; traditional feast day September 17), German abbess and visionary mystic.

Hildegard was born of noble parents and was educated at the Benedictine cloister of Disibodenberg by Jutta, sister of the count of Spanheim, whom she succeeded as prioress in 1136. Having experienced visions since she was a child, at the age of 43 she consulted her confessor, who in turn reported the matter to the archbishop of Mainz. A committee of theologians subsequently confirmed the authenticity of Hildegard's visions, and a monk was appointed to help her record them in writing. The finished work, *Scivias* (1141–52), consisted of 26 visions, prophetic and apocalyptic in form, treatment of the church, the relationship between God and man, and redemption. In about 1147 she left Disibodenberg with several of her nuns to found a new convent at Rupertsberg, where she continued to exercise the gift of prophecy and to record her visions in writing.

Her numerous other writings include lives of saints; two treatises on medicine and natural history, reflecting a quality of scientific observation rare at that period; and extensive correspondence, in which are to be found further prophecies and allegorical treatises. She also for amusement contrived her own language. Though her earliest biographer proclaimed her a saint and miracles were reported during her life and at her tomb, she has not been formally canonized. She is, however, listed as a saint in the Roman Martyrology and is honoured on her feast day in certain German dioceses.

Hilden, city, North Rhine-Westphalia *Land* (state), northwestern Germany, situated on the Itter, an east-bank tributary of the Rhine, just southeast of Düsseldorf. The city grew out of an estate of the archbishops of Cologne, first mentioned in 1169, and it was chartered in 1861. Historical landmarks include the early town fortifications (Holterhöfchen), the parish church (1136), and the birthplace of Wilhelm Fabry (Fabricius Hildanus), the Renaissance doctor and "father of German surgery." Hilden's industry is diversified; the major traditional products are metals and textiles. The nearby Hilden Heide (heath) is a nature preserve with unusual flora. Pop. (1989 est.) 53,725.

Hildesheim, city, Lower Saxony *Land* (state), north-central Germany, located southeast of Hannover on the Innerste River in the foothills of the Harz Mountains. Originally it was a fort on the trade route between Cologne and Magdeburg. Louis I the Pious, son of Charlemagne, founded a bishopric there in 815, an event linked with the "thousand-year-old rosebush" (probably 300–500 years old) that



St. Michael's Church, Hildesheim, Ger.
Eric Carle—Shostal/EB Inc.

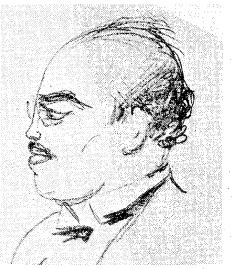
blooms above the east choir of the cathedral. Such great prelates as Bernward (bishop 993–1022) and Gotthard (bishop 1022–38) fostered Hildesheim's development as a cultural centre in the 11th century. It became a member of the Hanseatic League and was chartered in 1300. Its bishops were princes of the Holy Roman Empire until 1803, although they lost territory when the town accepted the Reformation in 1542. Hildesheim passed to Prussia in 1803 and then to Hanover in 1815.

Bombing during World War II damaged or destroyed nearly all of the historic buildings, some of which have been restored. Most notable are the cathedral, with magnificent art treasures from the 11th century, and St. Michael's Church, with a painted ceiling from the 12th century. Other landmarks are St. Gotthard's Church, the old Gothic town hall, and the Tempelhaus (1484–90). The Roemer-Pelizaeus-Museum has notable Egyptian and Greco-Roman collections.

Manufactures include cooking stoves, agricultural and dairy machinery, and radio and television equipment. Pop. (1989 est.) 103,512.

Hilferding, Rudolf (b. Aug. 10, 1877, Vienna—d. February 1941, Paris), Austrian-born German politician who was a leading representative of the Viennese development of Marxism and who served as finance minister in 1923 and 1928 in two German Social Democratic governments.

Hilferding turned to Socialism while he was a medical student and associated with Otto Bauer, Karl Kautsky, and August Bebel. In 1906 he became an instructor in the German



Hilferding, drawing by Emil Orlik, 1925
Archiv fur Kunst und Geschichte, Berlin

Social Democratic Party's training school in Berlin. The first volume of the *Marx Studien* series (1904–22), *Böhm-Bawerks Marx-Kritik* (*Böhm-Bawerk's Criticism of Marx*, 1966), was his original contribution to Marxist thought. In *Das Finanzkapital* (1910) he maintained that the banks' increasing influence over industry led to monopoly and cartels and through them to economic imperialism and war; this work foreshadowed his role as the party's chief theorist and financial expert. He was political editor (1907–15) of *Vorwärts*, the main publication of the German Social Democrats. At the outbreak of World War I he opposed war credits. Conscripted into the Austrian Army, he served as a doctor on the Italian front. He acquired German citizenship *c.* 1920 and became chief editor of *Die Freiheit*, organ of the Independent Social Democrats. He was a Reichstag deputy from 1924 until he fled from Hitler's Germany in 1933. He drafted the Prague Program (January 1934) for exiled German Socialists. According to a dispatch from Berlin, he was found hanged in a Paris prison cell after his arrest by the French, who turned him over to the Nazis.

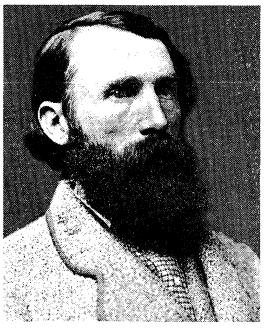
Hilgard, Ferdinand Heinrich Gustav: *see* Villard, Henry.

Hiligaynon, also called ILONGO, or PANAYAN, large ethnolinguistic group of the Philippines, living on Panay, western Negros, southern Mindoro, Tablas, Romblon, Sibuyan, Guimaras, and northwestern Masbate. Numbering about 4,200,000 in the mid-1970s, they speak a Visayan (Bisayan) language of the Austronesian (Malayo-Polynesian) family.

Geographically and culturally, the heartland of the Hiligaynon area lies along both sides of the broken straits separating Panay and Negros. The coastal cities of Iloilo, on the former, and Bacolod, on the latter, serve as economic and administrative centres for the region. Most Hiligaynon, however, live in small rural barrios where the main economic activity is farming or, occasionally, fishing. The major crops are rice, corn (maize), sugarcane, and coconuts.

Hill, A(mbrose) P(owell) (b. Nov. 9, 1825, Culpeper, Va., U.S.—d. April 2, 1865, Petersburg, Va.), Confederate general during the U.S. Civil War who was particularly active in the fighting around Washington, D.C. His force, called the "Light Division," was considered one of the best in the South.

After graduating from the U.S. Military Academy at West Point, N.Y., in 1847, Hill saw routine service before the outbreak of war. He joined the Confederate Army as a



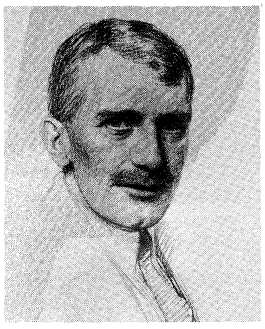
A.P. Hill
By courtesy of the Library of Congress, Washington, D.C.

colonel, serving primarily in northern Virginia. His regiment was held in reserve at the First Battle of Bull Run (July 1861), and, as brigadier general, he fought at Williamsburg (May 1862) in the Peninsular Campaign. As major general he led his "Light Division" in the Seven Days' Battles (June) at Mechanicsville, Gaines's Mill, and Frayser's Farm. Hill's troops helped repel the Federal attacks at the Second Battle of Bull Run (August) and assisted in capturing Harpers Ferry (Sep-

tember 14). Three days later he arrived at Antietam in time to check decisively the Federal assault against Gen. Robert E. Lee's right wing. Hill participated in the Battle of Fredericksburg (December) and was wounded at Chancellorsville (May 1863).

Promoted to lieutenant general in command of the III Corps, he had a prominent role in the Battle of Gettysburg (July). He was engaged in the Battle of the Wilderness (May 1864) and at Petersburg (April 1865), where he was killed.

Hill, A(rchibald) V(ivian) (b. Sept. 26, 1886, Bristol, Gloucestershire, Eng.—d. June 3, 1977, Cambridge), British physiologist and biophysicist, who received (with Otto Meyerhof) the 1922 Nobel Prize for Physiology or Medicine for discoveries concerning the production of heat in muscles, which helped



A.V. Hill, detail of a pencil drawing by F.W. Schmin, 1923
BBC Hulton Picture Library

establish the origin of muscular force in the breakdown of carbohydrates with formation of lactic acid in the absence of oxygen.

At the University of Cambridge (1911–14) he began his investigations of the physiological thermodynamics of muscle and nerve tissue. Working with a straplike thigh muscle in the frog, he was able to demonstrate that oxygen is needed only for the recovery, not the contractile, phase of muscular activity, laying the foundation for the discovery of the series of biochemical reactions carried out in muscle cells that results in contraction.

A professor of physiology at Manchester University (1920–23) and at University College, London (1923–25), he served as Fouleron research professor of the Royal Society from 1926 until his retirement in 1951. His written works include *Muscular Activity* (1926), *Muscular Movement in Man* (1927), and *Living Machinery* (1927). Hill also derived a mathematical expression—known as the "Hill equation"—for the uptake of oxygen by hemoglobin.

Hill, Aaron (b. Feb. 10, 1685, London—d. Feb. 8, 1750, London), English poet, dramatist, and essayist whose adaptations of Voltaire's plays *Zaïre* (*The Tragedy of Zara,* 1736) and *Mérope* (1749) enjoyed considerable success.

An optimistic speculator who engaged in various ambitious commercial enterprises, all without success, Hill was a kindly man who bored his friends and irritated them with unsolicited advice. After leaving school he travelled in the Near East, afterward publishing *A Full Account of the Present State of the Ottoman Empire* (1709). He married an heiress, produced Handel's opera *Rinaldo* (having himself translated the Italian libretto) at London's Haymarket Theatre, and in 1718 wrote *The Northern Star,* dedicated to Peter the Great of Russia, which the Tsar acknowledged by ordering a gold medal for Hill (the medal never arrived). Alexander Pope satirized Hill in *The Dunciad,* to which Hill retorted with *The Progress of Wit* (1730). His letters to Pope and others were published in 1751.

Hill, Abigail: *see* Masham, Abigail.

hill, abyssal (deep-sea formation): *see* abyssal hill.

Hill, David Octavius; and Adamson, Robert (respectively b. 1802, Perth, Perthshire, Scot.—d. May 17, 1870, Newington, near Edinburgh; b. 1821, Berunside, Scot.—d. Jan. 1848, St. Andrews), Scottish photographers who collaborated to produce some of the greatest photographic portraits of the 19th century.

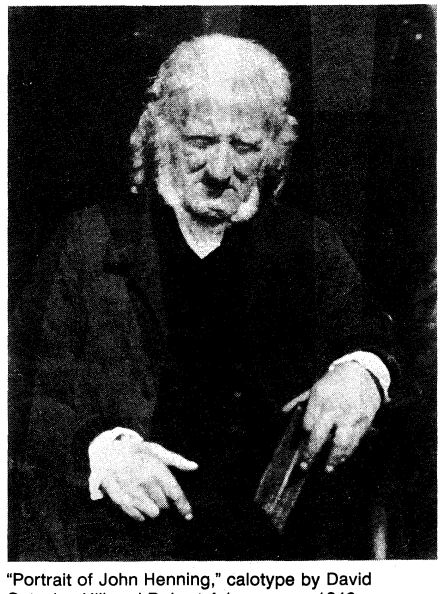
Originally a landscape painter, Hill made a name for himself at the age of 19 by publishing a series of landscapes printed by lithography. He was a founder member of the Royal Scottish Academy and was secretary of that organization for 40 years.

In 1843 Hill decided to paint a large commemorative picture of the founding of the Free Church of Scotland. In order to get an accurate record of the features of the several hundred delegates to the founding convention, Hill decided to make photographic portraits of each of them. He enlisted the collaboration of Robert Adamson, a chemist who for a year had made portraits in calotype, a photographic process by which an image is developed from a paper negative.

While Hill and Adamson made portraits of the delegates, most of the prominent Scots of the day came to watch the novel proceedings and have their own portraits made.

Hill and Adamson preferred the calotype to the daguerreotype because it suppressed details and emphasized the sitter's personality by allowing his face and hands to dominate the portrait. The portraits of the sculptor John Henning (before 1849) and of George Meikle Kemp (before 1845), architect of the Sir Walter Scott Monument in Edinburgh, show a masterful sense of form, composition, and dramatic use of light and shade.

Hill and Adamson did not restrict their activities to photographing Scotland's elite. They recorded many views of Edinburgh, especially



"Portrait of John Henning," calotype by David Octavius Hill and Robert Adamson, *c.* 1846
George Eastman House Collection

in Greyfriars' Churchyard. They also went to small fishing villages, where they did some of their best work, such as "Fishwife, Newhaven, Scotland" (before 1849).

After Adamson's death at the age of 27, Hill returned to painting. During their five years of collaboration, Hill and Adamson produced about 1,500 photographs.

Hill, George Washington (b. Oct. 22, 1884, Philadelphia—d. Sept, 13, 1946, Matapedia, Que., Can.), U.S. businessman whose marketing efforts introduced women to cigarettes.

Leaving Williams College before he graduated, Hill in 1904 went to work at the American Tobacco Company, where his father served as vice president. When the company bought the line of Pall Mall cigarettes, the younger Hill was put in charge of sales, and the cigarettes became the most popular among Turkish tobaccos. In 1911, the company was divided into four large competing firms as a result of a major antitrust suit. The senior Hill became president of the new American, and his son became sales manager. Six years later, they bought the Lucky Strike brand, and Hill made the new cigarette his pet project. He designed its marketing and advertising campaign, and by 1926 the cigarette accounted for one-fifth of U.S. cigarette sales. Hill became president of the firm. The next year (1927), Hill created an industry sensation by gearing advertising toward women for the first time. Female movie stars and singers lauded the brand, and soon Luckys controlled 38 percent of U.S. cigarette sales. At the beginning of the Great Depression, the company was thriving, and Hill's total salary was more than $2,000,000. Hill strongly believed in advertising and invested heavily in radio air time, sponsoring Your Hit Parade and the Jack Benny Show. He was an early sponsor for Frank Sinatra, Ethel Smith, and Lawrence Tibbett.

Hill, George William (b. March 3, 1838, New York City—d. April 16, 1914, West Nyack, N.Y., U.S.), U.S. mathematical astronomer considered by many of his peers to be the greatest master of celestial mechanics of his time. Among his many accomplishments, Hill was the first to use infinite determinants to analyze the motion of the Moon's perigee (1877). He also developed a theory of the motion of Jupiter and Saturn. His most significant theory, dealing with the effects of the planets on the Moon's motion, is considered fundamental in the development of celestial mechanics.

For his research on the motions of the Moon, Hill received the Gold Medal of the Royal Astronomical Society in 1887, and in 1898 he received the Damaiscan Prize from the Académie des Sciences. He was elected to the U.S. National Academy of Sciences (1874) and the Royal Society (1902), and from 1894 to 1896 he served as president of the American Mathematical Society.

Hill, (Norman) Graham (b. Feb. 15, 1929, London—d. Nov. 29, 1975, near London), British automobile racing driver who won the Grand Prix world championship in 1962 and 1968 and the Indianapolis 500 in 1966.

Trained as an engineer, Hill became a racing car mechanic and drove in his first race in 1954. From 1960 to 1966 he drove for British Racing Motors (BRM), winning his first major race at the Dutch Grand Prix in 1962. He drove in 176 Grand Prix races, a record total, winning more than 20 of them. In 1972 he won the Le Mans 24-hour Grand Prix d'Endurance. An articulate and thoughtful man, he served as a spokesman for professional racing drivers.

Hill, James Jerome (b. Sept. 16, 1838, near Guelph, Ont.—d. May 29, 1916, St. Paul, Minn., U.S.), U.S. financier and railroad builder of the American Northwest.

After settling in St. Paul about 1870, he established transportation lines on the Mississippi and Red rivers and arranged a traffic interchange with the St. Paul and Pacific Railroad. On that line's failure in 1873, Hill interested Canadian capitalists and reorganized it as the St. Paul, Minneapolis, and Manitoba Railway Company, becoming its president in 1882.

After the Great Northern Railway absorbed the St. Paul line in 1890, Hill became its president (1893–1907) and chairman of its board of directors (1907–12). The Northern Pacific and the Chicago, Burlington and Quincy railroads also came under Hill's control.

He was active in banking as president of the Northern Securities Company (which in 1904 was declared in violation of the Sherman Anti-Trust Act). In 1912 he took control of the First and Second National Banks of St. Paul and effected a merger. His *Highways of Progress* was published in 1910.

Hill, Joe, also called JOE HILLSTROM, original name JOEL EMMANUEL HAGGLUNG (b. Oct. 7, 1879, Gävle, Swed.—d. Nov. 19, 1915, Salt Lake City, Utah, U.S.), Swedish-born U.S. songwriter and organizer for the Industrial Workers of the World (IWW); his execution for an alleged robbery-murder made him a martyr and folk hero in the radical U.S. labour movement.

Born into a conservative Lutheran family, all of whom were amateur musicians, Hill left Sweden for the United States in 1902. He drifted around the country, from job to job, and in 1910 joined the San Pedro (Calif.) local of the Industrial Workers of the World, soon becoming its secretary. The following year his first and most famous folksong, "The Preacher and the Slave," appeared in the IWW's *Little Red Song Book.* It is sung to the melody of "In the Sweet Bye and Bye":

> You will eat, bye and bye
> In that glorious land above the sky;
> Work and pray, live on hay,
> You'll get pie in the sky when you die.

Most of his songs dealt with migratory workers, immigrant sweatshop workers, and railway employees; and all were tinged with humour and simple Marxism.

On the night of Jan. 10, 1914, while staying in Salt Lake City, he left the home of some friends and returned the following morning with a bullet wound in his chest. During that night there had been a robbery in which a grocer and his son had been killed. Hill was arrested and charged with murder. The case was confusing: the circumstantial evidence was not clear; Hill's story of having been shot in a fight with someone over a woman contained contradictions; the police and prosecutor ignored leads to other suspects; and Hill, wholly uncooperative, finally dismissed his lawyers. He was convicted after a 10-day trial, and legal appeals were unavailing. Despite mass demonstrations and accusations that he had been convicted because of his radicalism and despite an appeal to the Utah governor from Pres. Woodrow Wilson, Hill was executed by a firing squad. On Nov. 18, 1915, the night before his death, he telegraphed IWW leader Big Bill Haywood: "Goodbye Bill. I die like a true rebel. Don't waste time in mourning. Organize."

Hill was commemorated in a famous ballad bearing his name, written in 1925 by poet Alfred Hays.

Hill, John (b. *c.* 1716, Peterborough?, Eng.—d. Nov. 21, 1775, London), English writer and botanist who compiled the first book on British flora to be based on the Linnaean nomenclature.

After serving as an apprentice to an apothecary, Hill set up his own apothecary shop in London and studied botany in his spare time. Employed by the Duke of Richmond and Lord Petre to arrange their collections of plants, he travelled extensively to collect rare plants for them. When these efforts failed to increase his income, he turned to writing plays, novels, and papers on natural history, medicine, astronomy, and geology. He edited the monthly *British Magazine* from 1746 to 1750 and contributed a daily society-gossip

John Hill, engraving
The Mansell Collection

column to *The London Advertiser* and the *Literary Gazette.* His satirical writings often involved him in bitter quarrels.

Hill's most lasting work was in botany. In 1759 the first of the 26 folio volumes of his *Vegetable System* was published. This work, containing 1,600 copper plate engravings, represented 26,000 different plants. Although not completed until 1775, it won for him the Order of Vasa from the king of Sweden. Thereafter he called himself "Sir" John Hill.

Hill, Matthew Davenport (b. Aug. 6, 1792, Birmingham, Warwickshire, Eng.—d. June 7, 1872, Stapleton, near Bristol, Gloucestershire), British lawyer and penologist, many of whose suggested reforms in the treatment of criminals were enacted into law in England.

Hill studied law at Lincoln's Inn, London, and was called to the bar in 1819. After a term in the House of Commons (1832–35), he was recorder (judge) of Birmingham (1839–65) and bankruptcy commissioner for the Bristol district (1851–69). He believed that crime could be prevented by reformation in prison, ending in the convict's release on a showing of good behaviour throughout his prison term, and by life imprisonment of incorrigibles, without the possibility of parole. The 1853 and 1864 Penal Servitude Acts passed by Parliament were based on these principles. Among Hill's books was *Suggestions for the Repression of Crime* (1857). His work was complemented by that of his brother Frederic Hill (1803–96), whose *Crime: Its Amount, Causes, and Remedies* (1853), reflected his experience as inspector of Scottish prisons.

Hill, Octavia (b. Dec. 3, 1838, Wisbech, Cambridgeshire, Eng.—d. Aug. 13, 1912, London), leader of the British open-space movement, which resulted in the foundation (1895) of the National Trust for Places of Historic Interest or Natural Beauty. She was also a housing reformer whose methods of housing-project management were imitated in Great Britain, on the Continent, and in the United States.

Octavia Hill, detail of an oil painting by John Singer Sargent, 1899; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Hill was greatly influenced by John Ruskin, whom she met in 1853. Using money lent her by Ruskin, she established (1864) the first of her housing projects in a slum area of St. Marylebone borough, London. The next year she took over the direction of other housing projects, and later (1884) the Ecclesiastical Commissioners put her in charge of their property in Southwark, London, where she trained other women to manage mass housing.

In 1869 Hill and Edward Denison founded the Charity Organisation Society to investigate the living conditions and the mode of life of the poor. Her crusade for preserving open spaces was a consequence of her knowledge of the crowded environment of the poor people in London. In her various enterprises she was assisted by several of her sisters, especially Miranda (1836–1910), herself a noted teacher and reformer.

Hill, Patty Smith (b. March 27, 1868, Anchorage, Ky., U.S.—d. May 25, 1946, New York City), U.S. educator who introduced the progressive philosophy to kindergarten teaching, stressing the importance of the creativity and natural instincts of children and reforming the more structured programs of Friedrich Froebel.

Hill began her kindergarten work as a teacher and then became director of the Louisville Free Kindergarten Association in Kentucky. In 1906 she was appointed to the faculty of Columbia University Teachers College, where she taught for the next 30 years. There she developed a curriculum that emphasized the importance of a child's firsthand contact with nature for creative expression.

Hill developed the large "Patty Hill blocks," big sets of blocks widely used in kindergartens. In 1924 Hill helped to found the Institute of Child Welfare Research at Columbia and also promoted the extension of nursery schools through her work with the National Association for Nursery Education, which she helped to organize in 1925. In 1908 she was elected president of the International Kindergarten Union.

She wrote, with Mildred J. Hill, *Song Stories for the Kindergarten* (1893) and *A Conduct Curriculum for the Kindergarten and First Grade* (1923).

Hill, Phil byname of PHILIP TOLL HILL (b. April 20, 1927, Miami), first U.S. automobile race driver to win the world driving championship (1961).

Hill began in racing as a mechanic for midget-car racing in the Santa Monica, Calif., area where he grew up. He won his first sports car competition in 1949 and became a Formula I car racer for Ferrari in 1956. He was a disciplined perfectionist in car preparation, and in study of the course. His world championship title came to him upon winning the 1961 Italian Grand Prix, in which his Ferrari teammate (and leader for the championship by four points) was killed. He also won the Le Mans 24-hour endurance race (1958, 1961–62) and the Sebring (Fla.) 12-hour race (1958–59, 1961). Hill won the 1964 Daytona 2,000 kilometres, the 1966 Nürburgring 1,000 kilometres, and the 1967 BOAC Six Hours at Brand Hatch. He then retired and became a partner in an antique car restoration business.

Hill, Rowland (b. Aug. 23, 1744, Hawkstone Park, Surrey, Eng.—d. April 11, 1833, London), English popular preacher and founder of the Surrey Chapel.

He was educated at Shrewsbury and Eton and at St. John's College, Cambridge, where he was influenced by Methodism and gave open-air sermons despite opposition from the authorities. He was ordained curate of Kingston, Somerset, in 1773 but was refused priest's orders. Having inherited property, he

built for his own use Surrey Chapel, in Blackfriars Road, London, in 1783. Hill conducted his services in accordance with the forms of the Church of England, in whose communion he remained. Thirteen Sunday schools were attached to the chapel, and both there and on his tours of the countryside he attracted immense audiences.

Hill helped to found the Religious Tract Society, the British and Foreign Bible Society, and the London Missionary Society and was a stout advocate of vaccination. His best-known work is *Village Dialogues* (1801), which reached a 34th edition in 1839.

Hill, Sir Rowland (b. Dec. 3, 1795, Kidderminster, Worcestershire, Eng.—d. Aug. 27, 1879, Hampstead, London), British administrator and educator, originator of the penny postage system, principally known for his development of the modern postal service, which was subsequently adopted throughout the world.

The son of an English schoolmaster, Hill was interested in problems of teaching; for about 15 years he operated schools in which he emphasized student democracy, rigid self-discipline, and intensive teaching. His wide-ranging interests included printing, astronomy, mathematics, and transportation.

Hill's proposals for postal reform, formulated between 1835 and 1837, were based on the notion that revenue derived from taxes should increase with the growth of the population and national prosperity. He therefore suggested a lower levy on letters, since high taxes reduced the volume of mail and thus diminished the revenue derived therefrom; a uniform postage rate irrespective of distance, since excessive numbers of rates for letters traveling different distances greatly increased accounting expenses; and that all mail should be prepaid. To effect the last, he proposed a device that subsequently became known as the postage stamp. Hill managed to put his program into effect in 1840, despite bureaucratic hostility. He was knighted in 1860.

Hill (of Hawkestone and Hardwicke), Rowland Hill, 1st Viscount, BARON HILL OF ALMARAZ AND OF HAWKESTONE, BARON HILL OF ALMARAZ AND OF HARDWICKE (b. Aug. 11, 1772, Hawkstone, Shropshire, Eng.—d. Dec. 10, 1842, Hardwicke Grange, Shropshire), British general and one of the Duke of Wellington's chief lieutenants in the Peninsular (Spanish) campaigns of the Napoleonic Wars.

Entering the army in 1790, Hill took a course at Strasbourg Military School, did well at the Siege of Toulon (1793), and was wounded in the first fight in Egypt (1801). He became a brigadier in 1803 and commanded forces in Ireland and then Portugal (1808), fighting at Vimeiro, Corunna, Oporto, and Talavera. In 1810 Hill commanded a corps covering the southern flank and stood out as Wellington's ablest general. The following year a well-calculated march and surprise attack broke the division of J.B. Gerard near Arroyomolinos de Montánchez. He won other victories at Almaraz (1812) and at Saint-Pierre during the invasion of southwestern France in 1813.

Hill was made a Knight of the Bath and in 1812 was sent to Parliament from Shrewsbury. In 1814 he was created Baron Hill of Almaraz and of Hawkestone and in 1816 Baron Hill of Almaraz and of Hardwicke. In 1815 he commanded one of Wellington's two corps. On the right at Waterloo he led the charge of Sir Frederick Adam's brigade against the Imperial Guard; his horse was shot down, and for a time he was lost in the confusion.

When Wellington became prime minister in 1828, Hill replaced him as general commander in chief. Hill resigned in 1842 and was created a viscount shortly before his death. Hill was never married, and the viscountcy went to a nephew.

hill climb, short distance race for automobiles or motorcycles up mountain roads, with the finish at least 350 metres (383 yards) above

Driver Nick Sanborn taking a sharp curve during the Pikes Peak hill climb, July 1970
By courtesy of the U.S. Auto Club

the start in automobile events. In most cases the required minimum course length is 5 km (3.1 miles), and each competitor must cover a total minimum distance of 10 km (6.2 miles).

Hill climbing was an early method of testing automobile power and performance characteristics. Almost every community had its special hill to which a car fancier would drive to see if his vehicle could "take it in high" (*i.e.,* in third gear). In modern hill-climbing events each driver is alone on the course, racing only against the clock. Winding curves and rough road surfaces are perhaps more of a challenge than the overall steepness of the hill. Competition is well organized in all parts of the world but the United States, and events attract top drivers and huge crowds. The best-known U.S. event is the Pikes Peak race, held annually since 1916. All types of motorcars—sports cars, antiques, classics, stock cars—participate under strict safety rules and regulations. This type of competition is especially rough on the low gears of the car's transmission and on the tires. Hill climbs for motorcycles also are held, particularly in Europe; the required minimum and maximum course lengths are 2 km (1.2 miles) and 6 km (3.7 miles).

Consult the INDEX *first*

Hillah, Al-, town, central Iraq. It lies on the Al-Ḥillah Stream, the eastern branch of the Euphrates River, and on a road and a rail line running northward to Baghdad. The town was founded in the 10th century as Al-Jamiayn ("Two Mosques") on the east bank of the Euphrates; in the 12th century a new town was founded opposite on the west bank and in 1102 was called Al-Ḥillah. The town was on the pilgrimage route between Baghdad and Kufa, then one of the most important cities in Iraq, venerated by Shīʿite Muslims as the site of the assassination of ʿAlī, the fourth caliph. Al-Ḥillah is now a prosperous river port and grain market. In the 19th century Al-Ḥillah Stream's flow gradually decreased, restricting local agriculture, but the Hindīyah Barrage, built in 1913, diverted more water into the channel. Pop. (1985 est.) 215,249.

Hillary, Sir Edmund (Percival) (b. July 20, 1919, Auckland, N.Z.), New Zealand mountain climber and Antarctic explorer who, with the Nepalese mountaineer Tenzing Norgay, was the first to reach the summit of Mount Everest (29,028 feet [8,848 m]), the highest mountain in the world.

A beekeeper by occupation, Hillary began climbing in the New Zealand Alps. In 1951 he joined a New Zealand party to the central Himalayas and then went on to help in a reconnaissance of the southern flank of Everest. In 1953, as a member of the British Everest expedition, he reached the top on May 29 and was knighted for this feat on July 16. He described his exploits in *High Adventure* (1955). Hillary made other expeditions in the Everest region during the early 1960s and built schools, hospitals, and airfields for the Sherpa people who lived there.

Between 1955 and 1958 Hillary commanded the New Zealand group participating in the British Commonwealth Trans-Antarctic Expedition led by Vivian Fuchs. He reached the

Hillary, 1956
UPI—EB Inc.

South Pole by tractor on Jan. 4, 1958, and recorded this feat in *The Crossing of Antarctica* (1958; with Fuchs) and *No Latitude for Error* (1961). On his Antarctic expedition of 1967, Mount Herschel (10,941 feet [3,335 m]) was scaled for the first time. In 1977 he led the first jet boat expedition up the Ganges River and continued by climbing to its source in the Himalayas. His autobiography, *Nothing Venture, Nothing Win,* was published in 1975.

Hillegom, *gemeente* (commune), Zuidholland *provincie,* western Netherlands, on the Ringvaart, a canal around the Haarlemmermeer polder. With Lisse it is one of the two great commercial centres of Holland's bulb-growing district and is the site of the Teslong Demonstration Garden (1949) and bulb exchange. The annual Flower Parade on "Tulip Sunday" in April starts alternately from Hillegom, Lisse, or Sassenheim. There is also some market gardening, cattle raising, and light manufacturing. Pop. (1981 est.) 18,203.

Hillel (fl. second half of the 1st century BC–*c.* first quarter of the 1st century AD), Jewish sage, foremost master of biblical commentary and interpreter of Jewish tradition in his time. He was the revered head of the school known by his name, the House of Hillel, and his carefully applied exegetical discipline came to be called the Seven Rules of Hillel.

Hillel was born in Babylonia, where he received both his early and secondary education. As a young man he went to Palestine in order to continue advanced studies under the leading teachers of Scripture and the Oral Law who belonged to the group or party called Pharisees. Although a strictly biographical account of Hillel's life cannot be set forth, for virtually every narrative about him is encrusted with legend, the literary sources do combine coherently to summon up what may be called the first distinct personality of Tal-

mudic Judaism, the branch of Jewish thought and tradition that created the Talmud, a commentative work on the Oral Law. Put another way, it can be said that the life of Hillel is more than a vague recollection of anecdotes or a name with a saying or two attached.

More than one story underscores Hillel's whole-hearted devotion to study. As with most of the Talmudic sages, no miracles or supernatural performances are ascribed to Hillel, but he is represented as a person of exemplary, even superlative virtues. He is, in the traditional accounts, the model of patience, and, even when repeated attempts are made by some to insult him, his equanimity and civility remain unaffected. He appears as a fervent advocate of peaceful conduct, a lover of all men, a diligent student, a persuasive and ready teacher, and a man of thorough and cheerful trust in God. In short, he appears as the model of the ideal Jewish sage.

This idealization is not entirely storyteller's praises. Critical analysis of Hillel's sayings, of his two legal enactments to relieve economic hardships in society, and even of the motifs the legends seek to emphasize leave little doubt that Hillel did indeed affect the texture of Jewish life profoundly.

While he is nowhere described as the originator of rules to guide the student in the legitimate interpretation of Holy Scriptures, Hillel is unquestionably one of the most influential Talmudic sponsors and practitioners of a conscious, carefully applied exegetical discipline necessary for the proper explanation of the contents of the Bible. The "Seven Rules" he employed—some of which are reminiscent of rules prevailing in Hellenistic schools where Homer was studied and interpreted—were to serve as the basis for more elaborate rules in the 2nd century. Homilies or parables ascribed to Hillel reveal him as a superb pedagogue.

Along with his other gifts, Hillel had an epigrammatic felicity that is apparent in his sayings and which inevitably contributed to their being long remembered. Significantly, in the unique treatise of the Mishna (the authoritative collection of Oral Law), *Pirqe Avot* ("Chapters of the Fathers"), Hillel is quoted more than any other Talmudic sage. As head of a school known as the House of Hillel, he succeeded in winning wide acceptance for his approach, which liberated texts and law from slavishly literal and strict interpretation; indeed, without him an uncompromising rigidity and severity might have developed in the inherited traditions.

Hillel's appreciation of the socioeconomic needs of his age and of the large possibilities that are inherent in biblical statements and values, plus his preference for persuasiveness to get across his point of view, led to the adoption, with few exceptions, of the Hillelite view of Talmudic teaching and to its establishment as the legal norm.

Talmudic sources speak of Hillel's promotion to patriarchal leadership after he had proved his intellectual superiority to the incumbents then in office. In any event, the Jewish patriarchs—the Roman term for the official leaders of the Palestinian Jews—down to about the 5th century, when the patriarchate came to an end, were descendants of Hillel.

Many of the stories about Hillel, especially those in which he is contrasted with Shammai, are among the most popular Talmudic tales in Jewish literature and folklore. (J.Gol./Ed.)

BIBLIOGRAPHY. In addition to the summary description in the general Jewish histories, see W. Bacher, *Die Agada der Tannaiten,* vol. 1 (1890); A. Buchler, *Types of Jewish-Palestinian Piety* (1922); L. Finkelstein, *Ha-Perushim ve-Anshe Keneset Ha-Gedolah,* (1950), English summary, pp. vi–viii; L. Ginzberg, *On Jewish Law and Lore,* pp. 77–124 (1955); N.N. Glatzer, *Hillel the Elder: The Emergence of Classical Judaism* (1956); and J. Goldin, "Hillel the Elder," *Journal of Religion,* 26:263–277 (1946). The nature of the material on Hillel is such as to make impossible a solid reconstruction of his life along the lines of scholarship. The better studies, listed in this bibliography, are ultimately speculative. The most useful presentation, therefore, remains the chapter in *Die Agada der Tannaiten* (cited above).

Hillel ben Samuel, also called EL-AL BEN SHACHAR (b. *c.* 1220—d. *c.* 1295), physician, Talmudic scholar, and philosopher who defended the ideas of the 12th-century Jewish philosopher Maimonides during the "years of controversy" (1289–90), when Maimonides' work was challenged and attacked; Hillel ben Samuel denounced in turn the adherents of the 12th-century Spanish Arab philosopher Averroës, asserting that they precipitated the controversy through their denial of the immortality of the individual human soul.

Reputed to have lived in the Italian cities of Verona, Naples, and Capua, and later in Barcelona, Spain, Hillel ben Samuel wrote his major work, *Tagmule ha-nefesh* (1288–91; "The Rewards of the Soul"), to rebut Averroës' theory of the soul. In the work, he holds that the soul is composed of "formal substance" that derives from the universal soul and that both are immortal.

Hiller, Ferdinand (b. Oct. 24, 1811, Frankfurt am Main—d. May 10, 1885, Cologne), German conductor and composer whose memoirs, *Aus dem Tonleben unserer Zeit* (1867–76; "From the Musical Life of Our Time"), contain revealing sidelights on many famous contemporaries.

Hiller studied in Weimar under the celebrated pianist-composer Johann Nepomuk Hummel. From 1828 to 1835 he was in Paris, where his friends included Frédéric Chopin, Franz Liszt, and Hector Berlioz. He conducted the Gewandhaus concerts in Leipzig (1843–44), conducted at Dresden in 1845, and led the Düsseldorf Orchestra, 1847–50. In 1850 he became conductor at Cologne, where he organized the conservatory and was its first director. His compositions include operas and large instrumental works. His extensive writings on music include studies of Beethoven and a memoir of his friend Felix Mendelssohn.

Hiller, Johann Adam, Hiller also spelled HÜLLER (b. Dec. 25, 1728, Wendisch-Ossig, near Görlitz, Saxony [Germany]—d. June 16, 1804, Leipzig), German composer and conductor, regarded as the creator of the German Singspiel, a musical genre combining spoken dialogue and popular song.

Hiller learned to play several instruments and to sing and also briefly studied law while developing wide intellectual and literary interests. After varied activities in the musical life of Leipzig, he became conductor (1781–85) of the Gewandhaus concerts and the town's leading musical figure. From 1789 to 1800 he was cantor of the Thomasschule, a position formerly held by J.S. Bach.

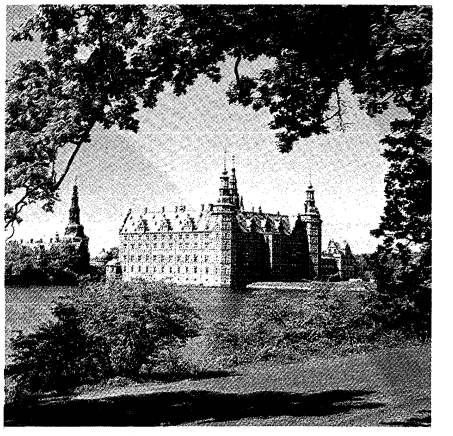
With his Singspiels Hiller gave Germany its first national operettas, which quickly became popular. *Die Liebe auf dem Lande* (1768; "Love of the Land") and *Die Jagd* (1770; "The Hunt") rank among the finest of his many works in the form. He also wrote numerous songs and church music.

Hiller, Dame Wendy (b. Aug. 15, 1912, Bramhall, Cheshire, Eng.), English stage and motion-picture actress.

Hiller was educated at Winceby House School and at age 18 joined the Manchester Repertory Company, in which she acted and stage-managed for several years. She scored an instantaneous success on the London stage as Sally Hardcastle in *Love on the Dole* (performed London 1935, New York 1936), a play whose coauthor, Ronald Gow, she subsequently married. Her performance as Joan of Arc in George Bernard Shaw's *Saint Joan* in 1936 secured her the role of Eliza Doolittle in the first screen version of Shaw's *Pygmalion* (1938). She also played the title role in the screen version of Shaw's play *Major Barbara* (1941).

Hiller returned to stage acting in the early 1940s, appearing in *The First Gentleman* (1945) and *Tess of the d'Urbervilles* (1946). After playing in *Waters of the Moon* (1951–53), she joined the Old Vic Company and played a variety of Shakespearean roles there in 1955–56. Her subsequent stage appearances included roles in *A Moon for the Misbegotten* (1957), *Toys in the Attic* (1960), *The Battle of Shrivings* (1970), and *Crown Matrimonial* (1972). She played principal roles in more than 40 stage productions in London, New York, and elsewhere. Her later film roles included *Separate Tables* (1958), *Sons and Lovers* (1960), *Toys in the Attic* (1963), *A Man for All Seasons* (1966), *Murder on the Orient Express* (1974), and *The Elephant Man* (1980). She was created Dame of the British Empire in 1975.

Hillerød, city, seat of Frederiksborg *amtskommune* (county commune), northeastern Sjælland (Zealand), Denmark. It developed around Frederiksborg Castle, which was built (1602–20) by Christian IV in Dutch Renaissance style on the site of an earlier castle. Danish kings were crowned there from 1660 to 1840, and it was a favourite royal residence



Frederiksborg Castle, Hillerød, Den.
Inga Aistrup

until gutted by fire in 1859. It was restored, and the National Historical Museum was founded there in 1878. Hillerød is a flourishing market town and rail junction, supported by the fertile surrounding countryside. Industries include manufacture of agricultural machinery, meat canning, and brickworks. Pop. (1985 est.) 25,265.

Hillery, Patrick J(ohn) (b. May 2, 1923, Milltown Malvay, County Clare, Ire.), Irish politician and sixth president of Ireland, from 1976. He was the youngest person ever to attain that position.

Hillery attended Rockwell College and University College, Dublin, studying sciences and medicine. His practice of medicine yielded to politics in 1951, when as a member of the Fianna Fáil party he won election to Parliament. In the years following, he headed four government ministries: education (1959–65), industry and commerce (1965–66), labour (1966–69), and foreign affairs (1969–72). In 1973 he became Ireland's first representative on the Commission of the European Economic Community and achieved the post of vice president of the Commission. He succeeded to the Irish presidency in 1976 upon the abrupt resignation of Cearbhall O Dalaigh. When his term of office ended in September 1983, he indicated that he did not intend to seek a

second term but changed his mind when all three political parties pleaded with him to reconsider. He was returned for a further seven years without an electoral contest.

Ḥillī, al-, in full JAMĀL AD-DĪN ḤASAN IBN YŪSUF IBN ʿALĪ IBN MUṬHAHHAR AL-ḤILLĪ (b. Dec. 15, 1250, Ḥillah, Iraq—d. Dec. 18, 1325), theologian and expounder of Shīʿī doctrines one of the two main systems of Islām, the other being the Sunnī, which is the larger.

Al-Ḥillī studied law, theology, and the *uṣūl,* or principles of the faith, in the city of Ḥillah, an important centre for Shīʿī learning in the Sunnī territory of the ʿAbbāsid caliphate (the second Arab dynasty). A scion of a family of Shīʿī theologians, he became known as the "wise man of Ḥillah." He also studied philosophy with Naṣīr ad-Dīn aṭ-Ṭūsī (d. 1274), a noted philosopher of his time.

Among al-Ḥillī's more than 500 scholarly works on the Islāmic faith are the *al-Bāb al-ḥādī ʿashar* (*Treatise on the Principles of Shīʿite Theology,* 1928) and the *Sharḥ tajrīd al-iʿtiqād.* These are standard references on Twelver Shīʿī beliefs and are still used as textbooks in Iran.

Attracted by the religious freedom of the Mongol Il-Khanid dynasty (the descendants of Hülegü, who sacked Baghdad in 1258), al-Ḥillī emigrated to Iran in 1305. There he was responsible for converting Öljeytü, the eighth Il-Khanid of Iran, from the Sunnī faith to Shīʿah. In 1305 Shīʿah was proclaimed the state religion of Iran. Al-Ḥillī was buried in Meshed.

Hilliard, Nicholas (b. 1547, Exeter, Devon, Eng.—d. Jan. 7, 1619, London), the first great native-born English painter of the Renaissance. His lyrical portraits raised the art of painting miniature portraiture (limning in Elizabethan England) to its highest point of development and did much to formulate the concept of portraiture there during the late 16th and early 17th centuries.

Hilliard's earliest known attempts at miniature painting were made in 1560. Hilliard became miniature painter to Queen Elizabeth I about 1570 and made many portraits of her and of the leading members of her court. He paid a short visit to France in the service of the Duc d'Alençon but returned early in 1578 because his wife was expecting a child.

Throughout his life Hilliard practiced as goldsmith and jeweller as well as miniaturist, and in 1584 he designed Queen Elizabeth's second great seal. On the accession of James I, in 1603, his appointment as limner to the crown was continued, but he seems to have found the atmosphere of the new court less congenial to his art.

In his *Treatise on the Arte of Limning* (*c.* 1600) he gives an account of his method and many sidelights on his own mercurial and engaging temperament. Throughout his life he had financial difficulties and was imprisoned for debt for a short period in 1617. In the book he also states that his art is derived from that of the painter Hans Holbein the Younger, a German portraitist working in England, whose influence doubtless accounts for Hilliard's preference for even, nondramatic lighting and firm contours, as seen in the miniatures "An Unknown Youth Leaning Against a Tree Among Roses" and "An Unknown Man Against a Background of Flames" (both in the Victoria and Albert Museum, London).

Nicholas Hilliard's son Laurence (*c.* 1582–1640) also practiced miniature painting, but a much more eminent pupil was Isaac Oliver (*q.v.*).

Hillingdon, outer borough of Greater London, forming part of its western perimeter and extending to the River Coln and the old market town of Oxbridge. The area was still largely rural until suburban railway lines opened the area to housing developers and commuters between World Wars I and II. London's largest airport, Heathrow, is in the south of the borough. Hillingdon maintains an open aspect in the north, with 3,000 ac (1,200 ha) of the section designated as part of London's Metropolitan Greenbelt, together with golf courses and the Ruislip Lido water-sports centre. The borough has an area of 43 sq mi (110 sq km). Pop. (1983 est.) 234,200.

Hillman, Sidney, original name SIMCHA HILLMAN (b. March 23, 1887, Žagarė, Lithuania—d. July 10, 1946, Point Lookout, N.Y., U.S.), U.S. labour leader, from 1914 president of the Amalgamated Clothing Workers of America, and in 1935–38 one of the founders of the Congress of Industrial Organizations (CIO). He was noted for his aggressive organization of industrial workers and for his

Hillman
By courtesy of the AFL-CIO News

extension of union functions to include social services and political action.

After receiving a rabbinical education, Hillman worked in a chemical laboratory in Kovno (now Kaunas), Lithuania, now Lithuanian S.S.R. On his release from imprisonment by the tsarist government for advocating labour reforms, he went to England and then, in 1907, to the United States. Employed in a men's clothing factory in Chicago from 1909, he led a garment workers' strike there the following year. Subsequently he moved to New York City, where he was elected president of the Amalgamated Clothing Workers. Under his leadership the union greatly increased its membership; it secured unemployment insurance, provided a housing development for its members, and organized two banks, which, during the Great Depression, preserved several garment businesses by granting loans to the firms or by buying their stock.

During the presidency of Franklin D. Roosevelt (1933–45), Hillman served in the National Recovery Administration, the Office of Production Management, and the War Production Board's labour division. In 1943 he became chairman of the Political Action Committee of the CIO, which was prominent in the election campaign of 1944. After World War II he was vice president of the World Federation of Trade Unions. *Sidney Hillman: Statesman of American Labor,* by Matthew Josephson, was published in 1952.

Hillquit, Morris, original name MORRIS HILLKOWITZ (b. Aug. 1, 1869, Riga, Latvia—d. Oct. 7, 1933, New York City), American Socialist leader, chief theoretician of the Socialist Party during the first third of the 20th century.

Immigrating to the United States in 1886, Hillquit joined the Socialist Labor Party in New York and became active as a union organizer; in 1888 he helped found the United Hebrew Trades. He earned a law degree from the University of the City of New York (later renamed New York University) in 1893. As a consistent advocate of Socialist reform within the constitutional framework, Hillquit came into conflict with more radical elements in the party led by Daniel De Leon. When the party later split, Hillquit's more moderate faction joined a coalition of Socialist groups under the name Social Democratic Party, which in 1901 became the Socialist Party. Hillquit emerged the party's chief theoretician and tactician. As such, he was largely responsible for the party's steadfast policy of pacifism during World War I, a position that drew widespread criticism after the U.S. entry into the war. With passage of the Espionage Act of 1917, Hillquit devoted much of his energies to defending Socialists in court. Hillquit ran unsuccessfully for Congress five times and for mayor of New York City twice. In 1924 he led his party in its support of Robert M. La Follette, presidential nominee of the Progressive Party. Among his books are *History of Socialism in the United States* (1903), *Socialism in Theory and Practice* (1909), and the autobiographical *Loose Leaves from a Busy Life* (1934).

Hillsboro, village, Pocahontas County, eastern West Virginia, U.S., near the Greenbrier River, in the Allegheny Mountains, 25 mi (40 km) north-northeast of Lewisburg. The Droop Mountain Battlefield State Park (218 ac [88 ha]), 3 mi south, commemorates the Civil War battle (Nov. 6, 1863) in which the Union forces of Gen. William Averell, after camping at Hillsboro, defeated a Confederate army under Gen. John Echols, ending the last serious Southern resistance in the state. Pearl S. Buck, the Pulitzer and Nobel prizewinning author, was born (1892) in Hillsboro, and her birthplace, Stulting House (1847), is preserved as a museum. There is farming (livestock, dairying, and fruit) in the vicinity, and Calvin Price State Forest, Watoga State Park, and Cranberry Mountain Visitor Center in the Monongahela National Forest are nearby. Pop. (1980) 276.

Hillsborough, also spelled HILLSBORO, town (township), Hillsborough County, southern New Hampshire, U.S., on the Contoocook River, west-southwest of Concord. Granted in 1748 and named for Sir Wills Hills, earl of Hillsborough, it was incorporated in 1772. It is a textile and agricultural centre but is primarily known as the birthplace (1853) of Franklin Pierce, 14th president of the U.S.; his homestead (1804) is preserved. Nathaniel Hawthorne College (1962), Pat's Peak Ski Area, and Franklin Pierce Lake (recreation and waterpower) are nearby. Pop. (1980) 3,437.

Hillsborough, formerly HILLSBORO (until 1965), town, seat of Orange County, north central North Carolina, U.S., on the Eno River, just northwest of Durham. Laid out in 1754 on the site of an Indian village (Acconeech or Occaneechi), it was initially called Orange, then Corbinton (after Francis Corbin, colonial official), and in 1759 it was incorporated as Childsburgh (for Thomas Childs, provincial attorney general). It was renamed in 1766 to honour Wills Hill (1718–93), earl of Hillsborough, then secretary of state for the colonies. In 1768 the town was the focus of disturbances by the Regulators (colonials who fought against taxes and legal fees) and during the Revolution it served for a time as state capital. British troops under Lord Cornwallis mustered there prior to the Battle of Guilford Courthouse (1781). Many pre-Revolutionary buildings have been preserved including Heartsease, home of Gov. Thomas Burke and scene of his capture by Tories in 1781. An industrial economy prevails with textiles and furniture as the town's main products. Pop. (1980) 3,019.

Hillstrom, Joe (radical leader): *see* Hill, Joe.

Hilmand River (Afghanistan and Iran): *see* Helmand River.

Hilo, city, seat of Hawaii county, northeastern Hawaii Island, Hawaii, U.S. It lies along Hilo Bay and is the island's business centre. The city is surrounded by sugarcane fields and supports a thriving orchid industry. Its deepwater harbour (once a whaling port) is protected by a breakwater and has bulk sugar-loading facilities. Exports also include orchids, anthuriums, macadamia nuts, and cattle. Wailoa River flows through the area and provides berths for a large fishing fleet. A port of entry, Hilo serves as a tourist's gateway to Hawaii Volcanoes National Park and the Kona and Waimea resort areas.

The University of Hawaii at Hilo includes Hilo College (1947) and Hawaii Community College (1969). The Lyman Mission House and Museum (1839) displays artifacts of the early missionary and whaling periods. Nearby Rainbow Falls tumble over a lava ledge in the Wailuku River. Pop. (1987 est.) 38,836.

Hilton, Conrad (Nicholson) (b. Dec. 25, 1887, San Antonio, N.M., U.S.—d. Jan. 3, 1979, Santa Monica, Calif.), American businessman and founder of one of the world's largest hotel organizations.

As a boy in the little New Mexican desert town of San Antonio, he helped his enterprising father turn the family's large adobe house into an inn for traveling salesmen. By 1915 he was president as well as partner in the A.H. Hilton and Son general store. He served a term in the state legislature and went to France as a second lieutenant in World War I.

After his father's death in 1918, Hilton sought to continue expansion of the family business. In Cisco, Texas, where he had gone to negotiate purchase of a bank, he bought the Mobley Hotel. Finding the hotel business lucrative, he bought others in Dallas, Fort Worth, Waco, and elsewhere in Texas. The depression of the 1930s hurt but did not destroy the Hilton chain, and by 1939 he was building, leasing, or buying (and sometimes selling) hotels in California, New York, Illinois, and elsewhere. In 1946 the Hilton Hotels Corporation was formed, followed in 1948 by the Hilton International Company, as he expanded his operations to other countries. In 1954 he bought the Statler Hotel chain. Diversification included a credit corporation, the origin of Carte Blanche credit cards, and a car-rental corporation.

By the 1960s the company reorganized its foreign operations, going into partnership with outside corporations and foreign governments. Many Hilton hotels became franchises or were only partially owned by the Hilton chain. Conrad Hilton was succeeded as president of the corporation by his son Barron in 1966.

Hilton was author of *Be My Guest* (1957) and *Inspirations of an Innkeeper* (1963).

Hilton, James (b. Sept. 9, 1900, Leigh, Lancashire, Eng.—d. Dec. 20, 1954, Long Beach, Calif., U.S.), English novelist whose popular works include *Lost Horizon* (1933), *Goodbye, Mr. Chips* (1934), and *Random Harvest* (1941), all of which were made into highly successful motion pictures.

Hilton was contributing articles to newspapers and had had his first novel (*Catherine Herself*) published before he graduated from the University of Cambridge in 1921. He became a journalist and had several more of his novels published, though without conspicuous success. His novella *Goodbye, Mr. Chips* was published in the *British Weekly* in 1934 and became enormously popular after it was reprinted in the *Atlantic Monthly* (in the United States) that same year. Hilton's novels *Knight Without Armor* and *Lost Horizon,* which had been published in 1933, were quickly reissued and also attracted wide readerships. In 1941 Hilton moved to California to write film adapatations of his novels.

Goodbye, Mr. Chips is a deftly written, rather sentimental story of a gentle, aging schoolmaster and his long, close association with the school in which he has taught. *Lost Horizon* is the story of an Englishman who finds paradise in the Tibetan valley of Shangri-La. The word Shangri-La for a remote, utopian land derives from this novel. A later novel, *Random Harvest,* describes the ordeal of a man who loses three years of his life because of amnesia.

Hilton, Walter (b. *c.* 1340—d. March 24, 1396, Thurgarton Priory, Nottinghamshire, Eng.), devotional writer who is considered one of the greatest English mystics of the 14th century.

He studied at the University of Cambridge before becoming a hermit and later joined the Augustinians at Thurgarton Priory, where he remained for the rest of his life. His major work was *The Scale* [or *Ladder*] *of Perfection,* written separately in two books. The first teaches the means by which a soul may advance toward perfection by destroying the image of sin and forming the image of Christ through the practice of virtue. The second distinguishes between the active, ascetic life and the contemplative, mystical life and describes the early stages of mystical contemplation, apparently from Hilton's own experience.

The careful theological basis of his writings, which resembles that of the Dominican spirituality of the Rhineland and anticipates much of the teaching of the celebrated Spanish mystic and poet St. John of the Cross, makes Hilton's works unique in English medieval spiritual writings. Because of its sober and methodical character, *The Scale* became and remained a popular devotional classic through the 15th and early 16th centuries and is regarded as the finest treatise on contemplation written in the late Middle Ages. A modernized version of *The Scale* was prepared by G. Sitwell in 1953.

Hilversum, *gemeente* (commune), Noordholland *provincie,* west-central Netherlands. The centre of the Gooiland district of lakes and woods, it was a village dependent on agriculture and weaving until the railway arrived in 1874. It is now a southeastern suburb of Amsterdam, a health and summer resort, and the centre of Dutch radio and television broadcasting. Manufactures include electrical machinery, telephone equipment, pharmaceuticals, carpets, furniture, and metal goods. It is known for its modern architecture, including the town hall (1931) designed by W.M. Dudok, St. Vitus' tower by Petrus Cuypers, schools, and broadcasting buildings. Pop. (1987 est.) mun., 85,449; metropolitan area, 102,775.

Hilwan (Egypt): *see* Ḥulwān.

Himāchal Pradesh, constituent state of the Republic of India occupying the extreme northern portion of the subcontinent. A region of scenic splendour, it is bounded on the north by Jammu and Kashmir, on the east by China (Tibet), and, in India, on the southeast by Uttar Pradesh, on the south by Haryāna, and on the west by Punjab.

A brief treatment of Himāchal Pradesh follows. For full treatment, *see* MACROPAEDIA: India.

Himāchal means "snowy mountain" (*hima,* "snow"; *acal,* "mountain"), the state taking its name from the Himalayas rising in its midst. The history of the area dates back to the Vedic period; later the Aryans assimilated the indigenous peoples. The area was exposed to successive invasions through the centuries, ending with British domination in the 19th century. Between 1948 and the achievement of statehood in 1971, Himāchal Pradesh went through various changes in size and administrative setup.

The terrain varies with many hills, wooded valleys, and flowing rivers. The mountains rise to about 22,000 feet (6,700 m) and include the Himalayan ranges of the Pīr Panjāl, Hathi, and Dhaula mountains. The major rivers include the Chenāb (Chandra Bhāga), Rāvi, and Beās in the west and the Sutlej and Yamuna (Jumna) in the east. The climate ranges from mild to cold, with icy winds sweeping the state and with the hills and valleys remaining covered with snow for months. In the valleys, fruits grow in abundance, and rivers abound with fish.

Himāchal Pradesh is one of the least urbanized states in India. Less than 10 percent of the people there can be classified as urban. The vast majority of the state's population—a mixture of hill tribes including Gaddis, Gūjars, Kinners, Lahaulis, and Pangwalas—is Hindu, with a sprinkling of Buddhists, Sikhs, Muslims, and Christians. More than 60 dialects are spoken in the state, the primary language being Pahārī—a derivation from Sanskrit and Prākrit. The state language is Hindī.

The state's economy is still based almost entirely on the land, with about 80 percent of the people depending on farming, horticulture, and livestock raising for their livelihood. The chief crops are wheat, corn (maize), barley, rice, and potatoes. One of the top fruit- and vegetable-producing states of India, it produces apples, plums, peaches, apricots, and pomegranates, as well as ginger and mushrooms. Sheep and goat rearing are widespread, and wool and pashm (the fleece of the Tibetan goat) are important products. The coniferous forests have also been a source of revenue.

Himāchal Pradesh, with its snow-fed rivers, has about 20 percent of the total national hydroelectric potential. The Bhākra Dam (completed in 1963) across the Sutlej is one of the state's major hydroelectric projects. There is immense scope for the development of forests and the establishment of forest-based industries (including newsprint), but there is as yet little industry in Himāchal Pradesh. The people remain at a subsistence level, and the state's vast natural resources have yet to be tapped systematically. Except for the rail line from Kālka (in Haryāna) to Simla (the capital) and a line connecting Pathānkot (Punjab) and Jogindarnagar in Himāchal, there are no railways in the state. Roads constitute the communications lifeline of Himāchal Pradesh. The state is attractive to tourists seeking skiing, golfing, fishing, trekking, and mountain climbing.

Himāchal Pradesh has a medical college at Simla and several dozen degree colleges. The Himāchal Pradesh University is at Simla, and the Himāchal Pradesh Agricultural University is at Palampur. Research is conducted at the Indian Institute of Advanced Study at Simla and at the Central Research Institute at Kasauli. Area 21,495 square miles (55,673 square km). Pop. (1981) 4,280,818.

Himalayan, also called COLOURPOINT, or COLORPOINT, breed of domestic cat with the colouring of the Siamese and the build and coat of the longhair, or Persian. The Himalayan is produced by matings between Siamese and longhairs followed by selected breeding of the offspring to bring out the proper colouring, coat, and build. A good Himalayan is cobby (of stocky build) and short-legged with long, soft fur, a broad, rounded head, and round blue eyes. Born cream-coloured, it later develops the darker points (ears, face, legs, and tail) of the Siamese. The points, as in the Siamese, may be deep brown (seal point), lighter brown (chocolate point), blue gray (blue point), pinkish gray (lilac point), or reddish orange (red point).

Himalayan bear: *see* Asiatic black bear.

Himalayas, great mountain system of Asia forming an almost impassable barrier between

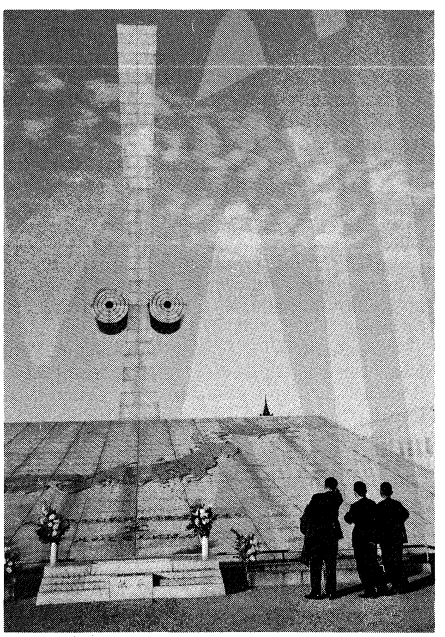
the Tibetan Plateau to the north and the alluvial plains of the Indian subcontinent to the south.

A brief treatment of the Himalayas follows. For full treatment, *see* MACROPAEDIA: Asia.

The Himalayan ranges contain 30 mountains rising to heights greater than 24,000 feet (7,300 m) above sea level, including Mount Everest, the world's highest peak, which reaches an elevation of 29,029 feet (8,848 m). The mountains extend without interruption in a broad arc for about 1,550 miles (2,500 km) from their western end at Nānga Parbat peak in the territory of Jammu and Kashmir, eastward to Namcha Barwa peak in the Tibet Autonomous Region of China, near its southern border with India. Between these western and eastern extremities lie several Indian states and the Himalayan kingdoms of Nepal and Bhutan. The Himalayas' total area covers about 229,500 square miles (594,400 square km). The backbone of the mountain system is formed by the Great Himalayas, a single high range rising above the line of perpetual snow to its maximum height in Nepal and having in that section 9 of the 14 highest peaks in the world.

The Himalayan ranges' most characteristic features, in addition to their great heights, are their snowcapped and steep-sided jagged peaks, extremely large valley glaciers, deeply cut river gorges, and rich temperate and Alpine vegetation. The Himalayan ranges act as a great climatic divide, affecting air- and water-circulation systems, and therefore exercise a dominating influence on the meteorological conditions in bordering regions. The height of the highest mountain range, the Great Himalaya Range, obstructs the passage of cold continental air from the north into India in winter and also forces the southwest monsoonal (rain-bearing) winds to give up most of their moisture before crossing the range northward, thus causing a heavy precipitation of rain and snow on the Indian side but arid conditions in Tibet. The mountain region is drained by 19 major rivers, of which the Indus and Brahmaputra are the largest. The economic resources of the Himalayas include rich arable land, extensive grassland and forest, workable mineral deposits, and a tremendous potential for easily harnessable hydroelectric power.

Himeji, city, Hyōgo *ken* (prefecture), western Honshu, Japan. It is situated west of Kōbe, near the Inland Sea. It developed as a castle town around the white, five-storied Himeji, or Shirasagi ("Egret"), Castle, built in the 14th century and reconstructed in 1577 and 1964. A large part of the city was destroyed by bombing during World War II. The city recovered and grew rapidly after the war. It is now the third largest industrial centre in the prefecture (after Kōbe and Amagasaki). Himeji's industries include iron, steel, textiles, and leather goods. Pop. (1987 est.) 453,974.



Peace Memorial, Himeji, Japan
Bob Glaze—Artstreet

Himera, ancient city on the northern Himeras (modern Grande) River, on the northern coast of Sicily. It was founded in about 649 BC by Syracusan exiles and Chalcidian inhabitants of Zancle (Messana). Early in the 5th century the tyrant Terillus, who had been driven out of Himera by Theron of Acragas, encouraged an unsuccessful Carthaginian invasion of Sicily, which ended in the death of Hamilcar at the Battle of Himera in 480 BC. Four years later, the citizens of Himera appealed to Hieron of Syracuse for aid against the oppressive rule of Theron's son, Thrasydaeus, but this only led to the citizens' massacre by Theron and a resettlement of the town with Dorians. Himera was finally destroyed in 409 by Hamilcar's grandson Hannibal.

The only relic of the ancient town visible above ground is a Doric temple, probably erected in commemoration of the victory of 480 BC; many of its lion-head spouts are exhibited in the Palermo Museum.

Himiko, also spelled PIMIKO, also called YAMATOHIME NO MIKOTO (fl. early 3rd century AD, Japan), first known ruler of Japan and the supposed originator of the Grand Shrine of Ise, still considered the most important Shintō sanctuary in Japan.

According to Japanese legend, Himiko was the daughter of the emperor Suinin (fl. 1st century BC–1st century AD), who gave her custody of the sacred mirror, symbol of the sun goddess. In 5 BC she supposedly enshrined the mirror at Ise, a city of present Mie Prefecture.

Chinese historical records, considered more accurate than contemporary Japanese accounts, confirm the existence of an unmarried queen named Himiko but place her in the early 3rd century AD. According to some sources, she ruled an area referred to as Yamatai, the location of which remains in dispute. The characters used to represent the name Himiko mean "sun child," or "sun daughter" in archaic Japanese, and it is interesting to note that later Japanese rulers claimed to be descendants of the sun goddess. That Himiko seems to have had dual status as both a ruler and a kind of high priestess corroborates the theory that early Japan was governed by women with religious powers.

Himilco (fl. late 5th century BC), Carthaginian navigator known to have sailed from Carthage through the Strait of Gibraltar and northward along the Spanish and French Atlantic coasts.

Himilco may possibly have visited Cornwall to obtain tin from its mines and may even have proceeded as far north as Ireland. Himilco's account of his voyage can be taken to suggest that he may have reached the Sargasso Sea. (It is possible that he fabricated his stories of calms, weeds, and mists in order to discourage others from taking the same routes.) The trip was probably made before 480 BC.

Himilco (d. 396 BC?), Carthaginian general who twice made conquests of the Greeks in Sicily that brought him to the gates of Syracuse and twice had his momentum broken by plague among his soldiers.

In the first campaign (406 BC), Himilco's army conquered and sacked Acragas, Gela, and Camarina. An epidemic among his troops, however, led him to sign a peace treaty in 405 BC with Dionysius the Elder, the Syracusan tyrant. This treaty left Carthage in control of most of Sicily. In 398 Dionysius attacked the Carthaginian positions in Sicily. Himilco returned to Sicily in 396, conquering the north coast and arriving once more at the gates of Syracuse, only to have the plague break the health and morale of his soldiers. The Syracusans counterattacked and completely defeated Himilco's army. He returned home and committed suicide.

Himmerland, region of Jutland between Hobro and Ålborg, forming the northernmost non-insular part of Denmark. It is nearly surrounded by water. At Års, the main town of the interior, the Vesthimmerlands Museum displays prehistoric and folk artifacts. Himmerland is a predominantly rural region of villages and small farms. Although much of the former wetland has been drained, the leached soils are not highly fertile, and peat bogs still occur in the east. Himmerland's wet, sandy environment supports unusual wildlife species. Black storks live in the 34-square-mile (88-square-kilometre) Lille Vildmose (marsh). Rare clovers, orchids, and blue anemones grow in the Rold Forest, the remnant of a spruce forest that once covered most of the region. North of Rold Forest the heather-covered Rebild Hills, bought by Danish Americans in 1911 and donated to Denmark (1912) as a national park, are the site of annual Danish-American July 4th celebrations.

Himmler, Heinrich (b. Oct. 7, 1900, Munich—d. May 23, 1945, Lüneburg, Ger.), German National Socialist politician, police administrator, and military commander who became the second most powerful man in the Third Reich.

The son of a Catholic secondary schoolmaster, Himmler received a diploma in agriculture after World War I and soon joined militant rightist organizations. As a member of one of these, the Reichskriegsflagge, he participated in Adolf Hitler's abortive Munich (Beer Hall) Putsch in November 1923. Himmler joined the Nazi Party in 1925 and rose steadily in the party hierarchy, but the foundations of his future importance were laid with his appointment as *Reichsführer* of the SS (*q.v.*), Hitler's elite bodyguard, which was nominally under the control of the Sturmabteilung (SA). Himmler immediately began expanding the SS, which reached a membership of more than 50,000 by 1933. After Hitler's accession to power (Jan. 30, 1933), Himmler became head of the Munich police and soon afterward became commander of all German police units outside Prussia. As such he established the Third Reich's first concentration camp, at Dachau. In April 1934 he was appointed assistant chief of the Gestapo (secret police) in Prussia, and from this position he extended his control over the police forces of the whole *Reich,* assuming full command of them in 1936. Himmler masterminded the June 30, 1934, purge in which the SS eliminated the SA as a power factor, thus strengthening Hitler's

Himmler
Camera Press

control over his own party and the German army, which had viewed the SA as a serious rival. Himmler then began to build the SS into the most powerful armed body in Germany next to the armed forces. Under Himmler the SS would eventually acquire vast police powers in Germany and the territories it occupied, and it also acquired primary responsibilities in the areas of security, intelligence gathering, and espionage.

World War II brought a vast extension of Himmler's empire and the resources at his command. After Hitler decided in 1941 to exterminate European Jewry, it was Himmler who organized the death camps in eastern Europe, which also provided human material for cheap forced labour and medical experiments. After Germany invaded the Soviet Union, Himmler was entrusted with the political administration of that nation's conquered territory with the goal of eliminating the Soviet system. By 1943 Himmler had risen to minister of the interior and plenipotentiary for Reich administration.

During the war Himmler expanded the Waffen (armed) SS until, with 35 divisions, it rivaled the army. He also gained control of the intelligence network, military armaments (after the abortive attempt on Hitler's life of July 20, 1944), the Volkssturm, a levee en masse of older men, and later the Werwolf, a guerrilla force intended to continue the struggle after the war. He also unsuccessfully commanded two army groups.

Not content with military power alone, Himmler attempted to set up an autonomous SS industrial empire. When this provoked resistance from Hitler's minister for armaments and war production, Albert Speer, Himmler appears to have orchestrated an attempt on the latter's life in February 1944.

In the final months of the war, Himmler suffered increasingly from psychosomatic illnesses and was progressively shunted aside by Hitler's entourage. When it became known that Himmler hoped to succeed the Führer and had negotiated with the Swedish count Folke Bernadotte to surrender Germany to the Western allies and with the West to continue the war against the Soviet Union (April 1945), Hitler promptly stripped him of all offices and ordered his arrest. Disguised as a common soldier, he attempted to escape. Captured by the Western allies, he committed suicide by taking poison.

Himmler was a highly effective administrator and a ruthless and adroit power seeker who was slavishly devoted to Hitler. He combined a penchant for philosophical mysticism with a cold-blooded, fanatical adherence to the Nazi racist ideology, with the result that he was the prime architect of the Holocaust. More than any other individual, Himmler was the man who created the network of state terror by which the Third Reich suppressed its opposition, eliminated its internal enemies, and compelled obedience from the German citizenry.

Ḥimṣ, also spelled HOMS, city, central Syria. The city is situated near the Orontes River at the eastern end of Syria's only natural gateway from the Mediterranean coast to the interior. It occupies the site of ancient Emesa, which contained a great temple to the sun god El Gebal (Aramaic; Latin: Elagabalus; Greek: Heliogabalus). Emesa was ruled by a line of priest-kings throughout the Roman Empire, and two of its nobility rose to become emperor, Elagabalus and Severus Alexander. Aurelian (reigned AD 270–275) made the town his headquarters and there defeated Queen Zenobia of Palmyra. It was taken in 636 by the Muslims, who renamed it Ḥimṣ, and the city's large Christian element was eliminated during the rebellion of 855, when the churches were demolished and the Christians executed or deported. Ḥimṣ later (1516) passed into Ottoman hands, where it remained, except for a brief period of Egyptian control in the 1830s, until the creation of Syria after World War I.

Ḥimṣ is situated in a fertile agricultural region that produces wheat, corn (maize), millet, cotton, fruits, and vegetables. The city has thus become a thriving agricultural market centre; its local handicrafts, which include jewelry, belts, and cloaks, are also well-known. In addition, Ḥimṣ has an oil refinery opened in 1959, an agricultural research station, fertilizer and vegetable-oil plants, a sugar refinery, and a university (1977). The hub of an important road and rail network, it is the central link between the interior cities and the Mediterranean coast. A shrine and mosque erected in 1908 honours the Arab general and conqueror Khalīd ibn al-Walīd, known as "the Sword of Allāh," who died there in 642. Ḥimṣ contains a medieval citadel with remains of older foundations. There is a minority Christian community in the city. Pop. (1987 est.) 431,000.

Ḥimyar, originally, an important tribe in the ancient Sabaean kingdom of southwestern Arabia; later, the powerful rulers of much of southern Arabia from about 115 BC to about AD 525.

The Ḥimyarites were concentrated in the area known as Dhū Raydān on the coast of present-day Yemen (San'ā'); they were probably aided in the overthrow of their Sabaean kinsmen by the discovery of a sea route from Egypt to India, which deprived the inland Sabaean kingdom of its former importance as a centre for overland trade. The Ḥimyarites (classical Homeritae) inherited the Sabaean language and culture, and from their capital at Ẓafār their power at times extended eastward as far as the Persian Gulf and northward into the Arabian Desert. At the beginning of the 4th century AD, the Ḥimyar capital was moved northward to San'ā', and later in that century both Christianity and Judaism gained firm footholds in the area. Internal disorders and changing trade routes caused the kingdom to suffer political and economic decline, and in 525, after several unsuccessful attempts, Abyssinian invaders finally crushed the Ḥimyarites. A Ḥimyar appeal to Persia for aid led to Persian control in 575.

Hīnayāna (Sanskrit: "Lesser Vehicle"), the more orthodox, conservative schools of Buddhism; the name Hīnayāna was applied to these schools by the followers of the Mahāyāna Buddhist tradition in ancient India. The name reflected the Mahāyānists' evaluation of their own tradition as a superior method, surpassing the others in universality and compassion; but the name was not accepted by the conservative schools as referring to a common tradition.

In one sense, all of the so-called 18 schools of ancient Buddhism are Hīnayānist, in that they predate the emergence of Mahāyāna ideas as a separate doctrine. The modern upholders of the ancient Hīnayāna tradition are the Theravādins (followers of the Way of the Elders), who are but one of the 18 ancient schools. *See* Theravāda.

Hinchinbrook Island, island off the northeastern coast of Queensland, Australia. It is situated opposite the port of Cardwell and 60 miles (95 km) northeast of Townsville. About 22 miles (35 km) long and 152 square miles (394 square km) in area, it is separated from the mainland by Hinchinbrook Channel. The thickly wooded, mountainous island, now a national park, is noted for its waterfalls and caves. Its rugged bluffs include Mount Bowen, Mount Diamantina, and The Thumb—all exceeding 3,000 feet (900 m) in height. Hinchinbrook was named in 1770 by Captain James Cook after the family seat of his patron, George M. Dunk, 2nd Earl of Halifax; it was not until 1819, however, that the British surveyor Captain Phillip King identified it as an island.

Hinckley and Bosworth, district (borough), county of Leicestershire, England. It comprises the town of Hinckley, an important centre of the hosiery industry since framework knitting was first introduced there in 1640, as well as the towns of Market Bosworth and Earl Shilton, which is a centre of both the hosiery and footwear industries. The Battle of Bosworth Field was fought near Market Bosworth in 1485. The district extends from the western suburbs of the city of Leicester in the east to the county boundary with neighbouring Warwickshire in the west, a boundary that there follows the line of Watling Street, the old Roman road. The area of Hinckley and Bosworth district is 115 square miles (297 square km). Pop. (1986 est.) 94,100.

Hincks, Sir Francis (b. Dec. 14, 1807, Cork, County Cork, Ire.—d. Aug. 18, 1885, Montreal), journalist and statesman, joint premier of the united province of Canada in 1851–54.

Hincks immigrated to York, Canada (as of 1834, Toronto), in 1831 and by 1835 was manager of the People's Bank, which rivaled the Bank of Upper Canada. In 1838 he founded the *Examiner* in Toronto, a moderate liberal newspaper in which he campaigned for responsible (*i.e.,* cabinet) government; the *Examiner* merged with *The Globe* (Toronto) in 1855.

After the union of Upper and Lower Canada as Canada West and Canada East (1840), Hincks entered the first united Parliament in 1841 as a Liberal for Oxford, becoming inspector general of accounts and member of the executive council. He resigned his post in 1843 and took up the editorship of the *Montreal Times* and also founded the *Pilot,* a leading opposition journal. In 1848 Hincks resumed the inspector generalship under the joint premiership of Robert Baldwin and Louis Hippolyte Lafontaine; in 1851–54 he was joint premier of Canada with Augustin Norbert Morin.

As premier, Hincks encouraged railway development and in 1854 concluded a treaty of reciprocity with the United States. Decimal coinage was introduced during the Hincks–Morin administration. In 1855 Hincks was made governor of Barbados and the Windward Islands and served until 1862, when he went to British Guiana as governor (1862–69).

Back in Canada, he served as minister of finance (1869–73) in Sir John Macdonald's government. Although reelected to Parliament in 1873, Hincks resigned from the cabinet that year and from active politics the following year, feeling out of touch with Canadian affairs. He was knighted in 1869.

Hincmar OF REIMS (b. *c.* 806, northern France?—d. Dec. 21, 882, Épernay, near Reims), archbishop, canon lawyer, and theologian, the most influential political counselor and churchman of the Carolingian era (9th century).

Educated at the abbey of Saint-Denis, Paris, Hincmar was named a royal consultant to King Louis I the Pious in 834. When King Charles the Bald of France continued him in that office (840), Hincmar incurred the hostility of Emperor Lothair I, Charles's rival. Chosen archbishop of Reims in 845, Hincmar began an extensive reorganization of his diocese but was accused by Lothair of impropriety for having nullified the priestly ordinations of his predecessor. The synod of Soissons (853) decided in Hincmar's favour, and in 855 he received the approbation of Pope Benedict III. Controversy with the imperial family sharpened in 860, when Hincmar, responding to

the attempt of Lothair II of Lorraine to repudiate his wife, wrote *De divortio Lotharii et Teutbergae* ("On the Divorce of Lothair and Teutberga"), the fullest apology to that time for Christian opposition to divorce.

In 863 he deposed Rothad, bishop of Soissons, for contesting his authority but was reversed by Pope Nicholas I the Great. He did procure, however, the condemnation of his nephew, Bishop Hincmar of Laon, in a similar dispute. On the entire matter of his ecclesiastical jurisdiction, he wrote the noted *Opusculum LV capitulorum* ("A Brief Tract of 55 Chapters"). After Lothair died (869), he secured the succession of Charles the Bald, whom he himself crowned, despite the objections of Pope Adrian II. In 876 he again opposed the pope, whose appointment of a papal legate for Germany and Gaul he regarded as an interference with his administrative rights. He died while fleeing a Norman raid.

Hincmar's fame also derives from his theological controversy with Gottschalk, monk of Orbais, on the doctrine of predestination. Hincmar in *Ad reclusos et simplices* ("To the Cloistered and Simple") upheld the traditional distinction between divine foreknowledge and predestination and maintained that God does not damn a sinner in advance. Because of widespread criticism that such a doctrine was not biblical, Hincmar wrote *De predestinatione Dei et libero arbitrio* ("On God's Predestination and Free Will"), in which he held that God cannot predestine the wicked to hell lest he be accounted the author of sin. After tedious councils at Quiercy (853) and Tuzey (860), both parties reached a reconciliation. A second theological dispute with Gottschalk concerned Hincmar's suspicion that certain liturgical expressions on the Divine Trinity (one God in Three Persons) could be misinterpreted as meaning a multiplication of deities. He defended his strictures in the treatise *De una et non trina deitate* (*c.* 865; "On One and Not a Threefold Deity"). He is also credited with being one of the first to doubt the authenticity of the False Decretals, an 8th- or 9th-century collection of spurious documents supporting papal supremacy.

Hincmar's writings are contained in the series *Patrologia Latina,* J.-P. Migne (ed.), vol. 125–126 (1852). A critical edition of his letters is given in *Monumenta Germaniae Historica, Epistolae VIII* (1935).

Consult the INDEX *first*

hind, any of certain species of fishes in the sea bass family, Serranidae (order Perciformes). All species referred to as hinds are in the genus *Epinephelus,* which also includes many groupers. They are found in the Atlantic Ocean and Gulf of Mexico along the North American coast, with the exception of the red hind (*E. guttatus*), which ranges from the Carolinas to Brazil. The rock hind (*E. adscensionis*), ranging from New England to the West Indies, may reach 61 cm (24 inches); the speckled hind (*E. drummondhayi*) of the coastal region of the southeastern United States is somewhat smaller, reaching a length of 46 cm (19 inches).

All hinds are considered edible and are sought after by sports fishermen. Although they do not run in schools, they may congregate because of habitat preference.

Hind Mazdoor Sabha (HMS), third largest trade-union federation in India after the All-India Trade Union Congress and the Indian National Trade Union Congress. The HMS was formed by the Socialists in 1948 but has little real connection with the Socialist Party. It is one of the least political and most pragmatic trade-union federations in India. The HMS is affiliated with the International Confederation of Free Trade Unions.

Hindemith, Paul (b. Nov. 16, 1895, Hanau, near Frankfurt am Main—d. Dec. 28, 1963, Frankfurt am Main), one of the principal German composers of the first half of the 20th century and a leading musical theorist. He sought to revitalize tonality, the system underlying Western music for three centuries, which had begun to disintegrate, and also pioneered in the writing of Gebrauchsmusik, or "utility music," compositions for workaday occasions. He regarded the composer as a craftsman (turning out music to meet social needs) rather than as an artist (composing to satisfy his own soul). As a teacher of composition he probably exerted an influence on most of the composers of the generation that followed him.

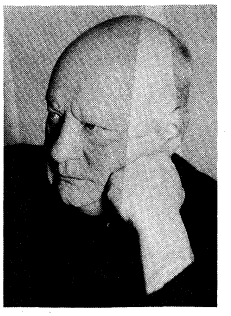
Hindemith earned his living at an early age playing the violin in cafes, dance bands, and theatres. His undertaking of almost any kind of musical job may have contributed to the facility and matter-of-factness with which he later composed. Studying music in Frankfurt, at 20 he became leader of the Frankfurt Opera Orchestra.

Meanwhile, his own compositions were being heard at international festivals of contemporary music. Early works included chamber music composed for the Amar-Hindemith Quartet, in which he played the viola; the song cycles *Die junge Magd* (1922; "The Young Maid"), based on poems by George Trakl, an Austrian poet who killed himself in a war hospital, and *Das Marienleben* (1924, rev. 1948; "The Life of Mary"); and the opera *Cardillac* (1926), based on E.T.A. Hoffmann's *Das Fräulein von Scuderi* ("The Girl from Scuderi"). By the late 1920s Hindemith was regarded as the foremost German composer of his generation.

The "utility" music he wrote for children's games, youth groups, brass bands, radio plays, and other practical purposes reflected a functional trend in the culture of postwar Germany. Hindemith collaborated with Kurt Weill on the music for a radio cantata by Bertolt Brecht, *Der Lindberghflug* (1928; "The Lindbergh Flight").

His greatest work, *Mathis der Maler,* an opera about the painter Mathias Grünewald and his struggles with society, caused a public imbroglio in Nazi Germany when Wilhelm Furtwängler conducted an orchestral version with the Berlin Philharmonic in 1934 and vigorously supported the opera in the press. The Nazi cultural authorities banned the opera. Furtwängler was barred briefly from conducting for his advocacy of a man denounced by Goebbels as a "cultural Bolshevist" and "spiritual non-Aryan."

Hindemith, who had been professor of composition at the Berlin Academy of Music since



Hindemith
Karlheinz Bauer, Bamberg

1927, left Germany for Turkey, where he set up a music-education system on Western lines. He taught at the conservatory in Ankara (1935–37), at Yale (1940–53), and at the University of Zürich (1951–58).

His early music was considered anti-Romantic and iconoclastic, but it also showed humour, exuberance, and inventiveness. His *Kammermusik* series—for small, unconventional, astringent groups of instruments—is outstanding. He also produced such works as the *Violin Concerto* (1939), the *Cello Concerto* (1940), the *Symphonic Metamorphoses on a Theme by Weber,* and the *Sinfonia Serena,* as well as the operas *Die Harmonie der Welt* (1957; "The Harmony of the World") and *The Long Christmas Dinner.*

An opponent of the 12-tone school of composer Arnold Schoenberg, Hindemith formulated the principles of a harmonic system that was based on an enlargement of traditional tonality. His *Unterweisung im Tonsatz* (1937–39; *The Craft of Musical Composition,* 1941, rev. 1945) constitutes a theoretical statement of his principles.

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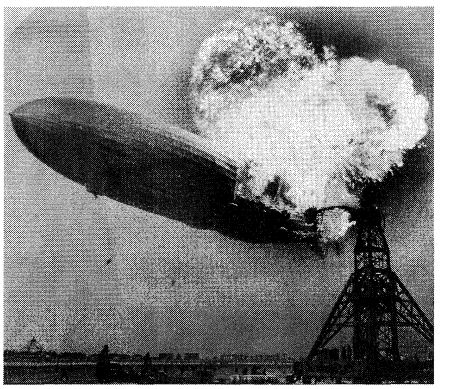
Hindenburg (Poland): *see* Zabrze.

Hindenburg, German dirigible, the largest rigid airship ever constructed, and the victim of a spectacular disaster. The *Hindenburg* was an



The *Hindenburg* in flames at Lakehurst Naval Air Station, New Jersey, May 6, 1937
By courtesy of the United States Navy

804-foot- (245-metre-) long airship of conventional Zeppelin design that was first launched at Friedrichshafen, Germany, in April 1936. It had a maximum speed of 84 miles per hour (135 km/h) and a cruising speed of 78 miles per hour (126 km/h). In 1936 the *Hindenburg* inaugurated commercial air service across the North Atlantic by carrying 1,002 passengers on 10 scheduled round trips between Germany and the United States.

On May 6, 1937, while landing at Lakehurst, N.J., on the first of its scheduled 1937 trans-Atlantic crossings, the hydrogen-inflated *Hindenburg* burst into flames and was completely destroyed. Thirty-six of the 97 persons aboard were killed. The fire was generally attributed to a discharge of atmospheric electricity in the vicinity of a hydrogen gas leak from the airship, though it has also been speculated that the dirigible was the victim of an anti-Nazi act of sabotage. The *Hindenburg* disaster marked the end of the use of rigid airships in commercial air transportation.

Hindenburg, Paul von, in full PAUL LUDWIG HANS ANTON VON BENECKENDORFF UND VON HINDENBURG (b. Oct. 2, 1847, Posen, Prussia [now Poznań, Pol.]—d. Aug. 2, 1934, Neudeck, Ger. [now in Poland]), German field marshal during World War I and second president of the Weimar Republic (1925–34). His presidential terms were wracked by political instability, economic depression, and the rise to power of Adolf Hitler, whom he appointed chancellor in 1933.

Hindenburg was the son of a Prussian officer of old Junker (aristocratic) stock. His mother,

however, was from a middle-class family—a fact he preferred to ignore but that may help account for his cautious, adaptable ways. A cadet at the age of 11, he served in the Austro-Prussian (Seven Weeks') War of 1866 and in the Franco-German War of 1870–71. In due time he was promoted to general, retiring in 1911 after an honourable but not especially distinguished career.

Hindenburg was called back into service in August 1914 to be the nominal superior of Maj. Gen. Erich Ludendorff. Acclaimed as one of the army's best strategists, Ludendorff was to drive a Russian invasion force from East Prussia. For this achievement, the rocklike Hindenburg, rather than Ludendorff, received the nation's applause. Soon Hindenburg's standing overshadowed that of Emperor William II; he was promoted to the rank of field marshal general, and in 1916 the Emperor was pressured into giving him command of all German land forces, with Ludendorff his co-responsible chief aide. Unable to win the war on land, they tried starving Britain into surrender by unrestricted submarine warfare, thus drawing the United States into the war and causing Germany's ultimate defeat. When they conceded defeat, Hindenburg let Ludendorff take the blame.

After the overthrow of William II, Hindenburg collaborated briefly with the new republican government. He directed the withdrawal of German forces from France and Belgium and had his staff organize the suppression of left-radical risings in Germany. With both tasks accomplished (and the old officer corps preserved in the process), he retired once more in June 1919. Living quietly in Hanover, he occasionally expressed antirepublican views but, on the whole, cultivated his image of nonpartisan national stature.

In April 1925, after the death of Friedrich Ebert, Hindenburg was elected the republic's second president, despite his professed monarchism. He adhered, if not to the spirit, then at least to the letter of the republican constitution. Yet his personal confidants, among them especially Maj. Gen. Kurt von Schleicher, longed for a new authoritarian regime and urged him to use his prestige and render the government more independent of parliamentary controls. Though tired of the frequent Cabinet crises, Hindenburg, fearful of any unconstitutional action and of added responsibilities, procrastinated.

When the Depression set in and the government again broke up, he did appoint a Cabinet resting on his, rather than on the Reichstag's (parliament's), confidence. He authorized Chancellor Heinrich Brüning to dissolve the Reichstag should it prove uncooperative and promised to issue emergency decrees in lieu of Reichstag-enacted laws. The Reichstag was dissolved in July 1930; new elections produced an even less cooperative successor in which the antiparliamentarian National Socialists emerged as the second largest party. Brüning now governed almost exclusively by decree. Since the president's signature was required on each decree, however, Hindenburg could veto any governmental decision. Increasingly feeble, moody, and influenced by his military and landowning friends, the Marshal forced the government to spend huge amounts on the army and navy and hopelessly indebted estates at the expense of unemployment relief and other imperative needs. At the same time, Brüning's deflationist policies aggravated the economic difficulties. Unrest, sparked above all by the Nazis, kept mounting.

When Hindenburg's presidential term expired in April 1932, he ran again for the presidency as the only candidate who could defeat Hitler. He was reelected but mainly by the support of Brüning's Catholic Center Party and the Social Democrats, rather than the conservative nationalist circles, to whom he felt closest and who now supported Hitler. Those who did vote for him clung to him as a bulwark against Nazi lawlessness and brutality. Yet the President's confidants considered the Nazis a useful, if unpleasant, movement with whom they were sure they could come to terms. They saw in Brüning an obstacle to such an accommodation and persuaded the Marshal to dismiss the Chancellor, who had just helped to reelect him.

Two governments, one headed by Franz von Papen, a former cavalry officer, the other by Schleicher, failed to win the support of the Nazis. Hitler insisted on becoming chancellor in any government in which his party participated, but, despite a deluge of petitions and letters, Hindenburg, who distrusted Hitler's noisy aggressiveness, would not concede him that post. In November 1932, however, when the Nazis lost 10 percent of their vote in new Reichstag elections, Papen and Hitler agreed on forming a government with Hitler as chancellor, Papen as vice chancellor, and non-Nazis in most other posts. Hindenburg was assured by Papen that Hitler could easily be controlled. When Schleicher failed in his efforts to obtain parliamentary support for his government, Hindenburg, frustrated and tired, asked for his resignation. On Jan. 30, 1933, Hindenburg appointed Hitler chancellor of a new Cabinet in which only two other Nazis, Wilhelm Frick and Hermann Göring, held offices.

Papen's safeguards proved ineffective. Hitler quickly secured almost unlimited political power through terror, manipulations, and false promises. Hindenburg on his part accommodated himself to the new situation and, in effect, became a warm supporter of Hitler, although making an occasional innocuous gesture that seemed to set him apart from the Führer and the Nazi Party. At the time of his death, Hindenburg was still a revered, though rather remote, national figure. (A.Do.)

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Hindenburg
Culver Pictures

Hindenburg Line, defensive barrier improvised by the German Army on the Western Front in World War I. Faced with substantial numerical inferiority and a dwindling firepower advantage, the new German commanders, Field Marshal Paul von Hindenburg and Gen. Erich Ludendorff, shortened their lines of defense and installed concrete pillboxes armed with machine guns to strengthen the line of heavily wired systems of trenches. The Hindenburg Line resisted all Allied attacks in 1917 and was not breached until late in 1918.

Hindi language, official language of the Republic of India, a central Indo-Aryan language claimed as a mother tongue by more than 150,000,000 speakers. Literary Hindi, written in the Devanagari script, shows a strong influence of Sanskrit as a source for borrowings; it is based on the Khari Boli dialect, to the north and east of Delhi. Also commonly treated as dialects of Hindi are Braj Bhasa, which was an important literary medium from the 15th to the 17th century; Avadhi, also a literary medium; and Bagheli, Chattisgarhi, Bundeli, and Kanauji.

Hindi has a much simpler inflectional system than does Sanskrit, although the literary language uses a great number of Sanskrit forms. Nouns and pronouns have lost the full declension in eight cases of Sanskrit and instead make use of postpositions—small words attached to the end of nouns and functioning much like English prepositions. There are only two genders, masculine and feminine, whereas Gujarati and Marathi retain three. Verbs also are much reduced in inflectional complexity, with only the present and future indicative forms fully conjugated; other constructions are based on participial forms.

Hindi literature, the writings of the western Braj Bhāṣā and Khaṛī Bolī and of the eastern Awadhī and Bundelī dialects of the Indian subcontinent and also the writings of parts of Rājasthān in the west and of Bihar in the east that, strictly speaking, are not Hindi at all. Hindi literature also conventionally includes those works of Muslim writers (such as Jāyasī) in the Persian script in which the content is Hindu rather than Muslim in nature. It first began to appear in the 7th century AD and reached a consistency in the 10th. Almost all the earlier literature is in verse and in a dialect other than Khaṛī Bolī. The latter, on which modern standard Hindi and Urdu are based, was not widely used as a literary language until the end of the 17th century. Braj persisted as a medium for poetry until the late 19th century, although Khaṛī Bolī has now displaced it. Hence the anomaly that the language of modern Hindi literature is different from that of earlier periods.

Hindu, The, English-language daily newspaper published in Madras, generally regarded as one of India's most influential dailies.

Established in 1878 as a weekly, *The Hindu* became a daily in 1889. While India was under British rule, the paper spoke out for independence—but in a moderate vein. After 1947, when India achieved independence, *The Hindu* built a network of foreign bureaus, while extending its coverage of India.

The Hindu has followed a liberal-independent editorial policy over the years. The paper is distinguished for its comprehensive coverage of national and international political news and for its emphasis on accuracy and a cosmopolitan tone. Its makeup is austere; its front pages carried only classified advertising until 1958. Although it is published in a provincial capital, *The Hindu*'s reportage and editorials are read carefully and taken seriously in the national capital.

Hindu calendar, dating system used in India from about 1000 BC and still used to establish dates of the Hindu religious year. It is based on a year of 12 lunar months; *i.e.,* 12 full cycles of phases of the Moon. The discrepancy between this year of about 354 days and the solar year of about 365 days is partially resolved by intercalation of an extra month every 30 months.

Hindu geographical race (India): *see* Indic geographical race.

Hindu Kush, great mountain system of Central Asia nearly 1,000 miles (1,600 km) long, forming a great water divide between the Amu Darya (River) Valley to the northwest and the Indus River Valley to the southeast.

A brief treatment of the Hindu Kush follows. For full treatment, *see* MACROPAEDIA: Asia.

The Hindu Kush abuts the Pamir Mountain Area in the east near the Pakistani–Chinese border, after which it runs southwest through Pakistan and into Afghanistan, finally merging with minor ranges in western Afghanistan. Historically, the passes through the mountains have been of great military significance, providing access to the northern plains of India.

Three main sections of the mountain system may be defined: the eastern Hindu Kush in Pakistan; the central section, lying almost entirely in Afghanistan north of the city of Kābul; and the western Hindu Kush, also known as the Koh-i-Bāba, in western Afghanistan. The highest peaks are concentrated in the eastern Hindu Kush, among them about two dozen summits of more than 23,000 feet (7,000 m) in height, including the highest, Tirich Mīr, reaching an elevation of 25,230 feet (7,690 m).

Most of the system's major glaciers are situated in the valleys of the eastern section. The climate of the range as a whole shows great variations, as the eastern Hindu Kush lies at the extreme limit of monsoonal Asia and is characterized by rainy or snowy summers and dry winters, while the central and western sections border the Mediterranean climatic zone with hot, dry summers and cold, rainy or snowy winters. Below the snowy peaks the Hindu Kush are generally bare, stony, and poor in vegetation, supporting few wild animals. The economy of the sparse population is based on agriculture and the raising of goats and oxen. The natural resources of the region, including hydroelectric potential, quantities of salt and antimony, and possibly deposits of coal, metal ores, and petroleum and natural gas, remain virtually undeveloped.

Hinduism, the beliefs, practices, and socio-religious institutions of the peoples known as Hindus (principally the peoples of India and parts of Pakistan, Bangladesh, Sri Lanka, Nepal, and Sikkim, but also communities in other parts of the world) that have evolved from Vedism, the religion of the ancient Indo-European peoples who settled in India during the 2nd millennium BC.

A brief treatment of Hinduism follows. For full treatment, *see* MACROPAEDIA: Hinduism.

Because it integrates a variety of heterogeneous elements, Hinduism constitutes a complex but largely continuous whole; and, because it covers the whole of life, it has religious, social, economic, literary, and artistic aspects. Hinduism thus resists a precise definition, but a common core of characteristics most Hindus share can be identified.

Tradition and doctrine. Although the various Hindu sects all rely on their own set of scriptures, most also accept the sacredness of the ancient texts collectively known as the Vedas. These books are the oldest Indian documents and represent the religion of the Aryan invaders of the subcontinent over the period from 1400 to 500 BC. Vedism was almost entirely concerned with the cult of fire sacrifice (*yajña*) and the continual regeneration of the universe that resulted from it. By means of the correspondences that linked the ritual to both the macrocosmos and the microcosmos, the sacrificer simultaneously contributed to the welfare of the transcendental order and furthered his own interests. These correspondences were explored in the philosophical Vedic texts, the Upanishads, in which a search for the knowledge that would liberate man from repeated death led to the earliest formulations of Hindu doctrine.

Out of the multitude of Vedic deities responsible for various cosmic functions, the two principal gods of theistic Hinduism emerged as dominant at about the dawn of the Christian era. Vishnu, a god of extension and pervasiveness in the Vedas, appears as Īśvara, or lord, in his incarnation of Krishna already in the *Bhagavadgītā* ("Song of the Lord"; *c.* 200 BC–AD 200). Śiva is described as the sole creator, preserver, and destroyer of the universe as early as the Śvetāśvatara Upanishad (*c.* 400 BC) and has roots in the Vedic god Rudra. Devotional cults centring on one or the other of these two high gods grew in importance throughout the 1st millennium AD, were charged with emotional fervour by the medieval saints and poets, and continue to the present as the main forms of Hinduism.

Theistic Hinduism replaced the Vedic sacrificial cult with a form of worship or service to an image or representation of the deity called puja and an attitude of respectful, but often enthusiastic, devotion called bhakti. Puja consists of a more or less elaborate ritual in which the deity is invoked into an image that is established either in the home or temple, honoured as a royal guest with a seat, offerings of water, garments, perfumes, flowers, food, etc., and then dismissed out of the idol he has temporarily deigned to inhabit. The main purpose of the ritual is the communion with the deity gradually leading to a more permanent and even closer relationship between the worshiper and God.

Vaishnavism, the worship of Vishnu in one or all of his 10 incarnations, includes many different sects. The more important are the Śrīvaiṣṇavas and Dvaitins of South India, the followers of Vallabha in western India, the various groups in Bengal traced back to the saint Caitanya (1485–1533), and the Pāñcarātrins. Vaishnavism emphasizes a personal relation with a loving and gracious god.

Śaivism, the worship of Śiva, tends to be more ascetically inclined than Vaishnavism and often incorporates yogic mystical practices into its worship. Śiva is an ambivalent deity when presented anthropomorphically, terrible and yet protecting, and is often represented in the form of the phallic lingam conveying both erotic and ascetic meanings. The major Śaiva groups include the Kashmir Śaivas, and the Liṅgāyats and Śaiva Siddhāntins of South India.

A third major component of Hinduism is the cult of the goddess Śākti (also represented as Devī, Durgā, and Kālī), or Śāktism, which is usually combined with the esoteric Tantric methods of tapping the creative energies (shaktis) within oneself. Śāktism is also frequently a feature of Vaishnavism and Śaivism, in which devotion is paid to Lakṣmī or Pārvatī, the divine consorts of Vishnu and Śiva, and plays a crucial role in the religious life of many of India's villages.

Fundamental to all Hindu sects is the belief in an eternal, infinite, all-embracing neuter principle of ultimate reality called Brahman. The pervasive force lying within all being, Brahman is conceived as the "self," or atman, of all forms of life, and many Hindu traditions portray the realization of the identity between the individual self and the cosmic principle as the final religious goal.

Closely connected to the doctrine of Brahman/atman is the concept of samsara, or transmigration of the individual soul, and its complementary principle of karma, the law whereby acts produce future good or bad results. The cycle of perpetual rebirth entraps the soul until it is finally broken by spiritual self-realization and moksha, or liberation, is attained. Three paths, or means, to this salvation are generally accepted, though with differing emphases according to the particular tradition: (1) the path of ritual or disinterested action (karma-marga); (2) the way of true knowledge (jnana-marga); and (3) the method of bhakti, or intense devotion to God.

The caste system, which hierarchically arranges the groups of Hindu society on the basis of relative purity, has been identified by some scholars as the central unifying institution of Hinduism. Growing out of an ancient ideological division of society into four classes, priests, warriors, agriculturists and traders, and servants, the complex caste structure is indeed generally adhered to and often actively supported by the various Hindu traditions. Many, though not all, Hindus acknowledge the supremacy of the Brahman (priestly) class as the highest representative of religious purity and knowledge, and many support the notion that social and religious duties are differently determined according to birth and inherent ability. This is the underlying principle of dharma, the religious and moral law governing individual conduct.

In modern times a number of Hindu reformational movements have sprung up in response to the confrontation with the West. The Brahmo Samaj ("Society of God"), founded in 1828 by Rammohan Ray, and the Arya Samaj ("Society of Nobles"), created in 1875 by Dayanand Sarasvati, both attempted to purge Hinduism of polytheism and image worship and infuse it with new vitality. Rabindranath Tagore, India's greatest modern poet, was the son of one of the leaders of the Brahmo Samaj. In his struggle against British imperialism, Mohandas Gandhi put ancient Hindu teachings of nonviolence, vegetarianism, celibacy, and social tolerance to new social and political uses.

Mythology. Hindu mythology is rich, multifarious, and inclusive. It portrays the terrible alongside the benevolent, the trivial alongside the cosmic, and the grotesque alongside the sublime. The earliest source of Hindu mythology is the Vedic literature, the oldest texts of which are the four Vedas, or "Books of Knowledge": Rigveda, Yajurveda, Sāmaveda, and Atharvaveda. Though the Vedas convey much information about the warrior life-style of the conquering Aryans, their principal focus is the fire sacrifice. Three gods most frequently invoked in the Vedas are Indra, god of war and rain who releases the life-giving monsoons by killing the dragon Vṛtra; Agni, the deified sacrificial fire; and Soma, the hallucinogenic plant from which the sacrificial drink is pressed.

The major sources of classical Hindu mythology are a series of texts composed in Sanskrit during the 1st millennium AD. The *Mahābhārata* ("Great Epic of the Bharata Dynasty") includes the *Bhagavadgītā,* the most important religious text of Hinduism. The *Rāmāyana* narrates the adventures of Rāma, a popular incarnation of the god Vishnu. The most extensive sources of Hindu mythology, however, are the *Purāṇas,* encyclopaedic collections of Indian legend and mythology blending Aryan and indigenous Indic elements.

Hindustān, also spelled HINDUSTHAN (Persian: "Land of the Hindus"), historically, northern India, in contrast to the Deccan, or southern India. This area, more particularly the basin of the five Punjab rivers and the upper Gangetic Plain—a mostly fertile and well-populated corridor situated between walls of mountain, desert, and sea—has been regarded as the principal seat of Indian power, containing the bulk of Indian wealth and physical energy.

The name Hindustān is sometimes defined as "north of the Vindhya mountains." It is also occasionally used as a synonym for all of India.

Hindustani language, lingua franca of modern India before partition (1947). Based on Khari Boli, a dialect originating in the area around Delhi, Meerut, and Sahāranpur, it was

spread throughout India by the Mughals and merchants. In the late 18th and early 19th centuries, the language was strongly promoted by an Englishman, John Borthwick Gilchrist (1759–1841), who wrote a Hindustani dictionary and a number of grammars and served as the first president of the Fort William College in Calcutta, an institution that trained British civil servants. It was Gilchrist who invented the name Hindustani, or, as he spelled it, "Hindoostanee." Two literary languages arose from colloquial Hindustani: Hindi, showing a strong Sanskrit influence, and Urdu, with a heavily Persianized vocabulary. Hindi is now the national language of India, and Urdu is the official language of Pakistan.

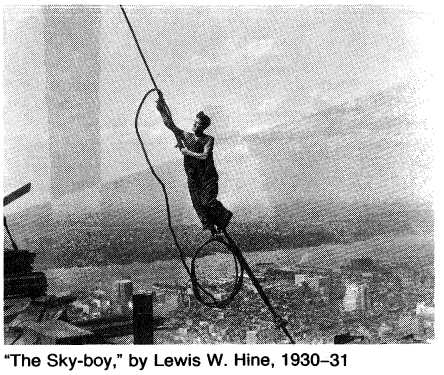
Hindustani music, the music of northern India and Pakistan that developed as a distinct type from the late 12th or early 13th century, when the Islāmic conquest of the northern parts of the subcontinent brought special emphasis to Arabic and Iranian musical practices, which merged with ancient Hindu traditions. The latter traditions, less affected by foreign influences, remain in the Carnatic music of the south, the division being roughly demarcated by the city of Hyderābād in Andhra Pradesh state.

Northern India shares with the south the basic melodic principles of raga (melodic framework for improvisation) and rhythmic principles of tala (cyclical rhythmic pattern), although there are pronounced differences in style and classification. Instrumental music is more dominant in the northern music, in which a greater number of different instruments are in use; and there exist some purely instrumental forms, such as the *gat,* a sort of theme with variations.

Hindustani music is often regarded as more emotional and romantic than its southern counterpart. The prolongation of tones, for instance, in introductory (*ālāpa*) sections of pieces can create a languorous effect. Change by stages to faster and faster tempos—sometimes with concomitant changes in tala patterns—is also characteristic of performances in northern India and Pakistan.

Hine, Lewis Wickes (b. Sept. 26, 1874, Oshkosh, Wis., U.S.—d. Nov. 3, 1940, Hastings-on-Hudson, N.Y.), American photographer who used his art to bring social ills to public attention.

Trained as a sociologist, Hine began to portray the immigrants who crowded onto New York's Ellis Island in 1905. He also



"The Sky-boy," by Lewis W. Hine, 1930–31
International Museum of Photography at George Eastman House

photographed the tenements and sweatshops where the immigrants were forced to live and work. These pictures were published in 1908 in *Charities and the Commons* (later *Survey*).

In 1909 Hine published "Child Labor in the Carolinas" and "Day Laborers Before Their Time," the first of his many photo stories documenting child labour. These photo stories included such pictures as "Breaker Boys Inside the Coal Breaker" and "Little Spinner in Carolina Cotton Mill," showing children as young as eight years old working long hours in dangerous conditions. Two years later, he was hired by the National Child Labor Committee to explore more extensively child-labour conditions in the United States. Hine traveled throughout the eastern half of the United States, gathering appalling pictures of exploited children and the slums in which they lived. He kept a careful record of his conversations with the children by secretly taking notes inside his coat pocket and photographing birth entries in family Bibles. He measured the children's heights by the buttons on his vest.

Late in World War I Hine served as a photographer with the Red Cross. After the Armistice he remained with the Red Cross in the Balkans, and in 1919 he published the photo story "The Children's Burden in the Balkans."

Returning to New York City, he was hired to record the construction of the Empire State Building, then the tallest building in the world. To get the proper angle for certain pictures of the skyscraper, Hine had himself swung out over the city streets in a basket or bucket suspended from a crane or other device. In 1932 these photographs were published as *Men at Work.* The remainder of his life was spent documenting government projects.

Hines, Earl (Kenneth), byname FATHA (b. Dec. 28, 1905, Duquesne, Pa., U.S.—d. April 22, 1983, Oakland, Calif.), American jazz pianist, bandleader, and composer who was one of the strongest influences in the first 30 years of jazz history. He improvised lines with his right hand that were phrased like those of a trumpeter and—with the use of octave voicings, tremolos, and his powerful attack—caused the piano to seem almost brassy. This style, adopted by Hines during the 1920s, was assimilated by succeeding jazz pianists and modified the formerly strictly pianistic approach to one that was more compatible with modern jazz beginning in the mid-1940s.

The Hines recordings with trumpeter Louis Armstrong (1927–29), especially their "Weather Bird" duet, are jazz classics. Hines was a bandleader through most of the 1930s and '40s, with a big band at Chicago's Grand Terrace Ballroom intermittently from 1928, his personnel during the 1940s including such budding stars of the bebop era as saxophonist Charlie Parker, trumpeter Dizzy Gillespie, and singers Billy Eckstine and Sarah Vaughan. Hit records of the 1940s included "Jelly, Jelly," "Stormy Monday Blues," and "Boogie Woogie on the St. Louis Blues." His best-known composition is "Rosetta."

BIBLIOGRAPHY. Stanley Dance, *The World of Earl Hines* (1977), details the musician's life and career.

Hingham, urban town (township), Plymouth county, eastern Massachusetts, U.S., on Hingham Harbor, 19 miles (31 km) southeast of Boston. Settled in 1633, it was incorporated in 1635 and named for Hingham, Eng. During the 19th century it was a bustling industrial town (iron tools, nails, textiles), and its harbour was a busy fishing and boatbuilding centre; these activities declined after the American Civil War. Hingham is now primarily residential with some light manufacturing. The town's Old Ship Church (1681) is considered the oldest house of worship in continuous use in the United States, and the Old Ordinary (*c.* 1680) is an authentically furnished colonial house. The Nantasket Beach resort area and Wompatuck State Park are nearby. Pop. (1988 est.) 19,853.

Hinkson, Katherine: *see* Tynan, Katherine.

Hinn Island, Norwegian HINNØYA, island, in the Norwegian Sea, northern Norway. Forming part of the Vesterålen group and with an area of 849 square miles (2,198 square km), it is Norway's second largest island after Spitsbergen (principal island of Svalbard). It is divided between Nordland and Troms *fylker* (counties) and separated from the mainland by the narrow Tjeld Strait. Irregularly shaped and deeply indented by narrow fjords, Hinn Island's maximum dimensions are 47 miles (76 km) east-west and 36 miles (58 km) north-south. The town of Harstad on the northeastern coast is the main settlement and port. Hinn Island is mountainous, and its highest peak is Mount Møy (4,153 feet [1,266 m]). Fishing, fish processing, and shipbuilding and repair are its only industries. Pop. (1980) 31,098.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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Hino, city, Tokyo *no* (metropolis), Honshu, Japan, on the railway linking Tachikawa and Hachiōji. Located on the Tama River, Hino was a post town and ferry station during the Tokugawa era (1603–1867). The city is now part of the Keihin Industrial Region, producing automobiles, electrical machinery, and precision instruments. It also serves as a residential suburb of the Tokyo and Yokohama metropolitan area, containing the Tama Zoological Park and Takahata Temple. Pop. (1989 est.) 162,928.

Hinshelwood, Sir Cyril Norman (b. June 19, 1897, London, Eng.—d. Oct. 9, 1967, London), British chemist who worked on reaction rates and reaction mechanisms, particularly that of the combination of hydrogen and oxygen to form water, one of the most fundamental combining reactions in chemistry. For this work he shared the 1956 Nobel Prize for Chemistry with the Soviet scientist Nikolay Semyonov.

Educated at the University of Oxford, Hinshelwood became professor there in 1937. About 1930 he began his investigation of how water is formed. This work led to a greater understanding of the chain and branched-chain reactions occurring in explosions.

He next sought to explore molecular kinetics within the bacterial cell. Upon observing the biological responses of bacteria to changes in environment, he concluded that more or less permanent changes in a cell's resistance to a drug could be induced. This finding was important in regard to bacterial resistance to antibiotic and other chemotherapeutic agents. He was knighted in 1948. His publications include *The Kinetics of Chemical Change in Gaseous Systems* (1926) and *The Chemical Kinetics of the Bacterial Cell* (1946).

Hinsley, Arthur (b. Aug. 25, 1865, Carlton, Yorkshire, Eng.—d. March 17, 1943, Buntingford, Herefordshire), English Roman Catholic

Hinsley
The Mansell Collection

cardinal and fifth archbishop of Westminster who was an outspoken opponent of the fascist powers during World War II.

Educated at the English College, Rome, where he was ordained in 1893, Hinsely subsequently held various academic posts in England, at Ushaw College, Durham (1893–97), and at St. Bede's Grammar School (which he founded), Bradford (1899–1904). He was rector of the English College in Rome (1917–28) and was later consecrated titular bishop of Sardis, now Sart, Tur. (1930). He was the first papal representative appointed to deal with the hierarchy of Africa (1930–34), but he became ill and retired in 1935. Hinsley was called out of retirement to become archbishop of Westminster (March 25, 1935) on the death (January 1) of Francis Cardinal Bourne. In October 1940 he founded the Sword of the Spirit, a politico-religious group that comprised not only Roman Catholics but also the Churches of England and Scotland, as well as the Free Churches, in its efforts to rally British churchmen against totalitarianism. Hinsley criticized the negative stand of Pope Pius XI on Italy's invasion of Ethiopia (1935) and denounced the Hitler regime. One of his successors at Westminster, Archbishop John Heenan, wrote the biography *Cardinal Hinsley* (1944).

hinterland, also called UMLAND, tributary region, either rural or urban or both, that is closely linked economically with a nearby town or city.

George G. Chisholm (*Handbook of Commercial Geography,* 1888) transcribed the German word *hinterland* (land in back of), as hinderland, and used it to refer to the backcountry of a port or coastal settlement. Chisholm continued to use hinderland in subsequent editions of his *Handbook,* but the use of hinterland, in the same context, gained more widespread acceptance. By the early 20th century the backcountry or tributary region of a port was usually called its hinterland.

As the study of ports became more sophisticated, maritime observers identified export and import hinterlands. An export hinterland is the backcountry region from which the goods being shipped from the port originate and an import hinterland is the backcountry region for which the goods shipped to the port are destined. Export and import hinterlands have complementary forelands that lie on the seaward side of the port. An export foreland is the region to which the goods being shipped from the port are bound and an import foreland is the region from which goods being shipped to the port originate.

In the early 20th century, Andre Allix adopted the German word *Umland* ("land around") to describe the economic realm of an inland town, while continuing to accept hinterland in reference to ports. Allix pointed out that umland (now a standard English term) is found in late 19th-century German dictionaries, but suggested that its use in the sense of "environs" dates back to the 15th century.

Since Allix introduced the term umland, the differences between the meanings of hinterland and umland have become less distinct. The use of hinterland began to dominate references to coastal and inland tributary regions in the mid-20th century. Central-place hexagonal trade areas are often referred to as central-place hinterlands. The term urban hinterland has become commonplace when referring to city or metropolitan tributary regions that are closely tied to the central city. An example of a metropolitan hinterland is the Metropolitan Statistical Area (MSA) as designated by the U.S. Census Bureau. MSA's are comprised of a central city, defined by the corporate limits; an urbanized, built-up area contiguous to the central city; and a non-urbanized area, delimited on a county basis, economically tied to the central city.

Hinton (of Bankside), Christopher Hinton, Baron (b. May 12, 1901, Tisbury, Wiltshire, Eng.—d. June 22, 1983, London), engineer who was a leading figure in the development of the nuclear energy industry in Britain; he supervised the construction of Calder Hall, the world's first large-scale nuclear power station (opened in 1956).

Hinton was educated at Trinity College, Cambridge (1923–26), and in the late 1920s and the 1930s he held various governmental posts. He joined the Ministry of Supply at the beginning of World War II and in 1946 became deputy controller of nuclear energy production. He was thus involved in Britain's newly created, full-scale nuclear research program. From the outset Hinton stressed the development of peaceful uses of nuclear energy, and his efforts were directly responsible for the growing cooperation between the United States and Great Britain in this area. In 1954 Britain created the United Kingdom Atomic Energy Authority, and Hinton was appointed managing director (1954–57) of the industrial group of this body.

Hinton was knighted in 1951 and made a Knight of the British Empire in 1957. He was elected a fellow of the Royal Society of London in 1954 and in 1958 became chairman of the Central Electricity Generating Board. He was created a life peer in 1965.

hip, in anatomy, the joint between the thighbone (femur) and the pelvis; also the area adjacent to this joint. The hip joint is a ball-and-socket joint (*q.v.*); the round head of the femur rests in a cavity (the acetabulum) that allows free rotation of the limb. Amphibians and reptiles have relatively weak pelvic girdles and the femur extends horizontally. This does not permit efficient resistance to gravity, and the trunks of these animals often rest partially on the ground. In mammals the hip joint allows the femur to drop vertically, thus permitting the animal to hold itself off the ground and leading to specializations for running and leaping (*see also* leg).

hip roof, also called HIPPED ROOF, roof that slopes upward from all sides of a structure, having no vertical ends. The hip is the external angle where adjacent sloping sides of a roof meet. The degree of such an angle is referred to as the hip bevel. The triangular sloping surface formed by hips that meet at a roof's ridge is a hip end. A pyramidal hipped roof, also known as a pavilion roof, is hipped equally at all corners and the hips meet at a single peak, but the commoner form of hip roof is above a rectangular structure, and so there would be a roof ridge meeting two hips at either end.

A variant is the half-hipped or jerkin head roof, which has gable ends truncated by the eaves of a small hip end (or jerkin head) that descends a short distance from the roof ridge. On an irregularly shaped structure, there may be more than four hips, which then may alternate with valleys, to form a hip-and-valley roof.

Hipparchus, also spelled HIPPARCHOS (b. Nicaea, Bithynia—d. after 127 BC, Rhodes?), Greek astronomer and mathematician who discovered the precession of the equinoxes, calculated the length of the year to within 6½ minutes, compiled the first known star catalog, and made an early formulation of trigonometry.

Life. Hipparchus carried out his observations in Bithynia, at Rhodes, where he spent much time, and also, it seems, at Alexandria. The year 127 BC is usually cited as the last date known for his actual work, and a French astronomer, Jean-Baptiste-Joseph Delambre (1749–1822), clearly demonstrated that some observations of Hipparchus on the star Eta Canis Majoris could well have been carried out in that year.

Most of contemporary knowledge of Hipparchus is contained in the writings of Strabo of Amaseia (flourished *c.* AD 21) and in the great astronomical compendium *Almagest* by Ptolemy (flourished AD 127–151). Ptolemy often quotes Hipparchus, and it is obvious that he thought highly of him; indeed, as a result of the slow progress of early science, he speaks of him with the respect due a distinguished contemporary, although almost three centuries separated the work of the two men. It is difficult always to determine to which of them credit is due.

It is certain, however, that in all his work Hipparchus showed a clear mind and a dislike for unnecessarily complex hypotheses. He rejected not only all astrological teaching but also the heliocentric views of the universe that seem to have been proposed, according to Archimedes (*c.* 287–212 BC), by Aristarchus of Samos (flourished *c.* 270 BC) and that were resuscitated by Seleucus the Babylonian, a contemporary of Hipparchus. In this connection, it is necessary to recall that strong arguments had been advanced against the idea of the motion of the Earth, and the general climate of opinion had never been favourable to following up the lead given by Aristarchus. Moreover, the system of movable eccentrics, and that of epicycles and deferents, accounted well for most of the irregularities observed in the motions of the Sun, the Moon, and the planets. These two systems were based on the erroneous belief that all celestial movement is regular and circular, or at least that it is best described in terms of a system of regular motion in circles. In the system of movable eccentrics, the centres of the supposed orbits of bodies around the Earth were themselves revolving around the Earth. In the other, epicycles were small circles theoretically imposed on the great circular orbital paths, which were called deferents. The epicycle–deferent mechanism was found with that of the movable eccentric in Ptolemy's late form of the geocentric system of cosmology. It was, of course, this Ptolemaic geocentric system that was handed down to western European science, but it must be remembered that the views of Hipparchus had a profound influence on Ptolemy, as he himself acknowledged. It was not until the 15th century that regular observations over very long periods showed the geocentric hypothesis to be too complex to be acceptable and Copernicus proposed that the Sun is the centre of the universe.

Few details are known of the instruments that Hipparchus used. It seems likely that he observed with the usual devices current in his day, although Ptolemy credits him with the invention of an improved type of theodolite with which to measure angles.

Stellar observations. Hipparchus is best known for his discovery of the precessional movement of the equinoxes; *i.e.,* the alterations of the measured positions of the stars resulting from the movement of the points of intersection of the ecliptic (the plane of the Earth's orbit) and of the celestial equator (the great circle formed in the sky by the projection outward of the Earth's equator). It appears that he wrote a work bearing "precession of the equinoxes" in the title. The term is still in current use, although the phenomenon is more usually referred to merely as "precession." This notable discovery was the result of painstaking observations worked upon by an acute mind. Hipparchus observed the positions of the stars and then compared his results with those of Timocharis of Alexandria about 150 years earlier and with even earlier observations made in Babylonia.

He discovered that the celestial longitudes were different and that this difference was

of a magnitude exceeding that attributable to errors of observation. He therefore proposed precession to account for the size of the difference and he gave a value of 45″ or 46″ (seconds of arc) for the annual changes.

This is very close to the figure of 50.26″ accepted today and is a value much superior to the 36″ that Ptolemy obtained.

The discovery of precession enabled Hipparchus to obtain more nearly correct values for the tropical year (the period of the Sun's apparent revolution from an equinox to the same equinox again), and also for the sidereal year (the period of the Sun's apparent revolution from a fixed star to the same fixed star). Again he was extremely accurate, so that his value for the tropical year was too great by only 6½.

Observations of star positions measured in terms of celestial latitude and longitude, as was customary in antiquity, were carried out by Hipparchus and entered in a catalog—the first star catalog ever to be completed. Hipparchus measured the stellar positions with greater accuracy than any observer before him, and his observations were of use to Ptolemy and even later to Edmond Halley. To catalog the stars was thought by some of Hipparchus' contemporaries to be an impiety, but he persevered. Hipparchus had been stimulated in 134 BC by observing a "new star." Concluding that such a phenomenon indicated a lack of permanency in the number of "fixed" stars, he determined to catalog them, and no criticism was able to deflect him from his original purpose.

Hipparchus' catalog, completed in 129 BC, listed about 850 stars (not 1,080 as is often stated), the apparent brightnesses of which were specified by a system of six magnitudes similar to that used today. For its time, the catalog was a monumental achievement.

Lunar and solar work. In his work on the Sun and Moon Hipparchus used the observations of others as well as his own. He showed that the system based on movable eccentrics and that based on epicycles and deferents were equivalent in the motions they gave for the Sun and Moon and, indeed, for the planets. Both methods gave the position of the Sun correct to within 1′, and Hipparchus rejected the peculiar notion, prevalent in his day, that the Sun moved in an orbit inclined to the ecliptic. Hipparchus also redetermined the inclination of the ecliptic and obtained a value correct to within 5′ of the modern figure.

The motion of the Moon is more complex than that of the Sun, owing to the perturbations that the Moon suffers from both Earth and Sun; in consequence, there are more irregularities to be taken into consideration. Hipparchus satisfactorily accounted for that inequality of the Moon's motion that is now known to be due to the elliptical form of its orbit; he utilized the system of circular epicycles and deferent but proposed that the deferent was inclined at an angle of 5° to the ecliptic. His theory gave reasonably satisfactory results for the motion at Full and New Moon. Hipparchus was dissatisfied however, for, as he appreciated, the errors at quadrature (when the Moon stands at first and last quarters) were too great. He concluded that there was some further inequality in the Moon's motion, but he was unable to discover any means of solving this problem, and he said candidly that he was leaving the solution of this question to those who were to follow him.

Hipparchus also attacked the problem of the relative size of the Sun and Moon and their distance from the Earth. It had long been appreciated, of course, that the apparent diameter of each was the same, and various astronomers had attempted to measure the ratio of size and distance of the two bodies. Eudoxus obtained a value of 9:1, Phidias (father of Archimedes) 12:1, Archimedes himself 30:1; while Aristarchus believed 20:1 to be correct. The present-day value is, approximately, 393:1. Hipparchus followed the method used by Aristarchus, a procedure that depends upon measuring the breadth of the Earth's shadow at the distance of the Moon (the measurement being made by timing the transit of the shadow across the Moon's disk during a lunar eclipse). This method really gives the parallax (the apparent change in the position of a celestial body when observed from two different directions), and thus the distance, of the Moon, the parallax for the Sun being too small to give a significant result; moreover the accuracy obtainable for the distance even of the Moon is poor. Dissatisfied with his results, Hipparchus attempted to find the limits within which the solar parallax must lie for observations and calculations of a solar eclipse to agree; he hoped that differences between solar and lunar parallax might thus also be revealed. He obtained no satisfactory result from his efforts, however, and concluded that the solar parallax was probably negligible. At least he appreciated that the distance of the Sun was very great indeed.

Hipparchus was unsuccessful in forming a satisfactory planetary theory and was scientist enough to avoid building hypotheses on insufficient evidence. In his work Hipparchus adopted the generally accepted order for the Sun, Moon, and planets. With the Earth as the centre, they were, in order from the Earth, the Moon, Mercury, Venus, the Sun, Mars, Jupiter, and Saturn.

Contributions to mathematics. It is to be expected that the astronomical work of Hipparchus should have led him to develop certain departments of mathematics. He made an early formulation of trigonometry and tabulated a table of chords—*i.e.,* the length of the line joining two points on a unit circle corresponding to the given angle at the centre; *e.g.,* chord of $\alpha = 2 \sin (\alpha/2)$: he is known to have had a method of solving spherical triangles. It is also generally agreed that the theorem in plane geometry known as "Ptolemy's theorem" was originally due to Hipparchus and was later copied by Ptolemy. During the 18th century the French statesman and mathematician Lazare Carnot showed that the whole of plane trigonometry can be deduced from these formulas.

Geographical work. Hipparchus criticized severely the geographical work of Eratosthenes (*c.* 276–*c.* 194 BC) and himself did some work in this field. His main contribution was to apply rigorous mathematical principles to the determination of places on the Earth's surface, and he was the first to do so by specifying their longitude and latitude—the method used today. Hipparchus was, no doubt, led to this method by his work on the trigonometry of the sphere. He tried to measure latitude by utilizing the ratio of the longest to the shortest day at a particular place instead of following the customary method of the Babylonians of measuring the difference in length of day as one travels northward. Hipparchus also divided the then known inhabited world into climatic zones, and suggested that the longitude of places could be determined by observing, from these places, the moments when a solar eclipse began and ended; but this bold scheme, while theoretically satisfactory for a small area of the Earth's surface, was not a practical proposition in his day.

(C.A.R./Ed.)

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hipped roof: *see* hip roof.

Hippel, Theodor Gottlieb von (b. Jan. 31, 1741, Gerdauen, East Prussia—d. April 23, 1796, Königsberg), German writer of the late Enlightenment and a disciple of the philosopher Immanuel Kant. Although he was a minor writer of his time, his works have enjoyed an unusually long-lasting popularity and can

Hippel, engraving by J.F. Bolt
Archiv fur Kunst und Geschichte, West Berlin

now be seen to have foreshadowed the novels of Jean Paul (Johann Friedrich Richter).

Hippel studied law and theology. In 1780 he was appointed mayor of Königsberg, becoming president of the town in 1786. The influence of the author Laurence Sterne can be seen in his largely autobiographical novel *Lebensläufe nach aufsteigender Linie* (1778–81; "Careers in an Ascending Line"), which contains elements both of pietism (in its melancholy contemplations of death and morality) and of rationalism. His second novel, *Kreuz- und Querzüge des Ritters A bis Z* (1793–94; "The Knight's Crisscrossing Journeys from A to Z"), portrays the prejudice and pride of the nobility in the misadventures and ultimate reconciliation with society of a quixotic hero. Hippel's two essays *Über die Ehe* (1774; "On Marriage"), a praise of marriage, and *Über die bürgerliche Verbesserung der Weiber* (1792; "On the Civic Betterment of Women") attracted much attention with their emphasis on the emancipation of women. He also published two comedies in his youth; a number of legal, Masonic, and moral works; and hymns.

Hippias (d. 490 BC), tyrant of Athens from 528/527 to 510 BC. He was a patron of poets and craftsmen, and under his rule Athens prospered. After the assassination of his brother Hipparchus (514), however, Hippias was driven to repressive measures. An attempt by nobles in exile to force their way back failed, but in 510 the Spartans under Cleomenes I invaded Attica, besieged the tyrant's party on the acropolis, and forced their surrender and evacuation. Hippias took refuge with the Persian governor at Sardis and later (490) crossed the Aegean with the Persian army. It was he who advised the landing at Marathon where the Athenian army won a decisive victory. He is said to have died at Lemnos on the journey home.

Hippias OF ELIS (fl. 5th century BC, Elis, in the Peloponnese, Greece), Sophist philosopher who contributed significantly to mathematics by discovering the quadratrix, a special curve he may have used to trisect an angle.

A man of great versatility, with an assurance characteristic of the later Sophists, Hippias lectured on poetry, grammar, history, politics, archaeology, mathematics, and astronomy. His vast literary output included elegies and tragedies besides technical treatises in prose. He is credited with an excellent work on Homer, collections of Greek and foreign

literature, and archaeological treatises; but nothing remains except a few fragments. He is depicted in Plato's *Protagoras,* and two of Plato's minor dialogues are named after him.

Hippius, Zinaida Nikolayevna: *see* Gippius, Zinaida Nikolayevna.

Hippo, either of two ancient ports on the coast of North Africa.

Hippo, later called Hippo Regius, located near the modern town of Annaba (formerly Bône) in Algeria, was probably first settled by Carthaginians in the 4th century BC. It later became the home of Numidian rulers. Under Roman control it was first made a *municipium* (a community that exercised partial rights of Roman citizenship) and later a *colonia* (Roman settlement with full rights of citizenship). The city's most important personage, later a Father of the Church, St. Augustine, was bishop there from AD 395 to 430.

The ancient port of Hippo Diarrhytus, or Hippo Zarytus, is now occupied by the city of Bizerte (Banzart) on the coast of Tunisia. Settled at least as early as 350 BC, it achieved particular prominence during Roman and later times.

Hippocrateaceae, family of woody vines, shrubs, and trees, belonging to the order Celastrales, comprising 21 genera common in the tropics. They have simple leaves and small, greenish flowers. The genus *Hippocratea* has 80 or more species, including *H. ovata,* a high-climbing vine—in tropical America and the West Indies—with leathery, oval leaves. *Salacia,* with 200 species, differs from *Hippocratea* in that it lacks wings on its fruit. Fruits of the Mexican and Central American vine *H. celastroides* are mashed and used locally to kill lice.

Hippocrates (b. *c.* 460 BC, island of Cos, Greece—d. *c.* 377, Larissa, Thessaly), Greek physician of antiquity who is traditionally regarded as the father of medicine. His name has long been associated with the so-called Hippocratic Oath—certainly not written by him—which in modified form is still often required to be taken by medical students on graduating.

Life. Trustworthy information about Hippocrates' life is scanty. His younger contemporary Plato referred to him twice. In the

Hippocrates, Roman bust copied from a Greek original, *c.* 3rd century BC; in the collection of the Antichità Di Ostia, Italy

By courtesy of the Soprintendenza Alle Antichita Di Ostia, Italy

Protagoras Plato called Hippocrates "the Asclepiad of Cos" who taught students for fees and implied that Hippocrates was as well known as a physician as Polyclitus and Phidias were as sculptors. It is now widely accepted that an "Asclepiad" was not a temple priest or a member of a physicians' guild but instead was a physician belonging to a family that had produced well-known physicians for generations. Plato's second reference occurs in the *Phaedrus.* Hippocrates is referred to as a famous Asclepiad who had a philosophical approach to medicine. Further, Hippocrates regarded the body as "a whole"—that is, as an organism. His medical practice resulted from his collection of information regarding parts of the body into an embracing concept and, thereafter, the division of the whole into its parts.

Meno, a pupil of Aristotle, specifically stated in his history of medicine the views of Hippocrates on the causation of diseases, namely, that undigested residues were produced by unsuitable diet and that these residues excreted vapours, which passed into the body generally and produced diseases. Aristotle said that Hippocrates was called "the Great Physician" but that he was small in stature (*Politics*).

These are the only extant contemporary, or near-contemporary, references to Hippocrates. Five hundred years later, the Greek physician Soranus wrote a life of Hippocrates, but the contents of this and later lives were largely traditional or imaginative. Throughout his life Hippocrates appears to have travelled widely in Greece and Asia Minor practicing his art and teaching his pupils, and he presumably taught at the medical school at Cos quite frequently. His birth and death dates are traditional but may well be approximately accurate. Undoubtedly Hippocrates was a historical figure, a great physician who exercised a permanent influence on the development of medicine and on the ideals and ethics of the physician.

The Hippocratic Collection. From shortly after the Hippocratic period, references were made to named works by "Hippocrates," and this tradition continued. The number of works "by Hippocrates" known in ancient times was about 70, but the number now extant is about 60. They became known as the Hippocratic Collection (*Corpus Hippocraticum*), of which the earliest surviving manuscript dates from the 10th century AD.

Even in antiquity it was realized that not all the works attributed to Hippocrates had actually been written by him—hence the later attempts to designate the "genuine works." This endeavour started at least as early as the 2nd century AD and continues to the present day. The works differ enormously in length and style, in the opinions expressed, and in the types of their intended users. Some are written for professional physicians, some for their assistants and students, some for laymen, and some are philosophical works. From internal and other evidence the approximate dates of some of the treatises are known, and it seems fairly certain that at least a century—and possibly much longer—separates the date of the earliest work from that of the latest. One feature is common: all the works were written in the Ionic dialect, which thus became the language of Greek science.

There has long been general agreement that the collection constituted the library of a medical school, probably that at Cos, and that, during the 3rd or 2nd century BC, it passed to the great library at Alexandria, where the works were edited and made available. The collection deals with the following subjects: anatomy, clinical subjects, diseases of women and children, prognosis, treatment by diet and drugs, surgery, and medical ethics.

Prominent among the works in the Hippocratic Collection were a treatise on *Epidemics,* in seven books and written by at least two authors; *On the Sacred Disease,* a treatise on epilepsy; *Prognostics; Airs, Waters and Places;* and *Aphorisms,* a collection of 412 short counsels regarding diagnosis, prognosis, and treatment. (E.A.U.)

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Hippocrates OF CHIOS (fl. *c.* 460 BC), Greek geometer who compiled the first known work on the elements of geometry nearly a century before Euclid. Although the work is no longer extant, Euclid may have used it as a model for his *Elements.*

According to tradition, Hippocrates was a merchant whose goods had been captured by pirates. He went to Athens to prosecute them but met with little success in recovering his property. He remained in Athens, however, where he attended lectures on mathematics and finally took up teaching geometry to support himself. Aristotle used a different version of the story, claiming that Hippocrates allowed himself to be cheated by customs officers in Byzantium, purporting to show that, although he was a good geometer, he was incompetent to handle the ordinary affairs of life.

Hippocrates' *Elements* is known only through references made in the works of later commentators, especially the Greek philosophers Proclus (fl. *c.* AD 450) and Simplicius (fl. *c.* AD 530). In his attempts to square the circle, Hippocrates was able to find the areas of certain lunes, or crescent-shaped figures. He based this work upon the theorem that the areas of two circles have the same ratio as the squares of their radii. A summary of these quadratures of lunes, written by Eudemus of Rhodes (*c.* 335 BC), with elaborate proofs, has been preserved by Simplicius.

The third of the achievements attributed to Hippocrates was the discovery that a cube can be doubled if two mean proportionals can be determined between a number and its double.

Hippocratic oath, ethical code attributed to the ancient Greek physician Hippocrates, adopted as a guide to conduct by the medical profession throughout the ages and still used in the graduation ceremonies of many medical schools. Although little is known of the life of Hippocrates—or, indeed, if he was the only practitioner of the time using this name—a body of manuscripts, called the Hippocratic Collection (*Corpus Hippocraticum*), survived until modern times. In addition to containing information on medical matters, the collection embodied a code of principles for the teachers of medicine and for their students. This code, or a fragment of it, has been handed down in various versions through generations of physicians as the Hippocratic oath.

The text of the oath itself is divided into two major sections. The first sets out the obligations of the physician to students of medicine and the duties of pupil to teacher. In the second section the physician pledges to prescribe

only beneficial treatments, according to his abilities and judgment; to refrain from causing harm or hurt; and to live an exemplary personal and professional life.

hippodrome, ancient Greek stadium designed for horse racing and especially chariot racing. The typical structure was dug into a hillside and the excavated material used to construct an embankment for supporting seats on the opposite side. Seats ran in tiers around the U-shaped arena, except for the open end; a simple fence running down the middle divided the course. Because as many as 10 chariots raced at one time, the breadth of the course was sometimes as much as 400 feet (122 metres); the length was about 600 to 700 ft.

The largest hippodrome of the ancient world was that of Constantinople, begun under Septimius Severus in AD 203 and completed by Constantine in 330. An Egyptian obelisk, a memorial column, and the bronze serpent tripod from the Oracle at Delphi decorated the central divider. Its decorations also included the four bronze horses later taken by the Venetians in the Fourth Crusade (1204) that now decorate the facade of St. Mark's in Venice.

Hippolytus, minor divinity in Greek religion. At Athens he was associated with Aphrodite, the goddess of love; at Troezen, girls just before marrying dedicated to him a lock of their hair. To the Greeks his name suggested that he was destroyed by horses.

Hippolytus in his quadriga, detail from a Greek vase; in the British Museum

By courtesy of the trustees of the British Museum

In Euripides' tragedy *Hippolytus,* he was son of Theseus, king of Athens, and the Amazon Hippolyte. Theseus' queen, Phaedra, fell in love with Hippolytus. When Phaedra's passion was revealed to him, he reacted with such revulsion that she killed herself, leaving a note accusing Hippolytus of having attacked her. Theseus, refusing to believe Hippolytus' protestations of innocence, banished him and called down upon him one of the three curses the sea god Poseidon had given to him. Poseidon sent a sea monster that frightened Hippolytus' horses until he could no longer control them. They smashed the chariot and dragged their master to death.

Other plays treat the same story; the theme is that of the biblical story of Joseph and Potiphar's wife and of the story, in the *Iliad,* of Bellerophon and Stheneboea (Anteia).

Hippolytus OF ROME, SAINT (b. *c.* 170—d. *c.* 235, Sardinia; Western feast day August 13, Eastern feast day January 30), Christian martyr, the first antipope (217/218–235), a controversial theologian who was the first Roman priest to produce a theologico-philosophical work on dogma.

Hippolytus was a leader of the Roman Church during the pontificate (*c.* 199–217) of St. Zephyrinus, whom he attacked as being a modalist (one who conceives that the entire Trinity dwells in Christ and who maintains that the names Father and Son are only different designations for the same subject). Hippolytus, rather, was a champion of the Logos doctrine that distinguished the persons of the Trinity. He conceived of God as a unit who, while indivisible, was plural. In ethics he was conservative—being scandalized when Calixtus (successor of Zephyrinus) took measures to extend absolution to graver sins such as adultery—and he regarded the church as a society composed exclusively of the just.

Although Hippolytus' reputation as a scholar and his literary talent were assets to his cause, the church chose Calixtus for the papacy when Zephyrinus died. In disgust, Hippolytus withdrew from the Roman community and headed a dissident group that consecrated him. He reigned in opposition to the succeeding pontificates of SS. Urban I (222–230) and Pontian (230–235), with whom he was exiled to the mines of Sardinia in 235 during the persecution of Christians by the Roman emperor Maximinus. There he became reconciled with Pontian and exhorted his supporters to unite with Rome. Before dying as martyrs, both resigned to allow for a successor, St. Anterus (235–236), thus ending the schism. Pope St. Fabian (236–250) had their corpses brought to Rome for solemn burial.

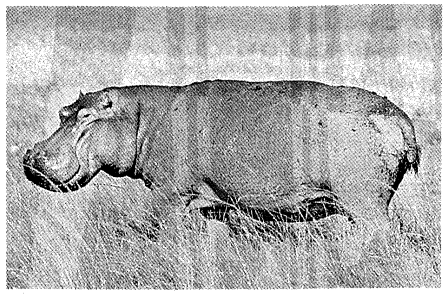
Rather than an original theologian, Hippolytus was a laborious, learned compiler whose writings were often marred by an embittered, controversial tone. The West soon forgot him because he was a schismatic and because he wrote in Greek. His most important work is considered to be *Philosophumena* ("Refutation of All Heresies"), which seeks to show that the various Christian heresies are traceable to false pagan philosophies. The church order, known as the *Apostolic Tradition* (extant only in later versions; Eng. trans. by G. Dix, 1937), is now generally attributed to him and illuminates liturgical practice *c.* 217. Adhémar d'Alès's *Théologie de Saint Hippolyte* was published in 1906.

Hippolytus, Canons of Saint, formally CANONS OF THE CHURCH AND PRECEPTS WRITTEN BY HIPPOLYTUS, ARCHBISHOP OF ROME, ACCORDING TO THE ORDINANCES OF THE APOSTLES, a collection of 38 canons preserved in an Arabic translation. The original text was Greek and written in Egypt; the Arabic version may rest on a Coptic translation.

These canons are neither the authentic work of St. Hippolytus nor the oldest church regulations but are a later adaptation of the *Apostolic Tradition* of St. Hippolytus. The unknown author of the canons generally follows the order of his source and treats the same subjects: ordination, catechumenate, Baptism, prayer, and discipline of the Christian community. But he alters the text when he wishes and makes additions of his own. Internal evidence indicates that he lived after the Council of Nicaea (AD 325) but that he wrote before the Roman Empire officially became Christian at the end of the 4th century. Unlike the *Apostolic Tradition,* the canons do not seem to describe an actual Christian community but instead contain a mixture of apostolic fiction, ideal reform, and actual practice.

hippopotamus (*Hippopotamus amphibius*), amphibious African mammal of the family Hippopotamidae (order Artiodactyla). Hippopotamuses are the largest nonruminating, even-toed, hoofed mammals. Formerly found in lakes and rivers throughout Africa, they are now more restricted, ranging from the Upper Nile to South Africa.

Hippopotamuses have barrel-shaped bodies and short limbs. They may reach a length of 4.6 metres (15 feet), a height of 1.5 m (5 feet) at the shoulder, and a weight of 3–4.5 metric tons (3.3–5 tons). The skin is thick, nearly hairless, and grayish black above, lighter and pinkish below. The eyes and nostrils protrude and may be kept above water when the animals are submerged. The mouth is enormous



Hippopotamus (*Hippopotamus amphibius*)

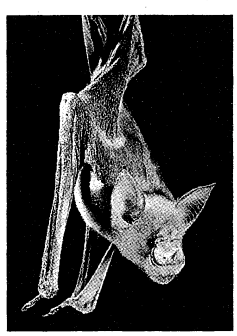
Leonard Lee Rue III—Annan Photo Features

and the upper lip is thick and bulging; the incisor and canine teeth are very large and grow continuously as they are worn away. Numerous skin glands release a protective, oily, pinkish secretion that has popularly, but incorrectly, been thought of as blood sweated by the animals.

Hippopotamuses live in herds in rivers and swamps and feed, mostly at night, on water plants and shore vegetation, often doing much damage to crops. In water, from which they never wander far, they can swim fast and also walk along the bottom. On land they can gallop for short distances faster than a man can run. The voice is a loud grunt or bellow. A single young is born after gestation of about eight months; the baby often rides the mother's back while she swims or floats at the surface. In the breeding season, males engage in battles that are sometimes fatal. Hippopotamuses are generally inoffensive but sometimes make unprovoked attacks on small boats, smashing them in their jaws. Their flesh is much esteemed by Africans, and their teeth are of good quality ivory.

The rare pygmy hippopotamus (*Choeropsis liberiensis*), also of the family Hippopotamidae, is about 1.5 m long and darker in colour. It lives alone or in pairs in the streams, wet forests, and swamps of West Africa and appears to be less aquatic than its larger relative.

Hipposideridae, family of insect-eating bats, suborder Microchiroptera, known collectively as Old World leaf-nosed bats. Hipposiderid bats are characterized by a complex nose leaf (fleshy appendage on the muzzle) consisting



Old World leaf-nosed bat (*Hipposideros commersoni gigas*)

Nina Leen, *Life* © Time Inc.

of several compartments and leaflike sections. They are found in the tropics from Africa to Australia; one genus, *Hipposideros,* is found virtually throughout that range. Hipposiderid bats are usually brown, although a red colour phase occurs in such forms as the trident leaf-nosed bats (*Asellia*). Head and body length is about 3–11 centimetres (1 1/5–4 1/3 inches); the tail is either entirely lacking or, when present, measures up to 6 cm (2.4 in.) long. Most of the 60 species are gregarious and shelter in caves or similar roosts.

Hipposiderid bats are closely related to the horseshoe bats (Rhinolophidae) and are sometimes included with the rhinolophids as the subfamily Hipposiderinae.

Hippuridales, also called HALORAGALES, the water milfoil order of dicotyledonous flowering plants comprising three families and eight genera of remarkably diverse aquatic and terrestrial herbs distributed throughout the world.

The plants are characterized by their herbaceous habit and usually simplified wind- or water-pollinated flowers that often lack petals and have a one- to four-chambered ovary positioned below the attachment point of the other floral parts and containing only one ovule per chamber. The order is considered to be closely related to the myrtle order (Myrtales) and to have an ancestry with it in the order Saxifragales.

The largest group is the water milfoil family (Haloragaceae or Haloragidaceae), some 150 species of land, marsh, and water herbs with small leaves, small flower clusters, and flowers with a two- to four-chambered ovary and a similar number of styles (pollen-receptive parts at the upper end of the ovary). The genera are *Haloragis* (75 species), *Myriophyllum* (45 species), *Laurembergia* (22 species), *Proserpinaca* (4 species), *Loudonia* (3 species), and *Meziella* (1 species). Of these, only one provides plants of horticultural interest, the water milfoils (*q.v.*; *Myriophyllum*).

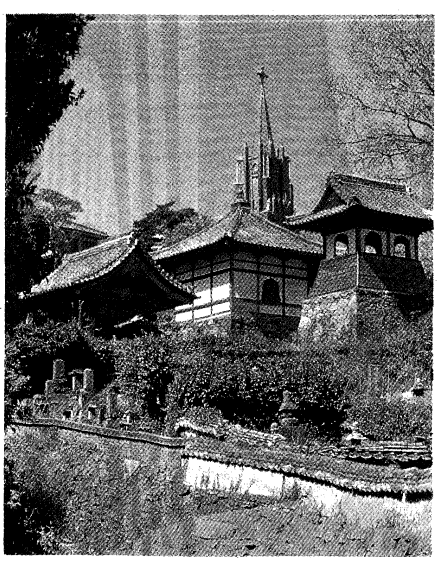
The family Gunneraceae, almost entirely found in the Southern Hemisphere, contains one genus, *Gunnera*, with about 50 species of large terrestrial herbs, many of which have huge, long-stalked leaves with round or kidney-shaped blades that give the plants a rhubarb appearance, but the leaves may be as much as 3 metres (about 10 feet) across the blade. Often grown as a striking garden ornamental, for example, is *Gunnera chilensis*, which has clusters of green leaf stalks nearly 2 metres (6 ft) long. The stalks are covered with stiff, bristly hairs and topped by large round or heart-shaped leaf blades with deep lobes radiating from the attachment point of the stalk. A similar but even larger species (*G. manicata*) has leaves that are attached at the centre of the blade.

The Hippuridaceae, or mare's-tail (*q.v.*) family, contains only one genus (*Hippuris*), with three species of elongate, submerged, aquatic herbs that bear whorls of small, linear leaves at intervals along the stems.

Hipsch Martin: *see* Schongauer, Martin.

Hira (ancient city, Iraq): *see* Ḥīrah, al-.

Hirado, city, Nagasaki Prefecture (*ken*), Japan, on Hirado-shima (Hirado Island), off the northwest coast of Kyushu. Although the city is composed of two islands, the town of Hirado on the northern shore of Hirado-shima serves as its core. The town was the first Japanese port opened to Portuguese, Dutch, and British trade in 1550; Nagasaki took its place in 1636. It also served as a castle town of the Hirado clan during the Tokugawa era (1603–1867) and is rich in historical monuments such as the Konyo-ji (Konyo Temple) and a Roman Catholic church. Part of Hirado-shima's 64 sq mi (165 sq km) is included in the Saikai National Park. Pop. (1980) 29,923.



Konyo-ji (Konyo Temple) overlooked by the steeple of a Roman Catholic church, Hirado, Japan

Shostal—EB Inc.

Hiragushi Denchū, also called TAKUTARŌ (b. Feb. 23, 1872, Okayama Prefecture, Japan—d. Dec. 30, 1979, Tokyo), sculptor who worked to preserve traditional Japanese wood-carving methods.

Hiragushi set out for Ōsaka at the age of 21 to receive training in wood sculpture from a doll-carving expert, training that greatly influenced his work in later years. He also studied ancient Buddhist images for two years in Nara, where he carved an image of Kannon. In 1898 Hiragushi moved to Tokyo to become the student of Takamura Kōun, leading wood sculptor of the period, who led the movement to blend the method of Buddhist idol sculpture with modern European realism. Hiragushi became active in the Nihon Bijutsuin (Japanese Fine Arts Academy) and from 1899 he participated in the Nihon Bijutsu Kyō kai exhibitions, and was also active in the annual exhibits of the Ministry of Culture. With the support of Okakura Kakuzō he and other sculptors founded in 1907 the Nihon Chōkoku Kai (Japan Sculpture Association), which held exhibits from 1908. In 1937 Hiragushi was elected to the Teikoku Geijutsuin (Imperial Art Academy) and in 1962 was awarded the Order of Cultural Merit. From 1944 to 1952, Hiragushi taught wood sculpture at what is now the Tokyo University of Fine Arts and Music. In 1971 he donated his old residence in the Ueno district of Tokyo, to be turned into a museum to exhibit modern Japanese sculpture, and moved to a Japanese-style house in the Tokyo suburb of Kodaira. In 1972, to mark his 100th birthday, he established the Hiragushi Denchū Prize to encourage young sculptors.

Hiragushi was especially known for his realistic and often brightly coloured portrait sculptures. His style combined the style of the *tempyō* sculpture of the Nara period with that of the small, sculptured portraits in wood of the post-Edo period. He also combined Western realism with the more spiritual Asian approach. Among representative works are "Tensei" (1920; "Transmigration") and "Goura tsuriudo" (1930; "The Angler at Goura"). He also carved a statue of the critic Okakura Kakuzō (1942), one of his teachers. The most popular of his works, however, is a series of life-size models of the well-known Kabuki actor Onoe Kikugorō VI, costumed for the *kagamijishi*, or lion dance. The two best known of these, begun in the 1930s, were completed in 1940 and 1958.

"Kagamijishi," wood sculpture by Hiragushi Denchū, 1940; in the Tokyo Fine Arts School

Used by permission of the Tokyo Fine Arts School

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Ḥīrah, al- (from Syriac *ḥirtā*, "camp"), English HIRA, ancient city located south of al-Kūfah in Karbalā' *muḥāfaẓah* (governorate), Iraq; it was prominent in pre-Islāmic Arab history. The town, originally a military encampment, became the capital of the Lakhmids (5th and 6th centuries AD), Arab vassals of Sāsānian Persia; it was a centre of diplomatic, political, and military activities, involving Persia, Byzantium, and the Arabian peninsula. It protected the Sāsānians from the attacks of Arabian nomads and served as an important station on the caravan route between Persia (Iran) and the Arabian peninsula.

Al-Ḥīrah is most important, however, in the cultural history of the Arabs. Tradition holds that the Arabic script was developed there, and al-Ḥīrah's role in the development of Arabic poetry and Arab Christianity was especially significant. Some of the best known poets in pre-Islāmic Arabia (*e.g.*, Ṭarafah and an-Nābighah adh-Dhubyānī) gravitated toward the Lakhmid court. As the seat of a bishopric for Nestorian Christians, al-Ḥīrah exercised a strong influence over the religious life of the East.

Al-Ḥīrah began to decline early in the 7th century, after the Persians brought about the collapse of the Lakhmid dynasty, and in 633 the town capitulated to the Muslims.

Hirakata, city, northeastern Ōsaka Urban Prefecture (*fu*), Honshu, Japan, on the Yodo-gawa (Yodo River). It prospered as a post station and river port between Kyōto and Ōsaka during the Tokugawa era (1603–1867). In the late 19th century the city declined, but it was revived by the opening of a railway (1910) between Kyōto and Ōsaka. Hirakata then developed as a residential suburb and educational centre, and industries producing textiles, metal products, machinery, and rolling stock gained importance. Pop. (1983 est.) 372,959.

Hiram, also called HURAM, or AHIRAM, Phoenician king of Tyre (reigned 969–936 BC), who appears in the Bible as an ally of the Israelite kings David and Solomon. He maintained friendly relations with Israel, supplying Solomon with men and materials for the construction of the Temple at Jerusalem and cooperating with him in Mediterranean and Red Sea trading voyages. Solomon gave him tribute and Galilean territory in return.

hiramaki-e, in Japanese lacquerwork, gold decoration in low, or "flat," relief, a basic form of *maki-e* (*q.v.*). The pattern is first outlined on a sheet of paper with brush and ink. It is then traced on the reverse side of the paper with a mixture of heated wet lacquer and (usually red) pigment. The artist transfers the pattern directly to the desired surface by rubbing with the fingertips, a process called *okime*. In the next step (*jigaki*), the pattern that has been transferred is painted over with lacquer—usually a reddish colour. A dusting tube is used to sprinkle gold powder on the painted design while the lacquer is still wet. When the lacquer is dry, superfluous gold powder is dusted off, and a layer of clear lacquer is applied over the gold-covered design. When dry, it is polished with powdered charcoal. A second layer of

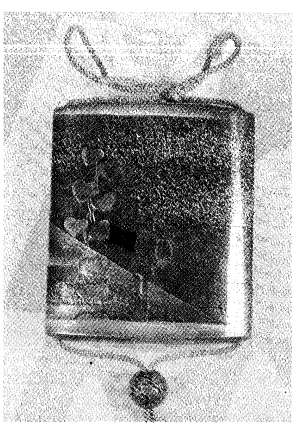
lacquer is added, allowed to dry, and given a fingertip polish with a mixture of linseed oil and finely powdered mudstone.

Tray decorated with a design of cobwebs and insects in *hiramaki-e* on a black *rō-iro* ground, mid-18th century, Edo period; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

The *hiramaki-e* technique, which dates from the latter part of the Heian period (794–1185), was preceded by *togidashi maki-e,* a technique in which not only the design but the whole surface is covered with clear lacquer after the sprinkling of metal powder; the lacquer is then polished down to reveal the design. During the Kamakura (1192–1333) and Muromachi (1338–1573) periods, *hiramaki-e* tended to be overshadowed by *takamaki-e* (gold or silver decoration in bold relief). It came fully into its own only in comparatively modern times. During the Azuchi-Momoyama period (1574–1600), *hiramaki-e* artists often left the sprinkled gold powder unpolished in a technique called *maki-hanashi* ("left as sprinkled").

hirameji (Japanese: "flat dust base"), in Japanese lacquerwork, variation of the *jimaki* technique. For this kind of ground decoration, small, irregularly shaped flakes of sheet gold or silver are used. The *hiramefun,* or "flat dust," is made by filing solid gold and then flattening the flakes between a steel roller and a steel plate. Sieves of varying degrees of fineness are used to separate *hiramefun* suitable for thin, medium, thick, or dappled (*usumaki, chūmaki, koimaki,* or *madaramaki*) gold or silver finishes. The flakes are sprinkled on wet lacquer with dusting tubes; when set, they are covered with *rō-iro-urushi* (a black lacquer, containing no oil, created by adding an iron agent to refined, clear raw lacquer), which is polished with powdered charcoal to a fine finish. In a variation of *hirameji* called *okibirame* ("placed flat dust"), each flake is applied to the wet lacquer surface individually. It is believed that *hirameji* developed from a technique called *heijin,* practiced during the Heian period (794–1185), in which flakes filed from solid gold were sprinkled unevenly.



Three-case *inrō* sprinkled with *hiramefun* (flat dust), the bamboo curtain and aoi plant done in *takamaki-e* and *hiramaki-e,* enriched with *kirikane* and inlaid shell, signed Kuanshosai after Hakugioku Hoin, Edo period (1603–1867); in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

Hirata Atsutane (b. Sept. 25, 1776, Akita, Japan—d. Oct. 4, 1843, Akita), Japanese thinker, systematizer, and leader of the Restoration Shintō (also known as Fukko Shintō; *q.v.*) school. His thought, stressing the divine nature of the emperor, exerted a powerful influence on royalists who fought for the restoration of imperial rule during the second half of the 19th century.

At the age of 20, Hirata moved to Edo (modern Tokyo), where most of his activity developed. He originally studied Neo-Confucianism but then turned to Shintō, becoming a disciple of the recently deceased Motoori Norinaga, one of the pioneers of the movement called National Learning (Kokugaku), which sought to find the true expression of the Japanese spirit in Japan's early traditions and culture. But while Motoori sought for the real Japanese spirit through careful philological study, Hirata attempted to develop a Shintō theological system that would

Hirata Atsutane, colour on silk by an unknown artist; in a private collection

By courtesy of the International Society for Educational Information, Tokyo

provide normative principles for social and political action. In his later years he became increasingly critical of the Tokugawa feudal regime, which ruled Japan through the office of shogun, forcing the emperor to be nothing more than a powerless symbol. As a result of his political activities, Hirata was confined to his birthplace for the rest of his life.

Hirata vigorously proclaimed a belief in Japan's natural superiority as the land of the gods; he held that the gods transmit the "True Way" to Japan through the Japanese imperial line. But despite his strong nationalism and xenophobia, he did not hesitate to accept certain features of Western science known to him through Chinese translations. He even appropriated for his Shintō theology some aspects of theological works written by Jesuit missionaries in China.

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Hiratsuka, city, Kanagawa *ken* (prefecture), Honshu, Japan. It lies along Sagami Bay of the Pacific Ocean. Hiratsuka developed as a post town along the main Tokyo–Kyōto Highway during the Tokugawa period (1603–1867). When the railway between Tokyo and Kōbe was opened in 1887, a commercial centre developed around the railroad station in the eastern part of the city. The city's northern sector is industrialized, with rubber, chemical, machinery, automobile, and food-processing plants. The surrounding agricultural region produces vegetables and dairy cattle. Much farmland in the area has been used for large housing projects for commuters to the Tokyo–Yokohama Metropolitan Area. Hiratsuka's annual Star Festival is renowned. Pop. (1987 est.) 234,759.

hird (military guard): *see* housecarl.

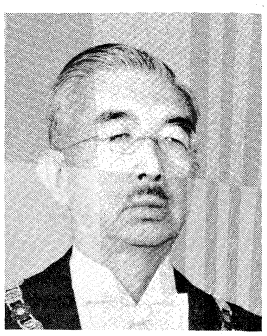
Hire, Laurent de La (French painter): *see* La Hire, Laurent de.

Hiroa, Te Rangi: *see* Buck, Sir Peter (Henry).

Hirohito, original name MICHINOMIYA HIROHITO, posthumous name SHŌWA (b. April 29, 1901, Tokyo—d. Jan. 7, 1989, Tokyo), emperor of Japan from 1926 until his death in 1989. He was the longest-reigning monarch in Japan's history.

Hirohito was born at the Aoyama Palace and was educated at the Peers' School and at the Crown Prince's Institute. Early in life he developed an interest in marine biology, on which he later wrote several books. In 1921 he visited Europe, becoming the first Japanese crown prince to travel abroad. Upon his return he was named prince regent when his father, the emperor Taishō, retired because of mental illness. In 1924 he married the princess Nagako Kuni.

Hirohito became emperor of Japan on Dec. 25, 1926, following the death of his father. His reign was designated Shōwa, or "Enlightened Peace." The Japanese constitution invested him with supreme authority, but in practice he merely ratified the policies that were formulated by his ministers and advisers. Many historians have asserted that Hirohito had grave misgivings about war with the United States and was opposed to Japan's alliance with Germany and Italy but that he was powerless to resist the militarists who dominated the armed forces and the government. Other historians assert that Hirohito might have been involved in the planning of Japan's expansionist policies from 1931 to World War II. Whatever the truth may be, in 1945, when Japan was close to defeat and opinion among the country's leaders was divided between those favouring surrender and those insisting on a desperate defense of the home islands against an anticipated invasion by the Allies, Hirohito settled the dispute in favour of those urging peace. He broke the precedent of imperial silence on Aug. 15, 1945, when he made a national radio broadcast to announce Japan's acceptance of the Allies' terms of surrender. In a second historic broadcast, made on Jan. 1, 1946, Hi-



Hirohito

By courtesy of the International Society for Educational Information Tokyo, Inc.

rohito repudiated the traditional quasi-divine status of Japan's emperors.

Under the nation's new constitution, drafted by U.S. occupation authorities, Japan became a constitutional monarchy. Sovereignty resided in the people, not in the emperor, whose powers were severely curtailed. In an effort to bring the imperial family closer to the people, Hirohito began to make numerous public appearances and permitted publication of pictures and stories of his personal and family life. In 1959 his oldest son, Crown Prince Akihito, married a commoner, Shōda Michiko, breaking a 1,500-year tradition. In 1971 Hirohito broke another tradition when he toured Europe and became the first reigning Japanese monarch to visit abroad. In 1975 he made a state visit to the United States. Upon his death in 1989, Hirohito was succeeded as emperor by Akihito.

Hirosaki, city, Aomori *ken* (prefecture), northern Honshu, Japan. The isolated volcanic cone of Mount Iwaki, a pilgrimage site, rises to the west. Located on the Isugaru Plain, Hirosaki developed as a castle town, and the remains of Hirosaki Castle (1611) are in Hirosaki Park. Commercially, the city specializes in green lacquer ware (*tsugaru-nuri*) and apple products. Hirosaki University was founded in 1949. Pop. (1988 est.) 175,953.

Hirosaki Castle, Japan

FPG—EB Inc.

Hiroshige, in full ANDŌ HIROSHIGE, original name ANDŌ TOKUTARŌ, professional names UTAGAWA HIROSHIGE and ICHIYŪSAI HIROSHIGE (b. 1797, Edo [now Tokyo], Japan—d. Oct. 12, 1858, Edo), Japanese artist, one of the last great ukiyo-e ("pictures of the floating world") masters of the colour wood-block print. His genius for landscape compositions was first recognized in the West by the Impressionists and Postimpressionists. His print series "Fifty-three Stages on the Tōkaidō" (1833–34) is perhaps his finest achievement.

Hiroshige was the son of Andō Genemon, warden of the Edo fire brigade. Various episodes indicate that the young Hiroshige was fond of sketching. In the spring of 1809, when Hiroshige was 12 years of age, his mother died. Shortly after, his father resigned his post, passing it on to his son. Early the following year, his father died as well. Hiroshige's actual daily duties as a fire warden were minimal, and his wages were small. Undoubtedly, these factors, with his own natural bent for art, eventually led him to enter, in about 1811, the school of the ukiyo-e master Utagawa Toyohiro. Hiroshige became a pupil of Toyohiro, and it was doubtless the latter's modest and refined taste that helped form Hiroshige's own style—and led his genius eventually to find full expression in the new genre of the landscape print.

Although receiving a *nom d'artiste* and a school license at the early age of 15, Hiroshige was no child prodigy, and it was not until six years later, in 1818, that his first published work appeared. In the field of book illustration, it bore the signature Ichiyūsai Hiroshige. No earlier signed works are extant, but it is likely that, during this student period, Hiroshige did odd jobs (*e.g.,* inexpensive fan paintings) for the Toyohiro studio and also studied, on his own, the Chinese-influenced Kanō style and the impressionistic Shijō style—both of which were to strongly influence his later work.

As soon as he was able, Hiroshige transferred to his own son the post of fire warden and devoted himself to his art. As is customary with artists of the plebeian ukiyo-e school, early biographical material regarding Hiroshige is scarce: he and his confreres were considered to be only artisans by the Japanese society of the time, and, although their works were widely enjoyed and sometimes even treasured, there was little interest in the personal details of their careers. Thus, Hiroshige's adult years must be traced largely through his works.

Hiroshige's artistic life may be characterized in several stages. The first was his student period, from about 1811 to 1830, when he largely followed the work of his elders in the field of figure prints—girls, actors, and samurai, or warriors. The second was his first landscape period, from 1830 to about 1844, when he created his own romantic ideal of landscape design and bird-and-flower prints and brought them to full fruition with his famed "Fifty-three Stages on the Tōkaidō" and other series of prints depicting landscape vistas in Japan. His last stage was his later period of landscape and figure-with-landscape designs, from 1844 to 1858, during which overpopularity and overproduction tended to diminish the quality of his work.

"Kambara" by Hiroshige, wood-block colour print from the series, "Fifty-three Stages on the Tōkaidō," 1834

Courtesy of ARS Planning

Hiroshige early had shown considerable artistic promise, but it was not until 1832 that his great talent developed. In 1832 he made a trip between Edo and Kyōto along the Tōkaidō road; he stayed at the 53 overnight stations along the road and made numerous sketches of everything he saw. He published in 1832 a series of 55 landscape prints entitled the "Fifty-three Stages on the Tōkaidō"—one for each station, as well as the beginning of the highway and the arrival in Kyōto. The success of this series was immediate and made Hiroshige one of the most popular ukiyo-e artists of all time. Later he made other journeys within Japan and issued series of prints depicting the famous "Sixty-nine Stages of the Kiso Highway," "Views of Edo," "Eight Views of Lake Biwa," and "Famous Places in Kyōto." He repeatedly executed new designs of the 53 Tōkaidō views in which he employed his unused sketches of previous years. The quality of Hiroshige's work declined toward the end of his life, largely because of the demands of his publisher and his own need for money.

It has been estimated that Hiroshige created more than 5,000 prints and that as many as 10,000 copies were made from some of his wood blocks. Possessing the ability to reduce the pictured scene to a few simple, highly decorative elements, Hiroshige captured the very essence of what he saw and turned it into a strikingly effective composition. Snow, rain, mist, and moonlight scenes compose some of his most poetic masterpieces.

Hiroshige was fond of travel, loved wine and good food, and in his other tastes was a true citizen of Edo. He died in the midst of a cholera epidemic.

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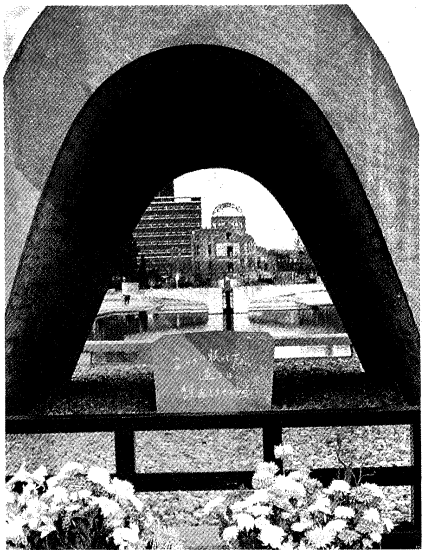
Hiroshima, *ken* (prefecture), southwestern Honshu, occupying an area of 3,269 square miles (8,467 square km). The Chūgoku Mountains run along the northern boundary, and delta plains are extensively developed along the Inland Sea in the south. Agriculture (rice, oranges, chrysanthemums, rushes, and cattle) supports most of the population. There are shipyards at Kure and Onomichi and on Inno Island. The prefecture encompasses several offshore islands, including Itsuku Island (also called Miya), noted for the Itsuku Island Shrine and other shrines. Pop. (1988 est.) 2,846,000.

Hiroshima, capital, Hiroshima *ken* (prefecture), southwestern Honshu, Japan, on Hiroshima Bay of the Inland Sea. The city is situated on the delta of the Ōta River, whose channels divide it into six islets. Hiroshima was founded as a castle town in the 16th century. From 1868 onward it was a military centre, and on Aug. 6, 1945, it became the first city in the world to be struck by an atomic bomb, dropped by the U.S. Army Air Forces. Most of the city was destroyed, and estimates of the number killed have ranged from 70,000 to 80,000. Deaths from radiation poisoning have mounted through the years.

Reconstruction under a city-planning scheme was begun about 1950 with the rebuilding of the Inari Bridge. Now the largest industrial city in that section of Japan encompassed by Chūgoku and Shikoku regions, Hiroshima contains many administrative offices, public-utility centres, and a university. Industries

produce steel, rubber, chemicals, ships, and transport machinery. The city is Japan's major needle producer.

Hiroshima has become a spiritual centre of the peace movement for the banning of atomic weapons. The Atomic Bomb Casualty Commission was established there in 1947 to conduct medical and biological research on the effects of radiation. Five public hospitals and 40 private clinics give free treatment to victims of the bombing. Hiroshima Castle was



Cenotaph in Peace Memorial Park, Hiroshima, Japan; the Atomic Bomb Memorial Dome is visible through the arch

Bob Glaze—Artstreet

restored in 1957 and houses a museum of city history. Peace Memorial Park contains a museum and monuments dedicated to those killed by the bomb explosion. The cenotaph for victims of the bombing is shaped like an enormous saddle, resembling the small clay saddles placed in ancient Japanese tombs; it contains a stone chest with a scroll listing the names of those killed. Atomic Bomb Memorial Dome is the remains of the only building to survive the blast. Pop. (1988 est.) 1,073,194.

Hirpini, in ancient times, an inland Samnite tribe in the south of Italy. To the north of them were the Pentri and Caraceni, who, with the Hirpini and Caudini, constituted the Samnite confederation in the wars of the 4th century BC. The Roman policy of separation cut the Hirpini off from these allies by the refoundation of their town of Maleventum as the Latin colony of Beneventum in 268, and thereafter they were a separate unit. They sided with Carthage against Rome in 216, remaining independent until receiving the Roman franchise in 82. Apart from Beneventum (Benevento) their chief towns were Abellinum (Avellino) and Aeclanum.

Hirsch, Maurice, baron de (French), German in full MORITZ, FREIHERR (baron) VON HIRSCH AUF GEREUTH (b. Dec. 9, 1831, Munich, Bavaria [Germany]—d. April 21, 1896, Érsekújvár, Hung.), Jewish businessman noted for his extensive philanthropy.

Born into a wealthy family, Hirsch increased his inheritance by his business acumen at the international banking house of Bischoffsheim and Goldschmidt, of Paris and London, and by financial speculations, beginning with the successful construction of a railway through the Balkans to Constantinople. He began his philanthropic activities by aiding Oriental Jews, whose poverty struck him while he was on a visit to Turkey. To aid them, he contributed 1,000,000 francs to the Alliance Israélite Universelle, a philanthropic organization, and subsequently maintained it with large annual donations. He then established and richly endowed the Jewish Colonization Association, with headquarters in England. This fund, which became one of the largest charitable trusts in the world, was used to establish agricultural colonies in hospitable countries, for Hirsch believed that Jews would best become self-supporting by farming.

In 1891 Hirsch founded and endowed the Baron de Hirsch fund in the United States, principally to help Jewish immigrants there to learn a trade. In the late 20th century the fund continued to support the Jewish Agricultural Society, which lent money to farmers and settled displaced persons on farms in various countries. Hirsch's charity was not confined to Jews, and it has been estimated that he spent more than $100,000,000 on his philanthropies.

Hirsch, Samson Raphael (b. June 20, 1808, Hamburg [Germany]—d. Dec. 31, 1888, Frankfurt am Main, Ger.), major Jewish religious thinker and founder of Trennungsorthodoxie (Separatist Orthodoxy), or Neo-Orthodoxy, a theological system that helped make Orthodox Judaism viable in Germany.

Hirsch was a rabbi successively in Oldenburg, Emden, Nikolsburg, and Frankfurt am Main. While still chief rabbi at Oldenburg, he published *Neunzehn Briefe über Judenthum* (1836; *Nineteen Letters of Ben Uziel*), in which he expounded Neo-Orthodoxy. This system required two chief courses of action: (1) an educational program that combined strict training in the Torah (Jewish Law) with a modern secular education—so that Orthodoxy could withstand the challenge of Reform Judaism, which interpreted the Torah with the aid of modern textual and historical data; and (2) a separation of Orthodox congregations from the larger Jewish community when the latter deviated from a strict adherence to Jewish tradition. In 1876 Hirsch was a prime mover in getting the Prussian parliament to pass a law permitting Jews to secede from the state-recognized Jewish religious community (which Hirsch considered unfaithful to the Torah) and to establish separate congregations. Among his many works are *Horeb, Versuche über Jissroéls Pflichten in der Zerstreuung* (1837; "Essays on the Duties of the Jewish People in the Diaspora"), an Orthodox textbook on Judaism, and commentaries on the Pentateuch, the five books of Moses (1867–78). In addition he founded (1855) and edited the monthly *Jeshurun* (the poetic name for Israel). Six volumes of his essays were published posthumously (1902–12).

In one respect, Hirsch's theology was akin to Reform Judaism, in that he interpreted Judaism to be essentially a community of faith; therefore, return to the land of Israel is not necessary for Jewish survival. Unlike the Reform Jews, however, he rejected the application of historical methods to the study of the Bible and of Judaism in general.

Hirsch, Samuel (b. June 8, 1815, Thalfang, near Trier, Prussia [Germany]—d. May 14, 1889, Chicago, Ill., U.S.), religious philosopher, rabbi, and a leading advocate of radical Reform Judaism. He was among the first to propose holding Jewish services on Sunday.

Educated at the universities of Bonn, Berlin, and Leipzig, Hirsch became rabbi at Dessau in 1838 but was forced to resign (1841) because of his views. From 1843 to 1866 he served as chief rabbi of the Grand Duchy of Luxembourg. Called to Philadelphia in 1866 to succeed David Einhorn as head of the Reform Congregation Keneseth Israel, he remained in that position for 22 years. He was elected president of the rabbinical conference held in Philadelphia in 1869 and in that capacity helped formulate the principles of Reform Judaism. The conference proclaimed that the dispersal of the Jews was part of a divine plan to lead all nations of the world to the true knowledge and worship of God. For Hirsch, Judaism was not law but *Lehre* ("doctrine"), which was expressed in symbolic ceremonies that should change as needs require. His most ambitious work, *Religionsphilosophie der Juden,* 2 vol. (1842), rejected Hegel's view that Judaism had no right to place itself in the ranks of "absolute religions."

Hirschberg (Poland): *see* Jelenia Góra.

Hirschfeld, Al, byname of ALBERT HIRSCHFELD (b. June 21, 1903, St. Louis, Mo., U.S.), American caricature artist, especially known for his drawings appearing in *The New York Times,* portraying show-business personalities.

Hirschfeld's family moved from St. Louis to upper Manhattan in New York City when he was age 11, and at age 17 he went to work as the art director of Selznick Studios in the city's Astoria district. With money saved, he went to Europe in 1924 to study art, residing mostly in Paris in the 1920s but returning often to New York City. In 1925 a Hirschfeld caricature drawn on a theatre *Playbill* was reproduced by *The New York Herald Tribune.* After his work became more popular and was published in several New York newspapers, he entered into an agreement with *The New York Times* in 1929 for the use of his theatre caricatures. (His work of theatrical and nontheatrical personalities continued to appear in numerous other publications.) In the 1930s he took a long trip to the Far East, where Japanese and Javanese art is said to have influenced his graphic style.

"World Premiere," drawing by Al Hirschfeld, with portraits of (left to right) Judy Garland, Spencer Tracy, Ethel Barrymore, Humphrey Bogart, Clark Gable, and Marilyn Monroe

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Beginning in the 1940s, Hirschfeld illustrated books by such authors as S.J. Perelman (*Westward Ha!* [1948], *Swiss Family Perelman* [1950]), Fred Allen (*Treadmill to Oblivion* [1954]), and Brooks Atkinson (*The Lively Years* [1973]); and he also began producing books of which he was both author and illustrator, such as *Show Business Is No Business* (1951) and *Hirschfeld by Hirschfeld* (1979). In *The World of Hirschfeld* (1968) he wrote extensively about his life and technique. Hirschfeld's drawings, watercolours, lithographs, etchings, and sculptures are to be found in both private and museum collections.

hirsutism (hair growth disorder): *see* hypertrichosis.

Hirt, Hermann (b. Dec. 19, 1865, Magdeburg, Prussia—d. Sept. 12, 1936, Giessen, Ger.), German linguist whose comprehensive *Indogermanische Grammatik,* 7 vol. (1921–37; "Indo-European Grammar"), remains influential. Earlier, Hirt had made original

Hirt
By courtesy of Giessen University Library, Germany

studies of accent and ablaut (vowel changes) in Indo-European. His concern with prehistory extended beyond language to the Indo-European people and their culture, which he treated in *Die Indogermanen,* 2 vol. (1905–07; "The Indo-Europeans").

The major part of his professional life was spent as professor of Indo-European philology and Sanskrit at the University of Giessen (1912–36).

Hirtius, Aulus (b. *c.* 90 BC—d. April 21, 43, near Mutina, Gallia Cispadana), Roman soldier and writer.

Beginning *c.* 54 he served under Caesar in Gaul and was sent to negotiate with Caesar's rival, Pompey, in December 50. Hirtius then served in Spain and the East, was praetor (46), and governor (45) of Transalpine Gaul. He was nominated (44) by Caesar, along with Gaius Vibius Pansa, for the consulship of 43; and after the dictator's assassination in March 44, he and Pansa supported the senatorial movement against Mark Antony, with whom Hirtius had at first sided. In 43 the two consuls set out for Mutina, where Mark Antony was besieging Decimus Brutus, and inflicted a severe defeat on Antony at Forum Gallorum. A few days later they again defeated him in battle near Mutina, but Hirtius was killed in action and Pansa died of wounds. Both men were granted a public burial in the Campus Martius, in Rome, where traces of Hirtius' tomb have been found.

Hirtius is almost certainly the author of the continuation of Caesar's *Commentaries,* the eighth book of the *Gallic War,* and probably also of the history of the Alexandrine War. He was a personal friend of Cicero, but his correspondence with the orator, which was published in nine books, has not survived.

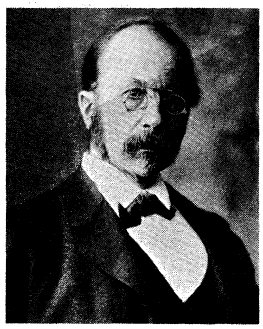
Hirundinidae, songbird family, order Passeriformes, consisting of swallows and martins, 79 species of small, streamlined birds, noted for their strong and nimble flight, found worldwide except for polar regions and certain islands.

Members range in size from 9.5 to 23 centimetres (4 to 9 inches) long. They have complete bronchial rings, unique among songbirds; short, flat bills; small, weak feet; and long, pointed wings. These agile fliers dart about catching insects on the wing. Barn swallows (*Hirundo rustica*) exhibit the typical forked "swallow-tail." The purple martin (*Progne subis*) is the largest North American swallow.

The Hirundinidae belongs to the songbird suborder (Passeres).

Hirwaun, locality, Cynon Valley district, Mid Glamorgan County, Wales, at the northeastern end of the Aberdare Valley. The Brecon Beacons mountain range rises to the north of Hirwaun and to the west rise the uplands of Hirwaun Common and Craig-y-Llyn peak (1,969, ft [600 m]). Many Iron Age tools and weapons, as well as 6th-century-BC tools and ornaments fashioned from bronze, were found in the area when a small natural lake on the slopes of Craig-y-Llyn was drained to form a reservoir in 1911. Some of the earliest ironworks in Wales were located in Hirwaun until their closure in the early 1800s. The community now has a modern industrial park, as well as coal mining and brick manufacture. It is linked to the Rhondda Valley by a mountain road, which reaches an elevation of nearly 1,700 ft as it crosses Hirwaun Commons.

His, Wilhelm (b. July 9, 1831, Basel, Switz.—d. May 1, 1904, Leipzig), Swiss-born German anatomist, embryologist who created the science of histogenesis, or the study of the embryonic origins of different types of animal tissue. His discovery (1886) that each nerve fibre stems from a single nerve cell was essential to the development of the neuron theory, which states that the neuron, or nerve cell, is the basic unit of the nervous system.



Wilhelm His, *c.* 1900
Archiv fur Kunst und Geschichte, West Berlin

A student of Johannes Müller at the University of Berlin and of Rudolf Virchow at the University of Würzburg, His taught at the universities of Basel (1857–72) and Leipzig (1872–1904), where he founded an institute of anatomy. In 1865 His invented the microtome, a mechanical device used to slice thin tissue sections for microscopic examination. He was the author of *Anatomie menschlicher Embryonen,* 3 vol. (1880–85; "Human Embryonic Anatomy"), considered the first accurate and exhaustive study of the development of the human embryo.

His, Wilhelm (b. Dec. 29, 1863, Basel, Switz.—d. Nov. 10, 1934, Wiesental), Swiss cardiologist (son of the renowned anatomist of the same name), who discovered (1893) the specialized muscle fibres (known as the bundle of His) running along the muscular partition between the left and right chambers of the heart. He found that these fibres help communicate a single rhythm of contraction to all parts of the heart. A professor of medicine at the University of Berlin (1907–26), he was one of the first to recognize that the heartbeat has its origin in the individual cells of heart muscle.

Hisarlık, archaeological mound in Turkey, long known to bear the remains of the Hellenistic and Roman town of Ilium. It lies on the Küçükmenederes River near the mouth of the Dardanelles. In 1822 it was identified by Charles Maclaren as the site also of Homeric Troy (*q.v.*), an identification adopted and demonstrated as correct by Heinrich Schliemann in excavations between 1870 and 1890.

Ḥisdai ibn Shaprut, in full ḤISDAI ABU YUSUF BEN ISAAC BEN EZRA IBN SHAPRUT, Hisdai also spelled ḤASDAI (b. *c.* 915, Jaén, Spain—d. *c.* 975, Córdoba), Jewish physician, translator, and political figure who helped inaugurate the golden age of Hebrew letters in Moorish Spain and who was a powerful statesman in a number of major diplomatic negotiations.

After becoming court physician to the powerful Umayyad caliph ʿAbd ar-Raḥmān III, Ḥisdai gradually gained eminence in the Arab world, acting as vizier without title. He used his linguistic talents (he knew Hebrew, Arabic, and Latin) and persuasive personality in delicate diplomatic missions between Muslim and Christian rulers. On one occasion he helped negotiate a treaty with the Byzantine Empire. One of the presents from the Byzantine emperor to the Caliph was a copy of a pharmacological text by the Greek physician Dioscorides (fl. *c.* AD 50); Ḥisdai helped translate it into Arabic. On another occasion, he paved the way for a peace treaty with the warring kingdoms of Navarre and León. After ʿAbd ar-Raḥmān died in 961, Ḥisdai continued to perform important services for ʿAbd ar-Raḥmān's son and successor, al-Ḥakam II, in whose reign he died.

Ḥisdai helped inaugurate the golden age of Spanish Judaism, gathering under his patronage such major literary figures as Dunash ben Labrat (*c.* 920–*c.* 990) and Menahem ben Saruq (*c.* 910–*c.* 970), who helped establish scientific Hebrew grammar and a new mode in Hebrew poetry. Ḥisdai fostered the study of Jewish law and the Talmud (the rabbinic compendium of law, lore, and commentary), thereby making Spanish Jewry relatively independent of the Eastern Talmudic academies.

Ḥisdai's correspondence (written by Menahem ben Saruq) with a Jewish Khazar king, Joseph, is of historic importance. The Khazars, a Turkic people dwelling in southern Russia, had converted to Judaism in the middle of the 8th century AD. Ḥisdai's letter and the King's response led a shadowy existence until their unexpected publication in the 16th century. After much controversy, the authenticity of both letters and the accuracy of their information seem well established.

Hise, Charles Richard Van: *see* Van Hise, Charles Richard.

Hishām ibn ʿAbd al-Malik (b. 691, Damascus—d. Feb. 6, 743, Damascus), the tenth caliph, who reigned during the final period of prosperity and glory of the Umayyads.

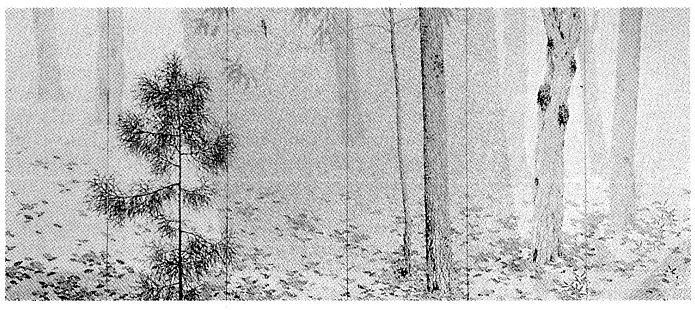
Before his accession to the throne in 724, Hishām led a quiet life in the Umayyad court, holding no important public offices. He reigned during a time of relative calm. Hishām easily maintained internal security but was forced to mount a number of military campaigns along the frontiers of the empire. His main concern was to consolidate administrative control over the vast lands that he had inherited. Though it is often difficult to determine which policies stemmed from the Caliph's personal initiative and which from the decisions of subordinate officials, the outlines of some of his more important policies are clear. In particular he recognized the danger of centrifugal forces among the Arabs, who then comprised the dominant elements in the Islāmic empire. The Arabs were divided into two large factions, the northern and the southern, and Hishām sought to draw both elements into his administration. A careful and frugal administrator, he devoted much attention to the receipt and expenditure of the imperial revenues, and some sources even credit him with reforming and reorganizing the whole system of agricultural taxation. In addition he pursued an energetic building policy, constructing a whole series of castles and palaces in Syria. In religious affairs he was strictly orthodox. Throughout his reign he sought to have his own son named heir presumptive, but he was forced to accept as heir his nephew al-Walīd ibn Yazīd, who had been nominated by the previous caliph, Yazīd II.

Hishām ibn (Muḥammad) al-Kalbī, also called ABŪ AL-MUNDHIR (b. before 747, al-Kūfah, Iraq—d. 819/821, al-Kūfah), scholar of the customs, lineage, and battles of the early Arabs.

Hishām's father was a distinguished scholar who endeavoured to put into writing oral traditions gathered from Bedouins and professional reciters. Hishām is said to have taught in Baghdad, perhaps late in life. He wrote extensively on the early Arabs and on religion. His extant works include *al-Khayl* ("Horses"), which contains short accounts of famous horses and poems on horses; *Jamharat an-nasab* ("Genealogical Collection"), a work of great importance about the politics, religion, and literature of the pre-Islāmic and early Muslim Arabs; and *Kitāb al-aṣnām* (*The Book of Idols,* 1952), in which he discusses the gods of the pre-Islāmic Arabs. The discussions in *Kitāb al-aṣnām* are supplemented by relevant excerpts from pre-Islāmic poetry.

Hishida Shunsō (b. Sept. 21, 1874, Nagano Prefecture, Japan—d. Sept. 16, 1911, Tokyo), painter who, with his friend Yokoyama Taikan, contributed to the revitalization of traditional Japanese painting.

Hishida studied in Tokyo, first with a painter



"Fallen Leaves," 6-panel *byōbu* screen painting by Hishida Shunsō, 1909; in the Tokyo National Museum

By courtesy of the Tokyo National Museum

of the Kanō school (which emphasized the use of Chinese subject matter and technique) and then at the Tokyo Fine Arts School with Hashimoto Gahō. In 1898 he joined the Japan Fine Arts Academy, where he and Taikan gradually mastered the art of reconciling traditional Japanese line drawing with a Western Impressionistic style (pejoratively known as *mōrōtai,* or "vague" and "indistinct"). Among his best known works are "Ochiba" (1909; "Fallen Leaves") and "Kuroi neko" (1910; "A Black Cat").

Hishikawa Moronobu, also called KICHIBĒ (b. 1618, Yasuda, Japan—d. 1694, Edo), Japanese printmaker, the first great master of Ukiyo-e; *i.e.,* the picture of the transient world of daily life.

The son of a provincial embroiderer, Hishikawa started by drawing designs for embroidery. Sometime around the middle of the 17th century he moved to Edo (now Tokyo), where he became an illustrator of storybooks using wood-block prints, and he developed a technique for the mass reproduction of paintings to make them accessible to a large public. He also continued to make pictures that were not to be reproduced as prints. Both his paintings and his prints depicted the customs and manners of the Edo people, especially of courtesans and Kabuki theatre actors. Among his works are the scroll "The Gay Quarters and the Kabuki Theatre," the 12 *ichimai-e* series "Scenes from the Gay Quarters at Yoshiwara," and the famous *ichimai-e* "A Beauty Looking over Her Shoulders." Moronobu, like his fellow Ukiyo-e painters, also drew many pictures of pornographic scenes known as *shun-ga.*

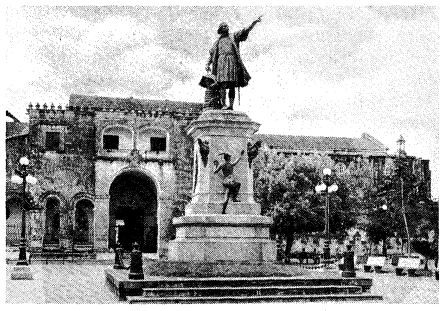
Ḥiṣn al-Ghurāb (Arabic: Crow Castle), ancient CANE, historic mountain site located on the southern coast of Arabia in southern Yemen. On the summit of the mountain are the ruins of an ancient castle, a watchtower, and cisterns and other structures. On flat ground immediately north of the mountain are the remains of Cane, a port and place of transit for the Arabian incense trade and for commodities traded between Egypt and India during Ptolemaic and Roman times.

Ḥiṣn Manṣūr (Turkey): *see* Adıyaman.

Hispania, in Roman times the name for the Iberian Peninsula; later, the Latin name for Spain. When the Romans took Hispania from the Carthaginians (206 BC), they divided it into two provinces: Hispania Ulterior (present Andalusia, Extremadura, southern León, and most of modern Portugal) and Hispania Citerior, or Tarraconensis (all of what is now northern, eastern, and south central Spain). Under Augustus (reigned 27 BC–AD 14), Hispania Ulterior was further divided into Lusitania (Portugal and part of western Spain) and Baetica (Andalusia and southern Extremadura).

Hispaniola, formerly ESPAÑOLA, second largest island of the West Indies, within the Greater Antilles. It is divided politically into the Republic of Haiti (west) and the Dominican Republic (east). The island's area is 29,418 sq mi (76,192 sq km); its greatest length is nearly 400 mi (650 km), and its width is 150 mi. There are relatively few offshore islands, the most notable being Gonâve and Tortuga Island (*q.v.*). Christopher Columbus discovered the island in 1492 and named it La Isla Española, which was supposedly Anglicized to Hispaniola. During Spanish colonial times it was commonly called Santo Domingo (English San Domingo), after the capital city, and this name is still sometimes used. The entire island has also been referred to as Haiti, supposed by some to be the precolonial name used by aboriginal Indians (Arawaks), who also called it Quisqueya. The island's position on the northern flank of the Caribbean Sea provided an excellent location for control of Spanish expansion to Cuba, Mexico, Panama, and South America during the early colonial period.

Hispaniola consists of alternate series of mountain ranges, long valleys, and plains. The orientation of the landforms causes contrasts in climatic conditions and hinders north–south transportation. More than one-third of the island lies higher than 1,500 ft (457 m), and it has the highest relief of the West Indies, reaching more than 10,400 ft in the Cordillera Central in the Dominican Republic with Pico Duarte as the loftiest point. The northern range reaches 3,993 ft, and the southern mountains rise to 5,350 ft. The most elevated part of Haiti is the southwestern peninsula. In contrast to the highlands, the basin of Lago Enriquillo in southwestern Dominican Republic has land below sea level, the surface of the lake being about 150 ft below sea level.



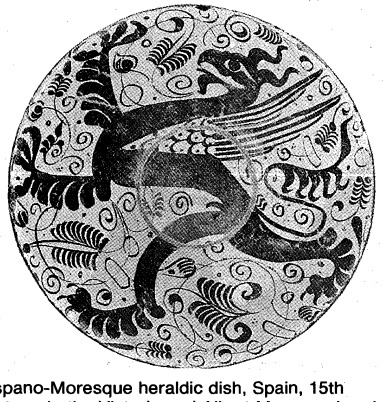
Old Cathedral and statue of Christopher Columbus, Trujillo, Dominican Republic

Ewing Galloway

The main rivers are the Yaque del Norte (125 mi long), the Camú, and the Yaque del Sur in the Dominican Republic and the Artibonite in Haiti. The island's coastline, though much indented, has relatively few deepwater, protected anchorages. Hurricanes occasionally strike the island and cause serious damage.

Land use is largely determined by the nearly parallel systems of mountains and plains. In general, the mountains are forested and sparsely populated, but in some places (notably in Haiti) the great population pressure has brought about the deforestation of land for cultivation. Coffee growing is the chief agricultural activity in the highlands, occurring through most of the humid mountainous regions. Many crops, chiefly cacao, are grown on the populous northern plains, especially in the humid eastern section, La Vega Real (The Royal Plain). Tobacco is dominant in the upper Yaque Plain, irrigated rice in the semi-arid lower plains, and sugarcane and sisal along the northern coast, the Plaine du Nord, in the west (Haiti). The southern plains of the island are also productive (sugarcane, livestock pasture, and cotton), though irrigation is necessary in many areas.

Hispano-Moresque ware, tin-glazed, lustred earthenware made by Moorish potters in Spain, chiefly at Málaga in the 15th century, and in the region of Manises, near Valencia, in the 16th century. The tin glaze was applied over a design usually traced in cobalt blue; after the first firing, the lustre, a metallic



Hispano-Moresque heraldic dish, Spain, 15th century; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

pigment, was applied by brush over the tin glaze, and the piece was fired again. The effect varies from a pale yellow iridescence in early pieces to a coarser, copperish iridescence in late work. Early designs are Islāmic; the tree of life, palm motifs, and Arabic inscriptions, for example. Later designs combine Islāmic and Italian Renaissance motifs. Misspelled or intentionally illegible Arabic inscriptions indicate that the work was taken over by Spanish Christian craftsmen. Imitation of this pottery in Italy led to the development of Italian maiolica ware.

Hiss, Alger (b. Nov. 11, 1904, Baltimore), former U.S. State Department official who was convicted in January 1950 of perjury concerning his dealings with Whittaker Chambers (*q.v.*), who accused him of membership in a Communist espionage ring. His case, which came at a time of growing apprehension about the domestic influence of Communism, seemed to lend substance to Sen. Joseph R. McCarthy's sensational charges of Communist infiltration into the State Department. It also brought to national attention Richard M. Nixon, then a U.S. representative from California, who was prominent in the investigation that led to the indictment of Hiss.

Hiss was a graduate of Johns Hopkins University (A.B., 1926; Phi Beta Kappa) and of Harvard Law School (1926–29) and was law clerk (1929–30) to Supreme Court Justice Oliver Wendell Holmes. In 1933 he entered government service in Pres. Franklin D. Roosevelt's administration and served successively in the departments of Agriculture, Justice, and State. He attended the Yalta Conference (1945) as an adviser to Roosevelt and later served as temporary secretary general of the United Nations (San Francisco Conference). In 1946 he was elected president of the Carnegie Endowment for International Peace, a position he held until 1949.

In 1948 Whittaker Chambers, a self-professed former courier for a Communist underground "apparatus" in Washington, D.C., accused Hiss of having been a member of the same "apparatus" before World War II. Hiss denied the charge, which was originally made before the House Committee on Un-American Activities. When Chambers repeated the charge publicly, away from the House committee chamber where his words were protected by congressional immunity, Hiss sued him for slander. On Dec. 6, 1948, the House committee released sworn testimony by Chambers that Hiss had provided him (Chambers) with certain classified State Department papers for transmission to a Soviet agent. Hiss promptly denied the accusation "without qualification." In a federal grand-jury investigation of the case, both Chambers and Hiss testified; and Hiss was indicted on December 15 on two charges of perjury, specifically charging that Hiss lied both when he denied that he had given any documents to Chambers and when he testified that he did not talk to Chambers after Jan. 1, 1937. Arraigned, Hiss pleaded not guilty. Hiss's first trial in 1949 ended in a hung jury. In the second trial, which ended early in 1950, he was found guilty. At both trials Chambers' sanity was a prominent issue. After serving more than three years of a five-year prison sentence, Hiss was released in 1954 and returned to private life, still asserting his innocence.

Several books have been written on the Hiss case, the most significant being Allen Weinstein's *Perjury: The Hiss-Chambers Case* (1978), which argues Hiss's guilt, and John Chabot Smith's *Alger Hiss, the True Story* (1976), which is largely a defense of Hiss.

Hissār, city, administrative headquarters of Hissār district, Haryāna state, northwestern India, on the Sirhind branch of the Western Yamuna Canal. Founded in 1356 by Emperor Fīrūz Shāh Tughluq, it was later an important Mughal centre. Depopulated in the 18th century, it was occupied later in the century by the British adventurer George Thomas. Hissār was constituted a municipality in 1867. The city is surrounded by a wall with four gates and contains the remains of Fīrūz Shāh's fort and palace and several ancient mosques, including the Jahaj, now a Jaina temple. Hissār is the major rail and road junction for the district, and its industries include cotton ginning and handloom weaving. Several colleges are affiliated with Kurukshetra University.

Hissār district (2,444 sq mi [6,331 sq km]), on the northeastern edge of the Great Indian (Thar) Desert, comprises an unbroken plain and outlying hills of the Arāvalli Range in the southwest. The Ghaggar is the only river; irrigation is by means of the Western Yamuna and Ghaggar canals. Failure of the district's grain, cotton, sugarcane, and oilseed crops is frequent. Cattle breeding is widespread, and Hissār contains one of northern India's largest government livestock-breeding farms. Pop. (1981) city, 131,309; metropolitan area, 137,369; district, 1,496,534.

Histadrut, English GENERAL FEDERATION OF LABOUR, Israeli labour organization that includes workers in the cooperative and collective agricultural settlements as well as in most industries. Organized in 1920, Histadrut is the largest voluntary organization in Israel and the most important economic body in the state. Its activities extend beyond the traditional concerns of labour unions.

Histadrut includes marketing and distribution agencies for consumer goods, materials, and equipment; a vast construction enterprise that builds settlements and public institutions; credit societies and banks; and trade unions and cooperative groups in every branch of work. The organization also deals with wage rates and working conditions in private industry. Histadrut conducts, on a cooperative basis and often in partnership with private investors, major industrial and public enterprises—*e.g.*, irrigation, shipping, and mining. Its varied enterprises account for more than 20 percent of the national income. It is also responsible for a health service and a system of social insurance. Educational and cultural activities of Histadrut include secondary and technical schools, a widespread system of adult education, theatre companies, and the publication of books, newspapers, and technical journals.

Histadrut is administered by an executive bureau elected by an executive committee, which is in turn elected by convention delegates chosen by members. The organization's leadership was dominated by the Mapai Party, which in 1968 merged with other parties to form the Labour Party. Histadrut is affiliated with the International Confederation of Free Trade Unions.

histamine, organic substance that is released from the body's tissues during conditions of stress, inflammation, and allergy. The compound is found in nearly all tissues of the mammalian body, as well as in those of other vertebrates, invertebrates, microorganisms, and some plants. Histamine was first chemically isolated by the English scientists George Barger and Henry H. Dale in 1911.

Histamine is formed in the body by the action of the enzyme histidine decarboxylase on the amino acid histidine. Histamine is stored chiefly in the large granules within mast cells. These wandering cells respond to injury or irritation by discharging some of their granules; the histamine thus released plays an important role in the body's protective response to injury or invasion by foreign substances.

Though much studied, the physiological importance of histamine remains only incompletely known. The substance produces many varied effects within the body. Histamine is one of the most potent activators of the secretion of gastric juice, especially gastric hydrochloric acid. It has also been identified as contributing to the control of uterine movement during pregnancy and producing the dilatation, or widening, of fetal and maternal blood vessels. The release of histamines from mast cells causes a contraction of the smooth muscle cells of such organs as the lungs and the uterus. Histamine in the hairs of the stinging nettles of certain plants is partly responsible for the swelling and itching produced by contact with those plants' leaves. The compound is also the irritating ingredient present in the insect venoms of many species of wasps and bees.

An intradermal injection of histamine initiates the chain of events known as the "triple response": reddening of a spot of skin; a brighter red skin flush spreading, or flaring, around the original spot; and the formation of a fluid-filled skin patch, or wheal, over the original spot. This phenomenon is caused by the fundamental effect histamine has on blood vessels, an effect that is crucial to its role as a primary initiator of such immune responses as inflammation, allergy, and anaphylactic shock.

Histamine's function in immune response stems from the chemical's ability: (1) to initiate the expansion, or widening, of blood vessels and (2) to increase the permeability of blood vessel walls so that more active constituents of the immune system can pass through those walls and migrate to the site of tissue injury or infection. This process is most clearly glimpsed in inflammation, *i.e.*, the local reaction of bodily tissues to injury. Injured tissue mast cells release histamine, which then acts to dilate the surrounding blood vessels and increase their permeability. Leukocytes and various blood plasma proteins can then pass through from the bloodstream through the vessel walls into the injured tissue, where they begin to fight infection and nourish and heal the injured tissues.

In allergic reactions such as hay fever, mast cells release histamine in inordinate amounts as a result of the immune system's hypersensitive reaction to (usually harmless) foreign substances (antigens) that are present in the body. Antibodies, which are bound to mast cells, proceed to bind to these antigens and thus neutralize them; in the process, however, the mast cells are disrupted and release their histamines. The release of histamine is responsible for the visible symptoms of an allergic attack, such as runny nose, watery eyes, and tissue swelling.

Antigen–antibody reactions are also the cause of anaphylactic shock, which is a severe, immediate, and often fatal response to contact with an antigen to which the individual has become sensitized. Some of the effects of anaphylactic shock are similar to those produced by an injection of histamine.

In the body histamine is changed to 1,4-methylhistamine, which is either excreted directly or deaminated (nitrogen is removed) by action of the enzyme histaminase before excretion. The product imidazolylacetic acid is excreted in the urine, usually combined with the sugar ribose.

Antihistamines are synthetic compounds that selectively counteract the effects of histamine in the body. They do so by replacing histamine at the sites where it is active, thereby preventing histamine-triggered reactions. *See* antihistamine.

Where the same name may denote a person, place, or thing, the articles will be found in that order

hister beetle, any member of the approximately 2,500 species of the insect family Histeridae (order Coleoptera). Hister beetles are carnivorous and are usually found around carrion, fungi, or dung. They are shiny black in colour, oval shaped, and measure from 0.5 to 10 millimetres (0.02 to 0.4 inch) long.

The hister beetle's wing covers (elytra) are short, leaving the last two abdominal segments exposed. When disturbed, these beetles lie motionless, resembling tiny black seeds.

Histiaeus (d. 494/493 BC), tyrant of the Anatolian city of Miletus under the Persian king Darius I and a reputed instigator of the revolt

(499–494) of the Ionian Greeks against Darius.

According to Herodotus, Histiaeus rendered great service to Darius during the king's Scythian campaign (*c.* 513) by persuading the tyrants of other cities not to destroy the Danubian bridge over which the Persians were to return. Histiaeus received Thracian territory as a reward. Darius, however, became distrustful of Histiaeus and recalled him to Susa, where he held him a virtual prisoner. Histiaeus' son-in-law Aristagoras replaced him as ruler of Miletus.

According to a questionable account by Herodotus, Histiaeus sent Aristagoras a secret message encouraging him to stir up the Ionians to revolt. After persuading Darius that he could quell the disturbances, Histiaeus was allowed to leave Susa. On his arrival at the Lydian coast, however, he found himself suspected of disloyalty by the satrap (provincial governor) Artaphernes and was ultimately driven to establish himself as a pirate at Byzantium. After the total defeat of the Ionian fleet (*c.* 495), Histiaeus made various attempts to reestablish himself but was captured and crucified at Sardis by Artaphernes.

histidine, an amino acid obtainable by hydrolysis of many proteins. A particularly rich source, hemoglobin (the oxygen-carrying pigment of red blood cells) yields about 8.5 percent by weight of histidine. First isolated in 1896 from various proteins, histidine is one of several so-called essential amino acids for human beings; they cannot synthesize it and require dietary sources. In microorganisms histidine is synthesized from the sugar ribose and the nucleotide adenosine triphosphate.

Histamine (*q.v.*), a compound involved in the physiological processes associated with allergic reactions, is formed in the human body by decarboxylation of histidine.

histogenesis, series of organized, integrated processes by which cells of the primary germ layers of an embryo differentiate and assume the characteristics of the tissues into which they will develop. Although the final form of the cells that compose a tissue may not be evident until the organ itself is well along in development, distinctive biochemical reactions, which are the signatures of histogenesis, can be detected much earlier.

Histogenesis can be detected at both the cellular and tissue level. The gradual conversion of an early mesoderm cell into a muscle cell is an example of histogenesis at the cellular level. Most often, however, single cells do not undergo histogenesis but change only when they are part of a larger group of cells acting at the tissue level, as when thousands of cells aggregate to form the tissue of the islets of Langerhans in the pancreas. It is this tissue that produces insulin. The transformation of a mass of undifferentiated cells into an organ is known as organogenesis (*q.v.*).

histology, branch of biology concerned with the composition and structure of plant and animal tissues in relation to their specialized functions. The terms histology and microscopic anatomy are sometimes used interchangeably, but a fine distinction can be drawn between the two studies. The fundamental aim of histology is to determine how tissues are organized at all structural levels, from cells and intercellular substances to organs. Microscopic anatomy, on the other hand, deals only with tissues as they are arranged in larger entities such as organs and organ systems (*e.g.*, circulatory and reproductive systems).

In their investigations, histologists mainly examine quantities of tissue that have been removed from the living body; these tissues are cut into very thin, almost transparent slices using a special cutting instrument known as a microtome. These thin sections, as they are called, may then be stained with various dyes to increase the contrast between their various cellular components so that the latter can be more easily resolved using an optical microscope. Details of tissue organization that are beyond the resolving power of optical microscopes can be revealed by the electron microscope. Tissues can also be kept alive after their removal from the body by placing them in a suitable culture medium. This method is useful for cultivating (and later examining) certain types of cells and for studying embryonic organ rudiments as they continue to grow and differentiate. A special branch of histology, histochemistry, involves the chemical identification of the various substances in tissues.

histone, any of a group of simple alkaline proteins usually occurring in cell nuclei, combined ionically with DNA (deoxyribonucleic acid) to form nucleoproteins (*q.v.*). A unit in which a molecule of a histone is bound to a segment of the DNA chain of genetic material is termed a nucleosome. It has been suggested that changes in these units are associated with changes in the physical state and function of the chromatin during cell division and the transcription of the genetic message. Discovered in avian red blood cell nuclei by Albrecht Kossel about 1884, histones are water-soluble and contain large amounts of basic amino acids, particularly lysine and arginine. They are abundant in the thymus and pancreas.

histoplasmosis, infection with the fungus *Histoplasma capsulatum,* occurring spontaneously in humans and other animals. The disease is contracted by the inhalation of dust containing spores of the fungus. The fungus is believed to flourish in soil contaminated by the droppings of chickens, pigeons, starlings, or bats. The chief site of infection is the lungs, though the fungus can spread through the bloodstream to other organs such as the liver.

There are three forms of the disease. The primary acute form involves only the lungs and causes symptoms of fever, coughing, and chest pain. The infection may be slight and is often asymptomatic. In the progressive disseminated form of histoplasmosis, the infection spreads to the liver, spleen, or adrenal glands, where it causes lesions and damages those organs. In the third form, chronic cavitary disease, the infection remains in the lungs but damages them more seriously, causing coughing and severe shortness of breath. All three forms can produce the characteristic symptoms of coughing, chest pain, difficulty in breathing, fever, chills, and fatigue.

Histoplasmosis is worldwide in distribution and is endemic in parts of the central eastern United States and the Mississippi Valley; infants and men past middle age show the least resistance to symptomatic infection, but 50–80 percent of the total population of endemic areas show positive skin tests. Treatment with amphotericin B is usually effective.

Historia, Museo Nacional de (Mexico City museum): *see* Museo Nacional de Historia.

Historia Augusta (biographical compilation): *see* Augustan History.

historical geography, geographic study of a place or region at a specific time or period in the past, or the study of geographic change in a place or region over a period of time. The writings of Herodotus in the 5th century BC, particularly his discussion of how the Nile delta formed, probably provides the earliest example of what would be called historical geography today. Historical geography, as the study of past geographies, remained a relatively undeveloped field of study until the 17th century, when Philipp Clüver, considered the founder of historical geography, published a historical geography of Germany, combining knowledge of the classics with knowledge of the land. In the 19th century the importance of geography as the basis for understanding history was taught in many universities, particularly in Great Britain. Geography as the basis for understanding history changed to the geographic influence upon historical events in the early 20th century. The work of Ellen Churchill Semple used this environmental deterministic interpretation of history. From the 1930s and onward, historical geography gained prominence through the valuable studies in sequent occupance—*i.e.,* the study of the human occupation of a specific region over intervals of historic time—initiated by Derwent S. Whittlesey and Carl O. Sauer. The establishment of the *Journal of Historical Geography* (1975) and historical-geography research groups by the Institute of British Geographers (1973) and the Association of American Geographers (1979) served to vindicate the historical approach in geography.

historical linguistics, also called DIACHRONIC LINGUISTICS, the branch of linguistics concerned with the study of phonological, grammatical, and semantic changes, the reconstruction of earlier stages of languages, and the discovery and application of the methods by which genetic relationships among languages can be demonstrated. Historical linguistics had its roots in the etymological speculations of classical and medieval times, in the comparative study of Greek and Latin developed during the Renaissance, and in the speculations of scholars as to the language from which the other languages of the world were descended. It was only in the 19th century, however, that more scientific methods of language comparison and sufficient data on the early Indo-European languages combined to establish the principles now used by historical linguists. The theories of the Neogrammarians, a group of German historical linguists and classical scholars who first gained prominence in the 1870s, were especially important because of the rigorous manner in which they formulated sound correspondences in the Indo-European languages. In the 20th century, historical linguists have successfully extended the application of the theories and methods of the 19th century to the classification and historical study of non-Indo-European languages. Historical linguistics, when contrasted with synchronic linguistics, is often called diachronic linguistics.

historical novel, work of fiction that attempts to convey the spirit, manners, and social conditions of a past age with realistic detail and fidelity to historical fact. The work may deal with actual historical personages, as does Robert Graves's *I, Claudius* (1934), or it may contain a mixture of fictional and historical characters. It may focus on a single historic event, as does Franz Werfel's *Forty Days of Musa Dagh* (1934), which dramatizes the defense of an Armenian stronghold. More often it attempts to portray a broader view of a past society in which great events are reflected by their impact on the private lives of fictional individuals. Since the appearance of the first historical novel, Sir Walter Scott's *Waverley* (1814), this type of fiction has remained popular. Though some historical novels, such as Tolstoy's *War and Peace* (1865–69), are of the highest artistic quality, many of them are written to mediocre standards. One type of historical novel is the purely escapist costume romance, which, making no pretense to historicity, uses a setting in the past to lend credence to improbable characters and adventures.

historical particularism (anthropology): *see* particularism.

historical school of economics, branch of economic thought, developed chiefly in Ger-

many in the last half of the 19th century, in which the economic situation of a nation is understood as the result of its total historical experience. Objecting to the deductively reasoned economic "laws" of classical economics, exponents of the historical approach believed in the need for an inductive method that would take into account the continuing development of the entire social order, of which purely economic motives and decisions were only one component. Members of both the earlier and later historical schools viewed government intervention in the economy as a positive and necessary force.

Founders of the earlier school included Wilhelm Roscher, Bruno Hildebrand, and Karl Knies, in whose works the idea of a historical method was developed. They held that the merits of economic policies depended on place and time but that by studying various societies it would be possible to specify certain general stages of development through which all countries must pass.

The later historical school (roughly after 1870) was responsible for most of the detailed historical research for which the school is known. The primary founder was Gustav von Schmoller, who hoped to discover cultural trends through extensive historical inquiry. Other prominent members of this school were Georg Friedrich Knapp and Lujo Brentano. Although the historical school was most influential in Germany, its impact was felt throughout Europe and the United States, particularly by the American institutional economists.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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historiography, the writing of history, especially the writing of history based on the critical examination of sources, the selection of particulars from the authentic materials in those sources, and the synthesis of those particulars into a narrative that will stand the test of critical methods. The term historiography also refers to the theory and history of historical writing.

A brief treatment of historiography follows. For full treatment, *see* MACROPAEDIA: History, The Study of.

Two major tendencies in the writing of history are evident from the beginnings of the Western tradition: the concept of historiography as an accumulation of records and the concept of history as storytelling, filled with explanations of cause and effect. Before Herodotus, the historical tradition in Greece was based on myths and the epic tradition; and in Egypt and Babylon it consisted of genealogical records and commemorative archives.

In the 5th century BC the Greek historians Herodotus and, later, Thucydides emphasized firsthand inquiry in their efforts to impose a narrative pattern on wars and major political events. As examples of literary art, their critical accounts are interesting and dramatically unified, though sometimes at the expense of truth or verifiability of evidence. Impartiality was at least a goal, if it was not always achieved; and biased accounts are more likely among the Romans, whose historians generally were members of the ruling class and thus were hardly disinterested.

The dominance of Christian historiography by the 4th century introduced the idea of world history as the result of divine intervention in the affairs of men and women, an idea that was to prevail throughout the Middle Ages. One result of this view was the creation of a unified chronology that reconciled all history around the birth of Christ. In the early Middle Ages in the West, the Christian monastic historians mingled fact and myth in their accounts, as in Geoffrey of Monmouth's 12th-century history, which attempts to single out the Celts as receivers of the world's destiny. The strengths of medieval historiography are its occasional accounts of witnessed contemporary events and frequent quotations from official documents.

The major contributions of Byzantine historiography were its strong lay tradition, which resulted in contemporary histories, biographies, and popular chronicles, and its preservation of and emulation of the Greco-Roman classical models, which resulted in the continuation of Greek learning and culture. The Byzantine tradition's most important achievement lay in its revival of the concept of critical history: attention thus was paid to rational analysis, to cause and effect.

The Renaissance brought about an awareness of historical change, although this awareness meant regarding the Middle Ages as a period of decline. Renaissance historiographers tended to regard the preceding period as unimportant, even benighted; hence the origin of the three-part division of all history into ancient, medieval, and modern.

The two main influences on historiography in the early modern period were nationalism (as manifested in the concept of national history) and the Reformation. In the latter rupture, conflicting claims to doctrinal validity led to the study of original church history. The new historiography of the Enlightenment resulted from the wish to transfer the objective and impartial methods of natural science to the analysis and improvement of human social structures.

The 19th and 20th centuries have seen the development of modern methods of historical investigation; the basis of these is the authentication, interpretation, and critical evaluation of historical documents and earlier historiographic writings, and the synthesis of these materials into an accurate narrative or analysis of the past. Modern historiography has largely become the province of professional historians who acquire a knowledge of their discipline through specialized higher education. Modern historiography is a cooperative venture in which the achievements of past historians are used systematically by their successors in a continuously expanding and changing reevaluation of the past.

history, the discipline that studies the chronological record of events (as affecting a nation or people), based on a critical examination of source materials and usually presenting an explanation of their causes.

History is treated in a number of articles in the MACROPAEDIA. For the principal treatment of the subject of historiography and the scholarly research necessary for the discipline, *see* History, The Study of. For information on any specific historical topic, such as the history of specific peoples, cultures, countries, and regions, the reader should first consult the relevant title in the Index. For information on the historical aspects of military affairs, economics, law, literature, sciences, art, philosophy, religion, and other fields of human endeavour, the reader should also first consult the relevant title in the Index.

For a description of the place of history in the circle of learning and for a list of both MACROPAEDIA and MICROPAEDIA articles on the subject, *see* PROPAEDIA: Part Nine.

History of Science, Museum of the, University of Oxford collection of early scientific instruments and apparatus. Although not given its present name until 1935, the museum began in 1924. In that year, the collection of early instruments in the possession of Lewis Evans (whose brother Sir Arthur Evans had been curator of the Ashmolean Museum) was housed in the Old Ashmolean Building. Other exhibits were added to that collection by its first curator, Robert Gunther, and by the early 1930s the museum occupied all three floors of the building, where it still remains. The building itself was erected in 1683 to house the Ashmolean Museum, which moved to new premises in the late 19th century. The present range of exhibits includes some of the largest collections of sundials, astrolabes, and microscopes in the world.

history play: *see* chronicle play.

histosol, worldwide soil type having a considerably higher organic-carbon content than the nine other major orders of soil taxonomy. Although ranking last in total area of all 10 orders, histosols form in any climate, from polar to tropical, wherever moisture and a rich supply of decaying vegetation are available. They are common in wet, cold areas such as Alaska, Finland, and Canada, as well as in wet, warm areas, such as Florida and Georgia. Histosols are the typical soils of peat bogs, moors, and swamps.

Histosols pose unique management problems. Artificial drainage accelerates decomposition of the organic-matter component, causing drastic reductions in soil volume and attendant subsidence of the land surface. In addition, the organic matter will burn and can be ignited naturally or by human agency. Plowing is often ineffective for seed-bed preparation; the soil may require rolling instead. Crops raised on histosol soils include truck-garden vegetables and cranberries.

Hita, city, Ōita *ken* (prefecture), Kyushu, Japan, in the centre of the Hita plateau. It grew as a castle town in the late 16th century and is now a market for the rice, wheat, and vegetables produced on the plateau. Forests of Japanese cedar on the surrounding mountains are the basis of the city's lumber industry and its manufacture of geta (wooden clogs) and furniture. The pottery industry still uses 18th-century Korean techniques.

Hita is also a popular summer resort, known for its quiet atmosphere and beautiful surroundings. Cormorant fishing is carried out on the Mikuma River, and the city is the starting point for shooting the Mikuma Rapids. Pop. (1985) 65,730.

Hitachi, city, Ibaraki *ken* (prefecture), Honshu, Japan. Its industrial development began with the discovery of copper in the locality in 1591. Large-scale copper smelting was introduced during the Meiji period (1868–1912), and after 1920 the Hitachi Company, Ltd., diversified into the production of electrical appliances and machinery. Between 1907 and 1938 Hitachi's population increased 10-fold. The company town prospered particularly after the Great Kantō Earthquake (1923), when it filled a manufacturing void after many factories in the Keihin Industrial Region were destroyed. Hitachi suffered heavy damage from American bombing during World War II, but its recovery was rapid. Its mine yields copper to be made into electric wires and rolled-copper products. Its harbour, completed in 1960, is the largest commercial port in the prefecture. Pop. (1987 est.) 204,870.

Hitachi, Ltd., Japanese KABUSHIKI KAISHA HITACHI SEISAKUSHO, major Japanese manufacturer of electric appliances and electronics equipment and one of the country's largest companies. Headquarters are in Tokyo.

Hitachi was formed in 1910 as a repair shop for a mining company in the town of Hitachi and was incorporated under its current name 10 years later. The company experienced rapid growth both in profits and in expanding its product line. By 1942 Hitachi had set up its first research facility, and this was followed by expansion into computer and nuclear-energy research after World War II. The most recent area of corporate research concerns energy-saving electric appliances.

Nearly half of the company's revenues are derived from the manufacture of home appliances and heavy electrical machinery. Hitachi also is a major Japanese manufacturer of railroad locomotive engines and other transportation machinery. The company moved rapidly into the communications boom of the 1970s, and communication and electronics equipment now bring in about one-quarter of total sales.

The company supplies computers to the United States through the Itel Corporation and also provides large-scale computers to Europe and South America. It has branch offices throughout the Americas, Europe, and Asia. About one-fourth of total sales comes from exports.

Consult the INDEX *first*

Hitchcock, Sir Alfred (b. Aug. 13, 1899, London—d. April 29, 1980, Bel Air, Calif., U.S.), English-born motion-picture director whose suspenseful films won immense popularity.

The son of a London poultry dealer, Hitchcock attended St. Ignatius College, London, and the University of London, where he studied engineering. In 1920 he began to work in the motion-picture industry, designing title cards for the Famous Players-Lasky Company. Within a few years he had become a scenario writer and an assistant director, and he directed his first film (*The Pleasure Garden*) in 1925. With *The Lodger* (1926), the story of a family who mistakenly suspect their roomer to be Jack the Ripper, Hitchcock began making the "thrillers" with which he was to become identified. His *Blackmail* (1929) was the first successful British talking picture. During the 1930s he directed such classic suspense films as *The Man Who Knew Too Much* (1934), *The Thirty-nine Steps* (1935), *Sabotage* (1936), and *The Lady Vanishes* (1938). In 1939 Hitchcock left England for Hollywood, where his first film, *Rebecca* (1940), won an Academy Award for best picture.

During the next three decades Hitchcock usually made a film a year in the Hollywood motion-picture system. Among the important films he directed during the 1940s were *Suspicion* (1941), *Shadow of a Doubt* (1943), *Lifeboat* (1944), *Spellbound* (1945), and *Rope* (1948). He began functioning as his own producer in 1948, and he went on in the 1950s to make a series of big-budget suspense films starring some of the leading actors and actresses of Hollywood. These films include *Strangers on a Train* (1951), *Dial M for Murder* (1954), *Rear Window* (1954), *To Catch a Thief* (1954), *The Man Who Knew Too Much* (1955; a remake of the 1934 film), *Vertigo* (1958), and *North by Northwest* (1959). In the 1960s Hitchcock turned to making thrillers with new and original emphases, among them *Psycho* (1960), *The Birds* (1963), and *Marnie* (1964). His *Torn Curtain* (1966) and *Topaz* (1969) are conventional espionage stories, while in his last films, *Frenzy* (1972) and *Family Plot* (1976), he returned to his original themes. From the 1940s on Hitchcock usually made a fleeting, wordless appearance in a bit part in each of his films.

Alfred Hitchcock
The Bettmann Archive

Hitchcock's films usually centre on either murder or espionage, with deception, mistaken identities, and chase sequences complicating and enlivening the plot. Wry touches of humour and occasional intrusions of the macabre complete this mixture of cinematic elements. Three main themes predominate in Hitchcock's films. The most common is that of the innocent man who is mistakenly suspected or accused of a crime and who must then track down the real perpetrator in order to clear himself. Examples of films having this theme include *The Lodger, The Thirty-nine Steps, Saboteur, Strangers on a Train, I Confess, To Catch a Thief, The Wrong Man, North by Northwest,* and *Frenzy.* The second theme is that of the guilty woman who enmeshes a male protagonist and ends up either destroying him or being saved by him; examples of this theme include *Blackmail, Sabotage, Notorious, Rebecca, Vertigo,* and *Marnie.* The third theme is that of the (frequently psychopathic) murderer whose identity is established during the working out of the plot; examples of this theme include *Shadow of a Doubt, Rope, Rear Window,* and *Psycho.* The psychopathic killer theme may sometimes be combined with the plot of the falsely accused innocent man, as in *Frenzy.*

Hitchcock's greatest gift was his mastery of the technical means to build and maintain suspense. To this end he used innovative camera viewpoints and movements, elaborate editing techniques, and effective soundtrack music. He had a sound grasp of human psychology, as manifested both in his credible treatment of everyday life and in the tense and nightmarish situations encountered in his more chilling films. His ability to convincingly evoke human menace, subterfuge, and fear gave his psychological thrillers great impact while maintaining their subtlety and believability.

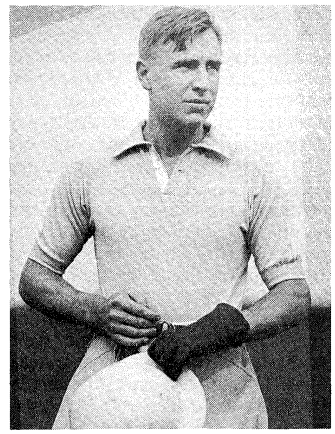
Hitchcock produced several popular American television series in the 1950s and '60s, which he introduced and sometimes directed. His name also appeared on a series of mystery-story anthologies. He received the American Film Institute's Life Achievement Award in 1979 and was knighted by Queen Elizabeth II in 1980.

BIBLIOGRAPHY. Among a number of biographies and books about Hitchcock's work is an "authorized" biography, *Hitch: The Life and Times of Alfred Hitchcock* (1978), by John Russell Taylor.

Hitchcock, Thomas, Jr., byname TOMMY HITCHCOCK (b. Feb. 11, 1900, Aiken, S.C., U.S.—d. April 19, 1944, Salisbury, Wiltshire, Eng.), American polo player, generally considered the greatest in the history of the sport.

The son of an outstanding player, Hitchcock achieved a 10-goal rating (the highest awarded) in 18 of the 19 seasons from 1922 through 1940. He was a member of four U.S. National Open championship teams (1923, 1927, 1935, 1936) and of U.S. teams that won five Westchester Cup competitions with Great Britain (1921, 1924, 1927, 1930, 1939).

In World War I Hitchcock was a combat aviator with the Lafayette Escadrille, a French unit composed of volunteers from the United States. A fighter group commander in the U.S. Army Air Corps during World War II, he was killed in an air crash.



Tommy Hitchcock, Jr.
By courtesy of the United States Polo Association

Hitchings, George Herbert (b. April 18, 1905, Hoquiam, Wash., U.S.), American pharmacologist who, along with Gertrude B. Elion and Sir James W. Black, received the Nobel Prize for Physiology or Medicine in 1988 for their development of drugs that became essential in the treatment of several major diseases.

Hitchings received his bachelor's and master's degrees from the University of Washington and earned a Ph.D. in biochemistry at Harvard University in 1933. He taught at Harvard until 1939, and in 1942 he joined the Burroughs Wellcome Laboratories, at which he conducted research until his retirement in 1975.

Over a span of nearly 40 years, Hitchings worked with Elion, who was first his assistant and then his colleague in research at Burroughs Wellcome. Together they designed a variety of new drugs that achieved their effects by interfering with the replication or other vital functions of specific pathogens (disease-causing agents). In the 1950s they developed thioguanine and 6-mercaptopurine (6MP), which became important treatments for leukemia. In 1957 their alteration of 6MP produced the compound azathioprine, which proved useful in treating severe rheumatoid arthritis and other autoimmune disorders and in suppressing the body's rejection of transplanted organs. Their new drug allopurinol was an effective treatment for gout. Other important drugs that were developed by Hitchings and Elion include pyrimethamine, an antimalarial agent; trimethoprim, a treatment for urinary and respiratory tract infections; and acyclovir, the first effective treatment for viral herpes.

Hitler, Adolf, byname DER FÜHRER (German: "The Leader") (b. April 20, 1889, Braunau am Inn, Austria—d. April 30, 1945, Berlin), leader of the National Socialist (Nazi) Party (from 1920/21) and dictator of Germany (1933–45). He was officially chancellor (*Kanzler*) from Jan. 30, 1933, and, after President Paul von Hindenburg's death, assumed the twin titles of Führer and chancellor (Aug. 2, 1934).

A brief account of the life and works of Adolf Hitler follows; for a full biography, *see* MACROPAEDIA: Hitler.

Hitler spent his early life in Linz, Austria, and in Vienna. He was a lonely, frustrated artist and moved to Munich in 1913. While serving in the German army during World War I, he was wounded (1916) and gassed (1918). He began his political career as an army political agent in the German Workers' (later National Socialist, or Nazi) Party in 1919 and became head of its propaganda arm in 1920. Hitler was soon made president of the party and

began his creation of a mass movement and his climb to power. After the abortive Munich (Beer Hall) Putsch of 1923, he served nine months in prison and began the writing of *Mein Kampf*, in which he condemned democratic government and expressed his hate and fear of Jews. Throughout the 1920s Hitler continued to gain strength; he unsuccessfully opposed Paul von Hindenburg in the presidential election of 1932 but was appointed chancellor in 1933. The offices of chancellor and president were merged in 1934, a move that was supported by the following plebiscite. As dictator, Hitler then turned his attention to foreign policy and World War II (1939–45). His "new order" for Europe called for indiscriminate extermination of whole peoples; the Jews of Europe were the most numerous among victims of the barbarism. Hitler retreated to the chancellory in Berlin in January 1945 and, in the face of impending defeat, committed suicide.

Hitler Youth, German HITLER-JUGEND, organization set up by Adolf Hitler in 1933 for educating and training male youth in Nazi principles. Under the leadership of Baldur von Schirach, head of all German youth programs, the Hitler Youth organization included by 1935 almost 60 percent of German boys. On July 1, 1936, it became a state agency that all young "Aryan" Germans were expected to join.

Upon reaching his 10th birthday, a German boy was registered and investigated (especially for "racial purity") and, if qualified, inducted into the Deutsches Jungvolk (German Young People). At age 13 the youth became eligible for Hitler Youth, from which he was graduated at age 18. Throughout these years he lived a Spartan life of dedication, fellowship, and Nazi conformity, generally with minimum parental guidance. From age 18 he was a member of the Nazi Party and served in the state labour service and the armed forces until at least the age of 21.

A parallel organization, the League of German Girls (Bund Deutscher Mädel), trained girls for comradeship, domestic duties, and motherhood.

Hito-no-michi (Japanese: Way of Man), Japanese religious sect founded by Miki Tokuharu (1871–1938); it was revived in a modified form after World War II as PL Kyōdan (*q.v.*; from the English words "perfect liberty" and a Japanese term for "church"). Hito-no-michi was a development of an earlier religious movement, Tokumitsu-kyō, named after its founder, Kanada Tokumitsu (1863–1919), who taught that the sufferings of his followers could be transferred to him by divine mediation and that he would vicariously endure their troubles. Hito-no-michi was compelled by the government to affiliate itself with one of the Sect Shintō denominations, Fusō-kyō; but its unorthodox teachings and growing strength (in 1934 it claimed a membership of 600,000) aroused the disfavour of the government. In 1937 the sect was ordered disbanded, and Miki Tokuharu and his son Miki Tokuchika were jailed. Tokuchika was released from prison in 1945 and shortly afterward established PL Kyōdan.

hitogami (Japanese: "man-god"), a way of distinguishing certain characteristics of Japanese religion by focussing on the close relationship between a deity and his transmitter, such as a seer or a shaman. The Japanese scholar Hori Ichiro contrasts *hitogami* as a religious system with the *ujigami* ("guardian deity") type of belief. Membership in the circle of believers is not dependent on family or geographical origin (as in the *ujigami* system) but is based on personal faith. The two types of spiritual relationship have constantly interacted with one another in Japanese history. The *hitogami* type of belief is evident in the deification of heroes such as Hachiman, god of war, and Tenjin, god of calligraphy; in the ecstatic singing and dancing of Japanese festival processions; and in the charismatic leadership of some of the "new religions" of Japan.

Hittite, member of an ancient Indo-European people who appeared in Anatolia at the beginning of the 2nd millennium BC; by 1340 BC they had become one of the dominant powers of the Near East.

Probably originating from the area beyond the Black Sea, the Hittites first occupied central Anatolia, making their capital at Hattusa (modern Boğazköy). Early kings of the Hittite Old Kingdom, such as Hattusilis I (reigned *c.* 1650–*c.* 1620 BC), consolidated and extended Hittite control over much of Anatolia and northern Syria. Hattusilis' grandson Mursilis I raided down the Euphrates River to Babylon, putting an end (*c.* 1590 BC) to the Amorite dynasty there. After the death of Mursilis, a dynastic power struggle ensued, with Telipinus (*q.v.*) finally gaining control about 1530 BC. In the noted Edict of Telipinus, long upheld by succeeding generations, he attempted to end lawlessness and to regulate royal succession, designating the *pankus* ("nobility") as high court in cases of constitutional crimes.

After Telipinus historical records are scarce until the Hittite New Kingdom, or Empire (*c.* 1400–*c.* 1200 BC). Under Suppiluliumas I (*c.* 1380–*c.* 1346 BC), the empire reached its height. Except for a successful campaign against Arzawa in southwestern Anatolia, Suppiluliumas' military career was devoted to involved struggles with the kingdom of Mitanni to the southeast and to the establishment of a firm Hittite foothold in Syria.

Under Muwatallis (*c.* 1320–*c.* 1294 BC) a struggle for domination of Syria with resurgent Egypt under Seti I and Ramses II led to one of the greatest battles of the ancient world, which took place at Kadesh on the Orontes in 1299 BC. Though Ramses claimed a great victory, the result was probably indecisive, and 16 years later, under Hattusilis III (*c.* 1275–*c.* 1250 BC), a peace treaty, mutual defense pact, and dynastic marriage were concluded between the Hittites and the Egyptians.

The fall of the Hittite Empire (*c.* 1193 BC) was sudden and may be attributed to large-scale migrations that included the Sea Peoples. While the heartland of the empire was inundated by nonliterate Phrygians, some of the Cilician and Syrian dominions retained their Hittite identity for another five centuries, evolving politically into a multitude of small independent principalities and city-states, which were gradually incorporated by Assyria until by 710 BC the last vestiges of Neo-Hittite political independence had been obliterated.

Hittite cuneiform tablets discovered at Boğazköy (in modern Turkey) have yielded important information about political organization, social structure, economy, and religion. The Hittite king was not only the chief ruler, military leader, and supreme judge but also the earthly deputy of the storm god; upon dying, he himself became a god. Hittite society was essentially feudal and agrarian, the common people being either freemen, "artisans," or slaves. Anatolia was rich in metals, especially silver and iron. In the Empire period the Hittites developed iron-working technology, helping to initiate the Iron Age.

The religion of the Hittites is only incompletely known, though it can be characterized as a tolerant polytheism that included not only indigenous Anatolian deities but also Syrian and Hurrian divinities.

The plastic art of pre-imperial Hittite culture is scarce; from the Hittite Empire, however, many examples have been found of stone sculptures in a powerful, though somewhat unrefined, style. The art of the Late Hittite states is markedly different, showing a composite of Hittite, Syrian, Assyrian, and, occasionally, Egyptian and Phoenician motifs and influences.

Hittite hieroglyphic writing, system of pictographic writing used in the Syrian Hittite states for writing an eastern dialect of the Luwian language (*q.v.*) chiefly in the period from the 10th to the 8th century BC, after the fall of the Hittite Empire. (Earlier Luwian texts written in cuneiform are thought by scholars to be in a central dialect.) Inscriptions

Broken door jamb inscribed in raised Hittite hieroglyphs, *c.* 900

By courtesy of the trustees of the British Museum

written in Hittite hieroglyphs usually begin in the upper-right-hand corner. Although most of the signs are ideographic, a number of them are phonetic syllabic signs. Hieroglyphic Hittite (or, more precisely, Hieroglyphic Luwian) was substantially deciphered between 1930 and 1935. There appears to be no direct connection between Hittite hieroglyphs and those of Egypt.

Hittite language, most important of the extinct Indo-European languages of Anatolia; closely related to Luwian, Lydian, Lycian, and Palaic. Hittite is known primarily from the approximately 25,000 cuneiform tablets or fragments of tablets preserved in the archives of Boğazköy (the ancient Hattusa, in modern Turkey), the majority of which are from the period of the Hittite Empire (*c.* 1400–*c.* 1190 BC) and are concerned with religious and other subjects. Old Hittite texts, from *c.* 1650–*c.* 1595 BC, are preserved in copies from the empire period and are the earliest Indo-European texts that have thus far been found.

Bedřich Hrozný, a Czech Orientalist, concluded in 1915 that Hittite was an Indo-European language because of the similarity of its endings for nouns and verbs to those of other early Indo-European languages. Hittite has provided significant information about the early Indo-European sound system.

Hittorf, Johann Wilhelm (b. March 27, 1824, Bonn—d. Nov. 28, 1914, Münster, Prussia), German physicist who first computed the electricity-carrying capacity of charged atoms and molecules (ions), an important factor in understanding electrochemical reactions.

Hittorf's early investigations were on the allotropes (different physical forms) of phosphorus and selenium. Between 1853 and 1859 his most important work was on ion movement caused by electric current. He measured the changes in the concentration of electrolyzed solutions, computed from these the transport numbers (relative carrying capacities) of many ions, and, in 1869, published his laws governing the migration of ions. He became profes-

sor of physics and chemistry at the University of Münster and director of laboratories there from 1879 until 1889. He also investigated the light spectra of gases and vapours, worked on the passage of electricity through gases, and discovered new properties of cathode rays (electron rays).

Hiva Oa, largest island (77 sq mi [200 sq km]) of the southeastern Marquesas Islands, French Polynesia, central South Pacific. The mountains of the volcanic island, reaching more than 4,000 ft (1,200 m), fall directly to the open sea, with neither a coastal plain nor a fringing coral reef. Sighted by the Spanish navigator Álvaro de Mendaña de Neira (1595), Hiva Oa had a small sandalwood trade in the 19th century. The rugged terrain limits agriculture to the narrow valley floors, with the exception of the Ahao Plateau (1,000 ft), an area with agricultural potential. Copra, the only export, is shipped from Atuona, the main village and port of the Marquesas Islands, on the Baie des Traîtres (Bay of Traitors).

The French artist Paul Gauguin lived on Hiva Oa in his last two years (1901–03) and is buried at Atuona. Pop. (1977) 1,159.

hives, also called URTICARIA, allergic skin reaction characterized by the sudden appearance of slightly raised, smooth and flat-topped wheals and plaques, which are usually redder or paler than the surrounding skin and are attended by severe itching. In the acute form, the skin lesions generally subside in 6 to 24 hours, but they may come and go and persist much longer in the chronic form.

Allergy to a specific food is probably the most frequent cause of acute urticaria, foods such as fish, eggs, berries, and nuts tending to head the list of common offenders. Hives may also be triggered by drugs, especially penicillin, by biological medications containing proteins, and by inhalants (*e.g.,* pollens, insecticides, dust, feathers). Less frequently, physical agents, such as cold, heat, and mechanical injury, as well as existing parasitic and infectious diseases, may also give rise to urticaria. Emotional and mental stresses are believed to be major and contributing causes of chronic urticaria.

The mechanism by which psychogenic factors give rise to chronic urticaria is not clear, but the overall sequence of biological events whereby a specific substance triggers acute urticaria has been clarified. The mast cells lining the blood vessels contain histamine, which is released following contact of the mast cells with the irritating substance. Histamine in turn increases the permeability of the capillaries, so that plasma escapes into the spaces between the cells of the skin, giving rise to swellings that constitute the wheals and plaques. The itching is also thought to be caused by histamine.

Hives appears to show a familial incidence and is more common in persons with a history of allergy. Treatment involves identification and subsequent avoidance of the allergen; administration of epinephrine and antihistamines may help to control the acute skin symptoms. Several specific causes of urticaria, as well as variant forms of its typical skin lesions, are denoted by qualifying the term urticaria with a descriptive word. Examples include urticaria bullosa, a rare type of skin allergy characterized by the appearance of bullae or vesicles (large or small blisters); solar urticaria, produced by exposure to sunlight; and urticaria subcutanea, caused by swelling of the tissues underlying the skin.

Hiwassee River, river rising in the Blue Ridge Mountains, Towns County, northern Georgia, U.S. It flows north into North Carolina past Hayesville, northwest past Murphy, into southeastern Tennessee, where it joins the Tennessee River 31 mi (50 km) northeast of Chattanooga at the Chickamauga Reservoir. The 132-mi Hiwassee has three major Tennessee Valley Authority (TVA) dams in its course—the Apalachia and the Hiwassee, in North Carolina, and the Chatuge, in North Carolina and Georgia. "Hiwassee" is probably derived from the Cherokee word meaning "meadow."

Hjálmar Jónsson (Icelandic folk poet): *see* Jónsson, Hjálmar.

Hjärne, Harald Gabriel (b. May 2, 1848, Klastorp, Swed.—d. Jan. 6, 1922, Uppsala), historian, politician, and political writer, known for his influence on Swedish historical scholarship and for his contributions to Swedish conservative and right-wing liberal thought.

After studying at the University of Uppsala, Hjärne joined the faculty in 1872. His scholarly work covered Germanic legal and social history, the history of Russia and of Russo-Swedish relations, and the history of 17th-century Sweden.

Hjärne's political thought underwent considerable change over the years but remained essentially conservative. He stressed the obligation of the citizen toward the state. Political representation, Hjärne felt, ought to reflect the principle that the citizen derived his rights from the state in accordance with his personal contribution to the nation. In the 1890s he broke with the Conservative party and became a right-wing liberal, offering a reform program that would grant voting rights to all who had fulfilled one year's military service, regardless of their social class. After a frustrating career in the second chamber of the Swedish Riksdag (parliament) in 1903–08, he turned toward the right, emphasizing national defense and foreign policy over domestic reform. In 1912–18 he served in the first chamber of the Riksdag.

Hjelm, Peter Jacob (b.1746—d.1813), Swedish chemist who discovered the element molybdenum in 1782.

Educated at the University of Uppsala, in 1782 Hjelm became master of assaying for the Royal Mint, Stockholm, and in 1794 was appointed director of chemical laboratories at the Swedish bureau of mines. His research interests included mineralogy, metallurgy, and industrial chemistry. He is credited with the observation that pig iron made from ore containing manganese, which he isolated successfully in 1781, frequently produced superior steel.

Hjørring, city, Nordjyllands *amtskommune* (county), northern Jutland, Denmark. The ancient capital of the Vendsyssel region, Hjørring was chartered in 1243 and remains the commercial centre of the district. The church of St. Kathrine dates from about 1250; the churches of St. Hans and St. Olai date from the 12th century. Special state subsidies and incentives have been used to develop the economy. Local products include milk, biscuits, bacon, and textiles. A military equipment centre was transferred from Copenhagen to Hjørring (1971). Pop. (1981) city, 23,697; (1982 est.) mun., 34,366.

Hkawa (people): *see* Wa.

Hlinka, Andrej (b. Sept. 27, 1864, Stará Černová, Slovakia, Austrian Empire—d. Aug. 16, 1938, Ružomberok, Czech.), Slovak Roman Catholic priest and patriot who was the leader of the Slovak autonomist opposition to the Czechoslovak government in the 1920s and 1930s.

Hlinka became priest of the small industrial town of Ružomberok in 1905 and eagerly supported the Slovak nationalist candidates there in the Hungarian parliamentary elections of 1906. In November 1906 he was tried for inciting the Slovaks to disloyalty to Hungary and condemned to two years' imprisonment, to which an additional year-and-a-half sentence was added the following May for the inflammatory nature of his farewell address to his parishioners.

On May 24, 1918, when the Slovak National Party took a position against Hungary, Hlinka, as the leader of the clerical Slovak People's Party, emphatically declared for union with the Czechs. By the following year, however, he was experiencing misgivings over the union and drew up a memorandum to the peace conference in Paris demanding a plebiscite in Slovakia. By August 1922 Hlinka had led his party into opposition to the Prague government, stating his position in the Žilina Memorandum, reproaching the Czechs for having robbed the Slovaks of the autonomy allegedly promised to them by Tomáš Masaryk in what Hlinka persisted in calling the "treaty" of Pittsburgh (usually called the Pittsburgh Convention)—a document signed in May 1918 by Masaryk and regarded by him as a statement of policy that U.S. Czechs and Slovaks were prepared to advocate. Later administrative reforms led to better relations, and Hlinka permitted his party lieutenant, Joseph Tiso, to accept a position in a Czechoslovak government in January 1927, but his party returned to opposition in 1929, when he refused to repudiate another of his lieutenants, Béla Tuka, after the latter was convicted of treason as a Hungarian agent. Thus the Slovak People's Party became associated in the 1930s with the German and Magyar opposition. Hlinka himself was a true Slovak patriot, but he allowed himself to be influenced by men like Tiso and Tuka, whose motives were less pure, and he failed to see that his by now fanatical hostility to the Czechs was being exploited by Germans and Magyars who aimed to destroy Czechoslovakia and who felt little benevolence for the Slovak cause.

Hlodwig (name of Merovingian kings): *see under* Clovis.

Hlódyn (Norse mythology): *see* Jörd.

Hlothere (d. February 685), king of Kent in Anglo-Saxon England, the son of Erconberht and brother of Egbert, whom he succeeded in 673.

Hlothere appears to have shared power with his nephew Eadric (Egbert's son); a code of law still extant was issued in their joint names. A quarrel between them caused Eadric either to be banished or to flee the kingdom. He returned with an army of South Saxons, and in the ensuing battle Hlothere was defeated and mortally wounded.

The law code of Hlothere and Eadric is one of the oldest and most important sources of information on the structure of early English society. It is an enlargement of the earliest known Anglo-Saxon code, which was issued by Hlothere's ancestor Aethelberht I (reigned 560–616). Reflecting a primitive Germanic social organization, it seems to recognize a nobility of birth rather than of service, and a class of legal pleaders who were not king's ministers but "judges of the Kentish people." Fines for crimes were listed prominently.

Hluhluwe Game Reserve, game reserve in northern Natal, South Africa, established in 1897. It lies 130 mi (288 km) north of Durban and has an area of 90 sq mi (233 sq km). Its name is a Zulu word for the local thorny rope plant. Hluhluwe, a subtropical region of undulating green hills and wooded valleys, is best known for the black rhinoceros and the rarer, larger white rhinoceros. Other wildlife includes buffalo, nyala and other antelope, wildebeest, zebra, giraffe, warthog, and a wide variety of birds, including the bustard, vulture, and roller. Headquarters are at Mtubatuba.

Hlutdaw (Burmese: "place of release"), the primary ministerial council in Burma from

approximately the 13th to the 19th century. The Hlutdaw held executive and judicial authority and was the principal administrative organ of the king. It predominated over weak kings and was often overruled by strong ones. In practice, no act of state was valid unless sanctioned by and registered with the Hlutdaw. A record of its decisions was presented daily to the king for review; decisions were rarely overturned.

Members of the Hlutdaw were known as *wungyi,* or "great burden bearers." The *wungyi* accepted individual responsibility for administering the various functions of government that fell within their respective fields of competence, such as military ordnance and administration, public works, foreign relations, legal matters, and taxation. Despite such area specialization, departmentalization of the government was avoided because the council as a whole reviewed all important decisions. Each of the *wungyi* was assigned a *wundauk* ("support"), who supervised the daily agenda of the Hlutdaw, participated actively in its discussions, and submitted opinions for consideration by the *wungyi.*

The authority of the Hlutdaw was effective and stable within the capital environs, but it lessened as the distance from the capital increased. The Hlutdaw appointed *myowun,* or governors, who functioned as an extension of the authority of the king and Hlutdaw.

After the Third Anglo-Burmese War (1885), which subjugated all Burma to British sovereignty, the king was exiled and the Hlutdaw was dissolved.

Hmong (people): *see* Miao.

Ho, also called LARKA KOL, tribal people of the state of Bihār in India, concentrated in the area of Kolhān on the lower Chota Nāgpur Plateau. They numbered about 1,150,000 in the late 20th century, mostly in Bihār and Orissa states of northeastern India. They speak a language of the Munda family and appear to have moved gradually into their territory from farther north. Their traditional social organization includes features common to those of other Munda-speaking tribes, including the institution of girls' and boys' dormitories, an elaborate system of village offices, and a territorial organization into quasi-military confederations. They trace their descent through the paternal line, and young people are expected to marry outside the paternal clan, but there is a prevalent custom of marrying one's cousin on the maternal side. Marriage by elopement and by abduction are also traditionally common.

The Ho worship spirits, some of which they believe to cause disease; they approach them through divination and witchcraft.

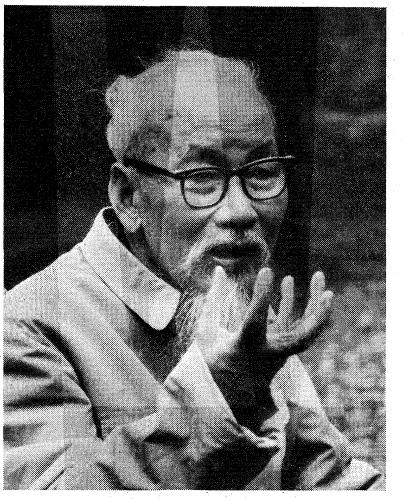
The traditional economy of the Ho was hunting and a primitive, shifting agriculture. These pursuits have declined in favour of settled agriculture and livestock raising. Many of the men also work as labourers in mines and factories.

Ho, town, southeastern Ghana. It is situated at the southern edge of the Akwapim-Togo Ranges. Ho was founded in the early 18th century during westward migrations of the Ewe people. Its agricultural basis was strengthened after 1870 by the development of German kola nut plantations and by expanding cacao cultivation. The town's modern commercial importance was ensured by the Volta Bridge (1957) at Adome, which connects Ho with Ghana's southern ports. A market centre, Ho also produces palm oil, cotton, and cocoa. It lies on a main road from the coast leading northeastward to Togo. The Ho Technical Institute was founded in 1968. Pop. (1984 prelim.) 37,200.

ho, Pinyin HE, also spelled HUO, type of Chinese bronze vessel that was produced during the Shang dynasty (18th–12th century BC) and the Chou dynasty (*c.* 1111–255 BC). A serving vessel for wine, it has a number of variations in silhouette, and its only unvarying characteristic is a tubular spout projecting prominently from the body. The *ho* usually had a domical lid and a vertical handle on the side opposite the spout, and it stood on three or four legs that were well-articulated with the shape of the body.

The form of the *ho* was derived from a Neolithic pottery predecessor. The decoration is often quite imaginative, especially in the early periods, and it both exploits and complements the shape of the *ho.*

Ho Chi Minh, original name NGUYEN TAT THANH, also called NGUYEN AI QUOC (b. May 19, 1890, Hoang Tru, Vietnam, French Indochina—d. Sept. 2, 1969, Hanoi, Vietnam), founder of the Indochina Communist Party (1930) and its successor, the Viet-Minh (1941), and president from 1945 to 1969 of the Democratic Republic of Vietnam (North Vietnam). As the leader of the Vietnamese nationalist movement for nearly three decades,



Ho Chi Minh, 1968
Marc Riboud—Magnum

Ho was one of the prime movers of the post-World War II anticolonial movement in Asia and one of the most influential Communist leaders of the 20th century.

Early Life. The son of a poor country scholar, Nguyen Sinh Huy, Ho Chi Minh was brought up in the village of Kim Lien. He had a wretched childhood, but between the ages of 14 and 18 he was able to study at a grammar school in Hue. He is next known to have been a schoolmaster in Phan Thiet and then was apprenticed at a technical institute in Saigon.

In 1911, under the name of Ba, he found work as a cook on a French steamer. He was a seaman for more than three years, visiting various African ports and the American cities of Boston and New York. After living in London from 1915 to 1917, he moved to France in the middle of World War I. There he worked, in turn, as a gardener, sweeper, waiter, photo retoucher, and oven stoker.

During the six years that he spent in France (1917–23), he became an active socialist, under the name Nguyen Ai Quoc ("Nguyen the Patriot"). He organized a group of Vietnamese living there and in 1919 addressed an eight-point petition to the representatives of the great powers at the Versailles Peace Conference that concluded World War I. In the petition, Ho demanded that the French colonial power grant its subjects in Indochina equal rights with the rulers. This act brought no response from the peacemakers, but it made him a hero to many politically conscious Vietnamese. The following year, inspired by the success of the Communist revolution in Russia and Lenin's anti-imperialist doctrine, Ho joined the French Communists when they withdrew from the Socialist Party in December 1920, and he denounced the evils of French and British colonialism in his journal *Le Paria* ("The Outcast").

After his years of militant activity in France, where he became acquainted with most of the French working-class leaders, Ho went to Moscow at the end of 1923. In January 1924, following the death of Lenin, he published a moving farewell to the founder of the Soviet Union in *Pravda.* Six months later, from June 17 to July 8, he took an active part in the fifth Congress of the Communist International, during which he criticized the French Communist Party for not opposing colonialism more vigorously. His statement to the congress is noteworthy because it contains the first formulation of his belief in the importance of the revolutionary role of oppressed peasants (as opposed to industrial workers).

In December 1924, under the assumed name of Ly Thuy, Ho went to Canton, a Communist stronghold, where he recruited the first cadres of the Vietnamese nationalist movement, organizing them into the Vietnam Thanh Nien Cach Menh Dong Chi Hoi ("Vietnamese Revolutionary Youth Association"), which became famous under the name Thanh Nien. Almost all of its members had been exiled from Indochina because of their political beliefs and had gathered together in order to participate in the struggle against French rule over their country. Thus, Canton became the first home of Indochinese nationalism.

When Chiang Kai-shek, then commander of the Chinese army, expelled the Chinese Communists from Canton in April 1927, Ho again sought refuge in the Soviet Union. In 1928 he went to Brussels and Paris and then to Siam (now Thailand), where he spent two years as a representative of the Communist International, the world organization of Communist parties, in Southeast Asia. His followers, however, remained in South China.

Founding of the Indochinese Communist Party (PCI). Meeting in Hong Kong in May 1929, members of the Thanh Nien decided to form an Indochinese Communist Party. Others—in the Vietnamese cities of Hanoi, Hue, and Saigon—began the actual work of organization, but some of Ho's lieutenants were reluctant to act in the absence of their leader, who had the confidence of Moscow. Ho was brought back from Siam, therefore, and on Feb. 3, 1930, he presided over the founding of the party. At first it was called the Vietnamese Communist Party, but after October 1930, Ho, acting on Soviet advice, adopted the name Indochinese Communist Party. Thus, the movement received greater international recognition and avoided the suggestion of "petit-bourgeois nationalism" implied by the earlier title. In this phase of his career, Ho acted more as an arbiter of conflicts among the various factions, allowing the organization of revolutionary action, rather than as an initiator. His prudence, his awareness of what it was possible to accomplish, his care not to alienate Moscow, and the influence that he already had achieved among the Vietnamese Communists can be seen in these actions.

The creation of the PCI coincided with a violent insurrectionary movement in Vietnam. Repression by the French was brutal; Ho himself was condemned in absentia to death as a revolutionary. He sought refuge in Hong Kong, where the French police obtained permission from the British for his extradition, but friends helped him escape, and he reached Moscow via Shanghai.

In 1935 the seventh Congress of the International, meeting in Moscow, which he attended as chief delegate for the PCI, officially

sanctioned the idea of the Popular Front (an alliance with the non-Communist left against Fascism)—a policy Ho had advocated for some time. In keeping with this policy the Communists in Indochina moderated their anticolonialist stance in 1936, allowing for cooperation with "antifascist colonialists." The formation of Premier Léon Blum's Popular Front government in France in the same year allowed leftist forces in Indochina to operate more freely, although Ho, because of his condemnation in 1930, was not permitted to return from exile. Repression returned to Indochina with the fall of the Blum government in 1937, and by 1938 the Popular Front was dead.

World War II and the founding of the Vietnamese state. In 1938 Ho returned to China and stayed for a few months with Mao Tse-tung at Yen-an. When France was defeated by Germany in 1940, Ho and his lieutenants, Vo Nguyen Giap and Pham Van Dong, plotted to use this turn of events to advance their own cause. About this time he began to use the name Ho Chi Minh (He Who Enlightens). Crossing over the border into Vietnam in January 1941, the trio and five comrades organized in May the Viet Nam Doc Lap Dong Minh Hoi (League for the Independence of Vietnam), or Viet Minh; this gave renewed emphasis to a peculiarly Vietnamese nationalism.

The new organization was forced to seek help in China from the government of Chiang Kai-shek. But Chiang distrusted Ho as a Communist and had him arrested. Ho was then imprisoned in China for 18 months, during which time he wrote his famed *Notebook from Prison* (a collection of short poems written in classic Chinese, a mixture of melancholy, stoicism, and a call for revolution). His friends obtained his release by an arrangement with Chiang Fa-k'uei, a warlord in South China, agreeing in return to support Chiang's interests in Indochina against the French.

In 1945 two events occurred that paved the way to power for the Vietnamese revolutionaries. First, the Japanese completely overran Indochina and imprisoned or executed all French officials. Six months later the United States dropped the atomic bomb on Hiroshima, and the Japanese were totally defeated. Thus, the two strongest adversaries of the Viet Minh and Ho Chi Minh were destroyed.

Ho Chi Minh seized his opportunity. Within a few months he contacted U.S. forces and began to collaborate with the Office of Strategic Services (oss; a U.S. undercover operation) against the Japanese. Further, his Viet Minh guerrillas fought against the enemy in the mountains of South China.

At the same time, commandos formed by Vo Nguyen Giap, under Ho's direction, began to move toward Hanoi, the Vietnamese capital, in the spring of 1945. After Japan's surrender to the Allies, they entered Hanoi on August 19. Finally, on September 2, before an enormous crowd gathered in Ba Dinh Square, Ho Chi Minh declared Vietnam independent, using words ironically reminiscent of the U.S. Declaration of Independence: "All men are born equal: the Creator has given us inviolable rights, life, liberty, and happiness. . . !"

All obstacles were not removed from the path of the Viet Minh, however. According to the terms of an Allied agreement, Chiang Kai-shek's troops were supposed to replace the Japanese north of the 16th parallel. More significantly, France, now liberated and under the leadership of Charles de Gaulle, did not intend to simply accept the fait accompli of an independent Vietnam and attempted to reassert its control. On October 6 General Leclerc landed in Saigon, followed a few days later by a strong armoured division. Within three months, he had control of South Vietnam. Ho had to choose between continuing the fight or negotiating. He chose negotiations, but not without preparing for an eventual transition to war.

Ho Chi Minh's strategy was to get the French to make the Chinese in the north withdraw and then to work for a treaty with France in which recognition of independence, evacuation of Leclerc's forces, and reunification of the country would be assured. Negotiations began in late October 1945, but the French refused to speak of independence, and Ho was caught in a stalemate. In March the deadlock was broken: on his side, Ho Chi Minh allowed parties other than the Viet Minh to be included in the new government, in an attempt to gain a wider base of support for the demands made on the French; at the same time, the French sent a diplomatic mission to China to obtain the evacuation of the Chinese soldiers. This was done, and some of Leclerc's troops were also removed from Haiphong, in the north. Having secured the withdrawal of the Chinese, Ho signed an agreement with the French on March 6. According to its terms, Vietnam was recognized as a "free state with its own government, army, and finances," but it was integrated into a French Union in which Paris continued to play the key role. Twelve days later, Leclerc entered Hanoi with a few battalions, which were to be confined to a restricted area.

The first Indochina war. The agreement was unsatisfactory to extremists on both sides, and Ho Chi Minh went to France for a series of conferences (June to September 1946) and concluded a second agreement with the French government. But the peace was broken by an incident at Haiphong (Nov. 20–23, 1946) when a French cruiser opened fire on the town after a clash between French and Vietnamese soldiers. Almost 6,000 Vietnamese were killed, and hope for an amicable settlement ended. Sick and disillusioned, Ho Chi Minh was not able to oppose demands for retaliation by his more militant followers, and the first Indochina war began on December 19.

After a few months, Ho, who had sought refuge in a remote area of North Vietnam, attempted to reestablish contact with Paris, but the terms he was offered were unacceptable. In 1948 the French offered to return the former Annamese (Vietnamese) emperor Bao Dai, who had abdicated in favour of the revolution in August 1945. These terms were more favourable than those offered to Ho Chi Minh two years earlier, because the French were now attempting to weaken the Viet Minh by supporting the traditional ruling class in Vietnam. But this policy was not successful. The Viet Minh army, commanded by Giap, was able to contain the French and Bao Dai's forces with guerrilla tactics and terrorism, and by the end of 1953 most of the countryside was under Viet Minh control, with the larger cities under a virtual state of siege. The French were decisively defeated at Dien Bien Phu on May 7, 1954, and had no choice but to negotiate.

The Geneva Accords and the second Indochina war. From May to July 21, 1954, representatives of eight countries—with Vietnam represented by two delegations, one composed of supporters of Ho Chi Minh, the other of supporters of Bao Dai—met in Geneva to find a solution. They concluded with an agreement according to which Vietnam was to be divided at the 17th parallel until elections, scheduled for 1956, after which the Vietnamese would establish a unified government.

It is difficult to assess Ho's role in the Geneva negotiations. He was represented by Pham Van Dong, a faithful associate. The moderation exhibited by the Viet Minh in accepting a partition of the country and in accepting control of less territory than they had conquered during the war follows the pattern established by the man who had signed the 1946 agreements with France. But this flexibility, which was also a response to pressures exerted by the Russians and Chinese, did not achieve everything for the Viet Minh. Hanoi lost out because the elections that were to guarantee the country's reunification were postponed indefinitely by the United States and by South Vietnam, which was created on a de facto basis at this time.

North Vietnam, where Ho and his associates were established, was a poor country, cut off from the vast agricultural areas of the south. Its leaders were forced to ask for assistance from their larger Communist allies, China and the Soviet Union. In these adverse conditions Ho Chi Minh's regime became repressive and rigidly totalitarian. Attempted agricultural reforms in 1955–56 were conducted with ignorant brutality and repression. "Uncle" Ho, as he had become known to the North Vietnamese, was able to preserve his immense popularity, but he abandoned a kind of humane quality that had distinguished some of his previous revolutionary activities despite ruthless purges of Trotskyists and bourgeois nationalists in 1945–46.

The old statesman had better luck in the field of diplomacy. He travelled to Moscow and Peking (1955) and to New Delhi and Jakarta (1958), skillfully maintaining a balance between his powerful Communist allies and even, at the time of his journey to Moscow in 1960, acting as a mediator between them. Linked by old habit, and perhaps by preference, to the Soviet Union, but aware of the seminal role China had played in the revolution in Asia, preoccupied with using his relations with Moscow to lessen China's influence in Asia, and, above all, careful to assert Vietnamese rights, Ho Chi Minh skillfully maintained a balance between the two Communist giants. When the war was resumed, he obtained an equal amount of aid from both.

Beginning about 1959, North Vietnam again became involved in war. Guerrillas, popularly known as the Vietcong, were conducting an armed revolt against the U.S.-sponsored regime of Ngo Dinh Diem in South Vietnam. Their leaders, veterans of the Viet Minh, appealed to North Vietnam for aid. In July 1959, at a meeting of the central committee of Ho Chi Minh's Lao Dong (Worker's Party), it was decided that the establishment of socialism in the North was linked with the unification with the South. This policy was confirmed by the third congress of the Lao Dong, held shortly thereafter in Hanoi. During the congress, Ho Chi Minh ceded his position as the party's secretary general to Le Duan. He remained chief of state, but, from this point on, his activity was largely behind-the-scenes. Ho certainly continued to have enormous influence in the government, which was dominated by his old followers Pham Van Dong, Truong Chinh, Vo Nguyen Giap, and Le Duan, but he was less actively involved, becoming more and more a symbol to the people. His public personality,which had never been the object of a cult comparable to that of Stal, Mao, or even Tito, is best symbolized by his popular name, Uncle Ho. He stood for the essential unity of the divided Vietnamese family.

This role, which he played with skill, did not prevent him from taking a position in the conflict ravaging his country, especially after American air strikes against the North began in 1965. On July 17, 1966, he sent a message to the people ("nothing is as dear to the heart of the Vietnamese as independence and liberation") that became the motto of the North Vietnamese cause. On Feb. 15, 1967, in response to a personal message from U.S. Pres. Lyndon Johnson, he announced: "We will never agree to negotiate under the threat of bombing." Ho lived to see only the begin-

ning of a long round of negotiations before he died. The removal of this powerful leader undoubtedly damaged chances for an early settlement.

Ho Chi Minh's importance. Among 20th-century revolutionaries, Ho waged the longest and most costly battle against the colonial system of the great powers. One of its effects was to cause a grave crisis in the national life of the mightiest of capitalist countries, the United States. As a Marxist, he stands with the Yugoslav leader Tito as one of the progenitors of the "national Communism" that developed in the 1960s and (at least partially) with Communist China's Mao Tse-tung in emphasizing the role of the peasantry in the revolutionary struggle.

Most of Ho Chi Minh's writings are collected in the two-volume *Selected Works,* published in Hanoi in 1960, in the series of Foreign Language Editions. (J.La.)

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Ho Chi Minh City, formerly called SAIGON, largest city in the Socialist Republic of Vietnam; it was the former capital of the French protectorate of Cochinchina (1862–1954) and of South Vietnam (1954–75). The city is situated on the Saigon River (Song Gai Gon) to the north of the Mekong Delta, about 50 mi (80 km) from the South China Sea.

The area now occupied by Ho Chi Minh City was for a long time part of the Kingdom of Cambodia. The Vietnamese first gained entry to the region in the 17th century. Relations with France began in the 18th century, when French traders and missionaries settled in the area. In 1859 the town was captured by the French, and in 1862 it was ceded to France by the Vietnamese emperor Tu Duc. As the capital of Cochinchina, Saigon was transformed into a major port city and a metropolitan centre of beautiful villas, imposing public buildings, and well-paved, tree-lined boulevards. Railway lines running north and south of the city were also constructed.

Saigon was occupied by the Japanese in 1940, but French colonial authorities continued to administer Vietnam until 1945, when they were interned by the Japanese. Saigon itself was largely unaffected by World War II.

After the Japanese surrender in 1945, Vietnamese independence was declared by the Viet Minh organization under Ho Chi Minh in Hanoi, but celebrations in Saigon turned into a riot. French troops then seized control of the city, and the First (or French) Indochina War began. The war ended in 1954 with the Geneva conference, which divided Vietnam into northern and southern zones. The cultural and political life of Saigon, which became the capital of South Vietnam, was enriched and complicated by an influx of refugees from North Vietnam. During the Second Indochina War, or Vietnam War, of the 1960s and early 1970s, Saigon was the headquarters of U.S. military operations. Parts of the city were destroyed by fighting in 1968.

On April 30, 1975, North Vietnamese troops captured Saigon. Under Communist control, Ho Chi Minh City lost its administrative functions, and strenuous efforts were made to reduce its population and dependence upon foreign imports and to nationalize its commercial enterprises.

While many business firms closed or were disrupted after 1975, new ventures began, with emphasis placed on self-sufficiency. A film studio now produces local motion pictures to replace those formerly imported, and a state-run handicraft enterprise exports a wide range of products—including furniture, carpets, lacquer paintings, and other works of art—made largely from local materials.

Most of the bars and restaurants that thrived in Saigon have closed their doors. The elegant Cercle Sportif, a focal point of social life for Westerners after it was founded in 1912, is now a people's museum. The old opera house, for 20 years the National Assembly Building, was converted to a national theatre. The University of Saigon and Buddhist University of Van Hanh were merged to form the national Ho Chi Minh University. The once busy Tan Son Nhat Airport was virtually shut down in 1975; it now has regularly scheduled flights by Air Vietnam to other domestic urban centres and by Air France to Paris. Pop. (1979 prelim.) 3,419,978.

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Ho Chi Minh Trail, elaborate system of mountain and jungle trails used by North Vietnam and Viet Cong forces in the Vietnam War for transport and communication between North Vietnam and South Vietnam, Laos, and Cambodia. It was used by guerrillas after World War II to sustain and supply insurgents in those countries. Clandestine access is by a network of roads, trails, and footpaths, some of which date from French colonial days, extending for about 300 mi (480 km) along the upper slopes of the Chaîne Annamitique (Annamite Chain; Vietnamese Truong Son) in Laos. Starting south of Hanoi, northern Vietnam, the main trail veers southwestward to enter Khammouane province of Laos via Deo (pass) Mu Gia. Thence it continues southward through eastern Laos, with nine or more side branches or exits through passes and saddles into South Vietnam. Among these are exits at Khe Sanh and through the valley at A Shau southwest of Hue.

In southern Laos a major western branch known as the Sihanouk Trail skirts the eastern Plateau des Bolovens, providing access to northeastern Kampuchea. The network of trails and volume of traffic expanded significantly beginning in the 1960s and was little affected by U.S. bombing of North Vietnam. Construction of the Truong Son Road, which uses the entire length of the trail in Vietnam on the eastern side of the Chaîne Annamitique, was begun in the 1960s; in the 1970s the paving of the road was begun.

Ho-ch'uan, Pinyin HECHUAN, city in eastern Szechwan Province (*sheng*), China. Ho-ch'uan is a county (*hsien*) seat in Chiangching Prefecture (*ti-ch'ü*). It is situated some 30 mi (50 km) northwest of Ch'ung-ch'ing (Chungking) at the confluence of three major rivers draining the eastern part of the Szechwan Basin, the Ch'ü Chiang (river), the Chia-ling Chiang, and the Fou Chiang. It was until comparatively recent times a major port, goods brought down the tributary streams in small craft being transshipped to larger vessels for onward expedition to Ch'ung-ch'ing. The opening of the Ch'ü Chiang to navigation by small steamers as far as Nan-ch'ung, however, and the completion of highways from Nan-ch'ung to Ch'ung-ch'ing, Ch'eng-tu, and Wan-hsien, took away much of its trade, and its former commercial prosperity has declined. It, nevertheless, remains an important market in a highly productive area and has developed a variety of small-scale industries, including grain milling, egg processing, and the weaving of textiles. It also produces some fertilizer. Pop. (mid-1970s est.) 50,000–100,000.

Ho-fei, formerly (until 1912) LU-CHOU, Pinyin HEFEI or LUZHOU, city in central Anhwei Province (*sheng*), China. The provincial capital since 1949, it is also a prefecture-level municipality (*shih*). The boundaries of the municipality include Ch'ang-feng County (*hsien*), an important rail junction some 37 mi (60 km) to the north. Ho-fei is a natural centre of communications, being situated to the north of Ch'ao Hu (lake) and standing on a low saddle crossing the northeastern extension of the Ta-pieh Shan (mountains), which form the watershed between the Huai and Yangtze rivers. From Ho-fei there is easy water transport via the lake to the Yangtze opposite Wu-hu. Important land routes run through Ho-fei—east–west from P'u-k'ou (opposite Nan-ching [Nanking] in Kiangsu) to Sian (Ch'ang-an; in Shensi) and north–south from Suchow (in Kiangsu) and Pang-pu to An-ch'ing (both in Anhwei).

From the 8th to the 6th century BC, Ho-fei was the site of the small state of Shu, later a part of the Ch'u kingdom. Many archaeological finds dating from this period have been made. The name Ho-fei was first given to the county (*hsien*) set up in the area under the Han dynasty (206 BC–AD 220) in the 2nd century BC. During the 4th to the 6th century, this crucial border region between northern and southern states was much fought over; its name and administrative status were consequently often changed. During the Sui (581–618) and T'ang (618–907) periods, it became the seat of Lu Prefecture (*chou*)—a title it kept until the 15th century, when it became a superior prefecture (*fu*) named Lu-chou.

The present city dates from the Sung dynasty (960–1126), the earlier Ho-fei having been some distance further north. During the 10th century, it was for a while the capital of the independent Wu kingdom (902–938) and was an important centre of the Southern T'ang state (937–975). After 1127 it became a centre of the defenses of the Southern Sung dynasty (1126–1279) against the Chin (Juchen) invaders, as well as a flourishing centre of trade between the two states. When the republic was founded in 1911, the superior prefecture was abolished, and the city took the name of Ho-fei County.

Before World War II, Ho-fei remained essentially an administrative centre and the regional market for the fertile plain to the south. It was a collecting centre for grain, beans, cotton, and hemp, as well as a centre for handicraft industries manufacturing cloth, leather, bamboo goods, and ironware.

The construction in 1912 of the Tientsin to P'u-k'ou railway, farther east, for a while made Ho-fei a provincial backwater, and much of its importance passed to Pang-pu. In 1932–36, however, a Chinese company built a railway linking Ho-fei with Yü-ch'i-k'ou (on the Yangtze opposite Wu-hu) to the southeast and with the Huai Ho at Huai-nan to the north. While this railway was built primarily to exploit the rich coalfield in northern Anhwei, it also did much to revive the economy of the Ho-fei area by taking much of its produce to Wu-hu and Nan-ching.

Although Ho-fei was a town of only about 30,000 in the mid-1930s, its population grew more than 10-fold in the following 20 years. The city's administrative role was strength-

ened by the transfer of the provincial government from An-ch'ing in 1949, but much of its new growth derived from its development as an industrial city. A cotton mill was opened in 1958, and a thermal generating plant, using coal from Huai-nan, was established in the early 1950s. It also became the seat of an industry producing industrial chemicals and chemical fertilizers. In the late 1950s an iron and steel complex was built. In addition to a machine-tool works and engineering and agricultural machinery factories, the city has developed an aluminum industry and a variety of light industries. There are two universities in the city. Pop. (1983 est.) 815,000.

Ho Hsien-ku, Pinyin HE XIANGU, in Chinese mythology, one of the Pa Hsien, the Eight Immortals of Taoism, and the only female (if Lan Ts'ai-ho is considered to be male). As a teenaged girl she dreamed that mother-of-pearl conferred immortality. She thereupon ate

Ho Hsien-ku, wood sculpture, 18th century; in the Musée Guimet, Paris
By courtesy of the Musee Guimet, Paris

some, became ethereal, and found she could float across the hills at will. She returned home each evening carrying herbs collected during the day.

Artists depict her as a beautiful woman often adorned with a lotus flower. An early legend relates that during a sumptuous birthday party for Hsi Wang Mu, she and the other Immortals became intoxicated with heavenly wine (*t'ien chiu*) and the fragrant surroundings. Though Ho Hsien-ku vanished after receiving a summons from Empress Wu Hou (7th century AD), someone caught sight of her 50 years later floating on a cloud. *See also* Pa Hsien.

Ho-kang, also called HAO-LI, Pinyin HEGANG or HAOLI, city, Heilungkiang Province (*sheng*), China. It is a prefecture-level municipality (*shih*). Hao-li (Ho-kang) is situated in the southeastern section of the Lesser Khingan Range. It is one of the principal coal-producing cities in China. The Ho-kang mines were founded in 1916 by a Chinese entrepreneur with Russian capital. In 1926 a railway was built to Chia-mu-ssu some 30 mi (50 km) to the south on the Sungari River. The mines were further developed after the Japanese occupation of Manchuria (now the Northeast) in 1931–32. After 1949 the city experienced further rapid growth. The mines were extended and modernized. Most of the coal is high-quality coking coal; apart from a small quantity consumed in Chia-mu-ssu, most of it is shipped by rail to An-yang in Honan Province and to other industrial cities in southern Manchuria. By the late 1950s the coal industry employed more than 80 percent of the working population. By the early 1970s, although the mines had been further developed and output increased, some other industrial development had occurred, and a large thermal power installation had been completed. Pop. (1980 UN est.) 458,000.

Ho-musubi, also called KAGU-TSUCHI, or HI-NO-KAMI, in the Shintō religion of Japan, a god of fire. His mother, the female creator Izanami, was fatally burned giving birth to him; and his father, Izanagi, cut him into pieces, creating several new gods.

The fire god is revered as a purificatory agent as much as out of fear for his destructiveness. During the *hi-matsuri* ("fire festivals") at the beginning of the new year, worshippers carry back to their home hearths torches lit from the new fire started by the temple priest. The traditional method of lighting a fire for religious purposes is with a fire drill. One of the most popular shrines dedicated to the fire god is on Mt. Atago, near Kyōto.

Ho-pi, also spelled HAO-PI, also called HAO-PI-CHI, Pinyin HEBI, HAOBI, or HAOBIJI, town in northern Honan Province (*sheng*), China. It is a county (*hsien*) seat in An-yang Prefecture (*ti-ch'ü*). Ho-pi is situated in the foothills of the southern T'ai-hang Shan (mountains), some 16 mi (25 km) southwest of An-yang. Under the First Five-Year Plan (1953–57) a branch railway line was built connecting the former local market town with T'ang-yin on the Peking–Han-k'ou railway. The area had long been known to have rich coal deposits, and the town has grown rapidly as a centre of coal mining. Pop. (mid-1970s est.) 100,000–300,000.

Ho Ryong, also called SOCH'I (Korean: Little Fool) (b. 1809, Korea—d. 1892, Korea), well-known Korean painter and calligrapher. Immensely popular in his time, Ho resisted the nationalizing tendency in Korean art, returning instead to the traditional Chinese academic style. His paintings of flowers and trees have special force and rhythm but are unrelated to their Korean subjects. His calligraphy, however, faithfully follows the native Korean *ch'usa* style.

Ho-shen, Pinyin HESHEN (b. 1750, China—d. Feb. 22, 1799, Peking), infamous Chinese courtier whose influence with the aged Ch'ien-lung emperor (reigned 1735–96) allowed him to monopolize major governmental posts and oppress the people.

At the age of 25, Ho-shen was an Imperial bodyguard. His handsome features, affable manner, and clever wit made a great impression on the 65-year-old emperor; within a year Ho-shen had assumed the highest ministerial positions in the empire and had gained control of the disbursement of revenue and the recruitment of personnel. His son was married to the Emperor's youngest and favourite daughter.

When the Pai-lien chiao (White Lotus Society) revolted in central and western China in 1796, Ho-shen was put in charge of suppressing the rebels. Together with several of his friends, he prolonged the campaign and channelled much of the money for the war effort into their own pockets. As a result, the troops took to looting the populace, and the authority of the dynasty was severely undermined.

With the death of the Ch'ien-lung emperor in 1799, Ho-shen was removed from power, capable generals were appointed, and, in 1804, after five more years of fighting, the rebellion was brought to an end. Ch'ien-lung's successor, the Chia-ch'ing emperor (reigned 1796–1820), had Ho-shen arrested and forced him to commit suicide. The official records, which may have been somewhat exaggerated by Ho-shen's enemies, claimed that the wealth confiscated from his estate included 60,000,000 ounces of silver, 75 pawnshops, 70,000 furs, and a gold service of 4,288 pieces.

Ho Sho: *see* Yosano Akiko.

Ho-t'ien, Pinyin HOTAN, conventional KHOTAN, oasis town in the southwest of the Sinkiang Uighur Autonomous Region (*tzu-chih-ch'ü*), China. Ho-t'ien forms a county (*hsien*) and is the administrative centre of the Ho-t'ien Prefecture (*ti-ch'ü*), which administers a string of counties based on the oases along the southern edge of the Takla Makan Desert.

The oasis of Ho-t'ien, the largest of these, includes Mo-yü (Kara Kash), to the northwest, and Lo-p'u, to the east. The oasis is watered by the K'a-la-k'a-shih Ho (Kara-kāsh River) and Yü-lung-k'a-shih Ho (Yürung-kash River), which flow from the high Kunlun Mountains to the south. They join in the north of the oasis to form the Ho-t'ien Ho (Khotan River), which discharges into the desert to the north. The rivers have their maximum flow during summer and are almost dry for much of the year.

Khotan first came into contact with China during the expeditions of the Later Han dynasty (AD 23–220) into Central Asia, which were led by the general Pan Ch'ao, who conquered Khotan for a while in AD 70. In these early centuries it was inhabited by an Aryan people known to the Chinese as the Vijaya, who spoke an Indo-European language and were much influenced by the culture of northern India and Afghanistan. Their kingdom represented an important post on the road from China to the west (via the Pamirs), and also to India. It was both a major commercial centre and one of the principal places through which Buddhism reached northern China. The Chinese again took Khotan when the expansionist policy of the T'ang dynasty (618–907) took Chinese armies into the Tarim Basin in the 630s. Disputed by the Tibetans from the south for a while, the T'ang government established the government general of Pi-sha (the Chinese transcription for Vijaya) there. This was destroyed at the time of the Chinese retreat from Central Asia after their defeat by the Arabs on the Talas River (now in the Soviet Union) in 752.

In the 10th century Khotan was conquered by the neighbouring state of Kashgar, part of the Uighur empire, and in the 12th century it was taken by the Hsi-hsia dynasty (Tangut peoples). In 1219 it was overrun by the Mongols. It was already famous in China in the 8th century for its fine fabrics and its sophistication, and when the Venetian traveller Marco Polo visited it in 1274 he noted its importance as a trading centre and its agricultural wealth, particularly its fine cotton. Restored to Chinese control in the mid-18th century, Khotan played a major part in the Muslim Rebellion against the Chinese beginning in 1862 and was one of the last places to be recaptured by Chinese forces in 1878.

The oasis is a long-established centre of carefully irrigated cultivation. Maize (corn), wheat, rice, and millet are the staple grains. Cotton is intensively grown, and the area produces much fruit, including mulberries. It has a well-established textile industry, producing silks and cotton fabrics. Local herds produce fine wool that is used for making carpets and felt goods. The area is a source for a limited amount of alluvial gold and is famous throughout the Far East as the major source of jade. It is also famous for its metalwork and jewelry. Pop. (mid-1970s est.) 10,000–50,000.

Ho Yen, Pinyin HE YAN (d. AD 249, Lo-yang, China), Chinese scholar who co-founded the philosophical movement *ch'ing-t'an* ("pure conversation"), in which groups of scholars used Taoist terms and concepts to give new

meanings to Confucian texts. They also utilized Confucian moral and social philosophy to politicize Taoist thought.

A child prodigy, Ho was taken at the age of seven into the house of a great general, Ts'ao Ts'ao, whose son, Ts'ao P'ei, founded the Wei dynasty (220–264) after his father's death and banished Ho from the palace. After Ts'ao P'ei's death, however, Ho returned to the court and became a high official.

Ho is best known for his scholarly works, especially his discussion of *wu,* or non-being. Ho considered *wu* to be beyond name and form, hence absolute and complete and capable of accomplishing anything. According to Ho, the true sage does not become a hermit in the typical Taoist tradition; but by careful practice of *wu-wei,* the avoidance of overbearing aggressive action, a man becomes capable of social and political achievements.

Hoa Binh, town, provincial seat of Ha Son Binh *tinh* (province), north central Vietnam, on the Black River (Song Da) about 45 mi (75 km) southwest of Hanoi. Located in a plateau region that forms the southwestern limits of the Red River (Song Hong) delta, it is a market centre for rice and forestry products. The Muong are the principal inhabitants of the region.

Hoa Hao, in full PHAT GIAO HOA HAO, nationalistic and xenophobic Vietnamese neo-Buddhist secret society formed in 1939 by the Buddhist reformer Huynh Phu So (*q.v.*). The Hoa Hao, along with the syncretic religious sect Cao Dai, was one of the first groups to initiate armed hostilities against the French and later the Japanese colonialists.

Based in the prosperous Mekong Delta area of southern Vietnam, where its adherents are primarily peasants, tenants, and rural workers, the Hoa Hao grew rapidly during the Japanese occupation in World War II. After the war, it continued to operate as an independent force in Vietnamese politics, opposing both the French colonialists and the Viet Minh nationalist movement of Ho Chi Minh. After 1954 the Hoa Hao and Cao Dai began armed opposition to the U.S.-backed government of Pres. Ngo Dinh Diem. At the time of Diem's death in 1963, the Hoa Hao had gained control of several of the southern and western provinces of South Vietnam. Though many Hoa Hao adherents joined the National Liberation Front in the late 1960s, the organization remained a powerful force in Vietnamese politics until the final victory of the Communists in 1975.

Hoad, Lew, byname of LEWIS ALAN HOAD (b. Nov. 23, 1934, Sydney), Australian tennis player who rose to prominence in the 1950s, winning 13 major singles and doubles titles.

With his rival and partner, Ken Rosewall, Hoad led Australia to win the Davis Cup in 1953 over the United States. The two were formidable in cup competition, and helped Australia regain the trophy in 1955 and 1956. As a doubles team, Hoad and Rosewall won the Wimbledon, French, Australian, and Italian titles in 1953. In 1956 Hoad defeated Rosewall in Wimbledon singles, and with his Australian and French titles, would have won the grand slam that year if Rosewall had not beaten him for the U.S. title.

In 1957 Hoad won the Wimbledon singles and shortly thereafter became a professional, joining Pancho Gonzales on tour. Hoad's style of play caused him back problems, however, which shortened his career in the 1960s. He returned briefly to tournament play in the early 1970s, but with little success.

Hoagland, Dennis Robert (b. April 2, 1884, Golden, Colo., U.S.—d. Sept. 5, 1949, Oakland, Calif.), distinguished U.S. plant physiologist and authority on plant and soil interactions.

Hoagland graduated with high honours from Stanford University (1907) with a major in chemistry. In 1908 he accepted a position as instructor and assistant in the Laboratory of Animal Nutrition at the University of California at Berkeley, an institution with which he would be associated for the remainder of his life. He worked in the field of animal nutrition and biochemistry until 1912, when he entered the graduate school in the department of agricultural chemistry at the University of Wisconsin, receiving his master's degree in 1913. The following year he became assistant professor of agricultural chemistry at Berkeley.

The American dependence on German sources of potash fertilizers was brought home by the interruption of commerce during World War I. In an attempt to find substitutes, Hoagland undertook a systematic study of the inorganic and organic compounds found in the giant kelps which are so abundant on the California coast. Although his findings were not very auspicious for a new source of fertilizer, he acquired a lifelong interest in the absorption and accumulation of ions by plants, a field which eventually won him world renown. The remarkable ability of kelps to absorb elements from seawater selectively and to accumulate potassium and iodide many times in excess of the concentrations found in seawater deeply impressed Hoagland. He developed scientific techniques for growing plants under rigidly controlled experimental conditions that would permit the identification and isolation of individual variables. His water-culture techniques for growing plants led him to develop a culture solution now universally known as Hoagland's solution.

Hoagland discovered that ion absorption is not a simple mechanical matter of permeability but is a metabolic process requiring the expenditure of energy. His work on mineral deficiencies in crop plants showed that several "diseases" of California crops were actually a manifestation of insufficient supplies of such elements as zinc. His early research on the effect of hydrogen-ion concentration (pH) on the growth of plants provided much useful information.

In recognition of his many discoveries, the American Society of Plant Physiologists elected him as president and awarded him the first Stephen Hales Prize (1930).

Hoang Hoa Tham (Vietnamese nationalist): *see* De Tham.

Hoang Lien Son, *tinh* (province) in northwestern Vietnam. It has an area of 5,734 sq mi (14,852 sq km) and was created in 1976 from the former provinces of Lao Cai and Yen Bai and from Nghia Lo province of the former Tay Back autonomous region. The mountainous province is bounded on the north by Yunnan Province, China. The Red River (Song Hong) and the Song (river) Chay flow from northwest to southeast through the province. The Haiphong railway to China runs along the Red River's left bank, passing Lao Cai, the provincial seat and strategically important border town near China. The high mountains, almost completely forested, rise to over 9,800 ft (3,000 m) in elevation.

Agricultural products include turnips, corn (maize), peppermint, tea, rice (particularly near Nghia Lo), melons, plums, peaches, sweet potatoes, beans, oranges, cinnamon, and mulberries. The government operates forestation and livestock-raising programs. There is an apatite mine in the province and a carbide factory at Lao Cai. About two-thirds of the population of the province belong to the Meo, Tay, Yao, Thai, and Muong ethnic groups. The town of Yen Bai in the southeast was the site of the Vietnamese uprising against the French colonial government in 1930. Chinese troops drove about 25 mi (40 km) into Hoang Lien Son province in 1979 before being repulsed. Pop. (1979) 778,217.

Hoang Lien Son (peak, Vietnam): *see* Fan Si Pan.

Hoar, Ebenezer R(ockwood) (b. Feb. 21, 1816, Concord, Mass., U.S.—d. Jan. 31, 1895, Concord), U.S. politician, leading antislavery Whig in Massachusetts and briefly attorney general in Pres. Ulysses S. Grant's administration.

Born into a distinguished New England family, Hoar was graduated from Harvard College (1835) and Harvard Law School (1839). His entry into private legal practice was followed by a rapid rise to prominence, and his outspoken opposition to slavery made him a leading public figure in his home state.

By the mid-1840s, Hoar was an antislavery Whig member of the state senate. It was there that he described himself as a "Conscience Whig," in contrast to the proslavery "Cotton Whigs." These designations were henceforth widely used, and Hoar became a recognized spokesman of the Conscience Whigs. As such, he opposed the Whigs' nomination of Zachary Taylor in 1848, and he was instrumental in the formation of the Free Soil and Republican parties in Massachusetts when the Whig Party declined.

Made a judge of the Court of Common Pleas in 1849, Hoar remained at that post until returning to private legal practice in 1855. In 1859 he became an associate justice of the Massachusetts Supreme Court, a position that he held until 1869, when President Grant appointed him U.S. attorney general. His tenure was brief, however. He alienated the Senate when he insisted that nine newly created federal judgeships be filled according to merit rather than through patronage. As a consequence, the Senate refused to confirm Hoar when Grant nominated him for a seat on the U.S. Supreme Court. In 1870 Hoar resigned from Grant's Cabinet.

After serving one term in the House of Representatives (1873–75), Hoar was defeated in his try for a Senate seat in 1876. Thereafter, he refused to run again for public office. He did, however, remain active in the Republican Party and was a delegate to several Republican national conventions.

Hoar, George Frisbie (b. Aug. 29, 1826, Concord, Mass., U.S.—d. Sept. 30, 1904, Worcester, Mass.), U.S. politician who was one of the leading organizers of the Republican Party and a lifelong crusader for good government.

Hoar was graduated from Harvard College (1846) and Harvard Law School (1849) and then went into private law practice in Worcester. His political life, which spanned more than half a century, began with his support of the Free Soil Party. During the 1850s he was busily organizing the Republican Party in Massachusetts while serving terms in both houses of the state legislature. He did not enter national politics until elected to the House of Representatives in 1869, but then he was in the House (1869–77) and the Senate (1877–1904) continuously for the rest of his life.

Hoar served on several important committees in both houses of Congress, and he was a member of the electoral commission selected to determine the winner of the Hayes–Tilden presidential contest in 1876. For many years he was chairman of the Senate Judiciary Committee, and he drafted the Presidential Succession Act of 1886.

Hoar fought for civil service reform, and he was an outspoken opponent of the American Protective Association—an anti-Catholic, anti-immigrant organization. He broke with his own party in protesting imperialistic U.S. policies toward the Philippines after the Spanish–American War, but he was so greatly ad-

mired for his honesty that he was decisively re-elected (1901–07).

Always interested in education and scholarship, Hoar served as an overseer of Harvard, trustee of the Worcester Polytechnic Institute and Clark University, regent of the Smithsonian Institution, and president of the American Antiquarian Society and the American Historical Association.

Hoare, Sir Samuel (John Gurney), 2ND BARONET, also called (from 1944) VISCOUNT TEMPLEWOOD OF CHELSEA (b. Feb. 24, 1880, London—d. May 7, 1959, London), British statesman who was a chief architect of the Government of India Act of 1935 and, as foreign secretary (1935), was criticized for his proposed settlement of Italian claims in Ethiopia (the Hoare–Laval Plan).

He was the elder son of Sir Samuel Hoare, whose baronetcy he inherited in 1915. He was educated at Harrow and New College, Oxford, and entered Parliament for Chelsea in 1910, retaining the constituency until 1944. During World War I Hoare was a military officer, serving in missions to Russia (1916–17) and Italy (1917–18). After the war, in 1922, he became air minister in Conservative governments, holding the post until 1929 (except for the brief Labour rule in 1924) and helping to build Britain's air force. From 1931 to 1935, as secretary of state for India, he had the immense task of developing and defending in debate the new Indian constitution. To this end, he is estimated to have answered 15,000 parliamentary questions, made 600 speeches, and read 25,000 pages of reports.

On June 7, 1935, he became foreign secretary and, after the outbreak of the Italo–Ethiopian War, developed with Pierre Laval of France the so-called Hoare–Laval Plan for the partition of Ethiopian land between Italy and Ethiopia (then called Abyssinia). The proposal drew immediate and widespread denunciation, forcing Hoare's resignation on Dec. 18, 1935.

Hoare came back into the government in June 1936 as first lord of the admiralty and then, in May 1937, under Neville Chamberlain, as home secretary. As one of the inner council that developed the Munich Pact, he became one of its staunchest defenders, further marking him as an appeaser, to the ultimate damage of his reputation. After war broke out and Churchill acceded to the prime ministry in 1940, Hoare's parliamentary service was at an end. During the war (1940–44) he served as ambassador to Spain. In 1944 he was created Viscount Templewood and shortly thereafter retired from public life.

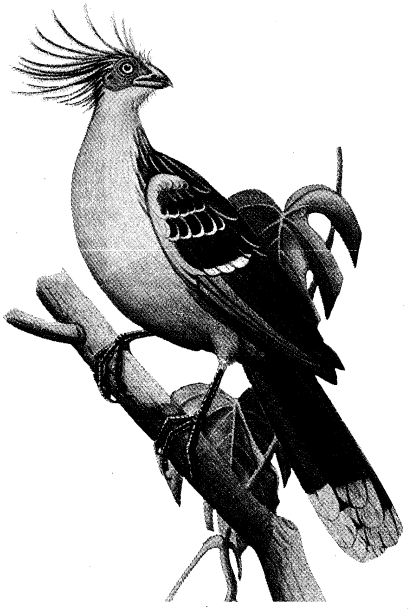
He authored several works, including *The Fourth Seal* (1930), *Ambassador on Special Mission* (1946), *The Unbroken Thread* (1949), *The Shadow of the Gallows* (1951), *Nine Troubled Years* (1954), and *Empire of the Air* (1957).

hoarfrost, deposit of ice crystals on objects exposed to the free air, such as grass blades, tree branches, or leaves. It is formed by direct condensation of water vapour to ice at temperatures below freezing and occurs when air is brought to its frost point by cooling. Hoarfrost is formed by a process analogous to that by which dew is formed on similar objects, except that, in the case of dew, the saturation point of the air mass is above freezing. The occurrence of temperatures below 0° C (32° F) is not enough to guarantee the formation of hoarfrost. Additionally, the air must be initially damp enough so that when cooled it reaches saturation, and any additional cooling will cause condensation to occur. In the absence of sufficient moisture, hoarfrost does not form, but the water in the tissues of plants may freeze, producing the condition known as black frost.

hoarhound (herb): *see* horehound.

hoary bat (*Lasiurus cinereus*), migratory North American bat, family Vespertilionidae, found in wooded areas from Canada to Mexico. It is about 13–14 centimetres (5–5½ inches) long, including a 5–6-cm tail, and weighs about 30 grams (1 ounce). Its thick, yellowish or reddish brown fur is tipped, or frosted, with silver. A strong-flying, solitary insect-eater, the hoary bat roosts in trees, where the colour of its fur blends with that of lichen-covered bark. A similar bat, possibly a race of *L. cinereus*, lives in the Hawaiian Islands.

hoatzin (*Opisthocomus hoazin*), primitive bird of hot swamps of South America, principally the Orinoco and Amazon basins. Although it was formerly placed in the Galliformes—the order that includes quails, grouse, pheasants, and peacocks—the hoatzin, based on evidence from studies of egg-white proteins, should be assigned to the subfamily Crotophaginae of the family Cuculidae (the cuckoos). The hoatzin is about 65 centimetres



Hoatzin (*Opisthocomus hoazin*)
Painting by Murrell Butler

(25½ inches) long, but weighs less than 1 kilogram (2 pounds). It has a long tail, plumage streaked brown above and yellowish below, a loose head crest, and bluish skin on the face. Sexes look alike. Adults can fly clumsily for short distances. Hoatzins feed on swamp plants, grinding leaves and buds in a greatly enlarged crop (not the gizzard, as in other birds).

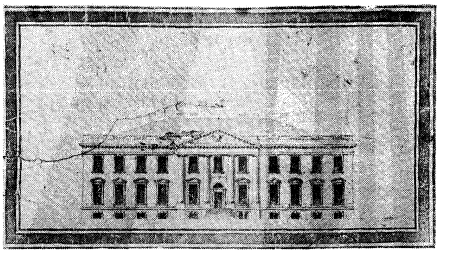
Hoatzins commonly form groups of three to six birds for promiscuous mating and cooperative parenthood. The nest—a tangle of twigs on a branch over water—contains two to five rather small, buffy, blue-spotted eggs. The young, which hatch in 28 days, bear two large claws at each wing bend that are used for clambering about in trees.

Hoatzins possibly go back to the upper Eocene Epoch (beginning about 54,000,000 years ago) of France, certainly to the upper Miocene (26,000,000 years ago) of Colombia.

Hobab (biblical priest): *see* Jethro.

Hoban, James (b. *c.* 1762, Callan, County Kilkenny, Ire.—d. Dec. 8, 1831, Washington, D.C.), U.S. architect who was the designer and builder of the White House in Washington, D.C. Hoban was trained in the Irish and English Georgian style and worked in this design tradition throughout his architectural career.

Hoban emigrated to the U.S. after the Revolutionary War, first settling in Philadelphia and then in South Carolina. There he designed the old state capitol building at Columbia (1791; burned in 1865), whose facade and portico were based on L'Enfant's proposed Federal Hall in New York City (1789)—a design that was widely published in the U.S. At George Washington's suggestion, Hoban went to the federal capital in 1792 and submitted a plan for the presidential mansion. He won the national competition and received the commission to build the White House as well as $500 and a lot in the District of Columbia. The cornerstone was laid in 1793, and work continued until 1801. Hoban also supervised the reconstruction of the building after it was destroyed in the War of 1812. The design for the White House was generally influenced by Leinster House in Dublin and the main facade by plate 51 in James Gibbs' *Book of Architecture* (London, 1728).



Drawing of the elevation of the White House by James Hoban, 1792; in the Maryland Historical Society, Baltimore
By courtesy of the Maryland Historical Society, Baltimore

From 1793 to 1802 Hoban was one of the superintendents in charge of the erection of the Capitol as designed by William Thornton. In Washington, D.C., Hoban also designed the Grand Hotel (1793–95), the Little Hotel (1795), and his last federal commission, the State and War Offices (1818).

Hobart, largest city, chief port, and capital of Tasmania, Australia. Located in the southeastern corner of the state on the west bank of the Derwent River estuary (2 mi [3 km] wide), 12 mi above its mouth, the city ranges along steep foothills with Mt. Wellington (4,167 ft [1,270 m]), often snow-covered, in the near background. Hobart is Australia's most southerly city. The British navigator George Bass explored the estuary in 1798 and was much impressed with the setting. Five years later, Philip Gidley King, governor of New South Wales, in an attempt to prevent French incursions into districts not yet under direct British control, dispatched a lieutenant to establish a settlement at Risdon Cove on the Derwent. It was named Hobart Town after Robert Hobart, 4th earl of Buckinghamshire, then secretary of state for the colonies. In 1804 the settlement was moved to the city's present site, Sullivan Cove. By the mid-19th century the community had become a major port for ships whaling in the southern oceans, but its development was being arrested by the limited resources that the Tasmanian island offered in comparison to the mainland. It was gazetted a city in 1842 and a municipality in 1852. The municipality became part of the city in 1857.

Hobart has an excellent deepwater port unhampered by tidal changes; this, coupled with rail lines (freight only) to the north and northwest, the junction of the Channel, Midland, Huon, and Tasman highways, and an airport, makes it a focus of communications and trade. Local industries include an electrolytic zinc refinery at Risdon, a calcium-carbide plant at Electrona (south), copper and newsprint

mills, and textile, confectionery, tool, furniture, fruit-processing, motor-body, and paint plants.

The city has Anglican and Roman Catholic cathedrals and the first Jewish synagogue in Australia (1843–45). It is the site of the University of Tasmania (1890), several other colleges, Parliament House (1834), and the state library, museum, and art gallery. Nearby recreation areas include Wrest Point Casino (the first legal casino in Australia), Mt. Wellington, the Nelson Range (southwest), and the beach resort of Bellerive. Suburbs have spread up the west shore of the estuary and also to the east shore, to which the city is linked by the Tasman Bridge (1965) and the Bowen Bridge (1984). Pop. (1981) 128,603.

Hobart, city, Lake County, northwestern Indiana, U.S., adjacent to Gary. George Earle laid out the site in 1849, built a dam across the Deep River to provide waterpower for his grist mill, and named the community for his brother Hobart. The dam created Lake George, now a recreation area near the centre of the city. Hobart is part of the East Chicago–Gary industrial complex and is the trading centre for a farming and dairying area. Indiana Dunes State Park and National Lakeshore are nearby. Inc. town, 1889; city, 1921. Pop. (1980) 22,987.

Hobart, Garret A(ugustus) (b. June 3, 1844, Long Branch, N.J., U.S.—d. Nov. 21, 1899, Paterson, N.J.), prominent politician who was vice president of the United States (1897–99) in the conservative Republican administration of Pres. William McKinley.

Garret A. Hobart, 1896

By courtesy of the Library of Congress, Washington, D.C.

Admitted to the New Jersey bar in 1869, Hobart began practice in Paterson and soon won a wide reputation in business and legal circles. His political career began with a term in the state assembly (1873–75). Later he was a state senator (1877–82) and president of that body the last two years. He was chairman of the state Republican committee (1880–91) and became a member of the Republican National Committee in 1884.

When McKinley was nominated for president in 1896 on a platform stressing hard money and a high tariff, Hobart was a natural choice for second place on the ticket; he came from a densely populated state and was an avid supporter of the gold standard. His one important act as vice president was to cast the tie-breaking vote in 1899 against an amendment to the treaty with Spain that would have promised future independence for the Philippine Islands.

Hobart, John Henry (b. Sept. 14, 1775, Philadelphia—d. Sept. 12, 1830, Auburn, N.Y., U.S.), U.S. educator, publisher, author, and bishop of the Protestant Episcopal Church whose emphasis upon the discipline of orthodoxy during the inchoate post-Revolutionary period in American history—when all things English were suspect—helped Anglicanism to expand in a new nation without compromising its traditions.

In 1806 in New York City Hobart founded the Protestant Episcopal Theological Society (later the General Theological Seminary), where in 1821 he became professor of pastoral theology and homiletics. Renowned as a preacher, he opposed free thought and liberalism in favour of more orthodox religious and social attitudes. He stressed "Evangelical Truth and Apostolic Order," strictly observing the Episcopal belief that authority and doctrine should be rooted in apostolic times.

Hobart wrote numerous manuals and founded the Protestant Episcopal Tract Society in 1810 and the Protestant Episcopal Press in 1817. Ordained as a priest in 1801, he was chosen assistant bishop of the diocese of New York in 1811 and became bishop in 1816. The same year he also became rector of Trinity Church, New York City. Hobart's attitudes, which helped give shape to the growing church in the early years of the United States, were expounded in his *Collection of Essays on the Subject of Episcopacy* (1806) and *An Apology for Apostolic Order and Its Advocates* (1807). In 1862 Geneva College, Geneva, N.Y., changed its name to Hobart College to memorialize the support he gave as bishop to its founding in 1822.

Hobart Paşa, in full AUGUSTUS CHARLES HOBART-HAMPDEN (b. April 1, 1822, Leicestershire, England—d. June 19, 1886, Milan), English naval captain and adventurer who commanded the Ottoman squadron in the Russo-Turkish War of 1877–78.

He served in the British Navy until 1863, when he retired with the rank of captain. During the U.S. Civil War (1861–65), he took command of a Confederate blockade runner, conveying war materials to Charleston, S.C., and returning with cargoes of cotton. Hobart entered Ottoman service about 1867 and was immediately nominated to the command of the fleet. He helped to suppress the Greek insurrection in Crete and was rewarded by the sultan with the title of paşa. In the Russo-Turkish War, his fleet completely dominated the Black Sea. Appointed *müşir* (marshal) in 1881, he was the first Christian to hold that office.

Hobbema, Meindert, also spelled MEYNDERT HOBBEMA, original name MEYNDERT LUBBERTSZ(OON) (baptized Oct. 31, 1638, Amsterdam—d. Dec. 7, 1709, Amsterdam), Dutch painter, one of the most important Baroque landscapists of the Dutch school.

He lived all his life in Amsterdam, adopting the surname of Hobbema as a young man.

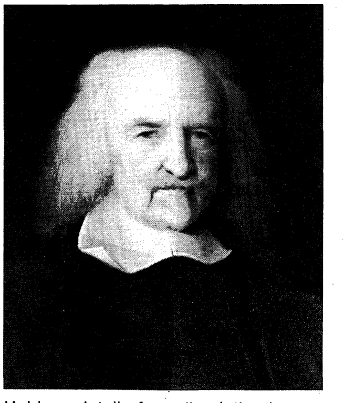
"The Avenue, Middelharnis," oil on canvas by Meindert Hobbema, 1689; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London; photograph, J.R. Freeman & Co. Ltd.

He was a friend and pupil of Jacob van Ruisdael. The two made sketching tours together and often painted the same views. In November 1668 Hobbema married the cook of the burgomaster of Amsterdam and through her influence obtained a minor municipal appointment checking weights and measures of imported wines. It was at one time thought that the acceptance of this post marked the end of Hobbema's artistic career. The position does seem to have reduced his activity as a painter, but the substantiation of a date of 1689 for his masterpiece "The Avenue, Middelharnis" (National Gallery, London) and the discovery of a date of 1671 after the cleaning of "The Ruins of Brederode Castle" (National Gallery, London) show that there was a development to greater maturity in his later works. Although popular and influential after his death, particularly among 18th- and 19th-century English collectors and painters, Hobbema had little success in his lifetime and was buried a pauper. In the 20th century, he was generally regarded as second only to Ruisdael in importance among Dutch landscapists.

Unlike Ruisdael, who liked to paint landscapes in all their wild splendour, Hobbema preferred quiet rural scenes of sun-dappled countryside, thickly studded with trees, and with scattered rustic buildings. A peaceful stream with a water mill may enliven the scene, as in "The Water Mill" (*c.* 1665; Wallace Collection, London). His idyllic landscapes are carefully composed and feature meticulous renderings of twisted foliage and gentle terrain. Hobbema softened Ruisdael's dramatic conception of landscape but retained a certain inventive grandeur in his views of the Dutch countryside.

Hobbes, Thomas (b. April 5, 1588, Westport, Wiltshire, Eng.—d. Dec. 4, 1679, Hardwick Hall, Derbyshire), English philosopher and political theorist, best known for his publications on individual security and the social contract, which are important statements of both the nascent ideas of liberalism and the longstanding assumptions of political absolutism characteristic of the times.



Hobbes, detail of an oil painting by John Michael Wright, in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Early life. Hobbes's father, a vicar, was "a choleric man," and he disappeared after engaging in a brawl at his own church door and abandoned his three children to the care of his brother, a well-to-do glover in Malmesbury. When he was four years old Hobbes was sent to school at Westport, then to a private school, and finally, at 15, to Magdalen Hall, Oxford, where he devoted most of his time to books of travel and the study of maps. Upon his graduation in 1608, Hobbes became a private tutor to William Cavendish, afterward 2nd earl of Devonshire, and so began a lifelong connection with the Cavendish family. He grew very fond of his pupil, who was only a little younger than himself. In 1610 Hobbes visited France and Italy with his pupil. There he probably found that the Aristotelian philosophy that he had been taught at Oxford was beginning to crumble before the discoveries of Galileo and of Johann Kepler, who formulated the laws of planetary motion. On

returning home he decided to make himself a classical scholar. The chief fruit of Hobbes's classical studies was his translation of Thucydides. Its publication in 1629 was inspired by the troubles of the time, for Hobbes saw in the fate of ancient Athens a salutary warning against democracy. It was also in that year that Hobbes went abroad again, as travelling companion to the son of Sir Gervase Clifton.

The Elements. The turning point in his intellectual history occurred at about this time, when, in Euclid's *Elements,* he traced the proofs back through proposition after proposition and was thus demonstratively convinced of their truth.

In 1630 Hobbes was recalled from Paris to teach the young earl of Devonshire, William Cavendish, son of his late patron. Hobbes himself related how he was in a gathering of learned men when the question was asked, "What is sense?" No one appeared to know the answer, but it occurred to Hobbes that, if material things and all of their parts were always at rest or in uniform motion, there could be no distinction of anything and consequently no perception; thus, the cause of all things must lie in diversity of motion. He was therefore driven to geometry to gain insight into the principles of motion. Hobbes laid out these ideas in his first known philosophical work, *A Short Tract on First Principles.*

During a third trip abroad, this time with the younger Cavendish, Hobbes's interest in science and philosophy was stimulated by his contact with the leaders of the new thought in Europe. He became obsessed with the idea of motion. He decided that the basic reality is matter in motion, and he aimed to deduce from this fact, by strict demonstrative arguments (as in geometry), the nature of everything else. He was able to discuss his ideas in Paris with the circle of Marin Mersenne and, in 1636, with Galileo. He then planned a philosophical trilogy: *De Corpore* (1655; "Concerning Body") was to show that physical phenomena are explicable in terms of motion; *De Homine* (1658; "Concerning Man") was to show what specific bodily motions are involved in human cognition and appetition; and *De Cive* (1642; "Concerning Citizenship") was to deduce from what had already been established the proper organization of men in society.

In 1637 Hobbes returned to England to find the country in the political ferment that preceded the Civil War, and he decided because of this threat to publish the last part of his planned philosophy first. He set out to prove that the royal powers and rights called in question were inseparably annexed to sovereignty, which at that time was admitted to reside in the king. *The Elements of Law, Natural and Politic,* part I on man and part II on citizenship, was circulated in manuscript in 1640. It already embodied Hobbes's characteristic doctrine that men can only live together in peace if they agree to subject themselves to an absolute and undivided sovereign, and it contained most of the political and psychological doctrines for which Hobbes is famous and which reappeared in *De Cive* and *Leviathan.* It differed from his *Leviathan,* however, by stressing that primary democracy is the first form of commonwealth by institution, monarchy and aristocracy arising when the democratic sovereign created by the social contract between individuals annihilates itself by transferring its power absolutely to one man or to a few. Unfortunately, Hobbes antagonized both parties in the current constitutional struggle.

Exile in Paris. When strife became acute in 1640, Hobbes feared for his safety and retired to Paris. He was soon in contact with later fugitives from England. He rejoined the Mersenne circle, wrote "objections" to the *Meditationes* and the *Dioptrique* of Descartes, and in 1642 published *De Cive,* which expanded the argument of the second part of *The Elements of Law* and concluded with a section on religion that dealt more fully with the relation between church and state. A Christian church and a Christian state, he held, were one and the same body; of that body, the sovereign was the head; he therefore had the right to interpret Scripture, decide religious disputes, and determine the form of public worship. Hobbes spent the next four years working on optics and on *De Corpore.* In 1646 the young prince of Wales, later to become Charles II, sought refuge in Paris, and Hobbes accepted an invitation to instruct him in mathematics. Contact with exiles from England made it increasingly difficult to concentrate on natural philosophy, and he turned once more to political theory. In 1647 he published a second, augmented edition of *De Cive* and, in 1651, an English version. In 1650 the manuscript of *The Elements of Law* was published in two parts, as *Human Nature* and *De Corpore Politico* ("Of the Body Politic").

Leviathan. Hobbes's masterpiece, however, was the *Leviathan, or the Matter, Form, and Power of a Commonwealth, Ecclesiastical and Civil* (1651). In the first two parts, "Of Man" and "Of Commonwealth," he reworked the ground already covered in the earlier treatises; in the last two, "Of a Christian Commonwealth" and "Of the Kingdom of Darkness," he embarked upon a discussion of Scripture and made a vigorous attack on the attempts of papists and Presbyterians to challenge the right of the sovereign. Hobbes's reputation as a thinker rests mainly on his contributions to the philosophy of man, in which he propounded an influential egoistic psychology. In moral theory he is generally regarded as a pioneer of the Utilitarian school. He justified obedience to moral rules on a purely secular basis, as the means to "peaceable, social, and comfortable living." Yet he also said that the laws of nature were God's commands.

In his political theory Hobbes first analyzed the conditions necessary for peace and security and then, in his version of the social contract, provided a recipe for constructing an ideal state in which these conditions could be satisfied. His fundamental concept was natural right rather than natural law. It is essentially a right to self-preservation. No man is obliged to act in accordance with the law of nature if he thinks such conduct inimical to his own security. Yet peace cannot be achieved unless the law of nature is generally observed. Hobbes's solution was to give everyone a guarantee of the good behaviour of his fellows by creating a power sufficient to keep them in awe. This power will be created if each individual promises every other individual that he will carry out whatever commands some selected person (or an assembly) shall consider necessary for the peace and defense of all. A sovereign so established may survive even if all the subjects desire to depose it. The sovereign's right will be as absolute as its power; it is responsible only to God. It cannot be unjust to its subjects, since these have authorized its actions. Nor is it bound by any covenant with the people.

By 1651 Charles I was dead and the Royalist cause seemed hopelessly lost; accordingly, at the end of *Leviathan,* Hobbes attempted to define the circumstances under which submission to a new sovereign became legitimate. He had always maintained that a subject had the right to abandon a ruler who could no longer protect him and to transfer his allegiance to one who could; but the statement of this view in *Leviathan* gave serious offense to Prince Charles's advisers, who concluded that Hobbes was trying to curry favour with the new regime in England in order to facilitate his own return. Barred from the exiled court and under suspicion by the French authorities for his attack on the papacy, Hobbes thus found his position in Paris becoming daily more intolerable. At the end of 1651, he returned to England and made his peace with the new regime.

Controversies. Though Hobbes was now 63 years of age, he was to retain his vigour for another quarter of a century. Hobbes had made enemies at Oxford by the publication of *Leviathan,* which attacked the university system as having supported the pope and as still working social mischief by adherence to the old learning. Oxford was therefore quick to avail itself of the opportunities for criticism offered by *De Corpore,* which was published at last in 1655.

Hobbes had been so impressed by Galileo's achievements in mechanics that he sought to explain all phenomena and, indeed, sense itself in terms of the motion of bodies. Thus his a priori mathematical approach to natural philosophy separated him decisively from Bacon, who had advocated an experimental–inductive method. Hobbes's main antagonists, opposed to such a mechanistic metaphysics, were Seth Ward, professor of astronomy, and John Wallis, author of the great treatise *Arithmetica Infinitorum,* both of them much abler mathematicians than Hobbes. He replied to their attacks in *Six Lessons to the Professors of Mathematics in the University of Oxford* (1656). In the spring of 1660 Hobbes published an onslaught on the newfangled methods of mathematical analysis in six dialogues. In *Dialogus Physicus, sive de Natura Aeris* (1661; "Dialogue on Physics, or on the Nature of Air") he fulminated against Robert Boyle and other friends of Wallis, who were then forming what became (in 1660) the Royal Society, dedicated to experimental research, in opposition to the deductive method of *De Corpore.* Wallis retorted in a scathing and devastating satire, accusing Hobbes, quite unjustly, of having written *Leviathan* in support of the Puritan leader Oliver Cromwell's title and of having deserted his royal master in distress. Hobbes answered these charges in a letter to Wallis, published under the title *Mr. Hobbes Considered in His Loyalty, Religion, Reputation, and Manners* (1662). In this piece, which is of great biographical value, he told his own and Wallis' "little stories during the . . . rebellion" so effectively that Wallis attempted no reply.

After a time Hobbes began a third period of controversial activity, which did not end on his side until his 90th year. His *De Principiis et Ratiocinatione Geometrarum* (1666) was designed to humble the professors of geometry by showing that their works contained much uncertainty and error. *Quadratura Circuli, Cubatio Sphaerae, Duplicatio Cubi* (1669; "The Squaring of the Circle, The Cubing of the Sphere, The Doubling of the Cube") gave Hobbes's solutions to these famous problems—solutions promptly refuted by Wallis. In 1678 appeared his last piece of all, *Decameron Physiologicum* ("Ten Questions of Physiology"), a new set of dialogues on physiological questions.

The Restoration. Meanwhile, from the time of the Restoration in 1660, Hobbes enjoyed a new prominence. Charles II, whom he had tutored in mathematics, received Hobbes again into favour. Though Hobbes's presence at court scandalized the bishops and the Chancellor, the King relished his wit. He even granted Hobbes a pension of £100 a year and had his portrait hung in the royal closet. It was not until 1666, when the House of Commons prepared a bill against atheism and profaneness, that Hobbes felt seriously endangered; for the committee to which the bill was referred was instructed to investigate *Leviathan.* Hobbes, then verging upon 80, burned such of his papers as he thought might compromise him and set himself to inquire into the state of the law of heresy.

The results of his investigations appeared in three short dialogues and in a tract entitled *An Historical Narration Concerning Heresy and the Punishment Thereof* (1680), in which he maintained that since the abolition of the high court of commission there was no court of heresy to which he was amenable and that, in any case, nothing was to be declared heresy but what was at variance with the Nicene Creed. Although Parliament dropped the bill on atheism, Hobbes could never afterward get permission to print anything on subjects relating to human conduct, the King apparently having made it the price of his protection that no fresh provocation should be offered to popular sentiment.

Last years and historical influence. Though he was impugned by enemies at home, no Englishman of the day stood in such high repute abroad as Hobbes, and distinguished foreigners who visited England were always eager to pay their respects to the old man, whose vigour and freshness of intellect remained unquenched. In his last years Hobbes amused himself by returning to the classical studies of his youth. The autobiography in Latin verse with its playful humour, occasional pathos, and sublime self-complacency was brought forth at the age of 84. In 1675 he produced a translation of the *Odyssey* in rugged English rhymes, with a lively preface, "Concerning the Virtues of an Heroic Poem." A translation of the *Iliad* appeared in the following year. As late as four months before his death, he was promising his publisher "somewhat to print in English."

Hobbes was not only the architect of a grand metaphysical design, but he was also a critical philosopher with a lively interest in language and a keen eye for its snares. Indeed, his account of the sources of absurdity, which provided him with a potent weapon against the Scholastics, gives him some title to be regarded as a forerunner of modern logical analysis, and over the years he has gradually been accorded recognition as one of the greatest English political thinkers.

MAJOR WORKS. *Human Nature; or, The Fundamental Elements of Policie* (1650); *De Corpore Politico; or, The Elements of Law, Moral and Politick* (1650); *Leviathan; or the Matter, Forme, and Power of a Commonwealth, Ecclesiasticall and Civil* (1651); *The Questions Concerning Liberty, Necessity, and Chance* (1656).

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Hobbs, city, Lea County, southeastern New Mexico, U.S., in the High Plains, near the Texas line. Founded by James Isaac Hobbs in 1907, it became a boomtown after the discovery of oil and gas in 1928. It expanded from a settlement of 598 (1930 census) to become the state's petroleum centre with a population exceeding 25,000. Hobbs serves as a supply, shipping, and trading point for the oil-drilling industry and for the surrounding ranch and artesian-irrigated farmlands. Potash deposits (40 mi [65 km] west-southwest) also contribute to the economy. Hobbs is the seat of the College of the Southwest (1957) and New Mexico Junior College (1965). The Confederate Air Force Flying Museum is 3 mi west. Inc. 1929. Pop. (1980) 28,794.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Hobbs, Sir John Berry, byname JACK HOBBS (b. Dec. 16, 1882, Cambridge, Eng.—d. Dec. 21, 1963, Hove, Sussex), English athlete who was the world's greatest cricket batsman of his time.

Hobbs began his first-class career for Surrey in 1905 and in his second game he scored the first of his 197 centuries (100 runs in a single innings). During 30 years as a professional he played for the all-England team in 61 international (Test) matches and scored a record 61,237 runs. Perhaps his greatest innings at the Oval (London cricket ground) was against Australia in 1926, when he made 100 to help recover the international trophy known as the Ashes. He retired in 1934, and in 1953 he became the first professional English cricketer to be knighted.

hobby, any of certain birds of prey of the genus *Falco* (primarily *F. subbuteo*) intermediate in size and strength between the merlin and the peregrine. *F. subbuteo* is about 33 centimetres (13 inches) long, dark bluish brown above and white below with dark streaking and reddish leg feathering. It breeds in Europe, northwestern Africa, the Middle East except Arabia, and all of sub-Arctic and temperate Asia. It inhabits open country near woodlands, where it captures small birds and large insects. Similar species are the African hobby (*F. cuvierii*), the sooty falcon (*F. concolor*) of eastern Africa, and the Oriental hobby (*F. severus*) of southeastern Asia and the South Pacific.

Hobby, Oveta Culp (b. Jan. 19, 1905, Killeen, Texas, U.S.), U.S. editor and publisher of the *Houston Post* (1952–53), first director of the U.S. Women's Army Corps (1942–45), and first secretary of the Department of Health, Education, and Welfare (1953–55).

A graduate of the University of Texas Law School, she served as parliamentarian of the Texas House of Representatives (1925–31), and in 1930 became assistant to the city attorney of Houston. In 1931 she was married to William Pettus Hobby, a former governor of Texas (1917–21) and publisher of the *Houston Post.* She went to work for the newspaper and by 1938 was executive vice president. In 1941 Hobby was appointed to the $1-a-year position of head of the women's division of the War Department's Bureau of Public Relations, and in 1942 she was chosen to head the newly created Women's Auxiliary Army Corps; she continued in command with the rank of colonel when the Women's Army Corps (WAC) received full army status in 1943. By 1945 the WAC had grown to a force of 100,000, and Hobby resigned her commission to return to the *Houston Post.* In 1953 she took office as administrator of the Federal Security Agency; the agency was reorganized later that year as the Department of Health, Education, and Welfare headed by a secretary with Cabinet rank, and Hobby thus became the second women to hold a U.S. Cabinet position. She resigned that post in 1955 and returned to the *Houston Post,* becoming chairman of the board in 1965.

Hobgoblin, in medieval English folklore, a mischievous fairy also called Puck (*q.v.*).

Hobhouse, Emily (b. April 9, 1860, near Liskeard, Cornwall, Eng.—d. June 8, 1926, London), English reformer and social worker whose humanitarian undertakings in South Africa caused her to be dubbed the "Angel of Love" by grateful Boer women.

Hobhouse spent the first sheltered 35 years of her life at her father's rectory. Upon his death, she engaged in temperance work in the United States. At the outbreak of the South African War in 1899, she became an outspoken critic of British policy. And when she learned of the high mortality rate of Boer women and children in British concentration camps, she went to South Africa (December 1900) to discover the facts for herself. Her investigations led to a storm of indignation in England. An amelioration of conditions soon followed. A second visit (October 1901) led to her deportation. Nonetheless, Hobhouse returned in 1903 and spent the next five years shaping the education of women and girls in the Orange Free State.

During World War I she took up further relief work with the destitute and war-ravaged peoples of central Europe, continuing her work after the war until ill health forced her to retire. After her death in London, her cremated remains were interred at the foot of the Women and Children's Memorial in Bloemfontein.

Hobhouse, Sir John Cam: *see* Broughton (de Gyfford), John Cam Hobhouse, Baron.

Hobhouse, L(eonard) T(relawny) (b. Sept. 8, 1864, St. Ives, Cornwall, Eng.—d. June 21, 1929, Alençon, Fr.), English sociologist and philosopher who tried to reconcile liberalism with collectivism in the interest of social progress. In elaborating his conception of sociology, he drew on his knowledge of several other fields: philosophy, psychology, biology, anthropology, and the history of religion, ethics, and law. Interested in the process of social change, Hobhouse tried to correlate such change with its contribution to the general advance of the community; he also studied the history of knowledge, morals, and religions in relation to social change.

Hobhouse taught at Oxford (1887–97) and at the University of London (1907–29), served as secretary of the Free Trade Union (1903–05), and arbitrated several labour disputes. He also wrote for the *Manchester Guardian* and was political editor of the *Tribune* (1905–07). Questioning the social theories most frequently advocated in England in his time, he rejected the idea of laissez-faire, because he believed that a certain degree of universal cooperation is necessary to the fulfillment of the potentialities of individual men, and disapproved of Fabian socialism, because it fostered a kind of cooperation that might lead to a mere bureaucracy, hindering progress.

Among Hobhouse's works are *The Theory of Knowledge* (1896), *Development and Purpose* (1913), intended as a full statement of his philosophy, and four books collectively entitled *The Principles of Sociology.* They are *The Metaphysical Theory of the State* (1918), *The Rational Good* (1921), *The Elements of Social Justice* (1922), and *Social Development* (1924).

Hoboken, city, Hudson County, northeastern New Jersey, U.S., adjoining Jersey City and Union City, on the Hudson River opposite Manhattan Island, with which it is connected by train, ferry, highway, tunnel, and subway. In 1630 the Dutch purchased the site from the Lenni Lenape Indians, who smoked carved stone pipes, and named it Hobocan from the Indian term Hobocan Hackingh (Land of the Tobacco Pipe). The first brewery in America (1642) was built there, and beer was later

brewed in great quantities by German immigrants, who dominated Hoboken culturally after the mid-19th century. In 1784, John Stevens, builder of the first U.S. steam locomotive (1825), for whom the Stevens Institute of Technology (established 1870) is named, bought the site and laid out the town more formally.

During World War I, Hoboken was a major port of embarkation for U.S. troops leaving for Europe. In 1952 the Port of New York Authority leased the port of Hoboken for operation as part of the Port of New York. Hoboken's highly diversified industries include food processing, shipbuilding, and the manufacture of clothing, pencils, furniture, machinery, and precision instruments. Inc. 1855. Pop. (1987 est.) 41,934.

Hobrecht, Jakob: *see* Obrecht, Jakob.

Hobson, Laura Z(ametkin), original name LAURA KEAN ZAMETKIN (b. June 18/19, 1900, New York City—d. Feb. 28, 1986, New York City), American novelist and short-story writer noted for her novel *Gentleman's Agreement* (1947), a best-selling study of anti-Semitism.

The daughter of Jewish socialist parents, she was educated at Cornell University, Ithaca, N.Y., and married Thayer Hobson in 1930. The marriage ended in divorce in 1935. In the early 1930s she began writing advertising copy and short stories, and in 1934 she joined the promotional staff of the Luce publications (*Time*, *Life*, and *Fortune* magazines). After 1940 she devoted herself entirely to writing, producing a total of nine novels and hundreds of short stories and magazine articles. Hobson is best-known for *Gentleman's Agreement,* the story of an American gentile journalist who poses as a Jew in order to gain a firsthand experience of anti-Semitism in American life. The book is a scathing depiction of the subtle and insidious manifestations of anti-Semitism in American society at that time. *Gentleman's Agreement* was made into an Academy Award-winning motion picture in 1947. Hobson's other novels include *The Trespassers* (1943) and *Consenting Adult* (1975).

Hoby, Sir Thomas (b. 1530—d. July 13, 1566, Paris), English diplomat and translator of Baldassare Castiglione's *Il Libro del cortegiano;* his translation was entitled *The Courtyer of Count Baldesser Castilio* (1561).

Educated at Cambridge and Strasbourg, Hoby traveled extensively on the European continent. By 1552 Hoby was at work on his translation of *Il cortegiano.* The influence of Hoby's translation in England was enormous, not only on the social pattern of life at court but on such writers as Shakespeare and Sir Philip Sidney. Hoby's other works include a translation of a Latin work on the Church of England and an autobiography. He was knighted by Elizabeth I in 1566 and sent to Paris as English ambassador. He died that same year.

Hoccleve, Thomas, Hoccleve also spelled OCCLEVE (b. 1368/69, London—d. *c.* 1450?, Southwick, Eng.), English poet, contemporary and imitator of Chaucer, whose work has little literary merit but much value as social history.

What little is known of Hoccleve's life must be gathered mainly from his works. At age 18 or 19 he obtained a clerkship in the privy seal office in London, which he retained intermittently for about 35 years. His earliest dated poem, a translation of Christine de Pisan's *L'Épistre au dieu d'amours,* appeared in 1402 as "The Letter of Cupid." His poem *La Mâle Règle* (1406; "The Male Regimen") presents a vivid picture of the delights of a bachelor's evening amusements in the taverns and cookshops of Westminster. Hoccleve married in about 1411.

Hoccleve, detail of an illumination from the manuscript of *De regimine principum,* early 15th century; in the British Library (MS. Royal 17 D VI)

By courtesy of the trustees of the British Library

In 1411 he produced *The Regement of Princes,* or *De regimine principum,* culled from a 13th-century work of the same name, for Henry, Prince of Wales. A tedious homily, it contains a touching accolade to Chaucer, whose portrait Hoccleve had painted on the manuscript to ensure that his appearance would not be forgotten. In his later years Hoccleve turned from the ballads addressed to his many patrons to serious religious verse and to recording the ills of the day in a literal-minded manner that presents a clear picture of the time. His most interesting work, *La Mâle Règle,* contains some realistic descriptions of London life.

Hoceima, al- (enclave, Morocco): *see* Alhucemas.

Hoceima, al-, Spanish ALHUCEMAS, city, northern Morocco. The city, founded by Spaniards in 1926 as Villa Sanjurjo, still has a large Spanish population. Situated on al-Hoceima Bay, it is a small fishing port, food-processing centre, and beach resort opposite the *plaza* (Spanish enclave of North Africa) of Alhucemas. It is connected by road with Nador and Tétouan. Pop. (1982) mun., 41,662.

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Hoche, (Louis-) Lazare (b. June 24, 1768, Versailles, Fr.—d. Sept. 18, 1797, Wetzlar, Nassau [Germany]), general of the French Revolutionary Wars who drove the Austro-Prussian armies from Alsace in 1793 and suppressed the counterrevolutionary uprising in the Vendée (1794–96).

The son of a royal stableman, Hoche enlisted in the French guards in 1784. He remained in the guards after the outbreak of the revolution in 1789, and in September 1792 he was made a captain. By that time France was at war with Austria and Prussia. Hoche distinguished himself in the invasion of the Austrian Netherlands (winter of 1792–93), and in October 1793 he was appointed commander of the army of the Moselle. The handsome, dashing Hoche proved to be a brilliant general. After raising the siege of Landau (now in Germany) in late December 1793, he secured Alsace by forcing the Austro-Prussian armies to pull back across the Rhine. Nevertheless, he was denounced to the Committee of Public Safety as a traitor by his colleague and rival, General Charles Pichegru. Hoche was arrested in March 1794 and imprisoned in Paris until shortly after the collapse of the Jacobin regime in late July.

Appointed commander of the army of Brest in November 1794, Hoche set out to subdue the royalist-led Roman Catholic peasants who had been in continual rebellion in the Vendée since 1793. By adopting a conciliatory policy, he brought the fighting to an end in February 1795, but in June British ships landed French émigrés (nobles in exile) at Quiberon Bay in Brittany. Hoche quickly rounded up the invaders, and by July 1796 he had completed the pacification of the Vendée.

Hoche's military triumphs and the extent of the area under his command made him one of the most powerful men in France. He took command of an army of the Rhine in January 1797 and defeated the Austrians at Neuwied (now in Germany) on April 18, thereby ending the war in Germany. Early in September a portion of Hoche's army helped the forces of Napoleon Bonaparte expel the royalists from the government of the Directory in Paris. Soon thereafter Hoche died, perhaps of pneumonia, at his military headquarters. Had he lived longer he would almost certainly have been drawn into a power struggle with Bonaparte, who seized control of the government in 1799.

Hoche, etching, after a portrait by J. Duplessi-Bertaux

By courtesy of the Bibliotheque Nationale, Paris

hocket, also spelled HOQUET, HOQUETUS, HOKET, HOCQUET, or OCHETUS, in medieval polyphonic (multipart) music, the device of alternating between parts, single notes, or groups of notes. The result is a more or less continuous flow with one voice resting while the other voice sounds.

The hocket was a popular device in the motet and the cantilena (vernacular polyphonic songs) forms of the 13th and 14th centuries. It appears rarely in the early 15th century. Although hocket technique generally is found in short passages (often at the endings of sections or phrases) within a larger composition, it is used pervasively in the 14th-century French composer Guillaume de Machaut's "David," in which the two upper voices sing in hocket above a slower moving tenor.

More recently the term has been applied to instrumental textures, for example in works by Anton Webern, characterized by rapid, often single-note, exchanges between different parts.

hockey, field (game): *see* field hockey.

hockey, ice (game): *see* ice hockey.

Hockney, David (b. July 9, 1937, Bradford, Yorkshire, Eng.), English painter, draftsman, printmaker, photographer, and stage designer whose works are characterized by economy of technique, a preoccupation with light, and a frank, mundane realism derived from Pop art and photography.

He studied at the Bradford College of Art (1953–57) and the Royal College of Art, London (1959–62), where he received a gold medal in the graduate competition. He visited the United States in 1961 and returned in 1964–67 to teach at the universities of Iowa, Colorado, and California, and thereafter commuted between England and the United

States. The intense, glaring light and sleek "California modern" aesthetic of Los Angeles in particular had a pronounced influence on his work.

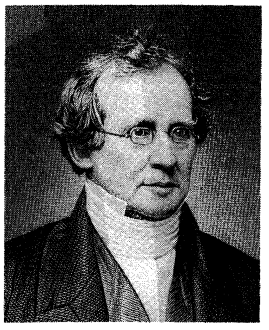
Much of Hockney's subject matter is autobiographical, including portraits and self-portraits and quiet, incidental scenes of his friends and his quarters (*e.g.*, "Portrait of an Artist," 1971). The casual elegance and tranquil luminosity of these pieces also predominate in his still lifes. He published several series of graphic works in book form, including illustrations for *Six Fairy Tales of the Brothers Grimm* (1970) and *The Blue Guitar* (1977). His designs for the stage included costumes and sets for the Glyndebourne Opera in East Sussex, Eng., for the Ballet de Marseille, Fr., and the Metropolitan Opera in New York City. A retrospective of Hockney's graphics was held in Great Britain in 1979, and a show of his stage designs toured the United States, Canada, and Mexico in 1984. His books include *Hockney by Hockney* (1976), *Travels With Pen, Pencil, and Ink* (1978), *Paper Pools* (1980), *David Hockney Photographs* (1982), *China Diary* (1983), and *Hockney Paints the Stage* (1983).

Hocktide play, a folk play formerly given at Coventry, Eng., on Hock Tuesday (the second Tuesday after Easter). The play was suppressed at the Reformation because of disorders attendant on it but was revived for the entertainment of Queen Elizabeth I at the Kenilworth Revels in 1575. As described by one of her courtiers, the action of the play consisted mainly of a mock battle between parties of men representing English and Danish knights, in which the Danes were defeated and led away as captives by English women. This was meant to represent the massacre of the Danes by King Ethelred in 1002, although some scholars believe that the play had its beginnings in hocking, a still older custom of the folk festivals. On Hock Monday women went out with ropes, hocking, or capturing, any man they met and exacting a forfeit. Men were allowed to retaliate in kind on Hock Tuesday. The forfeit money seems to have been used to defray parish expenses. The Bishop of Worcester forbade this practice in 1450, but traces of it are found in records well into the 17th century.

hocquet: *see* hocket.

Hodeida (Yemen [Ṣan'ā']): *see* Ḥudaydah, al-.

Hodge, Charles (b. Dec. 27, 1797, Philadelphia—d. June 19, 1878, Princeton, N.J., U.S.), conservative U.S. biblical scholar and a leader of the "Princeton School" of Reformed, or Calvinist, theology.



Hodge, detail from an engraving by A.H. Ritchie

By courtesy of Princeton University Archives

At Princeton University, his alma mater, Hodge became professor of biblical literature in 1822. From 1826 to 1828 he travelled in Europe, where he met the prominent theologians of the day. Firmly resistant to newer trends of thought, he formed a lasting friendship with the conservative German theologian August Tholuck of Halle. Hodge continued to teach at Princeton until his retirement in 1877, becoming professor of theology in 1840. In 1846 he served for one year as moderator of the "Old School" Presbyterian Church. This body, like the "Princeton School" of orthodox Calvinist theology, in which Hodge was a major figure, stressed the verbal infallibility of the Bible and asserted other generally conservative views.

With a theological method that he described as induction and deduction from biblical "facts" and a Calvinist orientation, Hodge constructed an influential *Systematic Theology* (3 vol., 1871–73) and wrote numerous biblical commentaries. For 46 years he edited the *Biblical Repertory and Princeton Review,* a journal he founded in 1825 and to which he contributed nearly 150 articles.

Hodgenville, city, seat (1843) of Larue County, central Kentucky, U.S., on the Nolin River just south of Elizabethtown. The area was settled in 1789 by Robert Hodgen, who erected a mill and tavern. The city is an agricultural trading centre (tobacco, corn, livestock), and natural gas wells are nearby. The Abraham Lincoln Birthplace National Historic Site is 3 mi (5 km) south on the Old Sinking Spring Farm. The Knob Creek Farm, where Lincoln's family moved when he was two, is 7 mi northeast. Inc. 1818. Pop. (1980) 2,459.

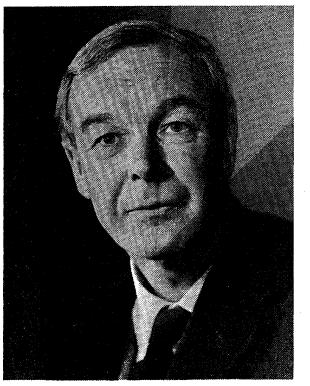
Hodges, John Cornelius, byname JOHNNY, OR RABBIT, HODGES (b. July 25, 1906, Cambridge, Mass., U.S.—d. May 11, 1970, New York City), U.S. jazz alto saxophonist and featured soloist in Duke Ellington's orchestra from 1928 until his death, except for the period 1951–55, when he led his own small ensemble.

Hodges was basically self-taught, though he received encouragement and a soprano saxophone that he played occasionally from Sydney Bechet. Hodges joined Ellington after brief stays in the bands of Lloyd Scott, Chick Webb, and Lucky Roberts. He was the leading alto saxophonist in jazz throughout the 1930s, applying precision and swing to a "sweet" tone and a brilliant improvisational sense of composition. Hodges excelled at ballads ("Warm Valley" is among his most famous solos) and blues. An impassive presence on the bandstand, he projected sensuous elegance through a commanding sound and perfected the use of slurs, portamentos, and glissandi. He recorded extensively with Ellington, as well as on several albums under his own name.

Hodgkin, Sir Alan (Lloyd) (b. Feb. 5, 1914, Banbury, Oxfordshire, Eng.), British physiologist and biophysicist, who received (with Andrew Huxley and Sir John Eccles) the 1963 Nobel Prize for Physiology or Medicine for the discovery of the chemical processes responsible for the passage of impulses along individual nerve fibres. He was knighted in 1972.

After conducting radar research (1939–45) for the British Air Ministry, Hodgkin joined the faculty at Cambridge University, where he worked (1945–52) with his student Andrew Fielding Huxley on measuring the electrical and chemical behaviour of individual nerve fibres. By inserting microelectrodes into the giant nerve fibres of the squid *Loligo forbesi,* they were able to show that the electrical potential of a fibre during conduction of an impulse exceeds the potential of the fibre at rest, contrary to the accepted theory, which postulated a breakdown of the nerve membrane during impulse conduction.

They knew that the activity of a nerve fibre depends on the fact that a large concentration of potassium ions is maintained inside the fibre, while a large concentration of sodium ions is found in the surrounding solution; their experimental results (1947) indicated that the nerve membrane allows only potassium to enter the fibre during the resting phase but allows



Sir Alan Hodgkin

Godfrey Argent

sodium to penetrate when the fibre is excited. Hodgkin served as a research professor for the Royal Society (1952–69), professor of biophysics at Cambridge University (from 1970), and chancellor of the university of Leicester (from 1971). Hodgkin's publications include *Conduction of the Nerve Impulse* (1964).

Hodgkin, Dorothy Mary Crowfoot (b. May 12, 1910, Cairo), English chemist whose determination of the structure of vitamin B_{12} brought her the 1964 Nobel Prize for Chemistry.

At Oxford (1929) she studied X-rays of complicated macromolecules. Then at Cambridge (1934) she and a co-worker took the first X-ray diffraction photograph of the protein pepsin, and somewhat later she made a survey of the sterols. She returned to Oxford as a tutor in chemistry in 1934, eventually becoming emeritus professor there as well as professor of the Royal Society (1960–77), chancellor of Bristol University (from 1970), and fellow of Wolfson College, Oxford (from 1977).

From 1942 to 1949 Hodgkin worked on a structural analysis of penicillin. She and her colleagues made the first X-ray photograph of vitamin B_{12}, one of the most complex nonprotein compounds, in 1948, eventually completely determining its atomic arrangement.

Hodgkin, Thomas (b. Aug. 17, 1798, Tottenham, Middlesex, Eng.—d. April 5, 1866, Jaffa, Palestine), English physician who early described (1832) the malignant disease of lymph tissue that bears his name.

Educated at Edinburgh, Hodgkin was an associate of the eminent physicians Richard Bright and Thomas Addison at Guy's Hospital, London. His achievements in the field of pathology also include one of the earliest descriptions of aortic insufficiency (1827).

Hodgkin's disease, also called LYMPHORETICULOMA, most common of the malignant lymphomas, or cancers of the lymphatic system. In its early stages the disease is characterized by local, painless swelling of one or more lymph nodes and sometimes swelling of the spleen, liver, or other organs. Other symptoms might include fever and pruritus, later followed by weight loss, weakness, and lassitude. Diagnosis of Hodgkin's disease, however, can be confirmed only by microscopic examination of affected tissue, usually from a lymph node. The cause of the disease remains unknown, but numerous infectious agents, including bacteria, protozoa, and viruses, have been suggested. Treatment consists of chemotherapy, radiation, or a combination of both, depending on the stage of development of the disease. More than 90

percent of patients in the early stages can be cured. Even those with advanced Hodgkin's disease have a significant chance of cure.

Hodgson, Frances Eliza (writer): *see* Burnett, Frances Eliza.

Hodgson, Ralph (b. Sept. 9, 1871, Yorkshire, Eng.—d. Nov. 3, 1962, Minerva, Ohio, U.S.), poet noted for simple and mystical lyrics that express a love of nature and a concern for modern man's progressive alienation from it.

While working as a journalist in London and later as the editor of *Fry's Magazine,* Hodgson belonged to the loosely connected group of poets known as the Georgians. After teaching English literature at Sendai University in Japan (1924–38), he emigrated to the United States, retiring to a small farm outside Minerva, Ohio. Most of Hodgson's works were written between 1907 and 1917, a period that ushered in the modernist revolution in poetry, in which he took little part. He achieved fame as a poet with the publication of the frequently anthologized "The Bull" in 1913. His collections include *The Last Blackbird and Other Lines* (1907), *Eve* (1913), *Poems* (1917), *The Skylark and Other Poems* (1958), and *Collected Poems* (1961).

Hodler, Ferdinand (b. March 14, 1853, near Bern—d. May 20, 1918, Geneva), one of the most important Swiss painters of the late 19th and early 20th century.

He was orphaned at the age of 12 and studied first at Thun under an artist who painted landscapes for tourists. After 1872, however, he worked in a more congenial atmosphere at Geneva, under Barthélémy Menn. By 1879, when Hodler settled in Geneva,

Hodler, self-portrait, oil on panel, 1891; in the Musée d'Art et d'Histoire, Geneva

By courtesy of the Musee d'Art et d'Histoire, Geneva

he was producing massive, simplified portraits owing something to the French realist painter Gustave Courbet. By the mid-1880s, however, a tendency to self-conscious linear stylization was visible in his subject pictures, which dealt increasingly with the symbolism of youth and age, solitude, and contemplation, in such works as "Die Nacht" (1890; "The Night," Kunstmuseum, Bern), which brought him acclaim throughout Europe. From this time his serious work can be divided between landscapes, portraits, and monumental figural compositions. The latter works present firmly drawn nudes who express Hodler's mystical philosophy through grave, ritualized gestures. These pictures are notable for their strong linear and compositional rhythms and their clear, flat, decorative presentation.

Hódmezővásárhely, town, Csongrád *megye* (county), southeastern Hungary. Located in the broad, flat plain of the canalized Maros-Körös (rivers) about 4 miles (6 km) east of the Tisza River, it was a flourishing market town during the 14th and 15th centuries but was twice totally destroyed by the Ottoman Turks. Rebuilt after 1700, the town was long a centre of activism in social and agrarian reform. Architectural monuments include the town hall, the Calvinist Old Church (1723) and the Calvinist New Church (1791–99), and a Baroque Greek Orthodox church dating from the 18th century.

The town's traditional industries are based on the processing of produce from the surrounding plain, including grain and fibre (especially flax) processing, dairying, meat processing, and the production of leather footwear; pottery and ceramic works preserve a regional tradition. Modern industries, many established after 1949, include the manufacture of bricks, ferro-concrete, and textiles and light engineering. The János Tornyai museum, named after a 19th-century local painter, preserves collections of archaeological, historical, and folk-art materials. Pop. (1987 est.) 54,000.

Hodna, Chott el-, shallow saline lake in north-central Algeria. It is separated from the Tell Atlas to the north by the Hodna Mountains. The lake occupies the bottom of an arid depression (elevation of 1,280 feet [390 m]) in the Hodna Plain and serves as an interior drainage basin. Owing to the extreme rate of evaporation, Chott el-Hodna is of varying size (about 50 miles [80 km] long and 10 miles [16 km] wide) and is often dry. The Hodna depression forms a break in the Saharan Atlas, dividing the Ouled Naïl Mountains (southwest) from the Aurès Massif (east).

Remains of agricultural and irrigation works evidence Roman and premedieval settlement in the vicinity of the lake. There are, however, only two modern communities nearby, Bou Saâda to the southwest and M'Sila to the north. Despite the possibility of artesian water supply, the region remains agriculturally undeveloped.

hoe, one of the oldest tools of agriculture, a digging implement consisting of a blade set at right angles to a long handle. The blade of the modern hoe is metal and the handle of wood; earlier versions, including the picklike mattock, had stone or wooden blades; the digging stick, precursor of most modern agricultural handtools, was simply a sharpened branch sometimes weighted with a stone. Hoes have largely been replaced in agriculture by plows and harrows but are still commonly used in gardening and horticulture to loosen dirt and to chop weeds. The modern rotary hoe is a sophisticated tool that hoes many rows of a field simultaneously.

Hoe, Richard March (b. Sept. 12, 1812, New York, N.Y., U.S.—d. June 7, 1886, Florence, Italy), American inventor who developed and manufactured the first successful rotary printing press.

He was the son of Robert Hoe (1784–1833), an English-born American mechanic, who, with his brothers-in-law Peter and Matthew Smith, established a factory for the production of printing presses in New York City. Richard entered R. Hoe and Company in 1827 and on his father's death became head of the firm.

Like his father, he had considerable inventive genius and made continual improvements in contemporary cylinder presses to increase the speed, quantity, and quality of output. The application of his ideas revolutionized printing processes. He discarded the old flatbed press, placing the type on a revolving cylinder, a model eventually developed into the Hoe rotary, or "lightning," press, patented in 1847. First used by the *Philadelphia Public Ledger* in 1847, it produced 8,000 sheets per hour printed on one side. It was further improved under the name of the Hoe web perfecting press, which was first used by the *New York Tribune* and produced 18,000 sheets an hour, printed on both sides. Hoe's press enabled publishers to satisfy the increasing demand for newspapers.

Hoe, Robert (b. Oct. 29, 1784, Hoes, Leicestershire, Eng.—d. Jan. 4, 1833, New York City), American printing-press manufacturer who, as head (1823–33) of R. Hoe and Company, bought (1827) and improved Samuel Rust's patent for a wrought-iron framed printing press and successfully manufactured it as the "Washington" press.

Hoe emigrated to the United States in 1803 and two years later became a partner with two brothers, Matthew and Peter Smith, in a newly founded enterprise, Smith, Hoe and Company, New York City, manufacturers of printers' equipment. The company prospered, and among several innovations was the introduction of the cast-iron frame to replace the wooden frame in presses. After the death of Matthew (1820) and Peter (1823), Hoe renamed the firm R. Hoe and Company. In 1829 he began improving upon the Napier cylinder press imported from England. The Hoe version of this press was so superior that it supplanted all English-made presses in the United States.

About 1830 Hoe bought the rights to a steam-powered press originally patented by Isaac Adams and manufactured it.

Hoechst Aktiengesellschaft (German: "Hoechst Limited-liability Company"), German chemical concern founded in 1863 in the Höchst quarter of Frankfurt am Main; originally a producer of dyestuffs, it became, by the late 20th century, one of the world's largest producers of pharmaceuticals.

From 1863 to about 1865 the company was styled Meister, Lucius & Co. (after the major founders, Wilhelm Meister and Eugen Lucius); it then became Meister, Lucius & Brüning (to include another founder, Adolf Brüning). In 1880 it was converted into a limited-liability company and gradually became known as Farbewerke Hoechst Aktiengesellschaft (Hoechst Dyeworks AG) after the area in which it was located. From 1925 to 1945 it was part of IG Farben (*q.v.*), the world's largest chemical concern; the latter was dissolved by the Allies in 1945, and Farbewerke Hoechst AG was reestablished in 1951. In 1970 the company acquired a majority interest in Cassella Farberwerke Mainkur Aktiengesellschaft, a German chemical corporation that had also been a member of the IG Farben cartel. The current name was adopted in 1974. In 1987 Hoechst AG's American subsidiary, the American Hoechst Corporation, acquired the Celanese Corporation, a major American producer of synthetic fibres.

Hoechst AG has divisions, affiliates, and subsidiaries not only in Germany but also in other European nations and on other continents. Its various operations produce pharmaceuticals, synthetic resins and paints, plastics and waxes, textile fibres, organic and inorganic chemicals, fertilizers and other agricultural chemicals, gases, dyestuffs, and film and printing accessories.

Høegh-Guldberg, Ove (b. Sept. 1, 1731, Horsens, Den.—d. Feb. 7, 1808, Hald), Danish statesman who was a powerful minister during the reign of the mentally unstable king Christian VII.

Høegh-Guldberg was of humble background. He earned a theology degree in 1753, and in 1761 became professor of rhetoric at Sorø academy. He was appointed tutor to Prince Frederick, half brother of the future king Charles VII, in 1764. As Frederick's private

secretary in 1771, he shared Frederick's hostility to Count Johann Friedrich Struensee, then supreme in Denmark through his domination of Christian VII; Høegh-Guldberg took part

Høegh-Guldberg, detail from an oil painting by an unknown artist

By courtesy of the Nationalhistoriske Museum paa Frederiksborg, Den.

in a conspiracy that led to Struensee's arrest and execution in 1772.

Thereafter, Høegh-Guldberg, along with Prince Frederick and the dowager queen Juliana Maria, gained significant power in the Danish state. In 1774 Høegh-Guldberg was made confidential cabinet secretary. Soon, without consulting the other council ministers, he was issuing orders signed by the incompetent Christian VII. He took over control of foreign policy after dismissing foreign minister Count Andreas Peter Bernstorff in 1780. Høegh-Guldberg was forced out of power during a 1784 coup d'état led by Prince Frederick. Thereafter, he served as a provincial official, returning also to scholarship.

Hoel, Halvor (Nielsen) (b. Feb. 4, 1766, Hedmark province, Nor.—d. March 5, 1852, Hedmark), peasant agitator who influenced peasant opinion against Norway's early 19th-century political leaders.

A member of a wealthy peasant family, Hoel opposed the upper-class, urban-dominated parliamentary government established in Norway in 1814; particularly, he attacked its fiscal policies, which he characterized as inimical to peasant interests. On the other hand, he exhibited the traditional peasant tolerance of royalism and favoured a strengthening of the role of the Swedish-Norwegian monarch.

Hoel was elected to the Storting (parliament) in 1815 but was denied his seat because he had not been completely exonerated of a previous criminal charge. He nevertheless continued to agitate among the peasantry with great effect. In 1818, during the coronation of King Charles XIV in the Norwegian city of Trondheim, large-scale peasant demonstrations and disorders occurred. Influenced by Hoel's polemics, the peasants called for reduced taxes, abolition of Norway's Parliament, and royal rule under the union's king. Although Hoel had advised against demonstrations, he was convicted of instigating the disturbances in 1826 and was sentenced to a year in prison. The king, however, reduced the sentence to one month and placed Hoel on a royal pension.

Hoel, Sigurd (b. Dec. 14, 1890, Nord-Odal, Nor.—d. Oct. 14, 1960, Oslo), novelist who is considered most representative of the interwar generation of fiction writers in Norway.

Hoel discontinued his training as a mathematics teacher when he won a Scandinavian prize for a short story. His first great success was a satirical novel, *Syndere i sommersol* (1927; *Sinners in Summertime*), in which he ridiculed the popular use of psychoanalytic terms. Hoel was himself influenced by Freudian psychoanalytic theory, as is shown in *En dag i oktober* (1931; *One Day in October*). He even attempted to attribute the compulsive tyranny of Nazism to the restrictions of childhood in *Møte ved milepelen* (1947; *Meeting at the Milestone*). *Veien til verdens ende* (1933; "Road to the World's End"), a novel of childhood, proved the best-loved of his works in Norway.

Hoess, Rudolf Franz (b. Nov. 25, 1900, Baden-Baden, Ger.—d. April 15, 1947, Auschwitz [Oświęcim], Pol.), German soldier and Nazi partisan who served as commandant of the Auschwitz extermination camp (1940–45), during a period when as many as 1,000,000 to 2,500,000 inmates perished there.

After serving in World War I, Hoess joined conservative cliques, was arrested and imprisoned (1923–28), and then joined the Nazi Party, becoming a member of the SS. In 1934 he began serving on the staff at Dachau concentration camp and in 1940 was given command of Auschwitz, where he devised increasingly efficient methods of mass gassing and cremation. In 1945 he was made a deputy inspector of all concentration camps. In 1947 he was tried and sentenced by a Polish court in Warsaw and hanged at Auschwitz.

Hoëvell, Wolter Robert, baron van (b. July 15, 1812, Deventer, Neth.—d. Feb. 10, 1879, The Hague), statesman and member of the Dutch Parliament who was largely responsible for ending the exploitive colonial Culture System, which extracted wealth from the Dutch East Indies from 1830 to around 1860, and who advocated replacing autocratic, arbitrary control of the Indies' economy with legal control by Parliament.

Educated in theology, van Hoëvell went to the Indies as a pastor in 1836. In Batavia (now Jakarta), he reestablished the Batavian Society for Arts and Sciences and founded the newspaper *Het Tijdschrift,* which succeeded, despite heavy censorship, in criticizing the colonial government. In 1848 he returned to The Netherlands and became a member of Parliament. More a humanitarian than a doctrinaire liberal, he was able to convince people of various political persuasions that the extractive Culture System was immoral. He also showed that using legal contracts instead of arbitrary favouritism would bring more profits for The Netherlands. He pressed Parliament to legalize the granting of sugar contracts in 1860, thus marking the beginning of Liberal power in The Netherlands.

Hof, city, Bavaria *Land* (state), east-central Germany. It lies along the Saale River, in the northeastern foothills of the Fichtelgebirge and the Frankenwald, near the border with Czechoslovakia. Founded by the dukes of Andechs-Meran, it was first mentioned in 1214 and was chartered by 1319. It passed to the Hohenzollern burgraves of Nürnberg in 1373, to Prussia in 1792, and to Bavaria in 1810. Most of the city's old buildings, including medieval churches, were rebuilt after a devastating fire in 1823. Hof is a cultural centre with a theatre, symphony orchestra, choirs, museum, and several colleges.

Hof is the industrial and commercial centre of northern Upper Franconia. Its chief manufactures are textiles, machinery, and beer. Although the city's significance as a communications centre diminished when most traffic north and east across the Czech and East German borders declined after 1945, there is still heavy traffic to the south and west, and it is an important border checkpoint. Pop. (1989 est.) 50,938.

Hofbauer, Saint Clement Mary, original name JOHN HOFBAUER (b. Dec. 26, 1751, Tasswitz, Moravia [now in Czechoslovakia]—d. March 15, 1820, Vienna; canonized May 20, 1909; feast day March 15), patron saint of Vienna.

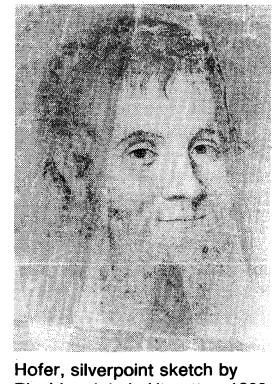
The son of a butcher, Hofbauer worked as a butcher until 1780. Educated at the University of Vienna and ordained in 1785, he was authorized to establish Redemptorist monasteries in northern Europe. In 1788 he took up residence in Warsaw, where he worked for 20 years, establishing Redemptorist houses in Switzerland and southern Germany. In 1808, after Napoleon ordered the Redemptorist community at Warsaw disbanded and its members exiled, Hofbauer spent the remainder of his life in Vienna. There he established a monastery and continued to seek government approbation for Redemptorist houses, which was granted shortly after his death. He was named patron saint of Vienna by Pope St. Pius X in 1914.

BIBLIOGRAPHY. John Hofer, *St. Clement Maria Hofbauer* (1926; originally published in German, 3rd ed., 1923), details his life and accomplishments.

Hofer, Andreas (b. Nov. 22, 1767, near Sankt Leonhard, South Tirol, Austrian Empire [now San Leonardo, Italy]—d. Feb. 20, 1810, Mantua, Kingdom of Italy), Tirolese patriot, military leader, and popular hero who fought Napoleonic France and Bavaria for two years (1809–10) in an attempt to keep his homeland under Austrian rule.

Hofer was an innkeeper, wine merchant, and cattle dealer and was intensely loyal to the Austrian house of Habsburg and the Roman Catholic church. He worked for the return of the Tirol to Austria after it had been ceded to Bavaria in 1805. With Austrian aid, he fought a number of successful minor actions against the Bavarian and Italo-French troops occupying his homeland, becoming well known throughout the Tirol.

After the Truce of Znaim (July 1809), Austria began to withdraw from its new war against Napoleon and again relinquished the Tirol, but Hofer, calling for a popular rising, defeated the Bavarians so decisively at the second Battle of Berg Isel near Innsbruck (August 1809) that they were forced to leave the province. He then styled himself commander in chief of the Tirol and established an administration with the acquiescence of the Austrian emperor Francis I. In the Treaty of Schönbrunn (October 1809), however, Francis ceded the Tirol to Napoleon, thus abandoning Hofer to the victorious French. Italo-French troops pacified most of the area shortly thereafter, while Hofer wavered between resistance and acceptance of the new order. He was finally captured near his home, taken to Mantua, and on Napoleon's orders executed. In 1823 his bones were transferred to Innsbruck. The poem "Sandwirth Hofer," by Julius Mosen, is still the Tirolese anthem.



Hofer, silverpoint sketch by Placidus-Jakob Altmutter, 1809; in the Tiroler Landesmuseum Ferdinandeum, Innsbruck, Austria

By courtesy of the Tiroler Landesmuseum Ferdinandeum, Innsbruck, Austria

Hoff, Jacobus Henricus van't (b. Aug. 30, 1852, Rotterdam—d. March 1, 1911, Berlin), physical chemist and first winner of the Nobel Prize for Chemistry (1901) for work on rates of reaction, chemical equilibrium, and osmotic pressure.

After studies in The Netherlands, he worked briefly under August Kekule at Bonn and then in the Paris laboratory of Charles-Adolphe Wurtz, where he met Joseph-Achille Le Bel. In 1874 he and Le Bel, independently of each other, announced a concept that proved to

Van't Hoff, detail of an oil painting by Helene Büchmann
Iconographisch Bureau

be the cornerstone in the study of the three-dimensional structure (stereochemistry) of organic compounds: the four chemical bonds that carbon can form are directed to the corners of a tetrahedron. This concept helped explain the property of optical rotation.

He was professor of chemistry, mineralogy, and geology at the University of Amsterdam (1878–96). In 1884 he published *Études de Dynamique chimique* ("Studies in Chemical Dynamics"), which contained the principles of chemical kinetics, described a new method for determining the order of a reaction, and applied the laws of thermodynamics to chemical equilibriums. He also introduced the modern concept of chemical affinity. In 1886 he showed a similarity between the behaviour of dilute solutions and gases. Until 1895 he worked on Svante Arrhenius' theory of the dissociation of electrolytes. In 1896 he became professor to the Prussian Academy of Science at Berlin. His studies of the salt deposits at Stassfurt, Ger., contributed to that nation's chemical industry. In 1887 he and the German chemist Wilhelm Ostwald founded the influential *Zeitschrift für physikalische Chemie* ("Journal of Physical Chemistry").

Hoffa, James R(iddle), byname JIMMY HOFFA (b. Feb. 14, 1913, Brazil, Ind., U.S.—disappeared July 30, 1975, Bloomfield Hills, near Detroit), American labour leader who served as president of the International Brotherhood of Teamsters from 1957 to 1971, becoming one of the most controversial labour organizers of his time.

The son of an Indiana coal driller who died when Hoffa was seven, Hoffa moved with his family to Detroit in 1924. He left school at 14, worked as a stockboy and warehouseman for several years, and began his union-organizing activities in the 1930s. Initially the business agent for Local 299 in Detroit, Hoffa by 1940 had become chairman of the Central States Drivers Council and by 1942 president of the Michigan Conference of Teamsters. In 1952 he was elected an international vice president of the Teamsters and five years later succeeded Dave Beck as international president. Known throughout the trucking industry as a tough and knowledgeable bargainer, Hoffa successfully centralized administration and bargaining in the international office of the union and played a key role in creating the first national freight-hauling agreement. He helped make the Teamsters the largest labour union in the United States.

Known to have long associated with underworld figures, Hoffa nevertheless survived a series of governmental prosecutions until 1967, when he entered the federal prison in Lewisburg, Penn., to begin a 13-year sentence for jury tampering, fraud, and conspiracy. Hoffa refused to resign as president of the Teamsters while in prison and kept his position until 1971. President Richard M. Nixon commuted Hoffa's sentence in December 1971, stipulating that Hoffa could not engage in any union activity until 1980. Hoffa, however, fought the restriction in court and was widely believed to have covertly continued his efforts to reestablish a union position. On July 30, 1975, he disappeared from a suburban restaurant near Detroit under circumstances that have never been fully determined. He was said to have had an appointment at the restaurant with Anthony Provenzano, a New Jersey Teamster official and former Mafia figure, and Anthony Giacalone, a Detroit mobster; both later denied having seen Hoffa, who was never seen again. He was legally declared "presumed dead" in 1982.

Hoffer, Eric (b. July 25, 1902, New York City—d. May 21, 1983, San Francisco), American longshoreman and philosopher whose writings on life, power, and social order brought him celebrity.

Hoffer's family was of modest means, and his early life was marked by hardship. A fall at the age of 7 left him partially blind until he was 15, when his eyesight returned. With the recovery of vision, Hoffer began to read voraciously. His mother had died when he was a child, and, when his father died in 1920, Hoffer, penniless, decided to go to California. For the next 23 years he found jobs as a migrant farm worker and a manual labourer; throughout this time he never stopped reading or lost his love of books, the only possessions he carried from job to job. He joined the longshoreman's union in 1943 so that he could work only a few days a week and spend the rest of the time reading and writing.

His first book, *The True Believer* (1951), demonstrated his insights into the nature of mass movements and the people who compose them. It received critical acclaim from both scholars and laymen and catapulted Hoffer into the limelight. Later works include *The Passionate State of Mind* (1955), a collection of cogent aphorisms; *The Ordeal of Change* (1963), composed of essays dealing with human reactions to social and political upheaval; *Working and Thinking on the Waterfront* (1967); *Reflections on the Human Condition* (1972); and *Before the Sabbath* (1979). Much of his writing was in quotable, piquant epigrams, showing the influence of Montaigne, an essayist whom Hoffer admired.

The rarity of a self-educated scholar (he claimed to have had no formal schooling) as well as the novelty of a philosopher with a working-class background made Hoffer into a sort of popular hero. He continued as a dockworker until 1967, completing his books in between assignments. He received the Presidential Medal of Freedom, the United States' highest civilian honour, in 1982.

Hoffman, Dustin (b. August 8, 1937, Los Angeles), American motion-picture and stage actor, noted for his convincing characterizations and varied roles.

After attending Santa Monica City College for one year, Hoffman dropped out to study acting, taking classes at the Pasadena Playhouse. In 1958 he went to New York, where his initially unpromising career as an actor brightened after his character portrayals in Broadway plays began winning acclaim in about 1965. In 1967 he made his film debut as the bemused, disillusioned young college graduate in *The Graduate,* an enormously popular film that established Hoffman's stardom. Hoffman went on to play a striking variety of characters in several important American films of the 1970s. He played leading roles in *Midnight Cowboy* (1969), *Little Big Man* (1970), *Straw Dogs* (1971), *Papillon* (1973), *All the President's Men* (1976), *Marathon Man* (1976), *Straight Time* (1978), *Kramer vs. Kramer* (1979), and *Tootsie* (1982). He returned to the Broadway stage in 1984 as Willy Loman in a revival of Arthur Miller's *Death of a Salesman.* Hoffman won an Academy Award for his portrayal of an autistic man in *Rain Man* (1988).

Hoffman endowed his roles with an emotionally charged intensity and vulnerability that attracted audiences' sympathy despite the antiheroic nature of the parts he sometimes played.

Hoffman, Paul G(ray) (b. April 26, 1891, Chicago—d. Oct. 8, 1974, New York City), American automobile-manufacturing executive who administered international assistance programs of the United States and the United Nations.

An employee of the Studebaker Corporation from 1911, he rose to become chairman of the board of directors in 1953 and chairman of the board of the company's successor, the Studebaker–Packard Corporation, in 1954. From 1948 to 1950 Hoffman headed the U.S. Economic Cooperation Administration, which, with the Organization for European Economic Cooperation, directed the post-World War II European Recovery Program (Marshall Plan). During 1951–53 he was president of the Ford Foundation. A U.S. delegate to the UN General Assembly in 1956–57, he became managing director of the Special United Nations Fund for Economic Development in 1959. In 1966 the fund was incorporated into the United Nations Development Program, of which Hoffman was named administrator; he held that post till 1972. He was also a director of Encyclopædia Britannica, Inc., and of Encyclopædia Britannica Educational Corporation.

Hoffman, Samuel Kurtz (b. April 15, 1902, Williamsport, Pa., U.S.), American propulsion engineer who led U.S. efforts to develop rocket engines for space vehicles.

An aeronautical-design engineer from 1932 to 1945, Hoffman later became professor of aeronautical engineering at Pennsylvania State University, University Park. In 1949 he joined North American Aviation, Inc. (later North American Rockwell Corp.), as chief of the Propulsion Section of the Aerophysics Department, where he helped develop a 75,000-pound-thrust rocket engine for an intercontinental missile.

Under Hoffman's leadership, North American developed and completed in 1950 one of the first high-thrust rocket engines, prototype of the Jupiter C that launched the first U.S. satellite and placed the first American astronauts in space. His work was also essential to the early development of the intercontinental Atlas and the intermediate-range Thor and Jupiter ballistic missiles.

In 1955 Hoffman was placed in charge of North American's Rocketdyne Division, which developed new high-pressure pumps and improved techniques for rocket maneuvering. Rocketdyne pioneered in the use of highly volatile fuels and liquid oxidizers of extremely low temperatures. In 1958 Hoffman took charge of the development of the rocket engines that were used in the Saturn launch vehicles, which eventually carried American astronauts to the Moon. He was president of Rocketdyne in 1960–70 and thereafter served as aerospace consultant to the firm.

Hoffmann, August Heinrich: *see* Hoffmann von Fallersleben, August Heinrich.

Hoffmann, E(rnst) T(heodor) A(madeus), original name ERNST THEODOR WILHELM HOFFMANN (b. Jan. 24, 1776, Königsberg, Prussia [now Kaliningrad, Russian S.F.S.R.]—d. June 25, 1822, Berlin), German writer, composer, and painter known for stories in which

supernatural and sinister characters move in and out of men's lives, ironically revealing tragic or grotesque sides of human nature.

The product of a broken home, Hoffmann was reared by an uncle. He was educated in law and became a Prussian law officer in the Polish provinces in 1800, serving until the bureaucracy was dissolved following the defeat of Prussia by Napoleon in 1806. Hoffmann then turned to his chief interest, music, and held several positions as conductor, critic, and theatrical musical director in Bamberg and Dresden until 1814. About 1813 he changed his third baptismal name, Wilhelm, to Amadeus in homage to the composer Wolfgang Amadeus Mozart. He composed the ballet *Arlequin* (1811) and the opera *Undine* (performed in 1816) and wrote the stories in *Phantasiestücke in Callots Manier*, 4 vol. (1814–15; "Fantasy Pieces in the Style of Callot"), that established his reputation as a writer. He was appointed in 1814 to the court of appeal in Berlin, becoming councillor in 1816.

Although he wrote two novels, *Die Elixiere des Teufels*, 2 vol. (1815–16; *The Devil's Elixir*), and *Lebens-Ansichten des Katers Murr nebst fragmentarischer Biographie des Kapellmeisters Johannes Kreisler*, 2 vol. (1820–22; "The Life and Opinions of Kater Murr, with a Fragmentary Biography of Conductor Johannes Kreisler"), and more than 50 short stories before his death from progressive paralysis, he continued to support himself as a legal official in Berlin. His later story collections, *Nachtstücke*, 2 parts (1817; *Hoffmann's Strange Stories*), and *Die Serapionsbrüder*, 4 vol. (1819–21; *The Serapion Brethren*), were popular in England, the United States, and France. Continued publication of the stories into the second half of the 20th century attested to their popularity.

In his stories Hoffmann skillfully combined wild flights of imagination with vivid and convincing examinations of human character and psychology. The weird and mysterious atmosphere of his maniacs, spectres, and automata thus intermingles with an exact and realistic narrative style. The struggle within Hoffmann between the ideal world of his art and his daily life as a bureaucrat is evident in many of his stories, in which characters are possessed by their art. His use of fantasy, ranging from fanciful fairy tales to highly suggestive stories of the macabre and supernatural, served as inspiration to several operatic composers. Richard Wagner drew on stories from *Die Serapionsbrüder* for *Die Meistersinger von Nürnberg* (1868), as did Paul Hindemith in *Cardillac* (1926) and Jacques Offenbach in *The Tales of Hoffmann* (1881), in which Hoffmann himself is the central figure. The ballet *Coppélia* (1870), by Léo Delibes, is also based on a Hoffmann story, as is Peter Tchaikovsky's ballet suite, *The Nutcracker* (1892). Hoffmann was a sensitive music critic who was an appreciative admirer of the works of Mozart and Beethoven as well as of J.S. Bach, who was neglected at that time.

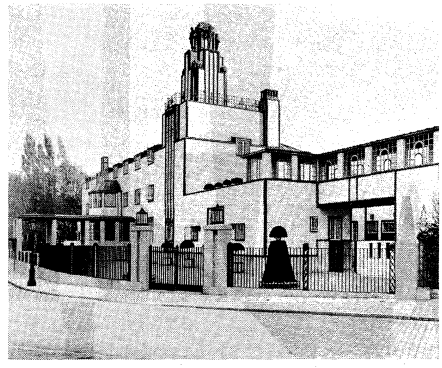
Hoffmann, Heinrich, in full HEINRICH HOFFMANN-DONNER, pseudonyms REIMERICH KINDERLIEB, HEINRICH KINDERLIEB, PETER STRUWWEL, HEULALIUS VON HEULENBURG, POLYKARPUS GASTFENGER, and ZWIEBEL (b. June 13, 1809, Frankfurt am Main—d. Sept. 20, 1894, Frankfurt am Main), German physician and writer who is best known for his creation of Struwwelpeter (Slovenly Peter), a boy whose wild appearance is matched by his naughty behaviour. Peter appeared in *Lustige Geschichten und drollige Bilder mit fünfzehn schön kolorten Tafeln für Kinder von 3–6 Jahren* (1845; *Slovenly Peter; or, Cheerful Stories and Funny Pictures for Good Little Folks*). This book of cautionary tales was written as a Christmas gift for the doctor's four-year-old son. Hoffmann also wrote poetry, humour, and satire, as well as other children's books and books on medicine and psychiatry.

Hoffmann studied medicine at Heidelberg and Halle, practiced and taught, and directed the state mental hospital in Frankfurt am Main (1851–88).

Hoffmann, Josef (b. Dec. 15, 1870, Pirnitz, Moravia [now in Czechoslovakia]—d. May 7, 1956, Vienna), German architect whose work was important in the early development of modern architecture in Europe.

Hoffman studied under Otto Wagner in Vienna and in 1899 joined in the founding of the Vienna Sezession, which, although influenced by the Art Nouveau movement, was more modernist than Wagner's approach. Beginning in 1899 he taught at the School of Applied Arts, Vienna, and participated (1903) in the establishment of the Vienna Werkstätte, a centre for arts and crafts, which he directed for some 30 years.

Hoffmann's Purkersdorf Sanatorium (1903; Purkersdorf, Austria) was an important early work, and his Stoclet House (1905) in Brussels is considered his masterpiece. The exterior of this opulent structure achieved a monumental elegance not often associated with design based on straight lines and white squares and rectangles.



Stoclet House, Brussels, by Josef Hoffmann, 1905–11
Foto Marburg

Hoffmann designed the Austrian pavilions for the 1914 Deutscher Werkbund Exhibition in Cologne and for the 1934 Venice Biennale. In 1920 he was appointed city architect of Vienna, and in 1924 and 1925 he carried out various housing projects for the city.

Hoffmann, Max (b. Jan. 25, 1869, Homberg an der Efze, Hesse [Germany]—d. July 8, 1927, Bad Reichenhall, Ger.), German officer who was primarily responsible for several striking German victories on the Eastern Front in World War I.

Hoffmann joined the German army in 1887, studied at the Berlin War Academy, and eventually became the General Staff's expert on the eastern sector (Russia and Japan). In August 1914, as a colonel and chief staff officer of the German 8th Army, he tried to persuade the 8th Army's commanding officer, General Max von Prittwitz, not to withdraw the army behind the Vistula River and so abandon East Prussia to the Russian forces. Prittwitz was soon recalled in disgrace, and his replacements, generals Paul von Hindenburg and Erich Ludendorff, accepted Hoffmann's plans for the 8th Army to attack the uncoordinated Russian armies in the area. The result of the consequent Battle of Tannenberg on August 26–30 was Germany's first great military victory on the Eastern Front.

Hoffmann planned the Battle of the Masurian Lakes (February 1915), another German victory, and was promoted to colonel in August 1916 and appointed chief of staff to the new German commander of the Eastern Front. At the Brest-Litovsk peace talks (December 1917–March 1918), Hoffmann, as the senior representative of the German High Command, and Richard von Kühlmann, the foreign minister, attempted to negotiate German treaties with the Ukraine and Russia.

Max Hoffmann, about 1925
Archiv fur Kunst und Geschichte, Berlin

When the Bolsheviks showed reluctance to sign a treaty, Hoffmann denounced (Feb. 16, 1918) the Russo-German armistice and two days later launched a massive German offensive against Russia, capturing a great deal of territory and thus forcing the Bolshevik government to agree (March 1) to peace terms with Germany.

After the war, Hoffmann wrote several books, among them *Der Krieg der versäumten Gelegenheiten* (1923; *The War of Lost Opportunities*).

Hoffmann, Melchior: *see* Hofmann, Melchior.

Hoffmann, Roald (b. July 18, 1937, Złoczów, Pol.), Polish-born U.S. chemist, corecipient, with Fukui Kenichi (*q.v.*) of Japan, of the Nobel Prize for Chemistry in 1981 for their independent investigations of the mechanisms of chemical reactions.

Hoffmann immigrated to the United States with his family in 1949. He graduated from Columbia University and received his Ph.D. from Harvard University in 1962. He collaborated with Robert B. Woodward at Harvard during the next three years and then joined the Cornell University faculty in 1965.

Hoffmann undertook the research leading to his share of the prize when he and Woodward sought an explanation of the unexpected course taken by a reaction that Woodward and his colleagues had hoped to use in the synthesis of the complicated molecule of vitamin B_{12}. Hoffmann and Woodward discovered that many reactions involving the formation or breaking of rings of atoms take courses that depend on an identifiable symmetry in the mathematical descriptions of the molecular orbitals that undergo the most change. Their theory, expressed in a set of statements now called the Woodward–Hoffmann rules, accounts for the failure of certain cyclic compounds to form from apparently appropriate starting materials, though others are readily produced; it also clarifies the geometric arrangement of the atoms in the products formed when the rings in cyclic compounds are broken.

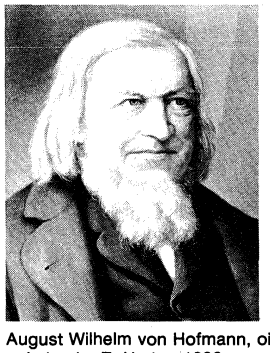
Hoffmann von Fallersleben, August Heinrich (b. April 2, 1798, Fallersleben, near Braunschweig, Hanover [Germany]—d. Jan. 19, 1874, Corvey Castle, near Höxter, Ger.), German patriotic poet, philologist, and literary historian whose poem "Deutschland, Deutschland über alles" was adopted as the German national anthem after World War I. (*See* Deutschlandlied.) His uncomplicated and attractive verses, expressing his deep love of country and and strong fellow feeling, were of great significance to the German student movement.

Having studied at the universities of Göttingen and Bonn, he was custodian of the university library at Breslau (1823–38). He became extraordinary professor of German language and literature there in 1830 and ordinary professor in 1835 but was removed by the Prussian authorities in 1842 for his *Unpolitische Lieder* (1840–41; "Nonpolitical Songs"), which was interpreted, despite its title, as political. He was allowed to return after the Revolution of 1848. In 1860 he was appointed librarian to the Duke of Ratibor at Corvey Castle.

Hoffmann was among the earliest and most effective of the poets who prepared the way for the revolutionary movement of 1848. He also composed melodies for many of his songs, which were sung throughout Germany. His patriotic poem "Deutschland, Deutschland über alles," written in 1841, is typical in its expression of popular feeling—the wish for national unity felt by German liberals of the period. In the first line the word "Deutschland" was repeated to fit Joseph Haydn's tune, which the latter had composed in 1797 as an Austrian imperial anthem. The third verse of the song, "Einigkeit und Recht und Freiheit" ("Unity and Justice and Freedom"), continued to be sung as the national anthem after World War II in West Germany.

As a student of ancient Germanic literature, Hoffmann ranks among the most persevering and cultivated of German scholars. His *Deutsche Philologie im Grundriss* (1836; "Outline of German Philology") made a valuable contribution to philological research.

Hofmann, August Wilhelm von (b. April 8, 1818, Giessen, Hesse-Darmstadt [Germany]—d. May 2, 1892, Berlin), German chemist whose research on aniline, with that of Sir William Henry Perkin, helped lay the basis of the aniline-dye industry.



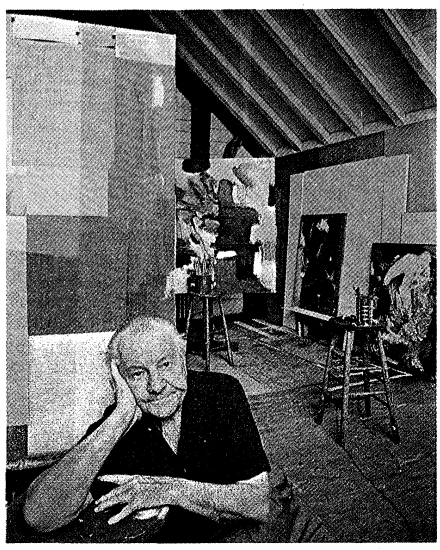
August Wilhelm von Hofmann, oil painting by E. Hader, 1886

Archiv fur Kunst und Geschichte, Berlin

Hofmann studied under Justus von Liebig at the University of Giessen and received his doctorate in 1841. In 1845 he became the first director of the new Royal College of Chemistry, in London. He moved to Bonn in 1864 but in 1865 became chemistry professor and laboratory director at the University of Berlin, continuing there as a teacher and researcher until his death.

His work covered a wide range of organic chemistry. His first research, on coal tar, led to the development of practical methods for obtaining benzene and toluene and converting them into nitro compounds and amines. In other work he prepared the three ethylamines and tetraethylammonium compounds and established their structural relationship to ammonia. He discovered formaldehyde, hydrazobenzene, the isonitriles, and, with Auguste Cahours, allyl alcohol. The Hofmann reaction was named after his method of converting an amide into an amine. He also developed a method for determining the molecular weights of liquids from vapour densities. Almost 1,000 scientific papers came from his laboratory, and nearly 300 of these represented his own work. He was a cofounder of the German Chemical Society (1867) and served 14 terms as its president during the years 1868–92.

Hofmann, Hans (b. March 21, 1880, Weissenberg, Ger.—d. Feb. 17, 1966, New York, N.Y., U.S.), German painter who was one of the most influential art teachers of the 20th century. He was a pioneer in experimenting in the use of improvisatory techniques; his work opened the way for the first generation of post-World War II American painters to develop Abstract Expressionism.



Hans Hofmann, photograph by Arnold Newman, 1960

© Arnold Newman

Hofmann began to study art in Munich in 1898, but in 1904 he moved to Paris, where he was deeply affected by the expressive use of colour that distinguished the paintings of Henri Matisse and Robert Delaunay. He opened his first school of painting in Munich in 1915.

In 1930 Hofmann moved to the United States, where he taught at the Art Students League in New York City and later opened his own Hans Hofmann School of Fine Art, which soon became one of the most prestigious art schools in the United States. By 1939 he was able to break away from the Expressionistic landscapes and still lifes he had painted in the early 1930s and to evolve a totally abstract manner, notable for its wealth of invention, vigorous brushwork, and saturated colours. He used both geometric and irregular forms in his paintings. His painting "Spring" (1940; Peter A. Rübel Collection, Connecticut) was among the earliest works to employ the paint-dripping technique associated with the American painter Jackson Pollock. In 1958 Hofmann disbanded his school and devoted the rest of his life to his own art. Before his death, Hofmann endowed a special gallery for the exhibition of his works in Berkeley, Calif.

Hofmann, Josef Casimir (b. Jan. 20, 1876, Podgorze, near Kraków, Pol.—d. Feb. 16, 1957, Los Angeles), Polish-born American pianist, especially noted for his glittering performances of the music of Frédéric Chopin.

He gave his first concert at the age of 6 and toured the United States at 11. Later he studied with two leading pianists of the late 19th century, Moritz Moszkowski and Anton Rubinstein. He resumed his public career at 18 and from 1898 lived mainly in the United States. From 1926 to 1938 he was director of the Curtis Institute of Music, Philadelphia. His playing was considered noble and poetic, free from any eccentricity, and never routine. He composed a symphony, five piano concerti, and solo piano music, some published under the pseudonym Michel Dvorsky. He also wrote three books on piano playing.

Hofmann, Melchior, Hofmann also spelled HOFFMANN (b. *c.* 1495, Schwäbisch-Hall, Swabia [Germany]—d. 1543/44, Strassburg [now Strasbourg, Fr.]), German mystic and lay preacher who contributed a zealous eschatology to the Anabaptists, a Reformation movement that advocated adult baptism.

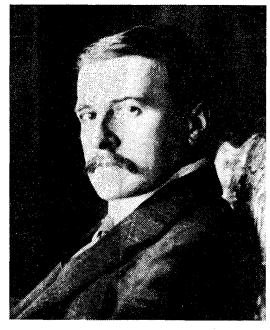
A furrier by trade, Hofmann worked as a Lutheran lay missionary in Livonia (modern Latvian S.S.R. and Estonian S.S.R.), Sweden, and northern Germany. His fervour made him a competitor of the educated clergy, and he was forced from Wolmar (now Valmiera, Latvian S.S.R.) in 1524 and from Dorpat (now Tartu, Estonian S.S.R.) in 1526. For two years he preached among the Germans in Stockholm. Later he received an appointment as preacher at Kiel from Frederick I of Denmark.

At a colloquy in Flensburg (1529), Hofmann alarmed Martin Luther by dissenting from the Lutheran doctrine of the Eucharist, and he was consequently banned from Denmark. Converted to Anabaptism in Strassburg, he developed his doctrines not only beyond Lutheranism but beyond Anabaptism as well; he predicted that the end of the world would occur in 1533 and that he himself would ride into Strassburg with Christ in the clouds to establish the New Jerusalem.

Traveling to the Netherlands in 1530, Hofmann won converts, who became known as Melchiorites; but upon his return to Strassburg (1533), where he was unpopular with the Anabaptists, he was arrested and imprisoned. Hofmann died in prison, his prophecy unfulfilled. For a short time afterward, Melchiorite groups persisted in Europe and England but eventually disappeared. Hofmann's views especially influenced the Anabaptist Reformer Menno Simons.

Hofmannsthal, Hugo von (b. Feb. 1, 1874, Vienna—d. July 15, 1929, Rodaun, a suburb of Vienna), Austrian poet, dramatist, and essayist. He made his reputation with his lyrical poems and plays and became internationally famous for his collaboration with the German operatic composer Richard Strauss.

The only child of a bank director, Hofmannsthal studied law at Vienna. At 16 he published his first poems, under the pseudonym Loris. They created a stir in Vienna and in Germany with their lyrical beauty, magic evocativeness of language, and dreamlike quality. Their anticipation of mature experience and formal virtuosity seem incredible in one so young. After his year of compulsory military service, he studied Romance philology with a view to an academic career but in 1901 married and became a free-lance writer.



Hofmannsthal, photograph by Thea Sternheim, 1911; in the Schiller-Nationalmuseum, Marbach, Ger.

By courtesy of the Schiller-Nationalmuseum, Marbach, Ger.

Between 1891 and 1899 Hofmannsthal wrote a number of short verse plays, influenced by the static dramas of the Belgian writer Maurice Maeterlinck, the dramatic monologues of the English Romantic poet Robert Browning, and the *proverbes dramatiques* of the French poet Alfred de Musset. These plays include *Gestern* (1891; "Yesterday"), *Der Tod des Tizian* (1892; *The Death of Titian,* 1913), *Der Tor und der Tod* (1893; *Death and the Fool,* 1913), *Das kleine Welttheater* (1897; "The Little Theatre of the World"), *Der Weisse Fächer* (1898; partially translated as *The White Fan,* 1909), *Die Frau im Fenster* (1898; *Madonna Dianora,* 1916), *Der Abenteurer und die Sängerin* (1899; *The Adventurer and the Singer,* 1917–18), and *Die Hochzeit der Sobeide* (1899; *The Marriage of Sobeide,* 1961). Of the same exquisite beauty as the poems, these playlets are lyric reflections on appearance and reality, transience and timelessness, and continuity and change within the human personality—themes constantly recurring in his later works. After the turn of the century, however, Hofmannsthal renounced purely lyrical forms in his essay "Ein Brief" (also called "Chandos Brief," 1902). This essay was more than the revelation of a personal predicament; it has come to be recognized as symptomatic of the crisis that undermined the esthetic Symbolist movement of the end of the century.

During a period of reorientation and transition Hofmannsthal experimented with Elizabethan and classical tragic forms, adapting Thomas Otway's *Venice Preserv'd* (1682) as *Das gerettete Venedig* (1904) and writing *Elektra* (1903), later set to music by Strauss. At the same time he began his novel, *Andreas* (1932; *The United,* 1936), which he never completed. The theatre increasingly became his medium. To the end of his life he collaborated with Strauss, writing the librettos for the operas *Der Rosenkavalier* (performed 1911; "The Cavalier of the Rose"), *Ariadne auf Naxos* (1912), *Die Frau ohne Schatten* (1919; "The Woman Without a Shadow"), *Die ägyptische Helena* (1928; *Helen in Egypt,* 1963), and *Arabella* (performed 1933).

After World War I, with the theatrical producer and designer Max Reinhardt, he founded the Salzburg Festival, at which performances have regularly been given of his *Jedermann* (1911; "Everyman") and *Das Salzburger grosse Welttheater* (1922; *The Great Salzburg Theatre of the World,* 1963). His comedies, *Cristinas Heimreise* (1910; *Christina's Journey Home,* 1916), *Der Schwierige* (1921; *The Difficult Man,* 1963), and *Der Unbestechliche* (performed 1923, published 1956; "The Incorruptible"), are written in Viennese dialect and set in contemporary Austrian society; concerned with moral issues, they blend realism with concealed symbolism.

Hofmannsthal's reflections on the crisis and disintegration of European civilization after World War I found expression in his political drama *Der Turm* (1925; *The Tower,* 1963) and in several essays that were prophetic of the future of Western culture. He responded to the collapse of the Habsburg empire by an increased awareness of his Austrian heritage, at the same time committing himself to the European tradition. His art continued to develop, and he always maintained the delicate grace and sense of transcendent beauty typical of his earliest works, but he was unable to accommodate himself to the 20th century.

Hofmannswaldau, Christian Hofmann von (b. Dec. 25, 1617, Breslau, Silesia—d. April 18, 1679, Breslau), poet who was the leading representative of the "Second Silesian School," the German counterpart to the Baroque extravagance of the Italian poets Giambattista Marino and Giovanni Battista Guarini and the Spanish poet Luis de Góngora.

While studying at Danzig, he met and was influenced by the great writer and theorist

Hofmannswaldau, engraving by Phillip Kilian
Historia-Photo

Martin Opitz. Having travelled widely, he returned to Breslau in 1646 to take a leading administrative post, which he held until his death. He wrote a quantity of verse, both religious and secular, characterized by eroticism and by exaggerated, high-flown expression. His most characteristic work is *Heldenbriefe* (1663; "Heroes' Letters"), a collection of prose and verse love letters giving full rein to his lascivious, extravagant style. He also published another collection of verse, *Grabschriften* (1643; "Epitaphs"), and *Deutsche Übersetzungen und Gedichte* (1673; "German Translations and Poetry"); his translations include Guarini's famous poem "Il pastor fido."

Hofmeister, Sebastian, byname OECONOMUS (b. 1476, Schaffhausen, Switz.—d. June 26, 1533), Swiss religious Reformer who was a prominent figure in the debates of the early Reformation.

Hofmeister was received into the Roman Catholic order of Franciscans at Schaffhausen, and he subsequently studied several years in Paris, where he was named a doctor of Scriptures (1519). In 1520 he was sent as a lecturer to Zürich and later the same year to Constance. Under the influence of the Swiss Protestant Reformer Huldrych Zwingli, he began openly to preach Reformation doctrines at Lucerne (1522) and was consequently expelled from the town.

Returning to Schaffhausen, Hofmeister became the city's principal Reformer before he was forced to flee again (1525), eventually finding safety in Zürich. He enjoyed an active role in the early Reformation debates: at the first Zürich disputation (Jan. 29, 1523); the second Zürich disputation (Oct. 26–28, 1523), over which he initially presided; and the disputation of Bern (January 1528). He participated in the Anabaptist (radical Reformers advocating adult Baptism) colloquies at Zürich and supervised the recantation of the Anabaptist leader Hans Pfistermeyer at Bern (April 19, 1531). He also preached in Sankt Gallen and Basel, corresponded with Martin Luther, and wrote several minor works, including an autobiography.

Hofmeister, Wilhelm (Friedrich Benedikt) (b. May 18, 1824, Leipzig—d. Jan. 12, 1877, Lindenau, near Leipzig), German botanist whose investigations of plant structure made him a pioneer in the science of comparative plant morphology.

Hofmeister entered his father's publishing business at the age of 17. Although he was completely self-taught, in 1863 he was appointed professor of botany and director of the botanical garden at Heidelberg; he became professor at Tübingen in 1872.

Hofmeister's first botanical paper was published in 1847. "Die Entstehung des Embryo der Phanerogamen" ("The Genesis of the Embryo in Phanerogams") was published two years later and won for him an honorary degree from the University of Rostock. In that paper he described in detail the behaviour of the nucleus in cell formation and proved the invalidity of the theory that plant embryos develop from the tip of the pollen tube.

Hofmeister's most brilliant achievements are to be found in his book on comparative morphology, *Vergleichende Untersuchungen . . .* (1851; *On the Germination, Development, and Fructification of the Higher Cryptogamia and on the Fructification of the Coniferae,* 1862), in which he points out the relationships among various cryptogams and establishes the position of the gymnosperms (*e.g.,* conifers) between the cryptogams (*e.g.,* ferns, mosses, algae) and the angiosperms (flowering plants). Hofmeister was also the discoverer of the regular alternation of a sexual and an asexual generation in mosses, ferns, and seed plants.

Hofmeyr, Jan (Hendrik) (b. July 4, 1845, Cape Town—d. Oct. 16, 1909, London), statesman and leader of the Afrikaner Bond (a political party of Dutch South Africans) of the Cape Colony. The son of a viticulturist, he was educated at the South African College, Cape Town, and rose to prominence as a journalist. In 1878 he formed the Farmers' Protection Association, whose aims were basically agricultural, and entered the Cape Colony Parliament as member for Stellenbosch. For the next 16 years, he served in Parliament as the recognized leader and spokesman for the Cape's Dutch population.

Much of Hofmeyr's political strength derived from his paramount position in the Afrikaner Bond, which he adroitly united with his Farmers' Protection Association in 1883. Though only briefly a member of a ministry (1884), he wielded considerable influence as a representative of the colony on various occasions. Gradually recognizing the value of closer ties with the British, Hofmeyr played a significant role in the imperial conferences of 1887 and 1894. By the time Cecil Rhodes became prime minister (1890–95), Hofmeyr was his close friend and supported his expansionist schemes. The Jameson Raid (Dec. 29, 1895) against the Boers in the Transvaal, however, ended their collaboration. After strongly condemning the raid, Hofmeyr turned his energies to the prevention of war between the British and the Boers. He persuaded Pres. Paul Kruger of the Transvaal to make concessions, but the Cape governor, Lord Milner, refused to yield.

During the South African War (1899–1902), a sick and dispirited Hofmeyr retired to Europe. He returned after the conflict to effect a reconciliation between the British and the Boers. As South Africa moved toward union, he supported a federal rather than a unitary system and championed the use of the Dutch language. Because of his great influence with the Dutch population, who affectionately called him "Onze [Our] Jan," Hofmeyr was asked to join the delegation that presented the final draft of the proposed union to the British government in London.

Hofsjökull, large glacier in central Iceland that covers a circular area (384 sq mi [994 sq km]) nearly 25 mi (40 km) in diameter. It rises to a height of 5,791 ft (1,765 m) in the centre, and its meltwaters feed several rivers, including the Héradhsvötn, Thjórsá, Ölfusá, and Blandá.

Hofstadter, Richard (b. Aug. 6, 1916, Buffalo, N.Y., U.S.—d. Oct. 24, 1970, New York City), U.S. historian whose popular books on the political, social, and intellectual trends in U.S. history garnered two Pulitzer Prizes.

He studied at the University of Buffalo (B.A., 1937) and Columbia University (M.A., 1938; Ph.D., 1942). From 1942 to 1946 he taught at the University of Maryland and then returned

to teach at Columbia (1946–70), remaining there for the rest of his career.

His works, several of which were best-sellers, used much sociological thought in his interpretations of U.S. history. His books include *The American Political Tradition* (1948), *The Age of Reform* (1955; 1956 Pulitzer Prize), *The Paranoid Style in American Politics* (1965), *The Idea of a Party System* (1969), and *American Violence* (1970). His *Anti-Intellectualism in American Life* (1963), which won the 1964 Pulitzer Prize, presented his controversial thesis that the egalitarian, Populist sentiments of Jacksonian democracy, themes that have echoed recurrently through U.S. political history, produced in many Americans a deep-seated prejudice against intellectuals, who are perceived as representatives of an alien elite.

Hofstadter, Robert (b. Feb. 5, 1915, New York City), U.S. scientist who was a joint recipient of the Nobel Prize for Physics in 1961 for his investigations of protons and neutrons, which revealed the hitherto unknown structure of these particles. He shared the prize with Rudolph Ludwig Mössbauer of Germany.

Hofstadter joined the faculty of Princeton University in 1946, where his principal scientific work dealt with the study of infrared

Hofstadter
By courtesy of Stanford University News Service

rays, photoconductivity, and crystal and scintillation counters. In 1950 he went to Stanford University, where he used the linear electron accelerator to measure and explore the structure of atomic nuclei. He found that both the proton and neutron have a central, positively charged core surrounded by a double cloud of pi-mesons. Both clouds are positively charged in the proton, but in the neutron the inner cloud is negatively charged, thus giving a net zero charge for the entire particle.

Hōfu, city, Yamaguchi Prefecture (*ken*), Honshu, Japan, facing the Inland Sea. Numerous prehistoric remains and tombs of the Tumulus period indicate that it was an early cultural centre. During the Tokugawa period (1603–1867) Hōfu was a post town and an important shipping port for salt. It served as the capital of Suō Province (now part of Yamaguchi Prefecture) until 1868. Despite its location on the railway between Kōbe and Moji, industrial development was slow. Hōfu now has textile, chemical, and food-processing plants. The salt works were abandoned in 1960. The Shintō Temmangū (Temman Shrine) at Hōfu is dedicated to the 9th-century scholar and statesman Sugawara Michizane, who was falsely accused of conspiring against the Emperor in 901. Pop. (1983 est.) 116,699.

Gate to the Shintō Temmangū (Temmon Shrine), Hōfu, Japan
Photos Pack—EB Inc.

Hofuf (Saudi Arabia): *see* Hufūf, al-.

Hofzinser, Johann Nepomuk (b. July 6, 1806, Vienna—d. March 1, 1875, Vienna), amateur conjurer who was one of the most brilliant inventors of small manipulative tricks, especially with playing cards. Hofzinser, who never appeared outside Austria, was one of the first to advocate simplicity of performance, eliminating elaborate costumes and stage apparatus. Although he requested that his magic secrets be buried with him, Ottokar Fischer searched Hofzinser's correspondence to friends to compile *Kartenkünstler* (1910; "Card Tricks").

hog, domestic swine. *See* pig.

hog cholera: *see* swine fever.

hog house, also called PIGPEN, building for housing swine, particularly one with facilities for housing a number of hogs under one roof. Typical housing protects against extremes of heat and cold and provides draft-free ventilation, sanitary bedding, and feeding. Simple hog houses are sometimes called sties.

Movable houses may be prefabricated or home-built with or without floor, single walled, and with burlap sacking for a door. They can be relocated on clean ground each season.

Enclosed houses, used mainly for herds of 12 sows or more, usually have concrete floors, smooth walls, and insulation. They may be air-conditioned or ventilated, and heated with unit heaters, underfloor hot-water pipes, or heat lamps. Farrowing stalls, sometimes called crates, may be used to confine the sow so that she may stand or lie down but cannot move about and accidentally crush her young.

hog plum, also called YELLOW MOMBIN (*Spondias mombin*), ornamental purplish green flowered tree, of the cashew family (Anacardiaceae), native to tropical areas of the world.

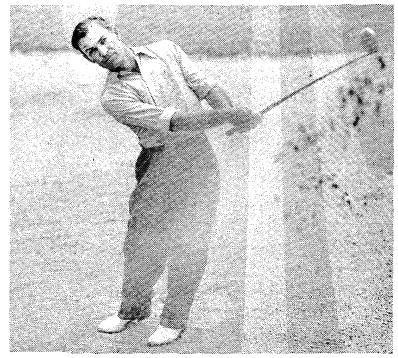
Hog plum (*Spondias mombin*)
W.H. Hodge

The hog plum and several other species of the genus *Spondias* are cultivated for their edible, plumlike fruits, called ciruela. The large stone in each fruit bears many spines and is difficult to separate from the pulp.

hogan, dwelling of the Navajo Indians of Arizona and New Mexico. The hogan is a roughly circular structure constructed usually of logs and mud but occasionally of stone. To form the roof, logs are stepped in gradually to create a dome shape. The whole structure, except for a circular opening in the roof to allow smoke to escape, is then covered with mud, dirt, or, sometimes, sod. The framed entrance generally faces east, toward the rising sun, and is usually covered with a blanket.

The hogan is a primitve dwelling without windows or interior divisions. Usually there is little or no furniture, and the family sits and sleeps around the fire on sheepskins placed directly on the earthen floor.

Hogan, Ben, byname of WILLIAM BENJAMIN HOGAN (b. Aug. 13, 1912, Dublin, Texas, U.S.), U.S. professional golfer who became supreme in the decade after World War II. His exceptional will enabled him to play winning golf after an automobile accident (1949) in which he was injured so severely that he was not expected to walk again.



Hogan, 1945
UPI/EB Inc.

Hogan became a golf professional in 1931. Before his injury he won the U.S. Professional Golfers' Association of America (PGA) championship twice (1946 and 1948) and the United States Open (1948). He also was a three-time winner (1940, 1941, and 1948) of the Vardon Trophy, awarded annually for the lowest stroke average in PGA-approved tournaments. He was the leading money winner on the PGA tours of 1940, 1941, 1942, 1946, and 1948. After his recovery he won the U.S. Open three more times (1950, 1951, and 1953), the Masters Tournament twice (1951 and 1953), and the British Open on his first attempt (1953).

In the late 1950s he organized a golf-equipment company in Fort Worth, Texas, and played in tournaments intermittently thereafter. He retired in 1970. His career was the subject of a motion picture, *Follow the Sun* (1951).

Hogarth, David George (b. May 23, 1862, Barton-upon-Humber, Lincolnshire, Eng.—d. Nov. 6, 1927, Oxford, Oxfordshire), English archaeologist, director of the Ashmolean Museum, Oxford (1909–27), and diplomat who was associated with the excavation of several important archaeological sites.

David George Hogarth
Reproduced by permission of the Royal Geographical Society

Around 1900 Hogarth assisted in Sir Arthur Evans' excavation of Knossos, Crete; in 1904–05 he led an excavation of the Temple of

Artemis at the site of ancient Ephesus, now in Turkey, and he wrote *The Archaic Artemisia of Ephesus* (1908). In 1911 he began the second major attempt at unearthing a capital of Hittite culture, Carchemish, in present-day Syria, and prepared a report of his findings in 1914. Sent to Cairo by the British government to help organize an Arab revolt against Turkish rule (1915), he subsequently became associated with T.E. Lawrence ("Lawrence of Arabia") and in 1919 served as British commissioner at the Middle East commission of the Paris Peace Conference. Over the years Hogarth enriched the Hittite and Cretan archaeological collections of the Ashmolean and published *Hittite Seals* (1920) and *Kings of the Hittites* (1926). His *Wandering Scholar in the Levant* (1896) was a popular contribution to travel literature.

Hogarth, William (b. Nov. 10, 1697, London—d. Oct. 26, 1764, London), the first great English-born artist to attract admiration abroad, best known for his moral and satirical engravings and paintings; *e.g.*, "A Rake's Progress" (eight scenes, begun 1732). His attempts to build a reputation as a history painter and portraitist, however, met with financial

"The Painter and His Pug," a self-portrait by William Hogarth in 1745, oil on canvas; in the Tate Gallery, London

By courtesy of the trustees of the Tate Gallery, London

disappointment, and his aesthetic theories had more influence in Romantic literature than in painting.

Youth and early career. Hogarth, the only son of Richard Hogarth, a minor classical scholar and schoolmaster, grew up with two sisters, Mary and Ann, in the heart of the teeming city. Richard's evident abilities as a classicist brought him scant reward but provided an educated and industrious, if not prosperous, home. Looking back on this period later, Hogarth dwelt almost exclusively on his father's shabby treatment at the hands of printers, booksellers, and wealthy patrons. Apart from confirming his distrust of learning, his resentment at his father's disappointing experiences fostered the boy's self-assertiveness and independence of character.

As a boy with little inclination to scholarship but gifted with a lively perception of the world around him, he enjoyed mimicking and drawing characters, interests that were encouraged by visits to a local painter's workshop. While not discouraging his artistic inclinations, his father, Hogarth later complained, could do little more "than put me in a way of shifting for myself." He consequently sought the security of a solid craftsman's training and became apprenticed, at about the age of 15, to a silversmith. Hogarth presumably moved to his master's house, where he learned to engrave gold and silver work with armorial designs—in his own phrase, the "monsters of heraldry." Valuable years lost on what the engraver George Vertue aptly termed "low-shrubb instructions" had crucial bearing on Hogarth's subsequent development. Apart from the insecurity they bred, Hogarth's frustration with his training led him to exploit unorthodox methods of self-instruction in order to make up for lost time. His originality and flexibility as an artist owed much to this pragmatic and unconventional approach to his career.

Hogarth's years of apprenticeship were by no means devoted exclusively to hard work, however. Sociable and fond of fun, a keen and humorous observer of human behaviour, with a special love of the theatre and shows of all kinds, he was evidently a convivial companion. Never prudish, he knew the exuberant life of the London streets, bawdy houses, fairs, and theatres at first hand and derived from them a fertile appreciation of the vitality of popular tradition. At the same time, he felt drawn to the coffeehouses and taverns frequented by writers, musicians, actors, and liberal professionals, forming lasting friendships in such lively intellectual circles. His sympathies rested with the middle classes and, specifically, with the critical, enlightened element—rational, tolerant, and humanitarian—that played such a prominent role in the cultural life of Hanoverian England.

George I had been king for six years when Hogarth set up shop on his own at the age of 23, resolving to escape the rigid limitations of his trade. He began by attending a private drawing school in St. Martin's Lane, where he joined other students drawing from casts and live models. He had a natural distaste for copying, however, likening it to emptying water from one vessel into another, and this instinctive rejection of formal training, combined with a natural waywardness, convinced him that the best method of learning to draw lay in direct attention to actual life. An intuitive realist, primarily concerned with expressive rather than formal values, he developed a kind of visual mnemonics: "the retaining in my minds eye without drawing on the spot whatever I wanted to imitate." From close observation of the everyday scene, Hogarth trained his unusual visual memory until he could dispense with preliminary studies, committing his ideas directly to paper or canvas. This inspired improvisation was supplemented by a formidable knowledge of the European tradition in art, acquired through familiarity with a vast range of reproductive engravings. Meanwhile, he earned his living as a copper engraver, executing trade cards, tickets, and book illustrations. His growing success as an illustrator brought Hogarth little satisfaction, for it entailed unwelcome dependence on the booksellers who had exploited his father; he later insisted that engraving "did little more than maintain myself in the usual gaities of life but (was) in all a punctual paymaster." He had long been an admirer of Sir James Thornhill's fluent adaptation of the late Baroque style, and in 1724 he joined a drawing school, newly opened in Thornhill's house. It was the start of a critical association. Holding the official post of serjeant painter to the King and being the first knighted English-born artist, Thornhill in his career affirmed the vitality of native art and the social respectability of the artist. Hogarth cared passionately about both, primarily for personal reasons but also because he believed in art as a vital creative force in society. He despised the connoisseurs' exclusive admiration for the old masters and their prejudice in favour of foreign artists. In his first major work, published independently of the booksellers in 1724, "Masquerades and Operas," Hogarth attacked contemporary taste and expressed attitudes that were vigorously sustained throughout his life. Boldly questioning the standards of a powerful clique that was supported by the Earl of Burlington, an influential art patron, Hogarth's first blow with the connoisseurs was shrewdly designed to appeal to his hero, Thornhill, who was himself suffering from Burlington's Neoclassical revival. Thus, Hogarth made powerful enemies at the start of his career, and when they retaliated in about 1730 by nullifying royal interest in his work, he was cruelly disappointed. Indeed, despite his own intransigent frankness, Hogarth was always discouraged and offended when his opponents hit back.

A lawsuit he brought in 1728 against Joshua Morris, a tapestry weaver, throws eloquent light on his susceptibilities. The details of the case reveal that, by the age of 30, Hogarth felt sufficiently confident of his abilities to embark on a painting career. Morris failed to share this confidence and rejected a painting he had ordered on grounds that it was not finished. Hogarth indignantly sought and obtained public vindication with the help of professional witnesses, including Thornhill. Their testimony was amply justified by his first dated painting, "The Beggar's Opera" (1728), a scene from John Gay's popular farce on lowlife, which emphasized Hogarth's prevailing interests: his involvement with the theatre and with down-to-earth, comic subjects. Closely attentive to realistic detail, he recorded the scene exactly as it appeared to the audience and included portraits of the principal actors and spectators. He thus anticipated both his later narrative paintings and the small, informal group portraits, or "conversation pieces," that occupied him in the years immediately after this auspicious debut.

Reputation and success. Hogarth eloped in March 1729 with Thornhill's daughter Jane. The marriage proved stable and contented, though childless. A few months later, Vertue remarked on his public success with "conversations," and in the next few years, these small paintings, which acknowledged a great debt to the early 18th-century painter Antoine Watteau and the elegance of French Rococo art, brought Hogarth an appreciative and wealthy clientele. Though he displayed remarkable energy at the time, Hogarth quickly tired of these little works, which involved numerous portraits for relatively poor remuneration. For his own enjoyment he began to record humorous scenes from everyday life. The crowded canvas of "Southwark Fair" (1733) captures the noisy and exuberant vigour of a popular festival and shows Hogarth feeling his way toward a completely new kind of narrative art based on vivid appreciation of contemporary life. Friends he made in the theatrical world, the actor-manager David Garrick and writer Henry Fielding, shared his enthusiasm for honest naturalism in art. Like his great predecessor, the 16th-century Flemish painter Pieter Bruegel the Elder, Hogarth wanted to extract entertaining and instructive incidents from life. In telling the story of a young country girl's corruption in London and her consequent miseries, he not only ridiculed the viciousness and follies of society but painted an obvious moral. The engravings were aimed at a wide public, and their tremendous success immediately established Hogarth's financial and artistic independence. He was henceforth free, unlike most of his colleagues, to follow his own creative inclinations. To safeguard his livelihood from unscrupulously pirated editions, he fought to obtain legislation protecting artist's copyright and held back the eight-part "Rake's Progress" until a law of that nature, known as the Hogarth Act, was passed in 1735. In the following year Hogarth moved into the house in Leicester Fields that he was to occupy until his death.

Historical and portrait painting. After Thornhill's death, in 1734, Hogarth reestablished his drawing school on a cooperative basis, and it became an important arena for artistic discussion and experiment. In 1735, in line with the humanitarian concern that occupied enlightened opinion of the day, he was elected a governor of St. Bartholomew's Hospital, and he seized this opportunity to decorate the main staircase with two large religious works, "Pool of Bethesda" and "The Good Samaritan." In abandoning comic narrative and genre for history painting, he was generally held to have overreached himself, however, and modern critics have tended to endorse this opinion.

In about 1740 he turned once again to painting portraits, chiefly of middle-class sitters. He derived special enjoyment from painting the full-length, seated portrait of his friend, the philanthropist Captain Thomas Coram—a compelling and deeply sympathetic image that injected the dead aristocratic tradition with forthright realism and carried far-reaching implications for European portraiture. Hogarth, well aware of its importance, judiciously placed it on semipublic display at the Foundling Hospital, a benevolent institution for orphan children established by Coram in 1739. From the start Hogarth played an active role in the affairs of this charitable venture, and when the buildings were completed in 1745 he persuaded a group of fellow artists to join him in contributing paintings as edifying decoration. Their cooperative effort produced the first public exhibition of contemporary art in England and was a vital step toward the foundation of the Royal Academy in 1768.

The famous self-portrait of 1745, a year that marked, in many ways, the high point of Hogarth's career, was also an artistic manifesto. He mischievously juxtaposed his own blunt and intelligent features with those of his sturdy pug-dog, Trump, and placed volumes of the great English writers William Shakespeare, John Milton, and Jonathan Swift beside a palette inscribed with the sinuous "line of beauty," his shorthand symbol for the variety, intricacy, and expressiveness of Nature. In the same year he published the long-announced prints of "Marriage à la Mode," censuring the marriage customs of the upper classes, for which he had completed the paintings in May 1743.

Return to prints. Apart from a gratifying commission for a large history piece, which he won from the lawyers of Lincoln's Inn (one of the four legal societies and schools in London), Hogarth concentrated for the next few years on simple, didactic prints aimed at an unrefined public, executed from drawings not paintings. "Beer Street," "Gin Lane," and "Four Stages of Cruelty" (1751) he cut deliberately crudely on wood blocks to make them cheaper and facilitate a wide distribution. "Industry and Idleness" (1747) contains, in addition to its obvious moral message, a good deal of self-dramatization, depicting the virtuous apprentice made good in a hostile world. In these years Hogarth's uncertainty and frustration expressed themselves in a number of unfinished paintings. In several spontaneous sketches, he succeeded where he had failed in his heroic pictures and synthesized dynamic elements of the 17th-century Baroque style with an uncompromising realism and fully expressive handling of the paint. These sketches were ignored in his lifetime, and it is only in the wake of the 19th-century Impressionist movement that such sketches have received serious attention.

In 1745 and again in 1751 Hogarth organized auctions of his work. Both fetched extremely low prices, and Hogarth, in anger and mortification, retreated into aggrieved isolation, pursuing his philanthropic interests but adopting, in public, a defiant and defensive pose that involved him in increasingly rancorous debate on artistic matters. He expounded his own theories in *The Analysis of Beauty* (1753), combining practical advice on painting with criticism of the art establishment. He expressed his belief in the "beauty of a composed intricacy of form," which "leads the eye a kind of chace" and advocated variety, irregularity, movement, and exaggeration in the interests of greater expressiveness. Though his ideas were respectfully received, especially on the Continent, the book inspired much adverse comment from his opponents.

His large "Election" series (1754–58), painted with elaborate care, was a last attempt to prove the dignity of "comic history painting," and thereafter he painted little of importance. His appointment as sergeant painter to George III, contrived in 1757, revived some interest in portraiture, but his last years, when he probably suffered considerable ill health, were dominated by the acrimony induced by a patron's rejection of his painting "Sigismunda" (1759) and the outraged public opinion over his satiric political print "The Times, I" (1762).

Obsessive to the last, a few months before his death he executed an engraving sardonically titled "Tail-Piece," or "The Bathos," in which he sombrely depicted the demise of his own artistic world. In a sense it was prophetic, for as the 19th-century English painter John Constable rightly remarked, "Hogarth has no school, nor has he ever been imitated with tolerable success." His immediate influence had been more strongly felt in literature than painting, and after his death it was significantly the Romantics, many of whose ideas Hogarth had anticipated, who first recognized his greatness. Though never neglected, Hogarth was chiefly remembered for his satiric engravings, and like that other lonely pioneer, the 19th-century painter J.M.W. Turner, the implications of his work were better understood on the Continent than in England.

(S.E.B./Ed.)

MAJOR WORKS. *Paintings.* "The Beggar's Opera" (1728; Tate Gallery, London); "Captain Woodes Rogers and His Family" (1729; National Maritime Museum, Greenwich, London); "The Wedding of Stephen Beckingham and Mary Cox" (1729–30; Metropolitan Museum of Art, New York City); "A Musical Party" (*c.* 1730; Fitzwilliam Museum, Cambridge, Eng.); "The Fountaine Family" (*c.* 1730; Philadelphia Museum of Art); "A Fishing Party" (*c.* 1730; Dulwich College Picture Gallery, London); "The Conquest of Mexico (The Indian Emperor)" (1731; Earl of Ilchester's Collection, London); "The Cholmondeley Family" (1732; Marquis of Cholmondeley's Collection); "A Rake's Progress" (eight scenes, begun 1732; Sir John Soane's Museum, London); "Southwark Fair" (1733; Lady Oakes' Collection); "The Distressed Poet" (*c.* 1735; City Museum and Art Gallery, Birmingham, Eng.); "The Good Samaritan" (1735; St. Bartholemew's Hospital, London); "The Four Times of the Day" (*c.* 1736; Viscount Bearsted and the Earl of Ancaster Collection); "Captain Thomas Coram" (1740; Foundling Hospital, London); "Miss Mary Edwards" (*c.* 1740; Frick Collection, New York City); "The Graham Children" (1742; National Gallery, London); "Marriage à la Mode" (six scenes, 1743; Tate Gallery); "Garrick in the Character of Richard III" (1745; Earl of Feversham Collection); "Mrs. Elizabeth Salter" (1744; National Gallery); "Self-Portrait" (1745; National Gallery); "Lord George Graham in His Cabin" (1745; National Maritime Museum); "Moses Brought Before Pharaoh's Daughter" (1746; Foundling Hospital); "An Election" (four scenes, 1754–58; Sir John Soane's Museum); "The Ascension" (1756; St. Mary Redcliffe, Bristol, Eng.); "Hogarth's Servants" (*c.* 1758; National Gallery); "Picquet, or Virtue in Danger" (1758–59; Albright-Knox Art Gallery, Buffalo); "The Shrimp Girl" (*c.* 1759; National Gallery).

Engravings. "Masquerades and Operas" (1724; Burlington Gate); "A Harlot's Progress" (1731–32); "A Rake's Progress" (1735); "The Strolling Actresses Dressing in a Barn" (1738); "Marriage à la Mode" (1745); "Industry and Idleness" (1747); "Beer Street" and "Gin Lane" (1751); "The Four Stages of Cruelty" (1751); "The Invasion" (two plates, 1756); "The Bench" (1758); "The Times, I" (1762).

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hogchoker, North American fish, a species of sole (*q.v.*).

Hōgen Disturbance, Japanese HŌGEN NO RAN (July 1156), in Japan, conflict in the Hōgen era between the Taira and Minamoto clans that marked the end of the Fujiwara family's dominance of the monarchy and the start of a prolonged period of feudal warfare.

The conflict began as a dispute over control of the Imperial court between the retired emperor Sutoku and the reigning emperor Go-Shirakawa. When the head of the Fujiwara family, which had controlled the position of chief councillor, or *kampaku,* since 857, supported Go-Shirakawa, Sutoku called in a band of Minamoto and Taira warriors headed by Minamoto Tameyoshi. Another group of warriors headed by Taira Kiyomori then came to the aid of the opposing side. Kiyomori's forces were victorious; Tameyoshi was executed, and Sutoku was exiled. Fujiwara leadership had been proven ineffective, however, and the Taira family came into real control of the government.

Three years later, Minamoto Yoshitomo, the head of the Minamoto forces that had allied with Taira Kiyomori in 1156, attempted a coup d'etat against Taira leadership. In the ensuing Heiji Disturbance (Heiji no ran), Kiyomori emerged victorious, and the Taira consolidated their hold over the country.

Hogendorp, Dirk van (b. Oct. 13, 1761, Hoenvliet, Neth.—d. Oct. 29, 1822, Rio de Janeiro), Dutch statesman and official of the Dutch East India Company who tried to incorporate the liberal ideas of the French Revolution into Dutch colonial policy and thereby stimulated wide controversy.

Trained as a soldier, van Hogendorp went to the Indies in 1783 on a naval expedition, and

three years later he was hired by the Dutch East India Company as a commercial agent in Patna, India, where he became familiar with the British system of direct administration and taxation during his two-year stay. His liberal ideas aroused the displeasure of the Indies governor general, Sebastian Nederburgh, who imprisoned him in 1798. He escaped to the Netherlands, where the publication of his pamphlet *Report on Conditions in the Batavian Possessions in East India* caused a sensation. His report shocked many Dutchmen because of its suggestion that the Indonesians were guided by the same economic principles as those of Europeans.

At that time, the company had only just turned the Indies over to the Dutch government, which then had to formulate a colonial policy. Van Hogendorp was put on the committee charged with drawing up a new charter, but his ideas were overruled by the other, conservative, committee members.

Van Hogendorp continued his career in the Dutch state department until Napoleon annexed the Netherlands in 1810, when he went to France as an aide to Napoleon. After Napoleon's fall (1815), he went to Brazil to recoup his fortunes but died impoverished.

hogfish, any of certain species of fishes in the wrasse family, Labridae (order Perciformes). Although representatives of the family are found in tropical to temperate oceans of the world, the hogfishes occur in the Atlantic, predominantly in the West Indies.

One hogfish, *Lachnolaimus maximus*, usually occurs in the warm subtropical marine waters from Florida to Bermuda to the Caribbean. Most specimens are red to pinkish in colour, and many reach a length of 60 centimetres (2 feet). Characteristically three or four anterior spines of the dorsal fin are lengthened into filamentous extensions.

The spotfin hogfish and the Spanish hogfish belong to the genus *Bodianus* and occupy the same geographic range as *L. maximus*. The spotfin hogfish seldom attains a length of more than 15 cm and is sometimes used in marine aquariums.

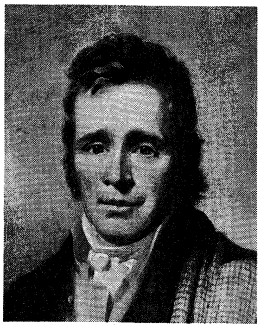
Hogg, Douglas McGarel, 1ST VISCOUNT HAILSHAM OF HAILSHAM (b. Feb. 28, 1872, London—d. Aug. 16, 1950, Carter's Corner Place, Sussex, Eng.), British lawyer and politician, a prominent member of the Conservative Party in both the House of Commons and the House of Lords.

Hogg was the son of Quintin Hogg, founder of the Royal Polytechnic Institution in Regent Street, London. On leaving Eton, Hogg spent eight years with his father's firm of West India merchants. After serving in the South African War (1899–1902), he was called to the bar (1902) and forthwith took a leading position as a junior.

His deadly power of cross-examination, easy mastery of facts and figures, and persuasive speech made him formidable in every kind of case. In 1922, on entering Parliament as Conservative member for Marylebone, he became attorney general in Bonar Law's government, receiving the usual knighthood given to a law officer. In opposition or in office he showed himself a powerful debater; he vigorously attacked the dropping of the prosecution of J.R. Campbell, a Communist journalist accused of tampering with military discipline. His speech in Commons on the subject had not a little to do with the defeat of Ramsay MacDonald's government in 1924. Hogg was attorney general from 1924 to 1928, when he was created a baron; in 1929 he was created a viscount. He was lord chancellor 1928–29; secretary of state for war 1921–35, and lord chancellor 1935–38.

Hogg, James (baptized Dec. 9, 1770, Ettrick, Selkirkshire, Scot.—d. Nov. 21, 1835, Altrive, Yarrow, Selkirkshire), Scottish poet, known as the "Ettrick Shepherd," who enjoyed a vogue during the ballad revival that accompanied the Romantic movement.

Hogg spent most of his youth and early manhood as a shepherd and was almost entirely self-educated. His talent was discovered



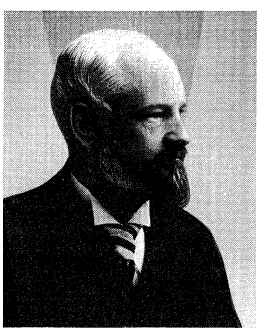
James Hogg, detail of an oil painting by W. Nicholson; on loan to the Scottish National Portrait Gallery, Edinburgh

By courtesy of Mrs. Lawrence MacEwen; photograph, Scottish National Portrait Gallery, Edinburgh

early by Sir Walter Scott to whom he supplied material for Scott's *Minstrelsy of the Scottish Border*. Before publishing *The Queen's Wake* (1813), a book of poems concerning Mary Stuart, Hogg went in 1810 to Edinburgh, where he met Lord Byron, Robert Southey, and William Wordsworth. Of Hogg's prolific poetic output only a few narrative poems and ballads included in the *Wake* are of lasting value. Among them are "Kilmeny" and "The Witch of Fife."

Hogg, Quintin (b. Feb. 14, 1845, London—d. Jan. 17, 1903, London), English philanthropist, social reformer, and founder of the Polytechnic, which became a model for later social and educational centres for underprivileged youth. For more than three decades, Hogg and his wife devoted their time and fortune to working among poor young people in London.

Educated at Eton at a time when England was in a ferment of religious revivalism, Hogg, who took a position in a tea business in a poor section of London, was moved to sympathy for the waifs playing in nearby streets. In an effort to obtain firsthand experience with the problems of lower-class children, he disguised himself as a shoeblack and worked nights alongside these boys. His attempt to teach reading, with the Bible as a textbook, to two crossing sweepers led to the opening of his "ragged school" in Of Alley, Charing



Quintin Hogg

BBC Hulton Picture Library

Cross. The school was moved to Castle Street in 1868. By means of trade classes and a combination of education and religious work, Hogg hoped to reconstruct the lives of destitute children.

In 1878 Hogg set up his Working Lads' Institute at Long Acre. Three years later he acquired a run-down building in Regent Street known as the Polytechnic, which he repaired and converted to "the instruction of artisans and clerks in the principles and, to some extent, the practice of their breadwinning pursuits." His work was carried on without public funds until 1889, when it won the support of the London County Council, and within four years other branches of the Polytechnic were established.

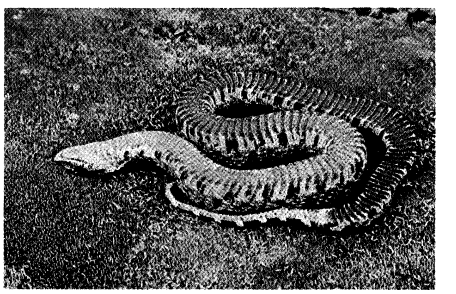
Hogg, Thomas Jefferson (b. May 24, 1792, Norton, Durham, Eng.—d. Aug. 27, 1862, London), English writer best known as the first biographer of his friend Percy Bysshe Shelley.

The Life of Shelley, 2 vol. (1858), throws much light on the poet's character through the use of anecdotes and letters and contains a good deal of material relating to Hogg himself. It was to have been in four volumes; but the Shelley family, objecting to the autobiographical content of the first two volumes, refused Hogg access to sources necessary for completing the *Life*. Hogg met Shelley at Oxford and was expelled with him in 1811 for his share in writing a pamphlet called "The Necessity of Atheism." He later studied law at London's Middle Temple and became a barrister in 1817.

Hoggar (mountains, Africa): *see* Ahaggar.

Hogni (legendary hero): *see* Hagen.

hognose snake (*Heterodon*), any of three or four species belonging to the family Colubridae. They are named for the upturned snout,



Hognose snake (*Heterodon platyrhinos*) playing dead

Jack Dermid

used for digging. These are the harmless but often avoided puff adders, or blow snakes, of North America: when threatened they flatten the head and neck, then strike with a loud hiss—rarely biting. If their bluff fails, they roll over, writhing, and then "die" with mouth open and tongue lolling.

Hognose snakes live chiefly on toads and frogs. They lay 15 to 27 eggs underground. The widely distributed species are the eastern (*Heterodon platyrhinos*) and western (*H. nasicus*). Both are heavy bodied and blotchy; usual length is about 60 centimetres (24 inches).

hognut: *see* earthnut.

Hogoleu (Caroline Islands): *see* Truk Group.

hogweed, any of certain plant species of the cow parsnip (*q.v.*) group.

Hohe Tauern, segment of the Eastern Alps in southern Austria, extending for 70 mi (110 km) between the Zillertal Alps (*q.v.*) and the Italian border (west) and Katschberg Pass (east). Within the range lie many lofty peaks, including Grossglockner (*q.v.*; 12,457 ft [3,797 m]), the highest point in Austria. Other summits are Grossvenediger, Sonnblick, Dreiherrnspitze (Italian Picco dei Tre Signori), Ankogel, and Hochalmspitze. The range is crossed by road through the Felber Tauern Tunnel (east of Grossvenediger) and through the Hochtor Tunnel (east of Grossglockner). A railroad line (built 1901–09) uses the Tauern

Tunnel (5 mi long) linking the towns of Spittal an der Drau (southeast) and Schwarzach im Pongau (north). The region is popular for its mountain climbing and skiing.

Hohenheim, Philippus Aureolus Theophrastus Bombast von (alchemist): *see* Paracelsus.

Hohenlohe FAMILY, German princely family which took its name from the district of Hohenlohe in Franconia. First mentioned in the 12th century as possessing the castle of Hohenloch or Hohenlohe, near Uffenheim, the family soon extended its influence over several of the Franconian valleys, including those of the Kocher, the Jagst, and the Tauber. Henry I (d. 1183) was the first to take the title of count of Hohenlohe, and in 1230 his grandsons Gottfried and Conrad, supporters of the emperor Frederick II, founded the lines of Hohenlohe—Hohenlohe and Hohenlohe-Brauneck. The latter became extinct in 1390, while the former was divided into several branches—the branches themselves dividing into further branches. One branch, the line of Hohenlohe-Neuenstein, which became Protestant during the Reformation, did not receive the rank of princes of the Holy Roman Empire until 1764. Another branch, the line of Hohenlohe-Waldenburg, which remained Catholic, attained princely rank in 1744.

Hohenlohe-Ingelfingen, Friedrich Ludwig, Fürst zu (prince of) (b. Jan. 31, 1746, Ingelfingen, Württemberg—d. Feb. 15, 1818, Castle Slawenitz, Silesia), Prussian field marshal who commanded one of the two Prussian armies that were decisively defeated by

Hohenlohe-Ingelfingen, engraving by Wilhelm Arndt, c. 1795

Archiv fur Kunst und Geschichte, West Berlin

Napoleon at the twin battles of Jena and Auerstädt in 1806, a disaster that turned his country into a French dependency.

Hohenlohe entered the Prussian Army in 1768, distinguishing himself in the War of the Bavarian Succession (1778–79). He became governor of Berlin in 1791 and participated in the campaign on the Rhine against revolutionary France in 1794. After war broke out again in 1806, he was given command of one of the two Prussian armies facing Napoleon. Disagreements with the commander in chief, Charles William Ferdinand, duke of Brunswick, caused a disastrous lack of coordination between the two armies. Napoleon practically destroyed Hohenlohe's force at Jena on Oct. 14, 1806. Retreating to Prenzlau, the Prince surrendered the remainder of his army two weeks later. He spent two years in French captivity, after which he retired in 1809.

Hohenlohe-Ingelfingen, Kraft, Prinz zu (prince of) (b. Jan. 2, 1827, Koschentin, Prussian Upper Silesia—d. Jan. 16, 1892, Dresden, Ger.), Prussian army officer and military writer.

The son of Adolf, Prinz zu Hohenlohe-Ingelfingen, he joined the Prussian Guard Artillery in 1845. During the Seven Weeks' War, Hohenlohe led the Guard Reserve Artillery with great success against the Austrian right wing in the decisive Prussian victory of Königgrätz or Sadowa (July 3, 1866).

After the war he turned his energies toward improving the tactical training of the Prussian artillery. In 1868 he was promoted to major general and assigned to command the Guard Artillery Brigade. In this capacity he served in the Franco-German War (1870–71), distinguishing himself at Gravelotte and Sedan, and directing the artillery attack on the Paris fortifications. He retired in 1879.

Hohenlohe's memoirs, *Aus meinem Leben,* appeared in four volumes (1897–1908) and in a one-volume edition (1915).

Articles are alphabetized word by word, not letter by letter

Hohenlohe-Schillingsfürst, Chlodwig Karl Viktor, Fürst zu (prince of) (b. March 31, 1819, Rotenburg an der Fulda, Hesse-Nassau—d. July 6, 1901, Bad Ragaz, Sankt Gallen, Switz.), imperial German chancellor and Prussian prime minister from October 1894 to October 1900, the "Uncle Chlodwig" whose fatherly relationship with the emperor William II did not enable him to prevent his sovereign's demagogic excesses.

A Bavarian Roman Catholic, he was a member of a princely house and bore the titles of Fürst zu Hohenlohe-Schillingsfürst and Prinz von Ratibor und Corvey. He was briefly with the Prussian civil service, then a member of the Bavarian upper house, and in 1848 he served as a diplomat in the provisional German government in Frankfurt.

In December 1866, after Prussia's defeat of Bavaria (an ally of Austria) in the Seven Weeks' War, he became minister president of Bavaria on the composer Richard Wagner's recommendation. His support of the alliances with the North German Confederation and of renewing the Zollverein, or German customs union, aroused the opposition of Bavarian nationalists, causing his fall from power in March 1870.

Hohenlohe, who in 1871 had encouraged Bavaria's entry into the German *Reich,* served as vice president of the Reichstag and as Bavarian representative in the Bundesrat (federal council). During the *Kulturkampf* (the conflict between the new German state and the Roman Catholic Church), he introduced a law against the use of the pulpit as a political platform and supported the expulsion of the Jesuit order from the empire.

His amiable skepticism, tact, and wide experience made Hohenlohe appear to be the provi-

Hohenlohe-Schillingsfürst, detail from an engraving, 1867

By courtesy of the Staatsbibliothek, Berlin

dential candidate to fill the void left by the dismissal of Chancellor Leo, Graf von Caprivi, in 1894. As the new chancellor, Hohenlohe found himself overshadowed by more forceful personages: Johannes von Miquel, Adm. Alfred von Tirpitz, Adolf Marschall von Bieberstein, and Bernhard von Bülow. He worked, without much success, to prevent or repair the damage done by William II's enthusiasms. Although he disagreed with William's intention to deal harshly with the Social Democrats, he supported passage of the German law against subversion (1894) and the Prussian law against the Socialists (1897).

Hohenlohe's influence virtually ended in 1897, when Bülow became foreign secretary and began to direct a new "world policy" of increasing German prominence in international affairs. When Hohenlohe resigned at the age of 81, he was replaced by Bülow.

Hohenstaufen DYNASTY, also called STAUFER DYNASTY, German dynasty that ruled the Holy Roman Empire from 1138 to 1208 and from 1212 to 1254. The founder of the line was the count Frederick (died 1105), who built Staufen Castle in the Swabian Jura Mountains and was rewarded for his fidelity to Emperor Henry IV by being appointed duke of Swabia as Frederick I in 1079. He later married Henry's daughter Agnes. His two sons, Frederick II, duke of Swabia, and Conrad, were the heirs of their uncle, Emperor Henry V, who died childless in 1125. After the interim reign of the Saxon Lothair III, Conrad became German king and Holy Roman emperor as Conrad III in 1138. Subsequent Hohenstaufen rulers were Frederick I Barbarossa (Holy Roman emperor 1155–90), Henry VI (Holy Roman emperor 1191–97), Philip of Swabia (king 1198– 1208), Frederick II (king, 1212–50, emperor 1220–50), and Conrad IV (king 1237–54). The Hohenstaufen, especially Frederick I and Frederick II, continued the struggle with the papacy that began under their Salian predecessors, and were active in Italian affairs.

The imperial dynasty was interrupted in 1208–12 by the brief reign of Otto IV, duke of Aquitaine of the House of Welf.

Hohenwart, Karl Siegmund, Graf von (count of) (b. Feb. 12, 1824, Vienna—d. April 26, 1899, Vienna), Austrian statesman who served briefly as prime minister of Austria (1871).

After service in the provincial administrations of Carniola (now in Yugoslavia) and Trentino, Italy, Hohenwart was appointed *Statthalter* (governor) of Upper Austria (1868). A Roman Catholic partisan in politics and an opponent of governmental centralization, he was appointed prime minister and minister of the interior in February 1871. His programs for wider Slavic autonomy within the Austrian part of the realm, first in Galicia but especially in Bohemia, caused opposition by the German liberal majority in the Reichsrat (imperial parliament) and the Magyars in Hungary; and a plan for redefining the position of Bohemia within the empire—the so-called Fundamental Articles—brought about his government's downfall in October. After 1879, during the long premiership of Eduard, Graf von Taaffe, he headed the progovernment forces.

Hohenzollern DYNASTY, dynasty prominent in European history, chiefly as the ruling house of Brandenburg-Prussia (1415–1918) and of imperial Germany (1871–1918). It takes its name from a castle in Swabia first mentioned as Zolorin or Zolre (the modern Hohenzollern, south of Tübingen, in the *Land* Baden-Württemberg). Burchard I, the first recorded ancestor of the dynasty, was count of Zollern in the 11th century. In the third and fourth generation from him two lines were formed: that of Zollern-Hohenberg,

extinct in all its branches by 1486, and that of the burgraves of Nürnberg, from which all the branches surviving into modern times derived.

Frederick III of Zollern (d. *c.* 1200), husband of the heiress of the former burgraves of Nürnberg, himself became burgrave in 1192 as Frederick I. Between his two sons, Conrad and Frederick, the first dynastic division of lasting consequence took place: that between the line later known as Franconian (burgraves of Nürnberg, later electors of Brandenburg, kings in Prussia, kings of Prussia, German emperors) and the Swabian line (counts of Zollern, of Hohenzollern, of Zollern-Schalksburg, of Haigerloch, etc.; princes of Hohenzollern-Hechingen, princes of Hohenzollern-Sigmaringen, princes of Hohenzollern, princes and then kings of Romania). There is some doubt about the seniority of the Franconian and of the Swabian lines: was Conrad I, burgrave of Nürnberg, the elder son, or was Frederick IV of Zollern?

The Franconian acquisitions of the burgraves of Nürnberg began when Frederick III (d. 1297) got possession of Bayreuth, and his descendants acquired Ansbach and Kulmbach. For a long time this group of territories was more important to the dynasty than Brandenburg. Then Frederick VI was appointed margrave of Brandenburg in 1411 and elector, as Frederick I, in 1415.

For the history of the rise of the Brandenburg Hohenzollerns (who became Lutheran at the Reformation but turned to Calvinism in 1613), including the account of their considerable acquisitions of territory in the 15th, 16th and 17th centuries, *see* Brandenburg. One of the most significant acquisitions was made by a junior member of the house in 1525—namely, the duchy of Prussia (*see* Prussia).

In 1701 the elector Frederick III of Brandenburg secured from the Holy Roman emperor Leopold I the title "king in Prussia." The change to "king of Prussia" was not formally recognized until 1772, when Frederick the Great obtained it. The kings of Prussia retained their title of electors of Brandenburg until the dissolution of the Holy Roman Empire in 1806. In 1871 William I of Prussia became German emperor. Both Prussian and German sovereignties were lost in 1918, at the end of World War I.

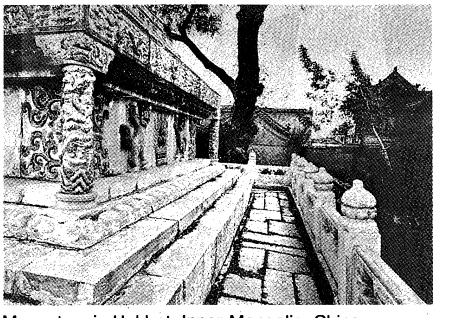
The Swabian line remained Catholic at the Reformation. It was in this line that the name Hohenzollern, as distinct from Zollern, first came into use—with Frederick IX. The Hechingen and Sigmaringen branches attained princely rank in 1623 but surrendered their sovereign status to Prussia in 1849. With the extinction of the Hechingen branch 20 years later, Charles Anton, head of the Sigmaringen, received the style prince (*Fürst*) von Hohenzollern, without territorial qualification. His second son, Charles, became prince of Romania in 1866 and king as Carol I in 1881; the candidature of the elder son, Leopold, for the Spanish throne had been one of the immediate causes of the Franco-German War of 1870–71. Leopold's son, Ferdinand, succeeded his uncle in Romania in 1914, where his descendants, who were brought up in the Orthodox faith, ruled until 1947.

Hohhot, Wade–Giles romanization HU-HO-HAO-T'E, Pinyin HUHO HOOTE, city and (since 1952) provincial capital of the Inner Mongolian Autonomous Region (*tzu-chih-ch'ü*), China. The city is a prefecture-level municipality (*shih*) and the command headquarters of the Inner Mongolian Military Region. It is situated in the upper valley of the Ta-hei Ho (westward-flowing tributary of the Huang Ho [Yellow River], which it joins on the northern side of that river's great loop) and south of a gap through the Yin Shan (mountains), which average 5,000 ft (1,500 m).

The area was traditionally on the edge of the area settled by Chinese, and Hohhot grew up as a frontier trading centre. The original Mongol city Kuku-khoto (Mongolian: Blue City) was founded in the 16th century and was an important religious centre for Tibetan Buddhism (Lamaism). At the end of the Ming period (1368–1644) the area began to be settled by Chinese, who farmed the fertile plain and named the city Kuei-hua (meaning "return to civilization"). Eventually, in the late 18th century, a new Chinese city, named Suiyüan, was founded some 2½ mi (4 km) north of the old one. Later the two cities were combined under the name Kuei-sui, which became a considerable frontier market with a large Muslim trading community.

In 1928, when Suiyüan Province (*sheng*) was established as a part of the policy of bringing Inner Mongolia firmly under Chinese civil administration, the city became the provincial capital. During the Japanese occupation (1937–45) it became the capital of the pro-Japanese autonomous region of Meng-chiang. In 1952 it replaced Chang-chia-k'ou (Kalgan) as the provincial capital of the Inner Mongolian Autonomous Region.

Before World War II Hohhot was still primarily a trading centre, although its importance had grown rapidly since the completion in 1922 of the railway linking it to Peking and Tientsin in the east and Pao-t'ou to the west. It collected the produce both of the pastoral Mongols and of the local Chinese farmers. A handicraft industry grew up; leather was processed; and rugs, felts, and clothing were manufactured.



Monastery in Hohhot, Inner Mongolia, China
Emil Schulthess—Black Star/EB Inc.

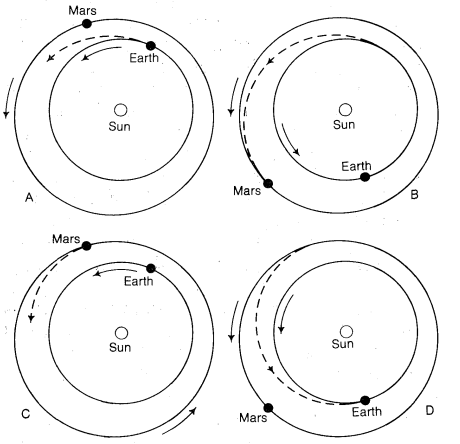
Originally, the old (Mongol) city was the commercial centre and the new (Chinese) city the administrative and residential area. After World War II the two were completely merged, and the whole grew rapidly, trebling in population in a decade.

Hohhot also developed into a fairly important industrial centre. Besides grain milling, tanning, oil extraction, and sugar refining from locally grown beets, a large woollen textile industry has grown up. A construction industry makes its own bricks and tiles, and a medium-sized iron and steel industry was established. There is also a large industrial chemical plant. During the early years after the Communists took over in 1949, Chinese settlement in Inner Mongolia was checked. By the early 1970s, however, expansion of cultivation to the north of Hohhot had brought major tractor and diesel engine factories to the city.

In 1957 Hohhot became the seat of the first university in Inner Mongolia with an important medical and veterinary college. Schools, hospitals, a palace of culture, and theatres have made the city a regional cultural centre. Pop. (1983 est.) 747,000.

Hohmann orbit, also called TRANSFER ORBIT, most economical path (though not the shortest or fastest) for a spacecraft to take from one planet to another. The German engineer Walter Hohmann showed in 1925 that elliptical orbits tangent to the orbits of both the planet of departure and the target planet require the least fuel and energy.

The Hohmann orbit from Earth to Mars requires about 260 (Earth) days; about two years and eight months would be needed for



Hohmann orbit
From W. Ley, *Rockets, Missiles and Men in Space*

a round trip, allowing for a waiting period of 455 days on Mars while the planets realigned themselves properly so that the returning craft would meet Earth's orbit when the Earth was present. To reach Venus 146 days would be required, and two years and one month for a round trip with waiting time included. Compromise orbits, faster but needing more energy than true Hohmann orbits, have been used by interplanetary probes launched since the 1960s.

Hohokam culture, culture of a group of North American Indians who lived between perhaps 300 BC and AD 1400 in the semiarid region of what is now central and southern Arizona, largely along the Gila and Salt rivers. The culture is customarily divided into four developmental periods: Pioneer, from perhaps 300 BC to AD 500; Colonial, 500–900; Sedentary, 900–1100; and Classic, 1100–1400.

During the Pioneer period the Hohokam lived in villages composed of widely scattered, individually built structures of wood, brush, and clay, each built over a shallow pit. They depended on the cultivation of corn (maize), supplemented by the gathering of wild beans and fruits and some hunting. Although floodwater irrigation may have been practiced, it was during this period that the first irrigation canal was built—a three-mile-long channel in the Gila River Valley that directed river water to the fields. The Hohokam's development of complex canal networks in the millennium to come was unsurpassed in pre-Columbian North America; this agricultural engineering was one of their greatest achievements. During this early period they also developed several varieties of pottery. They seem also to have had elaborate epic poems.

Hohokam culture expanded during the next period, the Colonial, to influence all of what is now the southern half of Arizona. Villages of pit houses, little changed from before, continued as the norm, but ball courts, similar to those of the Maya, were introduced. Cotton was added to corn as a major crop, and irrigation canals proliferated; by AD 700 canals had become narrower and deeper to cut down water loss through ground absorption and evaporation. Pottery was improved and styles were borrowed from neighbouring peoples.

The area of occupation contracted somewhat during the Sedentary period, but villages still consisted of unplanned collections of pit houses, only slightly better reinforced; occa-

sionally villages were walled. Corn and cotton were cultivated with ever more extensive irrigation systems. A major achievement was the casting of copper bells in wax molds.

The Classic period of Hohokam culture is notable for the peaceful intrusion of the Salado Indians, a branch of the Anasazi culture (*q.v.*). They came from the upper reaches of the Salt River, lived in Hohokam territory for several decades, then withdrew and disappeared. The principal effect of the presence of this Pueblo people is revealed in architecture. Great multiple-storied community houses with massive walls of adobe began to be built, along with the older, flimsier pit houses. Beans and squash were added to the staple of corn, supplemented by game and wild seeds and roots. Irrigation canal networks reached their greatest extent and complexity in the 14th century; in the Salt River Valley there were more than 150 miles of canals. (Some renovated canals were put back into use in the 20th century.) The art of basketry was added to pottery.

For unknown reasons the Hohokam culture disintegrated during the early 15th century. (The term Hohokam is said to be Pima for Those Who Have Vanished.) The later known occupants of the area, the Pima and Papago, are probably direct descendants of the Hohokam Indians.

Hoihow (China): *see* Hai-k'ou.

hoisin sauce, commercially prepared, thick reddish-brown sauce used in Chinese cuisine both as an ingredient in cooking and as a table condiment. Made from soybeans, flour, sugar, water, spices, garlic, and chili, it is sweet and spicy. It is used in cooking shellfish and fatty meats such as pork and duck. As a condiment, hoisin sauce is eaten with shrimp, pork, and poultry and is invariably served with Peking duck (*q.v.*).

hoist, mechanical device used primarily for raising and lowering heavy loads but occasionally for moving objects horizontally. It usually consists of a block and tackle—a combination of one or more fixed pulleys, a moving pulley with a hook or other similar attachment, and a rope (or cable) between them. Motive power for a hoist may be either manual or electric. Electrically powered hoists, commonly mounted to the floor or wall, are used for varied lifting and hauling operations in factories and warehouses. *See also* block and tackle.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Hōjō FAMILY, family of hereditary regents to the shogunate of Japan who exercised actual rule from 1199 to 1333. During that period, nine successive members of the family held the regency. The Hōjō took their name from their small estate in the Kanogawa Valley in Izu Province.

Rise to power. Hōjō Tokimasa (1138–1215), the first known member of the family, was charged by the Japanese ruler Taira Kiyomori with the co-wardenship of the exiled Minamoto Yoritomo in 1160. In 1180, however, when Yoritomo rallied the armed men of the Kantō, a region in Central Japan, against Taira rule, Tokimasa fought with him. Yoritomo acquired all power in Japan by 1189 and ruled as shogun (military commander); Tokimasa became the warden of Kyōto, while his daughter Masako married Yoritomo, with whom she had long had a liaison. At Yoritomo's death in 1199 Tokimasa became the guardian of the heir Yoriie and in effect regent, although Masako governed in the name of her son. The Hōjō family improved the simple but effective machinery of rule that Yoritomo had established. Yoritomo had received permission from the Emperor to place his own men as constables (*shugo*) and tax collectors (*jitō*) in each province. These appointees were responsible to the Samurai *dokoro,* or private military staff of the shogun, at Kamakura. The staff was headed by the *shikken,* or regent to the shogun. Thus, this office controlled the law, the peace, and the revenues of Japan, and the Hōjō family came to monopolize the office of *shikken* and to make it hereditary among them.

By 1247, when members of the house and clan held, through appointment, dominion over half the provinces of Japan, Hōjō rule tended to become authoritarian, and the regency was run not from its titular office but from Hōjō headquarters as a family council. This assumption of power, beginning with Tokimasa, was not difficult because the armed class did not wish to relinquish the peace, profits, and stability the *bakufu* (military government) had brought it. They were reluctant to permit the heir Yoriie, a youth of uncertain temper and strong appetites, to become shogun. Yoriie attempted the murder of Tokimasa but was himself exiled and killed. When the remaining heir, Sanetomo, was murdered (1219), the last impediment to Hōjō domination was gone. The final accretion of Hōjō power came in 1221, when the emperor Go-Toba raised the Taira of western Japan against the Hōjō. The revolt (Jōkyū no ran) not only failed but in its failing the Hōjō were able to confiscate thousands of estates and place them in the hands of landless adherents and friends. Many landless warriors, created by the litigious system of family inheritance in Japan, had little love for the Hōjō but less for hunger and dispossession. Their number, as it rose and fell, was an indication of the stability of the *bakufu,* and until the late 13th century the Hōjō kept their numbers small. The first three Hōjō regencies—Yoshitoki, who succeeded Tokimasa in 1205, was murdered in 1224 and replaced by his son Yasutoki (1183–1242)—were the apex of capable feudal rule in Japan. Dependable cadastral records were created in 1222–23. In 1232 a brief and workable code (Jōei shikimoku) for the conduct and regulation of the armed class in a feudal society was promulgated. Slowly, between 1221 and 1232, the simple military system of Yoritomo was transformed by the Hōjō family into a capable private government.

Relationship with the court and the aristocracy. Essentially, this meant maintaining a cordial but careful relationship with the court and its complex system of reigning, retired, and cloistered emperors and with the great aristocracy of Kyōto, who wished an end to the *bakufu* system. A Hōjō commander and garrison were stationed in Kyōto, but the property, revenues, and ceremonials of the Imperial family and nobility were protected. The powerful Buddhist clergy were kept in hand by strict auditing of their accounts. The vassals of Hōjō were kept solvent, peaceful, and apart from the court. The peasant was protected in his freedom and tenure. The regency drew its income from the Hōjō estates, which comprised nearly the whole of the Kantō. The family adhered firmly to Yoritomo's dictum that the simple warrior life would best preserve this class from the pervasive decadence of the Kyōto aristocracy. Yasutoki died in 1242 and was succeeded by the Hōjō regents Tsunetoki (1224–46) in 1242, Tokiyori (1227–63) in 1246, and Tokimune (1215–84) in 1256. Tokimune's regency was the last stable and powerful epoch of the Hōjō. Tokimune refused the Mongol Kublai Khan's demand (1271) that Japan pay tribute to him. The result was an unsuccessful Mongol–Chinese–Korean assault on Hakata Harbour in Kyushu. In 1281 a massive second joint assault on Kyushu was again beaten back; but the cost of preparing the defense, of the two months' battle around Hakata, and of maintaining a war footing until Kublai died in 1294 was deadly. For 20 years Hōjō resources had been under great strain in the defense of Japan; the resources of their vassals had been consumed in the war.

Decline of Hōjō power. When Sadatoki (1270–1311) became regent in 1284, he found himself so embroiled in a succession dispute between two powerful factions of the Imperial family—a struggle beginning to split all Japan—that he secluded himself in a temple, from where he continued to administer Japan during the last 10 years of his life. His successor, the ninth and last Hōjō regent, Takatoki (1303–33), passed his minority dissolutely and extravagantly. On attaining his majority (1316) he left the affairs of the regency in the hands of inept men at a time when only a severe and powerful man could have managed the difficult economic and political situation. In 1331, because of the continuing quarrel over the Imperial succession, Takatoki exiled the emperor Go-Daigo. Escaping from exile, the Emperor found it easy to raise war against the Hōjō. Takatoki was betrayed by his own general, Ashikaga Takauji, who seized Kyōto from its Hōjō garrison. The *bakufu's* own domain of the Kantō rose in revolt under Nitta Yoshisada (the opposition to the Hōjō was, in part, a revolt of the family's own constables and stewards, who had become locally powerful). Nitta sacked Kamakura, and on July 4, 1333, the last Hōjō regent committed suicide. But the foundation the Hōjō had laid was enduring. Go-Daigo's attempt to restore a civil Imperial government lasted only three years. Ashikaga Takauji declared himself shogun in 1336, and from then until 1868 a form of *bakufu*—as created by Yoritomo and refined by the Hōjō—ruled Japan. (J.A.Ha.)

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Hōjō Masako (b. 1157, Izu Province, Japan—d. Aug. 16, 1225, Kamakura), wife of Minamoto Yoritomo (1147–99), the first shogun, or military dictator, of Japan. She is said to have been largely responsible for Yoritomo's success, and after his death she assumed great power.

Masako fell in love with Yoritomo when he was exiled from the capital by his family's rivals, the Taira clan, and put under the watch of Masako's father. She persuaded her father to allow her to marry him, and later she aided Yoritomo in his conquest of Japan.

After Yoritomo's death (1199), Masako became a nun. In 1204 her oldest son, Yoritomo's successor Yoriie, was assassinated. His brother Sanetomo, Masako's second son, succeeded him as shogun; real power, however, was exercised through the post of regent, which was held by Masako's father, Tokimasa.

The next year, an attempt was made on Sanetomo's life, but Masako saved him. Tokimasa, who was implicated in the attempt, was deposed, and Masako's brother Yoshitoki became the new regent, with Masako exercising considerable indirect power. When Sanetomo was assassinated in 1219 by one of Yoriie's sons, Masako and her brother had an infant great-grandson of Yoritomo set up as a puppet shogun. She continued to dominate the government until her death, her power being so great that she was called the *ama* ("nun") shogun.

Hōjō Tokimasa (b. 1138, Izu Province, Japan—d. Feb. 6, 1215, Izu), Japanese warrior who aided Minamoto Yoritomo in establishing the Kamakura shogunate, the military government by which Yoritomo ruled the country from his base at Kamakura in central Japan, while the emperor continued to rule only symbolically from his residence at Kyōto, to the southwest. After Yoritomo's death, Tokimasa transferred the power of government from Yoritomo's descendants to his own family.

Tokimasa's original family name was Taira, but early in his life he changed it to Hōjō, the name of his domain in eastern Japan. In 1160, when the great warrior Taira Kiyomori (1118–81) killed Minamoto Yoshitomo (1123–60) and thereby established his domination over all Japan, Yoshitomo's young son Minamoto Yoritomo was sent under the watchful care of Tokimasa to Izu in eastern Japan.

Tokimasa became attached to the boy to whom he gave his own daughter, Masako, in marriage, and in 1181 he assisted him when he rose in revolt against Kiyomori. After Yoritomo's victory, Tokimasa helped Yoritomo establish the shogunate, wielding great power as the shogun's father-in-law.

Upon Yoritomo's death (1199), Tokimasa became the head of a council of leading warriors and politicians of the state in a move to check the power of Yoritomo's tempestuous son and successor, Yoriie. In 1204 Tokimasa finally had Yoriie murdered, and the shogunate passed to Yoriie's younger brother, Sanetomo. As Sanetomo was still a minor, Tokimasa was appointed to the newly created post of *shikken,* or regent, to the shogun.

Meanwhile, Tokimasa's second wife urged her husband to depose Sanetomo and place her son-in-law on the throne as the new shogun. In 1205 an attempt was made on the Shogun's life, but he was saved by his mother, Tokimasa's daughter Masako.

Masako and her brother Hōjō Yoshitoki then called a council meeting and forced their father to resign. Yoshitoki replaced him as regent, the office thus becoming the property of the Hōjō family. After his replacement, Tokimasa entered the priesthood and lived out the rest of his life in retirement.

Hōjō Tokimune (b. June 5, 1251, Kamakura, Japan—d. April 20, 1284, Kamakura), young regent to the shogun (military dictator of Japan), under whom the country fought off two Mongol invasions, the only serious foreign threats to the Japanese islands before modern times.

Tokimune was 17 when he assumed the office of regent in 1268, the year that the Mongol conqueror of China, Kublai Khan, sent a message demanding that Japan enter into a tributary relationship with the Mongols or face invasion. Although many in the government wished to compromise, Tokimune defiantly rejected the Mongol threat and sent soldiers to northwestern Kyushu in anticipation of an invasion.

Some 25,000 mixed Mongol and Korean forces finally invaded in 1274. The small outer islands quickly fell to this force, but the main Japanese island was saved when a storm forced the Mongol fleet to return home. Tokimune then devoted all his resources to fortifying western Japan, including a seawall to obstruct landing. Early in the summer of 1281, approximately 140,000 Mongol, Chinese, and Korean troops assaulted the islands, where they faced the entire Japanese army. The hard-fought battle ended almost two months later when a typhoon (known in Japanese tradition as the *kamikaze,* or divine wind) destroyed many of the invaders' ships, making the survivors an easy target for the Japanese. It is thought that as many as 100,000 of the invaders may have perished. Tokimune rendered heroic service to his country, but the huge military expenditures necessary during this period weakened the shogunate, and the power of the Hōjō family, which had dominated Japan since 1199, began to decline.

Hōjō Yasutoki (b. 1183, Kamakura, Japan—d. July 14, 1242, Kamakura), regent whose administrative innovations in the shogunate, or military dictatorship, were responsible for institutionalizing that office as the major ruling body in Japan until 1868 and for stabilizing Hōjō rule of Japan for almost a century.

The office of shogun originated with Minamoto Yoritomo in 1185, but after his death in 1199 Yasutoki's grandfather, Hōjō Tokimasa, and father, Hōjō Yoshitoki, took over the regency and transferred the power of the shogunate to the Hōjō family. In 1221 the Emperor, whom Yoritomo had permitted to remain in office in a symbolic position, launched a revolt against the Hōjō family. Given command of the Shogun's forces, Yasutoki quickly crushed the rebels and established military headquarters near the Emperor's residence at Kyōto to ensure Hōjō dominance over the Imperial court. The power of the shogunate was further increased by confiscating the estates of the court aristocracy and distributing them among loyal Hōjō retainers.

Yoshitoki died in 1224, and Yasutoki succeeded to the regency. Forgoing personal power, he wisely worked to create institutions to ensure efficient administration. To this end, he allowed his uncle to assume the post of *rensho,* or "co-signer," thus establishing the precedent of shared responsibility between the two leading Hōjōs. In 1225 he extended shared responsibility by establishing a Council of State (Hyōjōshū), an advisory body of leading warriors and administrators of the state. Yasutoki further established his authority when, in 1226, he dealt harshly with an uprising staged by warrior monks who, by their claims to spiritual authority as well as to military power, had harassed Japanese governments for several centuries.

In 1232 Yasutoki issued the Jōei Shikimoku, a law code that defined the function of the various officials, established terms for inheritance and succession, set up a new land system, and regulated standards to ensure fair trials.

Hōjō Yoshitoki (b. 1163, Japan—d. July 1, 1224, Kamakura, Japan), warrior responsible for the consolidation of the power of the Kamakura shogunate, the military dictatorship that ruled Japan from the city of Kamakura in central Japan (1192–1333).

Yoshitoki succeeded his father, Hōjō Tokimasa (*q.v.*), as regent, making this office the hereditary post of the Hōjō family. Thereafter, although the emperor at Kyōto was the official governmental authority, he ruled through his shogun in Kamakura, whose real power was vested in his regent. In 1219 the Shogun was assassinated, and Yoshitoki replaced him with an infant son of the Fujiwara lineage (a family with high standing among the aristocracy at Kyōto). That move further strengthened the power of the Kamakura government over the Imperial court.

But the court resented usurpation of its power by the Hōjō, and in 1221 the retired emperor Go-Toba tried unsuccessfully to overthrow Yoshitoki in the Jōkyū Disturbance (Jōkyū no ran). Go-Toba and his two sons were exiled, several of his generals were executed, and Yoshitoki established a military headquarters at Rokuhara, just south of Kyōto, to supervise the future activities of the court. The Hōjō family took over many of the estates of the Kyōto court aristocracy, which had hitherto remained outside Hōjō power, and gave them to loyal Kamakura retainers, thus strengthening Hōjō rule and assuring the shogunate's continuing dominion over Japan.

Hokan languages, major group, or phylum, of American Indian languages; it includes three families of Meso-American Indian languages and 14 families of North American Indian languages. The Meso-American groups are Tequistlatec (two languages in Oaxaca, Mex.), Tlapanecan (one living language in Guerrero, Mex., and an extinct one in Nicaragua), and Jicaque (spoken in Honduras). The North American Indian families are Yuman (four languages), Pomo (six languages), Palaihnihan (two languages), Shastan (three languages), Yanan (two languages), Salinan (two languages), and Chumashan (six languages), plus Chimariko (extinct), Washo, Seri, Esselen (extinct), Karok, Comecrudan (extinct), and Coahuiltecan (extinct), consisting of a single language each. The North American Hokan languages were once spoken in the southwestern United States from northern California to southern Texas and in northern Mexico.

The Hokan languages are basically agglutinative in structure; that is, they frequently use affixes (such as prefixes and suffixes), as well as compound words, to form long words made up of several elements. Sometimes such words become so complex that a complete sentence or phrase may be expressed by one word; when this occurs, and when the units that compose such a word are "bound" forms (*i.e.,* cannot be used except in conjunction with other elements within a word), the process has gone beyond agglutination and is called polysynthesis, a process characteristic of many American Indian languages. Some Hokan languages are extremely polysynthetic, among them the Yana language of northern California. The Yana word *yābanaumawild-jigummaha'nigi* means "let us, each one [of us], move indeed to the west across [the creek]." It is composed of the following elements—*yā* "several people move," *banauma* "everybody," *wil* "across," *dji* "to the west," *gumma* "indeed," *ha'* "let us," and *nigi* "we." Such word sentences are not uncommon in American Indian languages but are by no means universal. The Yana language is also of interest because it has two "dialects," one used exclusively by males to males and the other used in speech to or by females.

hoket (music): *see* hocket.

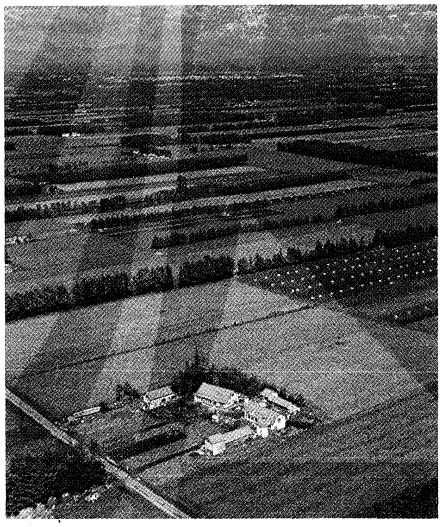
Hokinson, Helen (b. *c.* 1900, Mendota, Ill., U.S.—d. Nov. 1, 1949, Washington, D.C.), U.S. cartoonist best known for her gently satirical drawings of plump, slightly bewildered suburban matrons and clubwomen. Her "girls" were unworldly and naïve, concerned with diets, hats, propriety, and the diligent pursuit of style.

After drawing her first cartoons for the *New York Mirror,* Hokinson joined *The New Yorker* magazine in 1925, where she was a cartoonist until her death in an airline crash in 1949. James Reid Parker, a colleague at *The New Yorker,* was her long-time silent partner in creating the cartoons that made her famous, and he edited posthumous collections of them.

Hokitika, borough on the west coast of South Island, New Zealand. It lies at the mouth of the Hokitika River, which rises in the Southern Alps and, fed by the Mungo, Whitcombe, and Kokatahi rivers, flows northward 40 mi (64 km) to Westland Bight of the Tasman Sea. A store was erected at the river mouth in 1864. Hokitika grew with the discovery of gold and reached a peak population of 50,000 in 1866 with the "Australian invasion" of miners. By 1868, when it was made a borough, the population was already in decline. Hokitika was once a port, but the expense of building protective works and dredging caused that function to be abandoned. On both the South Westland Highway and a rail line to Christchurch (169 mi southeast), Hokitika serves a region

of dairy, beef, and sheep farming; gold mining (on the nearby Taramakau River); and lumbering. Greenstone, a type of jade, is quarried in nearby rivers and mountains. The town has joinery, dairy, coal-gas, brewing, and general engineering works and sawmills. It is also a major stopover for tourists visiting the river gorge and Lake Kaniere. The name Hokitika means "return in a straight line" in Maori. Pop. (1986) 3,427.

Hokkaido, northernmost of the four main islands of Japan, bordered by the Sea of Japan (west), the Sea of Okhotsk (north), and the Pacific Ocean (east and south). Together with a few small adjacent islands, it constitutes a *dō* (province) with an area of 32,247 square miles (83,519 square km), comprising 21 percent of Japan's land area. Hokkaido is characterized by a cool climate and recently



Farms on the Obihiro Plain, Hokkaido, Japan
Photos Pack—EB Inc.

formed mountains and volcanoes. It was long the domain of the aboriginal Ainu peoples. Serious Japanese settlement of the island began in 1869, when the territory, which was then called Yezo *dō* (province), was renamed Hokkaido (North Sea Province).

Sapporo (*q.v.*) is the administrative headquarters and an industrial, commercial, and tourist centre. Hokkaido University, founded in 1876, is located there. Other important towns are the ports of Hakodate, Otaru, and Muroran.

The economic development of Hokkaido includes iron, steel, wood-pulp, dairy, and fishing industries. Rice, soy and kidney beans, oats, barley, hay, and white potatoes are important crops. The island contains the largest coal deposits in Japan. Construction of the Seikan Tunnel, which was dug under the Tsugaru Strait in order to link Hokkaido with the main Japanese island of Honshu, was begun in 1964 and was completed in 1988. The tunnel carries a rail line between Hakodate on Hokkaido and Aomori on Honshu. Pop. (1986 est.) 5,678,000.

hokku (Japanese poetry): *see* haiku.

Hokuriku Region, Japanese HOKURIKU-CHIHŌ, industrial region, western Honshu, Japan, bordered by the Sea of Japan. It is neither an administrative nor a political entity. The northeastern portion of the area, occupying parts of Niigata and Toyama *ken* (prefectures), specializes in heavy and chemical industries and has close economic ties with the Keihin (Tokyo–Yokohama) Industrial Zone. The southwestern area, occupying portions of Ishikawa and Fukui prefectures, concentrates on textile and machinery production and has economic ties with the Keihanshin (Kyōto–Ōsaka–Kōbe) Industrial Zone.

The Echigo and Hida mountain ranges dominate the relief of the area. During the Tokugawa period (1603–1867), Hokuriku, then a paddy-rice-growing area, traded with Ōsaka and Kōbe via the Sea of Japan. Hokuriku's traditional industries included the manufacture of silk, timber products, lacquer ware, and agricultural tools.

Modern industrial techniques, introduced during the Meiji period (1868–1912), expanded the indigenous industries' production. Hydroelectric development in the mountains began near the city of Toyama during the early 1900s. During the 1930s, electrical smelting and electrochemical factories settled there to use the hydroelectric energy. Toyama and Takaoka cities became amalgamated into the new industrial city of Toyama–Takaoka in 1969. Aluminum and related factories have operated there since 1973 and are responsible for Hokuriku's lead in aluminum processing and refining.

In 1909 the city of Niigata, began building oil-drilling machinery, later producing ships, motor vehicles, machine tools, and diesel engines. Chemical industries later settled in Niigata city during the 1960s, utilizing natural gas from the area. As Niigata grew, it extended across the Shinano River and was redefined as a new industrial city under the Comprehensive National Development Plan in 1969. Niigata also produces metals, machinery, electrical appliances, chemicals, and lumber products. Other industrial cities in the region include Habutae, a textile centre, and Kanazawa, a centre for transport-machinery production. Kurobe began producing zippers during World War II and has become a world leader in zipper production. Kurobe is also Japan's major producer of window sash.

Hokuriku experienced an economic decline following World War II. While production increased in other regions, industrial development lagged in Hokuriku because the mountains and heavy snowfall blocked communications with the Pacific coastal industrial areas to the east. The sinking of land, resulting from the overuse of groundwater, has been a problem exacerbated by the exploitation of natural gas near Niigata city. Scarcity of energy sources also presents problems. Air, shipping, highway, and railway connections now render the region accessible, however.

Hokusai, in full KATSUSHIKA HOKUSAI, professional names SHUNRŌ, SŌRI, KAKŌ, TAITO, GAKYŌJIN, IITSU, and MANJI (b. October 1760, Edo [now Tokyo], Japan—d. May 10, 1849, Edo), Japanese master artist and printmaker of the ukiyo-e ("pictures of the floating world") school. His early works represent the full spectrum of ukiyo-e art, including single-sheet prints of landscapes and actors, hand paintings, and *surimono* ("printed things"), such as greetings and announcements. Later he concentrated on the classical themes of the samurai and Chinese subjects. His famous print series "Thirty-six Views of Mount Fuji," published between 1826 and 1833, marked the summit in the history of the Japanese landscape print.

Early years. Hokusai was born in the Honjo quarter just east of Edo (Tokyo) and became interested in drawing at the age of five. He was adopted in childhood by a prestigious artisan family named Nakajima but was never accepted as an heir—possibly supporting the theory that, though the true son of Nakajima, he had been born of a concubine.

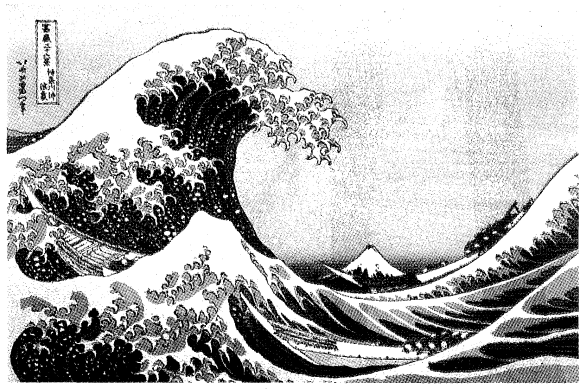
Hokusai is said to have served as a youth as clerk in a lending bookshop, and from 15 to 18 years of age he was apprenticed to a wood-block engraver. This early training in the book and printing trades obviously contributed to Hokusai's artistic development as a printmaker.

The earliest contemporary record of Hokusai dates from the year 1778, when, at the age of 18, he became a pupil of the leading ukiyo-e master, Katsukawa Shunshō. The young Hokusai's first published works appeared the following year—actor prints of the Kabuki theatre, the genre that Shunshō and the Katsukawa school practically dominated.

To judge from the ages of his several children, Hokusai must have married in his mid-20s. Possibly under the influence of family life, from this period his designs tended to turn from prints of actors and women to historical and landscape subjects, especially *uki-e* (semi-historical landscapes using Western-influenced perspective techniques), as well as prints of children. The artist's book illustrations and texts turned as well from the earlier themes to historical and didactic subjects. At the same time, Hokusai's work in the *surimono* genre during the subsequent decade marks one of the early peaks in his career. *Surimono* were prints issued privately for special occasions—New Year's and other greetings, musical programs and announcements, private verse selections—in limited editions and featuring immaculate printing of the highest quality.

Hokusai's early 30s were to prove years of personal change. His master Shunshō died early in 1793, and somewhat later Hokusai's young wife passed away, leaving a son and two daughters. In the year 1797 he remarried and adopted the name Hokusai. This change of name marks the beginning of the golden age of his work, which was to continue for a half century.

Mature years. In format, Hokusai's oeuvre from this period covers the gamut of ukiyo-e art: single-sheet prints, *surimono,* picture books and picture novelettes, illustrations to verse anthologies and historical novels, erotic books and album prints, and hand paintings and sketches. In his subject matter, Hokusai only occasionally (in a few notable prints, in



"The Breaking Wave off Kanagawa," wood-block colour print by Hokusai, from the series "Thirty-six Views of Mount Fuji," 1826–33
By courtesy of ARS Planning

paintings, and erotica) chose to compete with Utamaro, the acknowledged master of voluptuous figure prints. Aside from this limitation, however, Hokusai's work encompassed a wide range, with particular emphasis on landscape views and historical scenes in which figures were often of secondary interest. Around the turn of the century he experimented for a time with Western-style perspective and colouring.

From the early 19th century Hokusai commenced illustrating *yomihon* (the extended historical novels that were just coming into fashion). Under their influence, his style began to suffer important and clearly visible changes between 1806 and 1807. His figure work becomes more powerful but increasingly less delicate; there is greater attention to classical or traditional themes (especially of samurai, or warriors, and Chinese subjects) and a turning away from the contemporary *Ukiyo-e* world.

In about the year 1812, Hokusai's eldest son died. This tragedy was not only an emotional but also an economic event, for, as adopted heir to the affluent Nakajima family, the son had been instrumental in obtaining a generous stipend for Hokusai, so that he did not need to worry about the uncertainties of income from his paintings, designs, and illustrations, which at this period were paid for more with "gifts" than with set fees.

Whether for economic reasons or not, from this time on Hokusai's attention turned gradually from novel illustration to the picture book and, particularly, to the type of wood-block-printed copybook designed for amateur artists (including the famous *Hokusai manga*). Very likely his intention was to find new pupils and hence new patronage, and in this he succeeded to some degree.

Though famed for his detailed prints and illustrations, Hokusai was also fond of displaying his artistic prowess in public—making, for example, huge paintings (some fully 200 square metres [about 2,000 square feet] in area) of mythological figures before festival crowds, in both Edo and Nagoya. He was once even summoned to show his artistic skills before the shogun (the military leader who, although theoretically subordinate to the emperor, was in fact the ruler of Japan).

In the summer of 1828, Hokusai's second wife died. The master was then 68, afflicted intermittently with paralysis and left alone, evidently with only a profligate grandson, who had proved to be an incorrigible delinquent. It is probably no coincidence, therefore, that before long Hokusai's favourite daughter (and pupil), O-ei, broke her unhappy marriage with a minor artist named Tōmei and returned to her father's side, where she was to stay for his remaining years.

An energetic artist, Hokusai rose early and continued painting until well after dark. This was the customary regimen of his long, productive life. Of Hokusai's thousands of books and prints, his "Thirty-six Views of Mt. Fuji" is particularly notable. Published from about 1826 to 1833, this famous series (including supplements, a total of 46 colour prints) marked a summit in the history of the Japanese landscape print; in grandeur of concept and skill of execution there was little approaching it before and nothing to surpass it later—even in the work of Hokusai's famed late contemporary Hiroshige (*q.v.*).

Hokusai's frequent changes in domicile (more than 90 dwellings) and of his own name are indicative of the artist's restless nature. Besides his principal *noms d'artiste* (roughly one per decade), the artist had also some two dozen other occasional pseudonyms, though these were normally used as adjuncts to his principal name of a given period.

Despite his appeals to heaven for "yet another decade—nay, even another five years," on the 18th day of the fourth month of the Japanese calendar "the old man mad with painting," as he called himself, breathed his last. He was 89 but still insatiably seeking for an ultimate truth in art—as he had written 15 years earlier:

> From the age of five I have had a mania for sketching the forms of things. From about the age of 50 I produced a number of designs, yet of all I drew prior to the age of 70 there is truly nothing of any great note. At the age of 73 I finally apprehended something of the true quality of birds, animals, insects, fishes, and of the vital nature of grasses and trees. Therefore, at 80 I shall have made some progress, at 90 I shall have penetrated even further the deeper meaning of things, at 100 I shall have become truly marvelous, and at 110, each dot, each line shall surely possess a life of its own. I only beg that gentlemen of sufficiently long life take care to note the truth of my words.

Assessment. Hokusai embodied in his long lifetime the essence of the *Ukiyo-e* school of art during its final century of development. His stubborn genius also represents, in its 70 years of continuous artistic creation, the prototype of the single-minded artist, striving only to complete a given task. Moreover, Hokusai constitutes a figure who has, since the later 19th century, impressed Western artists, critics, and art lovers alike, more, possibly, than any other single Asian artist. (Ri.L.)

MAJOR WORKS. *Prints and illustrations.* "Festivals of the Green Houses" (*c.* 1790); "Festivals for the Twelve Months" (*c.* 1790); "Foreigners Observing Japanese Customs" (1796); *Chūshingura* series (I) (*c.* 1800); "Brocade Prints of the Thirty-six Poetesses" (1801); "Fifty Fanciful Poets, Each with One Poem" (1802); "Fuji in Spring" (1803); "A Picture Book of Kyōka" (1803–04); "Fifty-three Stations on the Tōkaidō" (1804); *Chūshingura* series (II) (1806); *Suikoden* (1807); "Portraits of Six Poets" (*c.* 1810); "Quick Lessons in Simplified Drawing" (1812); *Hokusai manga,* vol. 1 (1814); *Hokusai gashiki* (1819); *Hokusai sōga* (1820); "Paintings with One Stroke of the Brush" (1823); "Thirty-six Views of Mt. Fuji" (*c.* 1826–33); "Views of Famous Bridges" (*c.* 1827–30); "Snow, Moon, and Flowers" (*c.* 1827–30); "Flowers and Birds" (*c.* 1827–30); "The Poems of China and Japan Mirrored to Life" (*c.* 1828–33); "Tōshi-sen" (1833–36); "Hundred Views of Mt. Fuji" (1834–35); "Hundred Poems Explained by the Nurse" (*c.* 1845).

BIBLIOGRAPHY. J.R. Hillier, *Hokusai: Paintings, Drawings, and Woodcuts* (1955), the best general appreciation of Hokusai in English, though the biographical material is based on outdated sources—includes a detailed listing of his illustrated books; James A. Michener (ed.), *The Hokusai Sketchbooks: Selections from the Manga,* with translations by Richard Lane (1958), a comprehensive sampling of the *Hokusai manga,* with commentary, and translation of all prefaces; Theodore R. Bowie, *The Drawings of Hokusai* (1964), a pioneer study, but flawed by being based largely on forgeries and school copies; Richard Lane, *Masters of the Japanese Print* (1962), includes a critical survey of Hokusai's work and times, based on original sources.

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ḥol ha-mo'ed, also spelled HOL HAMOED, or CHOL HAMOED (from Hebrew *ḥol,* "weekday," *ha-mo'ed,* "[of] the festival"), in Judaism, the less festive days or semiholidays that occur between the initial and final days of the Passover (Pesaḥ) and Sukkot religious holidays. Because Jews in Israel celebrate Passover for seven days and Sukkot for eight, and Jews outside Israel add an additional day to each festival, the number of *ḥol ha-mo'ed* days is regulated by the locale. Israel, moreover, solemnizes only the first and last day of each festival, whereas the first two and last two days of each observance are solemnized by Jews outside Israel. The principal ceremonies (such as the eating of matzot) are observed during *ḥol ha-mo'ed,* but some work is not forbidden; marriages are postponed until after the festival, so that the happiness of one occasion may not interfere with that of another.

Holabird, William (b. Sept. 11, 1854, Amenia Union, N.Y., U.S.—d. July 19, 1923, Evanston, Ill.), U.S. architect who, with his partner, Martin Roche, was a leading exponent of the influential Chicago School of commercial architecture; their Tacoma Building (Chicago, 1886–89) established the use of a total steel skeleton as a framework for building skyscrapers—a significant advance over the pioneering use of metal supports in the Home Insurance Building by William Le Baron Jenney (Chicago, 1884–85).

Holabird attended the U.S. Military Academy at West Point, N.Y., but after two years he resigned (1875) and moved to Chicago. He worked as draftsman for Jenney, then for the eminent firm of Burnham and Root. He established his own practice in 1880 with Ossian C. Simonds, who subsequently left for a career in landscape architecture. Roche joined the firm in 1881. Holabird and Roche were responsible for many innovations identified with the Chicago School, such as the so-called Chicago School windows, which resulted in a facade almost entirely made of glass, as in their Marquette Building (1894, Chicago). Their Gage Building (1898, Chicago), with a facade by the brilliant architect Louis Sullivan, was cited as a Chicago architectural landmark in 1962. Although their buildings lack the virtuosity of Sullivan's or Root's, Holabird and Roche were unequalled in their perseverance in perpetuating the Chicago School. Long after others gave up the Chicago style in favour of historic styles or the newer Prairie School architecture, Holabird and Roche continued to produce their tall commercial buildings in the Chicago style until their deaths. The Republic Building (Chicago, begun 1905), one of their best 20th-century buildings, was demolished in 1961.

Holand, Thomas: *see* Surrey, Thomas Holland, duke of.

Holarctic region, one of the six major land areas of the world defined on the basis of its characteristic animal life. It is part of the Megagaean realm; it encompasses all the nontropical parts of Europe and Asia, Africa north of the Sahara, and North America south to the Mexican desert region. This vast region is often subdivided into the Palaearctic (Old World) and Nearctic (New World) subregions. The vegetational divisions roughly corresponding to this region are the Boreal and Palaeotropical (in part) kingdoms. The animals and plants of the region include a vast array of fishes, amphibians, reptiles, birds, and mammals.

Holbach, Paul-Henri Dietrich, baron d' (b. December 1723, Edesheim, near Landau, Rhenish Palatinate—d. June 21, 1789, Paris), French encyclopaedist and philosopher, a celebrated exponent of atheism and Materialism, whose inherited wealth allowed him to entertain many of the noted philosophers of the day, some of whom (Comte de Buffon, J.-J. Rousseau, d'Alembert) reportedly withdrew from his gatherings, frightened by the audacity of their speculations.

In deference to his uncle (F.A. d'Holbach, a naturalized French citizen to whom he owed his wealth), he added the surname d'Holbach to that of Dietrich (sometimes rendered in French as Thiry). He himself became a naturalized French citizen in 1749.

D'Holbach contributed to Diderot's *Encyclopédie* 376 articles (translations from German

texts), mostly on chemistry and allied scientific topics. His most popular book, *Système de la nature* (1770; "The System of Nature"), published under the name of J.B. Mirabaud, caustically derided religion and espoused an atheistic, deterministic Materialism: causality became simply relationships of motion, man became a machine devoid of free will, and religion was excoriated as harmful and untrue. In *Le Christianisme dévoilé* (1761; "Christianity Unveiled"), published under the name of a deceased friend, N.A. Boulanger, he attacked Christianity as contrary to reason and nature. *Système social* (1773; "Social System") placed morality and politics in a utilitarian framework wherein duty became prudent self-interest. His writings, considered mere echoes of opinions expressed by those who shared his table, were illogical and inconsistent. Voltaire felt the need to reply, but J.W. von Goethe and Percy Bysshe Shelley fell under their sway. Benevolent by nature, d'Holbach set aside his personal dislikes by offering his home to exiled Jesuits in 1762.

Holbæk, city and port, Vestsjællands *amtskommune* (county commune), northern Sjælland (Zealand), Denmark, on Holbæk Fjord. An old-established market town chartered in 1250, it is a rail junction with small industries and a modern harbour that supports fishing and shipbuilding. The local museum comprises farmsteads, workshops, and merchants' houses of former times. Pop. (1986 est.) city, 21,512; (1988 est.) mun., 30,860.

Holbein, Hans, THE ELDER (b. *c.* 1465, Imperial Free City of Augsburg [Germany]—d. 1524, Isenheim, Alsace [now in France]), German painter associated with the Augsburg school. He was the senior member of a family of painters that included his brother Sigmund and his sons Ambrosius (*c.* 1494–1519/20) and the famous Hans Holbein the Younger.

Nothing is known of Holbein's early life and training, but he was married and established as a painter in Augsburg by about 1493. Holbein's early works, which include the Weingarten Altar (1493; Augsburg Cathedral), the St. Afra Altar (*c.* 1495; parts in the bishop's palace at Eichstätt), the picture called the "Basilica of St. Mary" (1499; Augsburg), and a Passion series in 12 scenes (Donaueschingen), are characterized by deep, rich colouring and by balanced compositions of figures moving slowly and deliberately on a narrow stage. They show a knowledge of the art of Rogier van der Weyden, which has led some authorities to suppose that Holbein had visited the Netherlands, but ignorance of his Augsburg predecessors precludes any real evaluation of the immediate sources of his style.

"Presentation of Christ in the Temple" from the Kaisheim altar, panel painting by Hans Holbein the Elder, 1502; in the Alte Pinakothek, Munich

By courtesy of the Alte Pinakothek, Munich

A visit in 1501 to Frankfurt am Main, where, with the assistance of Sigmund Holbein and Leonhard Beck, he painted the high altar of the Dominican monastery (Städelsches Kunstinstitut, Frankfurt am Main), initiated a new stylistic phase that includes also the Kaisheim Altar (1502; Munich) and the "Basilica of St. Paul" (*c.* 1503–04; Augsburg). These paintings have much greater depth than before, with a freer grouping of highly individualized figures—often portraits—in rather lively movement. It has been suggested that this new manner was perhaps inspired by a contact with the early work of Matthias Grünewald in Frankfurt.

In a third and last phase, after 1510, including the St. Catherine Altar (1512; Augsburg), the St. Sebastian Altar (1516; Munich), and the "Fountain of Life" (1519; Lisbon), Holbein began to use Italianate ornament and evolved a compromise between the late Gothic and Renaissance styles similar to that of Gerard David in Bruges. However, he then found himself overshadowed by artists whose grasp of the Italian idiom was sounder than his own. In 1517, having fallen into financial difficulties, Holbein left Augsburg and went to Isenheim.

Holbein's honesty and insight as a portraitist are best seen in his many silverpoint drawings. It is clear that the portraiture of his more famous son must have owed much to his teaching. He also made designs for glass painting, and windows were designed by him in Eichstätt Cathedral (1502) and in the churches of St. Ulrich at Augsburg and St. James at Straubing.

Holbein, Hans, THE YOUNGER (b. 1497/98, Augsburg, Bishopric of Augsburg [Germany]—d. 1543, London, Eng.), German painter, draftsman, and designer renowned for the precise rendering of his drawings and the compelling realism of his portraits, particularly those recording the court of King Henry VIII of England.

Holbein was a member of a family of important artists. His father, Hans Holbein the Elder, and his uncle Sigmund were renowned for their somewhat conservative examples of late Gothic painting in Germany. One of Holbein's brothers, Ambrosius, became a painter as well, but he apparently died about 1519 before reaching maturity as an artist. The Holbein brothers no doubt first studied with their father in Augsburg; they both also began independent work about 1515 in Basel, Switz. It should be noted that this chronology places Holbein firmly in the second generation of 16th-century German artists. Albrecht Dürer, Matthias Grünewald, and Lucas Cranach all were born between 1470 and 1480 and were producing their mature masterpieces by the time Holbein was just beginning his career. Holbein is, in fact, the only truly outstanding German artist of his generation.

Holbein's work in Basel during the decade of 1515–25 was extremely varied, if also sometimes derivative. Trips to northern Italy (*c.* 1517) and France (1524) certainly affected the development of his religious subjects and portraiture, respectively. Holbein entered the painters' corporation in 1519, married a tanner's widow, and became a burgher of Basel in 1520. By 1521 he was executing important mural decorations in the Great Council Chamber of Basel's town hall.

Holbein was associated early on with the Basel publishers and their humanist circle of acquaintances. There he found portrait commissions such as that of the humanist scholar Bonifacius Amerbach (1519; Kunstmuseum, Basel). In this and other early portraits Holbein showed himself a master of the current German portrait idiom, using robust characterization and accessories, strong gaze, and dramatic silhouette. In Basel, Holbein was also active in designing woodcuts for title pages and book illustrations. The artist's most famous work in this area, a series of 41 scenes illustrating the medieval allegorical concept of the "Dance of Death," was designed by him and cut by another artist as early as about 1523 to 1526 but was not published until 1538. Its scenes display an immaculate sense of order, packing much information about the lifestyles and habits of Death's victims into a very small format. In portraiture, too, Holbein's minute sense of observation was soon evident. His first major portrait of Desiderius Erasmus (1523; Louvre, Paris) portrays the Dutch humanist scholar as physically withdrawn from the world, sitting at his desk engaged in his voluminous European correspondence; his hands are as sensitively rendered as his carefully controlled profile.

"Anne of Cleves," portrait by Hans Holbein the Younger, 1539; in the Musée du Louvre, Paris

Giraudon/Art Resource

Protestantism, which had been introduced into Basel as early as 1522, grew considerably in strength and importance there during the ensuing four years. By 1526 severe iconoclastic riots and strict censorship of the press swept over the city. In the face of what, for the moment at least, amounted to a freezing of the arts, Holbein left Basel late in 1526, with a letter of introduction from Erasmus, to travel by way of the Netherlands to England. Though only about 28 years old, he would achieve remarkable success in England. His most impressive works of this time were executed for the statesman and author Sir Thomas More and included a magnificent single portrait of the humanist (1527; Frick Collection, New York City). In this image, the painter's close observation extends to the tiny stubble of More's beard, the iridescent glow of his velvet sleeves, and the abstract decorative effects of the gold chain that he wears. Holbein also completed a life-size group portrait of More's family; this work is now lost, though its appearance is preserved in copies and in preparatory drawing in the Kunstmuseum, Basel. This painting was the first example in northern European art of a large group portrait in which the figures are not shown kneeling—the effect of which is to suggest the individuality of the sitters rather than impiety.

Before Holbein journeyed to England in 1526, he had apparently designed works that were both pro- and anti-Lutheran in character. On returning to Basel in 1528, he was admitted, after some hesitation, to the new—and now official—faith. It would be difficult to interpret this as a very decisive change, for Holbein's most impressive religious works, like his portraits, are brilliant observations of physical reality but seem never to have been inspired by Christian spirituality. This is evident in both the claustrophobic, rotting body of the "Dead Christ in the Tomb" (1521; Kunstmuseum, Basel) and in the beautifully composed "Family of Burgomaster Meyer Adoring the Virgin" (1526; Schlossmuseum, Darmstadt). In this latter painting Holbein skillfully combined a late medieval German compositional format with precise Flemish realism and a monumental Italian treatment of form. Holbein apparently quite voluntarily gave up almost all religious painting after about 1530.

In Basel, from 1528 to 1532, Holbein continued his important work for the town council. He also painted what is perhaps his only psychologically penetrating portrait, that of his wife and two sons (*c.* 1528; Kunstmuseum, Basel). This picture no doubt conveys some of the unhappiness of that abandoned family. In spite of generous offers from Basel, Holbein left his wife and children in that city for a second time, to spend the last 11 years of his life primarily in England.

By 1533 Holbein was already painting court personalities, and four years after that he officially entered the service of King Henry VIII of England. It is estimated that during the last 10 years of his life Holbein executed approximately 150 portraits, life-size and miniature, of royalty and nobility alike. These portraits ranged from a magnificent series depicting German merchants who were working in London to a double portrait of the French ambassadors to Henry VIII's court (1533; National Gallery, London) to portraits of the king himself (1536; Thyssen-Bornemisza Collection, Castagnola, Switz.) and his different wives, Jane Seymour (1536; Kunsthistorisches Museum, Vienna) and Anne of Cleves (Louvre, Paris). In these and other examples, the artist revealed his fascination with plant, animal, and decorative accessories. Holbein's preliminary drawings of his sitters contain detailed notations concerning jewelry and other costume decorations as well. Sometimes such objects point to specific events or concerns in the sitter's life, or act as attributes referring to a sitter's occupation or character. The relation between accessories and face is a charged and stimulating one, avoiding simple correspondence.

In an analogous fashion, Holbein's mature portraits present an intriguing play between surface and depth. The sitter's outlines and position within the frame are carefully calculated, while inscriptions applied on the surface in gold leaf lock the sitter's head into place. Juxtaposed with this finely tuned two-dimensional design are illusionistic miracles of velvet, fur, feathers, needleworks, and leather. Holbein acted not only as a portraitist but also as a fashion designer for the court. The artist made designs for all the state robes of the king; he left, in addition, more than 250 delicate drawings for everything from buttons and buckles to pageant weapons, horse outfittings, and bookbindings for the royal household. This choice of work indicates Holbein's Mannerist concentration on surface texture and detail of design, a concern that in some ways precluded the incorporation of great psychological depth in his portraits. Holbein died in a London plague epidemic in 1543.

Holbein was one of the greatest portraitists and most exquisite draftsmen of all time. It is the artist's record of the court of King Henry VIII of England, as well as the taste that he virtually imposed upon that court, that was his most remarkable achievement.

The fact that Holbein's portraits do not reveal the character or spiritual inclinations of his sitters is perfectly paralleled by knowledge of the artist's life. His biography is basically a recounting of disparate facts; about his personality practically nothing is known. Not one note or letter from his own hand survives. Other men's opinions of him are often equally inscrutable. Erasmus, one of Holbein's most renowned sitters, praised and recommended him on one occasion but scorned the artist as opportunistic at another time. Indeed, Henry VIII, who sent Holbein to the European continent to help select a bride by providing a dependable portrait for his scrutiny, was perhaps the only person who had absolute confidence in Holbein.

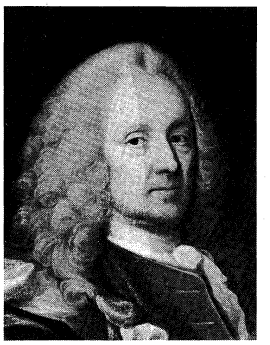
The artist's detachment and his refusal to submit to an authority that might inhibit his own creative (but very worldly) powers enabled him to produce paintings whose beauty and brilliance have never been questioned. Had he been a more devout Christian or more subject to the turmoil of his times, his artistic achievement might have been quite different. In recent times, the lack of spiritual involvement in his work has been consistently noted, especially inasmuch as the 16th century was a time when few artists managed to remain above the religious conflict sweeping Europe. Thus, the effect of Holbein's art has often been felt to be more artistic and external than expressionistic or emotional. Only in that sense, however, is his achievement finally limited.

(C.S.Ha.)

BIBLIOGRAPHY. Exhaustive and still valuable biographies include Alfred Woltmann, *Holbein and His Times* (1872); and Arthur B. Chamberlain, *Hans Holbein the Younger,* 2 vol. (1913). K.T. Parker, *Drawings of Hans Holbein in the Collection of His Majesty the King at Windsor Castle* (1945), is a scholarly account of what is probably the single most important collection of Holbein's mature drawings. Paul Ganz, *The Paintings of Hans Holbein* (1950), is a detailed monograph. John Rowlands, *Holbein: The Paintings of Hans Holbein the Younger* (1985), is complete and up-to-date. Roy Strong, *Holbein and Henry VIII* (1967), examines this important aspect of Holbein's career.

Holberg, Ludvig, FRIHERRE (Baron) HOLBERG (b. Dec. 3, 1684, Bergen, Nor.—d. Jan. 28, 1754, Copenhagen, Den.), the outstanding Scandinavian literary figure of the Enlightenment period, claimed by both Norway and Denmark as one of the founders of their literatures.

Orphaned as a child, Holberg lived with relatives in Bergen until the city was destroyed by fire in 1702, when he was sent to the University of Copenhagen. Longing to see the world, he set out for Holland (1704) after taking his degree, but he fell ill at Aachen and, having few resources, had to make his way back to Norway on foot. After working as a French tutor, he set out again in 1706 for London and Oxford, where he studied for two years, supporting himself by giving lessons on the flute and violin. While there, he must have begun his *Introduction til de fornemste Europæiske rigers historie* ("Introduction to the History of Leading European Nations"), which was not published until 1711, when he was back in Denmark. It led to his receiving a royal grant that permitted him to study and travel.



Holberg, detail of an oil painting after a portrait (destroyed) attributed to Roselius, *c.* 1740–50; in the Kunsthistorisk Pladearkiv, Copenhagen

By courtesy of the Kunsthistorisk Pladearkiv, Copenhagen

Holberg accordingly set out in 1714 and visited, chiefly on foot, many of the great cities of Europe. He returned to Denmark in 1716, where he published a work on natural law and natural rights, *Introduction til naturensog folke-retten.* His pecuniary troubles ended at last in 1717, when he was appointed professor at the University of Copenhagen and in 1720 was promoted to the chair of public eloquence.

Seized with a "poetic fit," Holberg began to create, under the pseudonym Hans Mikkelsen, an entirely new class of humorous literature. The serio-comic epic *Peder Paars,* the earliest classic of the Danish language, appeared in 1719. In 1722 the first Danish-language theatre was opened in Copenhagen, and Holberg began to produce, with astonishing rapidity, the steady flow of comedies that resulted in his being called the "Molière of the North." Their freshness is such that many are still performed on the Danish stage. Among the best are *Den politiske kandestøber* ("The Political Tinker"), *Den Vaegelsindede* ("The Waverer"), *Jean de France, Jeppe på bjerget* ("Jeppe of the Hill"), *Ulysses von Ithacia, Den Stundeslöse* ("The Fidget"), and *Erasmus Montanus.* These plays' characters are often stock types, based on the Miles Gloriosus (braggart soldier) of Plautus or on the cuckold Sganarelle of Molière, but the manners are Danish, and the targets of his satire are both contemporary and universal. A favourite target was the pretensions, jargon, and pedantry of the learned. For the theatre's last performance in 1727 (it closed for lack of funds), Holberg wrote a "Funeral of Danish Comedy." In 1731 he published his performed comedies and five additional plays and closed his career as a dramatic poet.

Thereafter, he turned to other forms of writing, notably an imaginary voyage in the satirical novel *Nicolai Klimii Iter Subterraneum* (1741; *The Journey of Niels Klim to the World Underground*). In 1747 he was created baron Holberg.

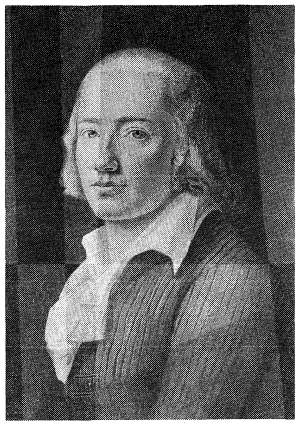
Holcroft, Thomas (b. Dec. 10, 1745, London, Eng.—d. March 23, 1809, London), English dramatist, novelist, journalist, and actor.

The son of a peddler, Holcroft worked as a stableboy, cobbler, and teacher before he was able to make his living as a writer. He is remembered for his melodrama *The Road to Ruin* (performed 1792, often revived); his translation of Beaumarchais's play *Le Mariage de Figaro* (Paris, 1784) under the title *The Follies of a Day* (performed 1784), in which Holcroft played the part of Figaro; and his autobiography, edited in 1816 by his friend William Hazlitt. This autobiography tells the story of a life of struggle against adversity and reveals the gentleness and humour that won him the friendship of such leading early Romantic writers as Samuel Taylor Coleridge, Charles Lamb, William Hazlitt, and William Godwin.

Holder, Alfred Theophil (b. April 4, 1840, Vienna, Austria—d. Jan. 12, 1916, Karlsruhe, Ger.), Austrian-born language scholar of astonishing productivity in classical and medieval Latin, Germanic, and Celtic studies who produced the monumental *Altceltischer Sprachschatz,* 3 vol. (1891–1913; "Old Celtic Vocabulary").

One of Holder's first major efforts was a two-volume edition of Horace (1864–69), prepared in collaboration with the German classical scholar Otto Keller. The chief librarian of the court and national library in Karlsruhe (1870–1916), he worked in four main fields of research. His editions of Latin authors include Tacitus (1882), Julius Caesar (1882, 1898), Avienus (1887), and works of Cicero, Seneca, and later writers. From ancient Greek and Roman works he assembled the highly useful compilation of Celtic names and glosses in his *Sprachschatz.* His Germanic research produced *Germanische Alterthümer* (1873; "Germanic Antiquities"), part of a grammar of Old German, and editions of many texts, including *Beowulf* (1882–84), Saxo Grammaticus (1886), and Bede (1890). His medieval Latin studies resulted in the catalog *Die Reichenauer Handschriften,* 3 vol. (1906–18; "The Reichenau Manuscripts").

Hölderlin, (Johann Christian) Friedrich (b. March 20, 1770, Lauffen am Neckar, Württemberg—d. June 7, 1843, Tübingen), German lyric poet who succeeded in naturalizing the forms of classical Greek verse in German and in melding Christian and classical themes.



Hölderlin, pastel by Franz Karl Hiemer, 1792; in the Schiller-Nationalmuseum, Marbach, Ger.

By courtesy of the Schiller-Nationalmuseum, Marbach, Ger.

Hölderlin was born in a little Swabian town on the River Neckar. His father died in 1772, and two years afterward his mother married the burgomaster of the town of Nürtingen, where Friedrich attended school. But his mother was again widowed, in 1779, and left alone to bring up her family—which included Friedrich, his sister Heinrike, and his half-brother Karl. His mother, a parson's daughter, and a woman of simple and rather narrow piety, wanted Friedrich to enter the service of the church. Candidates for the ministry received free education—a chance not to be missed by a gifted but impecunious boy—and accordingly he was sent first to the "monastery schools" (so called since pre-Reformation times) at Denkendorf and Maulbronn and subsequently (1788–93) to the theological seminary in the University of Tübingen, where he obtained his master's degree and qualified for ordination.

Hölderlin could not, however, bring himself to enter the ministry for which he had studied. Contemporary Protestant theology, an uneasy compromise between faith and reason, offered him no safe spiritual anchorage, while acceptance of Christian dogma was not wholly compatible with his devotion to Greek mythology, which made him see the gods of Greece as real living forces whose presence manifests itself to men in sun and earth, sea and sky. The strain of divided allegiance remained a permanent condition of his existence. Although he did not feel called to be a Lutheran pastor, Hölderlin did have a strong sense of religious vocation; for him, being a poet meant exercising the priestly function of mediator between gods and men.

In 1793 Hölderlin was introduced to Friedrich Schiller, and it was through Schiller's recommendation that he obtained the first of several posts as a tutor (in most of which he failed to give satisfaction). Schiller befriended the younger man in other ways too; in his periodical *Neue Thalia,* he published some of the poetry that Hölderlin had begun to write, as well as a fragment of his novel *Hyperion.* This elegiac story of a disillusioned fighter for the liberation of Greece remained unfinished. Hölderlin held Schiller in great reverence; he saw him again when in 1794 he left his tutor's post in order to move to Jena. His early poems clearly reveal Schiller's influence, and several of them acclaim the new world the French Revolution had seemed to promise in its early stages: they include hymns to freedom, to humanity, to harmony, to friendship, and to nature.

In December 1795 poverty forced Hölderlin to take a post in the house of J.F. Gontard, a wealthy Frankfurt banker. Before long, the susceptible young tutor was deeply in love with his employer's wife, Susette, a woman of great beauty and sensibility, and his affection was returned. In a letter to his friend C.L. Neuffer (February 1797), he described their relationship as "an everlasting happy sacred friendship with a being who has really strayed into this miserable century." Susette appears in his poems and in his novel *Hyperion,* the second volume of which appeared in 1799, under the Greek name of "Diotima"—a reincarnation of the spirit of ancient Greece. Their happiness was short-lived; after a painful scene with Susette's husband, Hölderlin had to leave Frankfurt (September 1798).

Though physically and mentally shaken, he finished the second volume of *Hyperion* and began a tragedy, *Der Tod des Empedokles* (*The Death of Empedocles*), the first version of which he nearly completed; fragments of a second and a third version have also survived. Symptoms of great nervous irritability alarmed his family and friends. Nevertheless, the years 1798–1801 were a period of intense creativity; in addition to a number of noble odes, they produced the great elegies "Menons Klagen um Diotima" ("Menon's Lament for Diotima") and "Brot und Wein" ("Bread and Wine"). In January 1801 he went to Switzerland as tutor to a family in Hauptwyl. His employer, however, found himself obliged to make other arrangements, and Hölderlin returned home in April of the same year.

After vainly attempting to obtain a lectureship in Greek literature at Jena through the influence of Schiller, he once more accepted a post as tutor, this time at Bordeaux, in France. Susette Gontard died in June 1802; in the same summer, Hölderlin suddenly left Bordeaux and travelled homeward on foot through France, arriving at Nürtingen completely destitute and mentally deranged, in an advanced stage of schizophrenia. He seemed to recover somewhat as a result of the kind and gentle treatment he received at home. The poems of the period 1802–06, including "Friedensfeier" ("Celebration of Peace"), "Der Einzige" ("The Only One"), and "Patmos," products of a mind on the verge of madness, are apocalyptic visions of unique grandeur. He also completed verse translations of Sophocles' *Antigone* and *Oedipus Tyrannus,* published in 1804. In this year a devoted friend, Isaak von Sinclair, obtained for him the sinecure post of librarian to the landgrave Frederick V of Hesse-Homburg. Sinclair himself provided a modest salary, and Hölderlin improved noticeably under his care and companionship. In 1805 Sinclair (who refused to believe that Hölderlin was insane) was falsely accused of subversive activities and held in custody for five months. By the time he was released, Hölderlin had succumbed irretrievably and, after a spell in a clinic in Tübingen, was moved to a carpenter's house, where he died, having passed the last 36 years of his life under the shadow of insanity.

Two years before he became mentally unbalanced, Hölderlin had summed up his destiny in the concluding lines of his ode "Die Heimat" ("Home"):

> For they who lend us the heavenly fire, the Gods, give us sacred sorrow too. Let it be so. A son of earth I seem; born to love and to suffer.

Hölderlin gained little recognition during his lifetime and was almost totally forgotten for nearly 100 years. It was not until the early years of the 20th century that he was rediscovered in Germany and that his reputation as one of the outstanding lyric poets in the German language was established in Europe. Today he is ranked among the greatest of German poets, especially admired for his uniquely expressive style: like no one before or since, he succeeded in naturalizing the forms of classical Greek verse in the German language. With passionate intensity he strove to reconcile the Christian faith with the religious spirit and beliefs of ancient Greece; he was a prophet of spiritual renewal, of "the return of the gods"—utterly dedicated to his art, hypersensitive, and therefore exceptionally vulnerable. In the end his mind gave way under the strains and frustrations of his existence. (W.Wi.)

MAJOR WORKS. *Hyperion, oder der Eremit in Griechenland,* vol. 1 (1797), vol. 2 (1799), epistolary novel; verse translations of Sophocles' *Antigone* and *Oedipus Tyrannus* (1804). *Hyperion* and the translations were the only works published in book form before the onset of Hölderlin's madness. Several editions of selected poems were published in the 19th century, the first in 1826 (edited by L. Uhland and G. Schwab), but it was not until the 1920s that a reliable and comprehensive edition was available. Among his best known poems are: (written before 1802) "Der Mensch," "Hyperions Schicksaalslied," "An die Parzen," "An die Hoffnung," "Brot und Wein"; (written between 1802 and 1806) "Hälfte des Lebens," "Der blinde Sänger," "Germanien," "Der Rhein," "Der Einzige," and "Patmos."

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The major modern edition of Hölderlin's works is *Sämtliche Werke,* ed. by Friedrich Beissner (vol. 1–5, 1946–52) and Adolf Beck (vol. 6–7: the Letters, 1954–). Beissner has also edited a plain text of the complete works in one volume (1964). There is a one-volume collection of Hölderlin's letters, ed. by Ernst Bertram (1935). The poems of Hölderlin's maturity, together with the second and third fragmentary versions of his drama *Der Tod des Empedokles,* have been trans. by Michael Hamburger: *Friedrich Hölderlin: Poems and Fragments,* bilingual edition (1966). A translation of *Selected Poems* was published in 1944 (2nd ed., 1954) by J.B. Leishman. *Hyperion* has been translated by W.R. Trask (1965).

There are several biographical and critical studies in English: Ronald Peacock, *Hölderlin* (1938); Agnes Stanfield, *Hölderlin* (1944); and L.S. Salzberger, *Hölderlin* (1952). Important aspects of Hölderlin's art are discussed by E.L. Stahl in *Hölderlin's Symbolism* (1945); and in "Hölderlin's Idea of Poetry," in *The Era of Goethe* (1959). Wilhelm Dilthey's essay on Hölderlin in *Das Erlebnis und die Dichtung* (1906) remains a classic. A number of illuminating studies by various hands are gathered together in *Über Hölderlin,* ed. by J. Schmidt (1970). Alessandro Pellegrini has written a detailed history of Hölderlin criticism: *Friedrich Hölderlin: Sein Bild in der Forschung* (1965). Richard Unger studies All-Unity as a dominant aspect of Hölderlin's poetry in *Hölderlin's Major Poetry: The Dialectics of Unity* (1976).

List of Abbreviations

A.B.	bachelor of arts (Latin *artium baccalaureus*)
ac	acre(s)
Ac	actinium
AC	alternating current
A.C.T.	Australian Capital Territory
AD	in the year of the Lord (Latin *anno Domini*)
Adm.	Admiral
Afg.	Afghanistan
Ag	silver (Latin *argentum*)
AG	Limited-liability Company (German *Aktiengesellschaft*)
AH	in the year of the hijrah (hegira), or Muslim era (Latin *anno Hegirae*)
Al	aluminum, aluminium
Ala.	Alabama
Alb.	Albania
Alg.	Algeria
Alta.	Alberta
Am	americium
AM	before noon (Latin *ante meridiem*)
AM	amplitude modulation
A.M.	master of arts (Latin *artium magister*)
Ar	argon
Arg.	Argentina
Ariz.	Arizona
Ark.	Arkansas
As	arsenic
A.S.S.R.	Autonomous Soviet Socialist Republic
At	astatine
Au	gold (Latin *aurum*)
Aug.	August
b.	born
B	boron
Ba	barium
B.A.	bachelor of arts
BC	before Christ
B.C.	British Columbia
BCE	before the Christian era, or Common Era
Be	beryllium
B.Ed.	bachelor of education
Belg.	Belgium
Bi	bismuth
Bk	berkelium
Bol.	Bolivia
BP	before the present
B.Ph.	bachelor of philosophy
Br	bromine
Braz.	Brazil
Brig.	Brigadier
Brit.	British
B.S.	bachelor of science
B.Sc.	bachelor of science
Bulg.	Bulgaria
c.	about, approximately (Latin *circa*)
C	carbon; Celsius
Ca	calcium
Calif.	California
Can.	Canada
Capt.	Captain
Cb	columbium
C.B.	Companion of the Order of the Bath
C.B.E.	Companion of the Order of the British Empire
Cd	cadmium
Ce	cerium
CE	Christian era, Common Era
cf.	compare (Latin *confer*)
Cf	californium
cg	centigram(s)
ch.	chapter
C.H.	Member of the Order of Companions of Honour
Chron.	Chronicles (Bible)
Cia.	Company (Italian *Compagnia;* Portuguese *Companhia;* Spanish *Compañia*)
Cie.	Company (French *Compagnie*)
cl	centilitre(s)
Cl	chlorine
cm	centimetre(s)
Cm	curium
C.M.G.	Companion of the Order of St. Michael and St. George
CMSA	consolidated metropolitan statistical area
Co	cobalt
Co.	Company
Col.	Colonel; Colossians (Bible)
Colo.	Colorado
Colom.	Colombia
Comdr.	Commander
Comdt.	Commandant
Commo.	Commodore
Conn.	Connecticut
Cor.	Corinthians (Bible)
Corp.	Corporation
cos	cosine
cot	cotangent
Cr	chromium
Cs	cesium
csc	cosecant
cu	cubic
Cu	copper (Latin *cuprum*)
C.V.O.	Commander of the Royal Victorian Order
Czech.	Czechoslovakia
d.	died
Dan.	Daniel (Bible)
D.B.E.	Dame Commander of the Order of the British Empire
DC	direct current
D.C.	District of Columbia
D.C.M.G.	Dame Commander of the Order of St. Michael and St. George
D.C.V.O.	Dame Commander of the Royal Victorian Order
D.D.	doctor of divinity
Dec.	December
Del.	Delaware
Den.	Denmark
Deut.	Deuteronomy (Bible)
D.F.	Federal District (Spanish *Distrito Federal*)
D.Litt.	doctor of letters (Latin *doctor litterarum*)
Dom.Rep.	Dominican Republic
Dr.	Doctor
Dy	dysprosium
E	east
Eccles.	Ecclesiastes (Bible)
ed.	edited; edition; editor
Ed.B.	bachelor of education
eds.	editors
e.g.	for example (Latin *exempli gratia*)
E.Ger.	East Germany
Eng.	England; English
Eph.	Ephesians (Bible)
Er	erbium
Es	einsteinium
est.	estimate; estimated
Esth.	Esther (Bible)
et al.	and others (Latin *et alii,* or *aliae*)
et seq.	and following page(s) (Latin *et sequens, sequentes,* or *sequentia*)
etc.	and so forth (Latin *et cetera*)
Eth.	Ethiopia
Eu	europium
Ex.	Exodus (Bible)
Ezek.	Ezekiel (Bible)
F	Fahrenheit; fluorine
Fe	iron (Latin *ferrum*)
Feb.	February
ff.	and following pages
Fig.	Figure
Fin.	Finland
fl.	flourished (Latin *floruit*)
Fla.	Florida
Fm	fermium
FM	frequency modulation
Fr	francium
Fr.	France
ft	foot, feet
Ft.	Fort
g	gram(s)
Ga	gallium
Ga.	Georgia
gal	gallon(s)
Gal.	Galatians (Bible)
G.B.E.	Knight (or Dame) Grand Cross of the Order of the British Empire
G.C.B.	Knight (or Dame) Grand Cross of the Order of the Bath
G.C.M.G.	Knight (or Dame) Grand Cross of the Order of St. Michael and St. George
G.C.V.O.	Knight (or Dame) Grand Cross of the Royal Victorian Order
Gd	gadolinium
Ge	germanium
Gen.	General; Genesis (Bible)
Ger.	Germany
GmbH	Company with Limited Liability (German *Gesellschaft mit beschränkter Haftung*)
Guat.	Guatemala
h	hour
H	hydrogen
ha	hectare(s)
Ha	hahnium
Hab.	Habakkuk (Bible)
Hag.	Haggai (Bible)
He	helium
Heb.	Hebrews (Bible)
Hf	hafnium
Hg	mercury (Latin *hydrargyrum*)
HMS	His, or Her, Majesty's Ship, or Service
HMSO	His, or Her, Majesty's Stationery Office
Ho	holmium
Hos.	Hosea (Bible)
hr	hour(s)
Hung.	Hungary
I	iodine
ibid.	in the same place (Latin *ibidem*)
Ice.	Iceland
i.e.	that is (Latin *id est*)
Ill.	Illinois
in.	inch(es)
In	indium
Inc.	Incorporated
Ind.	Indiana
Indon.	Indonesia
Ir	iridium
Ire.	Ireland
Isa.	Isaiah (Bible)
Jam.	Jamaica
Jan.	January
Jer.	Jeremiah (Bible)
Josh.	Joshua (Bible)
Jr.	Junior
Judg.	Judges (Bible)
K	Kelvin; potassium (Latin *kalium*); Köchel catalog number
Kan.	Kansas
K.B.E.	Knight Commander of the Order of the British Empire
K.C.B.	Knight Commander of the Order of the Bath
K.C.M.G.	Knight Commander of the Order of St. Michael and St. George
K.C.V.O.	Knight Commander of the Royal Victorian Order
kg	kilogram(s)
KG	Limited Partnership (German *Kommandit Gesellschaft*)
K.G.	Knight of the Order of the Garter
KK	Limited-liability Company (Japanese *Kabushiki Kaisha*)
kl	kilolitre(s)
km	kilometre(s)
kph	kilometre(s) per hour
Kr	krypton
K.T.	Knight of the Order of the Thistle
Ky.	Kentucky
l	litre(s)
La	lanthanum
La.	Louisiana
Lam.	Lamentations (Bible)
lb	pound(s)
Lev.	Leviticus (Bible)
Li	lithium
Liech.	Liechtenstein
Lieut.	Lieutenant
LL.B.	bachelor of laws (Latin *legum baccalaureus*)
LL.D.	doctor of laws (Latin *legum doctor*)
log	logarithm
Lr	lawrencium
Ltd.	Limited
Lu	lutetium
Luxem.	Luxembourg
m	metre(s)
M.A.	master of arts
Maj.	Major
Mal.	Malachi (Bible)
Man.	Manitoba
Mass.	Massachusetts
Matt.	Matthew (Bible)
M.B.E.	Member of the Order of the British Empire
mbH	Limited, with Limited Liability (German *mit beschränkter Haftung*)
Md	mendelevium
Md.	Maryland
M.D.	doctor of medicine (Latin *medicinae doctor*)
Mex.	Mexico
mg	milligram(s)
Mg	magnesium
mi	mile(s)
Mic.	Micah (Bible)
Mich.	Michigan
Mij	Company (Dutch *Maatschappij*)
min	minute(s)
Minn.	Minnesota
Miss.	Mississippi
ml	millilitre(s)
Mlle	Mademoiselle
mm	millimetre(s)
Mme	Madame
Mn	manganese
Mo	molybdenum
Mo.	Missouri
Mong.	Mongolia
Mont.	Montana
Mor.	Morocco
MP	member of Parliament
mph	mile(s) per hour
Mr.	Mister
Mrs.	"Missus"
MS.	manuscript
M.S.	master of science
MSA	metropolitan statistical area
M.Sc.	master of science

Msgr.	Monsignor
MSS.	manuscripts
Mt.	Mount; Mountain(s)
mun.	municipality
MV	Motor Vessel
M.V.O.	Member of the Royal Victorian Order
N	nitrogen; north
Na	sodium (Latin *natrium*)
NA	National Association
Nah.	Nahum (Bible)
Nb	niobium
N.B.	New Brunswick
N.C.	North Carolina
n.d.	no date
Nd	neodymium
N.D.	North Dakota
Ne	neon
NE	northeast
Neb.	Nebraska
Neh.	Nehemiah (Bible)
Neth.	The Netherlands
Nev.	Nevada
Nfd.	Newfoundland
N.H.	New Hampshire
Ni	nickel
Nic.	Nicaragua
N.Ire.	Northern Ireland
N.J.	New Jersey
N.Kor.	North Korea
N.M.	New Mexico
no.	number
No	nobelium
Nor.	Norway
Nov.	November
Np	neptunium
NS	Nuclear Ship
N.S.	New Style (calendar); Nova Scotia
N.S.W.	New South Wales
N.Terr.	Northern Territory
Num.	Numbers (Bible)
NV	Limited-liability Company (Dutch *Naamloze Vennootschap*)
NW	northwest
N.W.Terr.	Northwest Territories
N.Y.	New York
N.Z.	New Zealand
O	oxygen
Obad.	Obadiah (Bible)
O.B.E.	Officer of the Order of the British Empire
Oct.	October
Okla.	Oklahoma
Ont.	Ontario
op.	opus
op. cit.	in the work cited (Latin *opere citato*, or *opus citato*)
Ore.	Oregon
Os	osmium
O.S.	Old Style (calendar)
oz	ounce(s)
p.	page
P	phosphorus
pA	Limited (Italian *per Azioni*)
Pa	protactinium
Pa.	Pennsylvania
Pak.	Pakistan
Pan.	Panama
Pb	lead (Latin *plumbum*)
Pd	palladium
P.E.I.	Prince Edward Island
Pet.	Peter (Bible)
pH	potential of hydrogen (acidity–alkalinity factor)
Ph.B.	bachelor of philosophy (Latin *philosophiae baccalaureus*)
Ph.D.	doctor of philosophy (Latin *philosophiae doctor*)
Phil.	Philippians (Bible); Philippines
Philem.	Philemon (Bible)
PLC	Public Limited Company
Pm	promethium
PM	afternoon (Latin *post meridiem*)
PMSA	primary metropolitan statistical area
Po	polonium
Pol.	Poland
pop.	population
Port.	Portugal
pp.	pages
Pr	praseodymium
P.R.	Puerto Rico
prelim.	preliminary
Pres.	President
Prov.	Proverbs (Bible)
Ps.	Psalms (Bible)
Pt	platinum
Pu	plutonium
qq.v.	which see (plural; Latin *quae vide*)
Que.	Quebec
Queen.	Queensland
q.v.	which see (singular; Latin *quod vide*)
R	Rankine
Ra	radium
Rb	rubidium
Re	rhenium
rev.	revised; revision
Rev.	Revelations (Bible); Reverend
Rf	rutherfordium
Rh	rhodium
R.I.	Rhode Island
Rn	radon
Rom.	Romania; Romans (Bible)
rpm	revolutions per minute
Rt. Rev.	Right Reverend
Ru	ruthenium
s	second
S	south; sulfur
S.	Saint (*san, santo, santa, sant'*)
S. of Sol.	Song of Solomon (Bible)
SA	Limited-liability Company (French *Société Anonyme;* Italian *Società Anònima;* Portuguese *Sociedade Anónima;* Spanish *Sociedad Anónima*)
S.Af.	South Africa
Sam.	Samuel (Bible)
Sask.	Saskatchewan
S.Aus.	South Australia
Sb	antimony (Latin *stibium*)
Sc	scandium
S.C.	South Carolina
Scot.	Scotland
SCSA	standard consolidated statistical area
S.D.	South Dakota
Se	selenium
SE	southeast
sec	secant; second(s)
Sept.	September
S.F.S.R.	Soviet Federated Socialist Republic
Si	silicon
sin	sine
S.Kor.	South Korea
Sm	samarium
SMSA	standard metropolitan statistical area
Sn	tin (Latin *stannum*)
SpA	Limited-liability Company (Italian *Società per Azioni*)
sq	square
Sr	strontium
Sr.	Senior
SS	Steamship
SS.	Saints; Saintliest, or Holiest (Italian *Santissimo, Santissima*)
S.S.R.	Soviet Socialist Republic
St.	Saint (*Sankt, Sint*)
Sta.	Saint (*Santa*)
Ste.	Saint (*Sainte*)
SW	southwest
Swed.	Sweden
Switz.	Switzerland
Ta	tantalum
tan	tangent
Tanz.	Tanzania
Tas.	Tasmania
Tb	terbium
Tc	technetium
Te	tellurium
Tenn.	Tennessee
Th	thorium
Thai.	Thailand
Thess.	Thessalonians (Bible)
Ti	titanium
Tim.	Timothy (Bible)
Tit.	Titus (Bible)
Tl	thallium
Tm	thulium
trans.	translated; translation; translator(s)
Tun.	Tunisia
Tur.	Turkey
U	uranium
U.A.E.	United Arab Emirates
U.A.R.	United Arab Republic
U.K.	United Kingdom
UN	United Nations
U.S.	United States
USGPO	United States Government Printing Office
USS	United States Ship
U.S.S.R.	Union of Soviet Socialist Republics
v.	versus (law)
V	vanadium
Va.	Virginia
Venez.	Venezuela
Vic.	Victoria
Vir.Is.	Virgin Islands
vol.	volume(s)
Vt.	Vermont
W	tungsten (wolfram); west
Wash.	Washington
W.Aus.	Western Australia
W.Ger.	West Germany
Wis.	Wisconsin
W.Va.	West Virginia
Wyo.	Wyoming
Xe	Xenon
Y	yttrium
Yb	ytterbium
yd	yard(s)
Yugos.	Yugoslavia
Zech.	Zechariah (Bible)
Zeph.	Zephaniah (Bible)
Zimb.	Zimbabwe
Zn	zinc
Zr	zirconium

Table of Measurement Conversions

To convert	Into	Multiply by
acres	hectares	0.40468564
Celsius (centigrade)	Fahrenheit	(C° × 9/5) + 32
centimetres	inches	0.3937008
cubic feet	cubic metres	0.028316847
cubic metres	cubic feet	35.31467
Fahrenheit	Celsius (centigrade)	5/9(F° − 32)
feet	metres	0.3048
gallons (U.S. liquid)	litres	3.785412
grams	ounces (troy)	0.032150747
hectares	acres	2.471054
inches	centimetres	2.54
inches	millimetres	25.4
kilograms	pounds	2.2046226
kilometres	miles (nautical)	0.5399568
kilometres	miles (statute)	0.6213712
litres	gallons (U.S. liquid)	0.26417205
metres	feet	3.2808399
metres	yards	1.093613298
miles (nautical)	kilometres	1.852
miles (statute)	kilometres	1.609344
millilitres	ounces (U.S. fluid)	0.03381402
millimetres	inches	0.03937008
newtons	pounds (of force)	0.224809
ounces (troy)	grams	31.1034768
ounces (U.S. fluid)	millilitres	29.57353
pounds	kilograms	0.45359237
pounds (of force)	newtons	4.44822
square kilometres	square miles	0.38610216
square miles	square kilometres	2.58998811
yards	metres	0.9144